8.0

# *IBM MQ Developing Applications Reference*

**Note**

Before using this information and the product it supports, read the information in “Notices” on page 2003.

This edition applies to version 8 release 0 of IBM® MQ and to all subsequent releases and modifications until otherwise indicated in new editions.

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# Developing applications reference

Use the links provided in this section to help you develop your IBM MQ applications.

- “MQI applications reference” on page 7
- “User exits, API exits, and installable services reference” on page 1477
- IBM i “IBM i Application Programming Reference (ILE/RPG)” on page 967
- “SOAP reference” on page 1422
- “Reference material for IBM MQ bridge for HTTP” on page 1742
- “The IBM MQ .NET classes and interfaces” on page 1777
- “IBM MQ C++ classes” on page 1839
- The IBM MQ classes for Java libraries
- IBM MQ classes for JMS

**Related tasks**

Developing applications

# MQI applications reference

Use the links provided in this section to help you develop your Message Queue Interface (MQI) applications.

- “Code examples” on page 8
- “Constants” on page 61
- “Data types used in the MQI” on page 232
- “Function calls” on page 605
- “Attributes of objects” on page 776
- “Return codes” on page 847
- “Rules for validating MQI options” on page 848
- “Machine encodings” on page 872
- “Report options and message flags” on page 875
- “Data-conversion exit” on page 879
- “Properties specified as MQRFH2 elements” on page 902
- “Code page conversion” on page 910

**Related concepts**

“User exits, API exits, and installable services reference” on page 1477
Use the links provided in this section to help you develop your User exits, API exits, and installable services applications:

**Related tasks**

Developing applications

**Related reference**

“SOAP reference” on page 1422
IBM MQ transport for SOAP reference information arranged alphabetically.

“Reference material for IBM MQ bridge for HTTP” on page 1742
Reference topics for IBM MQ bridge for HTTP, arranged alphabetically

“The IBM MQ .NET classes and interfaces” on page 1777

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IBM MQ .NET classes and interfaces are listed alphabetically. The properties, methods and constructors are described.

"IBM MQ C++ classes" on page 1839
The IBM MQ C++ classes encapsulate the IBM MQ Message Queue Interface (MQI). There is a single C++ header file, **imqi.hpp**, which covers all of these classes.

The IBM MQ Classes for Java libraries

**Related information**

../com.ibm.mq.javadoc.doc/WMQJMSClasses/index.html

# Code examples

Use the reference information in this section to accomplish the tasks that address your business needs.

## C language examples

This collection of topics is mostly taken from the IBM MQ for z/OS sample applications. They are applicable to all platforms, except where noted.

### *Connecting to a queue manager*

This example demonstrates how to use the MQCONN call to connect a program to a queue manager in z/OS batch.

This extract is taken from the Browse sample application (program CSQ4BCA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
#include <cmqc.h>
.
.
.
static char Parm1[MQ_Q_MGR_NAME_LENGTH] ;

int  main(int argc, char *argv[] )
   {
   /*                                                  */
   /*     Variables for MQ calls                       */
   /*                                                  */
   MQHCONN Hconn;      /* Connection handle            */
   MQLONG  CompCode;   /* Completion code              */
   MQLONG  Reason;     /* Qualifying reason            */

   /* Copy the queue manager name, passed in the       */
   /* parm field, to Parm1                             */
   strncpy(Parm1,argv[1],MQ_Q_MGR_NAME_LENGTH);

   /*                                                  */
   /* Connect to the specified queue manager.          */
   /*   Test the output of the connect call.  If the   */
   /*   call fails, print an error message showing the */
   /*   completion code and reason code, then leave the*/
   /*   program.                                       */
   /*                                                  */
   MQCONN(Parm1,
          &Hconn,
          &CompCode,
          &Reason);
   if ((CompCode != MQCC_OK) | (Reason != MQRC_NONE))
      {
      sprintf(pBuff, MESSAGE_4_E,
              ERROR_IN_MQCONN, CompCode, Reason);
      PrintLine(pBuff);
      RetCode = CSQ4_ERROR;
      goto AbnormalExit2;
      }
      .
      .
      .
}
```

### *Disconnecting from a queue manager*

This example demonstrates how to use the MQDISC call to disconnect a program from a queue manager in z/OS batch.

The variables used in this code extract are those that were set in "Connecting to a queue manager" on page 8. This extract is taken from the Browse sample application (program CSQ4BCA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
   /*                                                  */
   /*   Disconnect from the queue manager.  Test the   */
   /*   output of the disconnect call.  If the call    */
   /*   fails, print an error message showing the      */
   /*   completion code and reason code.               */
   /*                                                  */
   MQDISC(&Hconn,
          &CompCode,
          &Reason);
   if ((CompCode != MQCC_OK) || (Reason != MQRC_NONE))
      {
      sprintf(pBuff, MESSAGE_4_E,
              ERROR_IN_MQDISC, CompCode, Reason);
      PrintLine(pBuff);
      RetCode = CSQ4_ERROR;
      }
⋮
```

### *Creating a dynamic queue*

This example demonstrates how to use the MQOPEN call to create a dynamic queue.

This extract is taken from the Mail Manager sample application (program CSQ4TCD1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
MQLONG  HCONN = 0;   /* Connection handle      */
MQHOBJ  HOBJ;        /* MailQ Object handle    */
MQHOBJ  HobjTempQ;   /* TempQ Object Handle    */
MQLONG  CompCode;    /* Completion code        */
MQLONG  Reason;      /* Qualifying reason      */
MQOD    ObjDesc = {MQOD_DEFAULT};
                     /* Object descriptor      */
MQLONG  OpenOptions; /* Options control MQOPEN */

   /*---------------------------------------- */
   /* Initialize the Object Descriptor (MQOD)  */
   /* control block.  (The remaining fields    */
   /* are already initialized.)                */
   /*----------------------------------------*/
   strncpy( ObjDesc.ObjectName,
            SYSTEM_REPLY_MODEL,
            MQ_Q_NAME_LENGTH );
   strncpy( ObjDesc.DynamicQName,
            SYSTEM_REPLY_INITIAL,
            MQ_Q_NAME_LENGTH );
   OpenOptions = MQOO_INPUT_AS_Q_DEF;
   /*----------------------------------------*/
   /* Open the model queue and, therefore,     */
   /* create and open a temporary dynamic      */
   /* queue                                    */
   /*----------------------------------------*/
   MQOPEN( HCONN,
           &ObjDesc,
           OpenOptions,
           &HobjTempQ,
           &CompCode,
           &Reason );
   if ( CompCode == MQCC_OK ) {

   }
   else {
      /*---------------------------------------*/
```

```
      /* Build an error message to report the  */
      /* failure of the opening of the model   */
      /* queue                                 */
      /*---------------------------------------*/
      MQMErrorHandling( "OPEN TEMPQ", CompCode,
                        Reason );
      ErrorFound = TRUE;
   }
   return ErrorFound;
}
.
```

### *Opening an existing queue*

This example demonstrates how to use the MQOPEN call to open a queue that has already been defined.

This extract is taken from the Browse sample application (program CSQ4BCA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
#include <cmqc.h>
.
static char Parm1[MQ_Q_MGR_NAME_LENGTH];
.
int  main(int argc, char *argv[] )
   {
   /*
   /*     Variables for MQ calls                         */
   /*
   MQHCONN Hconn ;            /* Connection handle       */
   MQLONG  CompCode;          /* Completion code         */
   MQLONG  Reason;            /* Qualifying reason       */
   MQOD    ObjDesc = { MQOD_DEFAULT };
                              /* Object descriptor       */
   MQLONG  OpenOptions;       /* Options that control    */
                              /*  the MQOPEN call        */
   MQHOBJ  Hobj;              /* Object handle           */
   .
   /*  Copy the queue name, passed in the parm field,    */
   /*  to Parm2 strncpy(Parm2,argv[2],         */
   /*  MQ_Q_NAME_LENGTH);                                */
   .
   /*                                                    */
   /*  Initialize the object descriptor (MQOD) control   */
   /*  block.  (The initialization default sets StrucId, */
   /*  Version, ObjectType, ObjectQMgrName,              */
   /*  DynamicQName, and AlternateUserid fields)         */
   /*                                                    */
   strncpy(ObjDesc.ObjectName,Parm2,MQ_Q_NAME_LENGTH);
   .
   /*  Initialize the other fields required for the open */
   /*  call (Hobj is set by the MQCONN call).            */
   /*                                                    */
   OpenOptions  = MQOO_BROWSE;
   .
   /*                                                    */
   /* Open the queue.                                    */
   /*   Test the output of the open call.  If the call   */
   /*   fails, print an error message showing the        */
   /*   completion code and reason code, then bypass     */
   /*   processing, disconnect and leave the program.    */
   /*                                                    */
   MQOPEN(Hconn,
          &ObjDesc,
          OpenOptions,
          &Hobj,
          &CompCode,
          &Reason);
```

```
   if ((CompCode != MQCC_OK) || (Reason != MQRC_NONE))
      {
      sprintf(pBuff, MESSAGE_4_E,
              ERROR_IN_MQOPEN, CompCode, Reason);
      PrintLine(pBuff);
      RetCode = CSQ4_ERROR;
      goto AbnormalExit1;       /* disconnect processing */
```

```
      }
   .
   .
   } /* end of main */
```

### *Closing a queue*

This example demonstrates how to use the MQCLOSE call to close a queue.

This extract is taken from the Browse sample application (program CSQ4BCA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
.
   /*                                                  */
   /*   Close the queue.                               */
   /*   Test the output of the close call.  If the call  */
   /*   fails, print an error message showing the        */
   /*   completion code and reason code.               */
   /*                                                  */
   MQCLOSE(Hconn,
           &Hobj,
           MQCO_NONE,
           &CompCode,
           &Reason);
   if ((CompCode != MQCC_OK) || (Reason != MQRC_NONE))
      {
      sprintf(pBuff, MESSAGE_4_E,
              ERROR_IN_MQCLOSE, CompCode, Reason);
      PrintLine(pBuff);
      RetCode = CSQ4_ERROR;
      }
.
```

### *Putting a message using MQPUT*

This example demonstrates how to use the MQPUT call to put a message on a queue.

This extract is not taken from the sample applications supplied with IBM MQ. For the names and locations of the sample applications, see Sample procedural programs (platforms except z/OS ) z/OS and Sample programs for IBM MQ for z/OS .

```
.
qput()
{
     MQMD    MsgDesc;
     MQPMO   PutMsgOpts;
     MQLONG  CompCode;
     MQLONG  Reason;
     MQHCONN Hconn;
     MQHOBJ  Hobj;
     char message_buffer[] = "MY MESSAGE";
    /*-------------------------------*/
    /*  Set up PMO structure.        */
    /*-------------------------------*/
     memset(&PutMsgOpts, '\0', sizeof(PutMsgOpts));
     memcpy(PutMsgOpts.StrucId, MQPMO_STRUC_ID,
            sizeof(PutMsgOpts.StrucId));
     PutMsgOpts.Version = MQPMO_VERSION_1;
     PutMsgOpts.Options = MQPMO_SYNCPOINT;

    /*-------------------------------*/
    /*  Set up MD structure.         */
    /*-------------------------------*/
    memset(&MsgDesc, '\0', sizeof(MsgDesc));
    memcpy(MsgDesc.StrucId, MQMD_STRUC_ID,
           sizeof(MsgDesc.StrucId));
    MsgDesc.Version     =  MQMD_VERSION_1;
    MsgDesc.Expiry      =  MQEI_UNLIMITED;
    MsgDesc.Report      =  MQRO_NONE;
    MsgDesc.MsgType     =  MQMT_DATAGRAM;
    MsgDesc.Priority    = 1;
    MsgDesc.Persistence = MQPER_PERSISTENT;
    memset(MsgDesc.ReplyToQ,
           '\0',
```

```
           sizeof(MsgDesc.ReplyToQ));
    /*-----------------------------------------------------*/
    /*  Put the message.                                   */
    /*-----------------------------------------------------*/
    MQPUT(Hconn, Hobj, &MsgDesc, &PutMsgOpts,
          sizeof(message_buffer), message_buffer,
          &CompCode, &Reason);
```

```
    /*-------------------------------------*/
    /*  Check completion and reason codes. */
    /*-------------------------------------*/
    switch (CompCode)
        {
         case MQCC_OK:
             break;
         case MQCC_FAILED:
             switch (Reason)
                 {
                  case MQRC_Q_FULL:
                  case MQRC_MSG_TOO_BIG_FOR_Q:
                      break;
                  default:
                      break; /* Perform error processing */
                 }
             break;
         default:
             break;          /* Perform error processing */
        }
}
```

### *Putting a message using MQPUT1*

This example demonstrates how to use the MQPUT1 call to open a queue, put a single message on the queue, then close the queue.

This extract is taken from the Credit Check sample application (program CSQ4CCB5) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
MQLONG   Hconn;              /* Connection handle        */
MQHOBJ   Hobj_CheckQ;        /* Object handle            */
MQLONG   CompCode;           /* Completion code          */
MQLONG   Reason;             /* Qualifying reason        */
MQOD     ObjDesc    = {MQOD_DEFAULT};
                             /* Object descriptor        */
MQMD     MsgDesc    = {MQMD_DEFAULT};
                             /* Message descriptor       */
MQLONG   OpenOptions;        /* Control the MQOPEN call  */

MQGMO    GetMsgOpts = {MQGMO_DEFAULT};
                             /* Get Message Options      */
MQLONG   MsgBuffLen;         /* Length of message buffer */
CSQ4BCAQ MsgBuffer;          /* Message structure        */
MQLONG   DataLen;            /* Length of message        */

MQPMO    PutMsgOpts = {MQPMO_DEFAULT};
                             /* Put Message Options      */
CSQ4BQRM PutBuffer;          /* Message structure        */
MQLONG   PutBuffLen = sizeof(PutBuffer);
                             /* Length of message buffer */
⋮
```

```
void Process_Query(void)
   {
   /*                                                   */
   /* Build the reply message                           */
   /*                                                   */
   ⋮
   /*                                                   */
   /* Set the object descriptor, message descriptor and  */
   /* put message options to the values required to      */
   /* create the reply message.                         */
   /*                                                   */
```

```
   strncpy(ObjDesc.ObjectName, MsgDesc.ReplyToQ,
           MQ_Q_NAME_LENGTH);
   strncpy(ObjDesc.ObjectQMgrName, MsgDesc.ReplyToQMgr,
           MQ_Q_MGR_NAME_LENGTH);
   MsgDesc.MsgType = MQMT_REPLY;
   MsgDesc.Report  = MQRO_NONE;
   memset(MsgDesc.ReplyToQ, ' ', MQ_Q_NAME_LENGTH);
   memset(MsgDesc.ReplyToQMgr, ' ', MQ_Q_MGR_NAME_LENGTH);
   memcpy(MsgDesc.MsgId, MQMI_NONE, sizeof(MsgDesc.MsgId));
   PutMsgOpts.Options = MQPMO_SYNCPOINT +
                        MQPMO_PASS_IDENTITY_CONTEXT;
   PutMsgOpts.Context = Hobj_CheckQ;
   PutBuffLen = sizeof(PutBuffer);
   MQPUT1(Hconn,
          &ObjDesc,
          &MsgDesc,
          &PutMsgOpts,
          PutBuffLen,
          &PutBuffer,
          &CompCode,
          &Reason);

   if (CompCode != MQCC_OK)
      {
      strncpy(TS_Operation, "MQPUT1",
              sizeof(TS_Operation));
      strncpy(TS_ObjName, ObjDesc.ObjectName,
              MQ_Q_NAME_LENGTH);
      Record_Call_Error();
      Forward_Msg_To_DLQ();
      }
   return;
   }
   .
   .
   .
```

### *Getting a message*

This example demonstrates how to use the MQGET call to remove a message from a queue.

This extract is taken from the Browse sample application (program CSQ4BCA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
#include "cmqc.h"
.
.
.
#define BUFFERLENGTH 80
.
.
.
int main(int argc, char *argv[] )
   {
   /*                                                   */
   /*     Variables for MQ calls                        */
   /*                                                   */
   MQHCONN Hconn ;            /* Connection handle      */
   MQLONG  CompCode;          /* Completion code        */
   MQLONG  Reason;            /* Qualifying reason      */
   MQHOBJ  Hobj;              /* Object handle          */
   MQMD    MsgDesc  = { MQMD_DEFAULT };
                              /* Message descriptor     */
   MQLONG  DataLength ;       /* Length of the message  */
   MQCHAR  Buffer[BUFFERLENGTH+1];
                              /* Area for message data  */
   MQGMO   GetMsgOpts = { MQGMO_DEFAULT };
                              /* Options which control  */
                              /*  the MQGET call        */
   MQLONG  BufferLength = BUFFERLENGTH ;
                              /* Length of buffer       */
   .
   .
   .
   /*     No need to change the message descriptor      */
   /*     (MQMD) control block because initialization   */
   /*     default sets all the fields.                  */
   /*                                                   */
   /*     Initialize the get message options (MQGMO)    */
   /*     control block (the copy file initializes all  */
   /*     the other fields).                            */
   /*                                                   */
   GetMsgOpts.Options = MQGMO_NO_WAIT      +
                        MQGMO_BROWSE_FIRST +
                        MQGMO_ACCEPT_TRUNCATED_MSG;
```

```
   /*                                                          */
   /* Get the first message.                                   */
   /*   Test for the output of the call is carried out         */
   /*   in the 'for' loop.                                     */
   /*                                                          */
   MQGET(Hconn,
         Hobj,
         &MsgDesc,
         &GetMsgOpts,
         BufferLength,
         Buffer,
         &DataLength,
         &CompCode,
         &Reason);
```

```
   /*                                                          */
   /* Process the message and get the next message,            */
   /* until no messages remaining.                             */
   .
   /*     If the call fails for any other reason,              */
   /*     print an error message showing the completion        */
   /*     code and reason code.                                */
   /*                                                          */
   if ( (CompCode == MQCC_FAILED) &&
        (Reason   == MQRC_NO_MSG_AVAILABLE) )
      {
      .
      }
   else
      {
      sprintf(pBuff, MESSAGE_4_E,
              ERROR_IN_MQGET, CompCode, Reason);
      PrintLine(pBuff);
      RetCode = CSQ4_ERROR;
      }
      .
   } /* end of main */
```

### *Getting a message using the wait option*

This example demonstrates how to use the wait option of the MQGET call.

This code accepts truncated messages. This extract is taken from the Credit Check sample application (program CSQ4CCB5) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
.
MQLONG   Hconn;              /* Connection handle        */
MQHOBJ   Hobj_CheckQ;        /* Object handle            */
MQLONG   CompCode;           /* Completion code          */
MQLONG   Reason;             /* Qualifying reason        */
MQOD     ObjDesc    = {MQOD_DEFAULT};
                             /* Object descriptor        */
MQMD     MsgDesc    = {MQMD_DEFAULT};
                             /* Message descriptor       */
MQLONG   OpenOptions;
                             /* Control the MQOPEN call  */
MQGMO    GetMsgOpts = {MQGMO_DEFAULT};
                             /* Get Message Options      */
MQLONG   MsgBuffLen;         /* Length of message buffer */
CSQ4BCAQ MsgBuffer;          /* Message structure        */
MQLONG   DataLen;            /* Length of message        */
```

```
.
void main(void)
   {
   .
   /*                                                          */
   /* Initialize options and open the queue for input          */
   /*                                                          */
   .
      /*                                                       */
      /* Get and process messages                              */
      /*                                                       */
```

```
      GetMsgOpts.Options = MQGMO_WAIT +
                           MQGMO_ACCEPT_TRUNCATED_MSG +
                           MQGMO_SYNCPOINT;
      GetMsgOpts.WaitInterval = WAIT_INTERVAL;
      MsgBuffLen = sizeof(MsgBuffer);
      memcpy(MsgDesc.MsgId, MQMI_NONE,
             sizeof(MsgDesc.MsgId));
      memcpy(MsgDesc.CorrelId, MQCI_NONE,
             sizeof(MsgDesc.CorrelId));
      /*                                                   */
      /* Make the first MQGET call outside the loop        */
      /*                                                   */
      MQGET(Hconn,
            Hobj_CheckQ,
            &MsgDesc,
            &GetMsgOpts,
            MsgBuffLen,
            &MsgBuffer,
            &DataLen,
            &CompCode,
            &Reason);
      .
      /*                                                   */
      /* Test the output of the MQGET call.  If the call */
      /* failed, send an error message showing the         */
      /* completion code and reason code, unless the       */
      /* reason code is NO_MSG AVAILABLE.                  */
      /*                                                   */
      if (Reason != MQRC_NO_MSG_AVAILABLE)
         {
         strncpy(TS_Operation, "MQGET", sizeof(TS_Operation));
         strncpy(TS_ObjName, ObjDesc.ObjectName,
                 MQ_Q_NAME_LENGTH);
         Record_Call_Error();
         }
         .
```

## *Getting a message using signaling*

*Signaling is available only with IBM MQ for z/OS* .

This example demonstrates how to use the MQGET call to set a signal so that you are notified when a suitable message arrives on a queue. This extract is not taken from the sample applications supplied with IBM MQ.

```
.
get_set_signal()
{
     MQMD    MsgDesc;
     MQGMO   GetMsgOpts;
     MQLONG  CompCode;
     MQLONG  Reason;
     MQHCONN Hconn;
     MQHOBJ  Hobj;
     MQLONG  BufferLength;
     MQLONG  DataLength;
     char message_buffer[100];
     long  int q_ecb, work_ecb;
     short int signal_sw, endloop;
     long  int mask = 255;

     /*--------------------------*/
     /*  Set up GMO structure.    */
     /*--------------------------*/
     memset(&GetMsgOpts,'\0',sizeof(GetMsgOpts));
     memcpy(GetMsgOpts.StrucId, MQGMO_STRUC_ID,
            sizeof(GetMsgOpts.StrucId);
     GetMsgOpts.Version      = MQGMO_VERSION_1;
     GetMsgOpts.WaitInterval = 1000;
     GetMsgOpts.Options      = MQGMO_SET_SIGNAL +
                               MQGMO_BROWSE_FIRST;
     q_ecb             = 0;
     GetMsgOpts.Signal1      = &q_ecb;
     /*--------------------------*/
     /*  Set up MD structure.     */
     /*--------------------------*/
     memset(&MsgDesc,'\0',sizeof(MsgDesc));
     memcpy(MsgDesc.StrucId, MQMD_STRUC_ID,
```

```
       sizeof(MsgDesc.StrucId);
 MsgDesc.Version  = MQMD_VERSION_1;
 MsgDesc.Report   = MQRO_NONE;
 memcpy(MsgDesc.MsgId,MQMI_NONE,
       sizeof(MsgDesc.MsgId));
 memcpy(MsgDesc.CorrelId,MQCI_NONE,
       sizeof(MsgDesc.CorrelId));
```

```
/*-----------------------------------------------------*/
/*  Issue the MQGET call.                              */
/*-----------------------------------------------------*/
 BufferLength = sizeof(message_buffer);
 signal_sw   = 0;

 MQGET(Hconn, Hobj, &MsgDesc, &GetMsgOpts,
       BufferLength, message_buffer, &DataLength,
       &CompCode, &Reason);
/*-------------------------------------*/
/*  Check completion and reason codes. */
/*-------------------------------------*/
 switch (CompCode)
     {
      case (MQCC_OK):          /* Message retrieved  */
          break;
      case (MQCC_WARNING):
          switch (Reason)
          {
           case (MQRC_SIGNAL_REQUEST_ACCEPTED):
               signal_sw = 1;
               break;
           default:
               break;   /* Perform error processing  */
          }
          break;
      case (MQCC_FAILED):
          switch (Reason)
          {
           case (MQRC_Q_MGR_NOT_AVAILABLE):
           case (MQRC_CONNECTION_BROKEN):
           case (MQRC_Q_MGR_STOPPING):
               break;
           default:
               break;  /* Perform error processing.  */
          }
          break;
      default:
          break;       /* Perform error processing.  */
     }
/*-----------------------------------------------------*/
/* If the SET_SIGNAL was accepted, set up a loop to  */
/* check whether a message has arrived at one second */
/* intervals. The loop ends if a message arrives or  */
/* the wait interval specified in the MQGMO          */
/* structure has expired.                            */
/*                                                   */
/* If a message arrives on the queue, another MQGET  */
/* must be issued to retrieve the message. If other  */
/* MQM calls have been made in the intervening       */
/* period, this may necessitate reinitializing the   */
/* MQMD and MQGMO structures.                        */
/* In this code, no intervening calls                */
/* have been made, so the only change required to    */
/* the structures is to specify MQGMO_NO_WAIT,       */
/* since we now know the message is there.           */
/*                                                   */
/* This code uses the EXEC CICS DELAY command to     */
/* suspend the program for a second. A batch program */
/* may achieve the same effect by calling an         */
/* assembler language subroutine which issues a      */
/* z/OS STIMER macro.                                */
/*-----------------------------------------------------*/
```

```
if (signal_sw == 1)
   {
    endloop = 0;
    do
      {
       EXEC CICS DELAY FOR HOURS(0) MINUTES(0) SECONDS(1);
```

```
           work_ecb = q_ecb & mask;
           switch (work_ecb)
               {
                case (MQEC_MSG_ARRIVED):
                    endloop = 1;
                    mqgmo_options = MQGMO_NO_WAIT;
                    MQGET(Hconn, Hobj, &MsgDesc, &GetMsgOpts,
                          BufferLength, message_buffer,
                          &DataLength, &CompCode, &Reason);
                    if (CompCode != MQCC_OK)
                        ;          /* Perform error processing. */
                    break;
                case (MQEC_WAIT_INTERVAL_EXPIRED):
                case (MQEC_WAIT_CANCELED):
                    endloop = 1;
                    break;
                default:
                    break;
               }
          } while (endloop == 0);
       }
     return;
}
```

### *Inquiring about the attributes of an object*

This example demonstrates how to use the MQINQ call to inquire about the attributes of a queue.

This extract is taken from the Queue Attributes sample application (program CSQ4CCC1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
#include <cmqc.h>      /* MQ API header file       */
:
#define NUMBEROFSELECTORS  2

const MQHCONN Hconn = MQHC_DEF_HCONN;
:
static void InquireGetAndPut(char   *Message,
                             PMQHOBJ pHobj,
                             char   *Object)
```

```
   {
   /*      Declare local variables                        */
   /*                                                     */
   MQLONG  SelectorCount = NUMBEROFSELECTORS;
                               /* Number of selectors  */
   MQLONG  IntAttrCount  = NUMBEROFSELECTORS;
                               /* Number of int attrs  */
   MQLONG  CharAttrLength = 0;
                    /* Length of char attribute buffer  */
   MQCHAR *CharAttrs ;
                    /* Character attribute buffer       */
   MQLONG  SelectorsTable[NUMBEROFSELECTORS];
                               /* attribute selectors  */
   MQLONG  IntAttrsTable[NUMBEROFSELECTORS];
                               /* integer attributes   */
   MQLONG  CompCode;           /* Completion code      */
   MQLONG  Reason;             /* Qualifying reason    */
   /*                                                     */
   /*     Open the queue.  If successful, do the inquire */
   /*     call.                                          */
   /*                                                     */
      /*                                                  */
      /*   Initialize the variables for the inquire      */
      /*   call:                                         */
      /*    - Set SelectorsTable to the attributes whose */
      /*      status is                                  */
      /*       required                                  */
      /*    - All other variables are already set        */
      /*                                                  */
      SelectorsTable[0] = MQIA_INHIBIT_GET;
      SelectorsTable[1] = MQIA_INHIBIT_PUT;
      /*                                                  */
      /*   Issue the inquire call                        */
      /*     Test the output of the inquire call. If the */
```

```
      /*     call failed, display an error message       */
      /*     showing the completion code and reason code,*/
      /*     otherwise display the status of the         */
      /*     INHIBIT-GET and INHIBIT-PUT attributes      */
      /*                                                 */
      MQINQ(Hconn,
            *pHobj,
            SelectorCount,
            SelectorsTable,
            IntAttrCount,
            IntAttrsTable,
            CharAttrLength,
            CharAttrs,
            &CompCode,
            &Reason);
      if (CompCode != MQCC_OK)
         {
         sprintf(Message, MESSAGE_4_E,
                 ERROR_IN_MQINQ, CompCode, Reason);
         SetMsg(Message);
         }
      else
         {
           /* Process the changes */
         } /* end if CompCode */
```

### *Setting the attributes of a queue*

This example demonstrates how to use the MQSET call to change the attributes of a queue.

This extract is taken from the Queue Attributes sample application (program CSQ4CCC1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
#include <cmqc.h>      /* MQ API header file      */
⋮
#define NUMBEROFSELECTORS  2

const MQHCONN Hconn = MQHC_DEF_HCONN;

static void InhibitGetAndPut(char   *Message,
                             PMQHOBJ pHobj,
                             char   *Object)
   {
   /*                                                 */
   /*      Declare local variables                    */
   /*                                                 */
   MQLONG  SelectorCount = NUMBEROFSELECTORS;
                              /* Number of selectors  */
   MQLONG  IntAttrCount  = NUMBEROFSELECTORS;
                              /* Number of int attrs  */
   MQLONG  CharAttrLength = 0;
                   /* Length of char attribute buffer  */
   MQCHAR *CharAttrs ;
                   /* Character attribute buffer       */
   MQLONG  SelectorsTable[NUMBEROFSELECTORS];
                              /* attribute selectors  */
   MQLONG  IntAttrsTable[NUMBEROFSELECTORS];
                              /* integer attributes   */
   MQLONG  CompCode;          /* Completion code      */
   MQLONG  Reason;            /* Qualifying reason    */
   ⋮
   /*                                                 */
   /*     Open the queue.  If successful, do the      */
   /*     inquire call.                               */
   /*                                                 */
   ⋮
      /*                                               */
      /*   Initialize the variables for the set call:  */
      /*    - Set SelectorsTable to the attributes to be */
      /*      set                                      */
      /*    - Set IntAttrsTable to the required status */
      /*    - All other variables are already set      */
      /*                                               */
      SelectorsTable[0] = MQIA_INHIBIT_GET;
      SelectorsTable[1] = MQIA_INHIBIT_PUT;
      IntAttrsTable[0]  = MQQA_GET_INHIBITED;
```

```
      IntAttrsTable[1]  = MQQA_PUT_INHIBITED;
      .
      .
      .
      /*                                                  */
      /*   Issue the set call.                            */
      /*     Test the output of the set call.  If the     */
      /*     call fails, display an error message         */
      /*     showing the completion code and reason       */
      /*     code; otherwise move INHIBITED to the        */
      /*     relevant screen map fields                   */
      /*                                                  */
      MQSET(Hconn,
            *pHobj,
            SelectorCount,
            SelectorsTable,
            IntAttrCount,
            IntAttrsTable,
            CharAttrLength,
            CharAttrs,
            &CompCode,
            &Reason);
      if (CompCode != MQCC_OK)
         {
         sprintf(Message, MESSAGE_4_E,
                 ERROR_IN_MQSET, CompCode, Reason);
         SetMsg(Message);
         }
      else
         {
           /* Process the changes */
         } /* end if CompCode */
```

### *Retrieving status information with MQSTAT*

This example demonstrates how to issue an asynchronous MQPUT and retrieve the status information with MQSTAT.

This extract is taken from the Calling MQSTAT sample application (program amqsapt0 ) supplied with IBM MQ for Windows systems. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
/**********************************************************************/
/*                                                                    */
/* Program name: AMQSAPT0                                             */
/*                                                                    */
/* Description: Sample C program that asynchronously puts messages    */
/*              to a message queue (example using MQPUT & MQSTAT).    */
/*                                                                    */
/* Licensed Materials - Property of IBM                               */
/*                                                                    */
/* 63H9336                                                            */
/* (c) Copyright IBM Corp. 2006, 2022. All Rights Reserved.           */
/*                                                                    */
/* US Government Users Restricted Rights - Use, duplication or        */
/* disclosure restricted by GSA ADP Schedule Contract with            */
/* IBM Corp.                                                          */
/*                                                                    */
/**********************************************************************/
/*                                                                    */
/* Function:                                                          */
/*                                                                    */
/*   AMQSAPT0 is a sample C program to put messages on a message      */
/*   queue with asynchronous response option, querying the success    */
/*   of the put operations with MQSTAT.                               */
/*                                                                    */
/*      -- messages are sent to the queue named by the parameter      */
/*                                                                    */
/*      -- gets lines from StdIn, and adds each to target             */
/*         queue, taking each line of text as the content             */
/*         of a datagram message; the sample stops when a null        */
/*         line (or EOF) is read.                                     */
/*         New-line characters are removed.                           */
/*         If a line is longer than 99 characters it is broken up     */
/*         into 99-character pieces. Each piece becomes the           */
/*         content of a datagram message.                             */
/*         If the length of a line is a multiple of 99 plus 1, for    */
```

```
/*         example, 199, the last piece will only contain a         */
/*         new-line character so will terminate the input.          */
/*                                                                  */
/*      -- writes a message for each MQI reason other than          */
/*         MQRC_NONE; stops if there is a MQI completion code       */
/*         of MQCC_FAILED                                           */
/*                                                                  */
/*      -- summarizes the overall success of the put operations     */
/*         through a call to MQSTAT to query MQSTAT_TYPE_ASYNC_ERROR*/
/*                                                                  */
/*    Program logic:                                                */
/*         MQOPEN target queue for OUTPUT                           */
/*         while end of input file not reached,                     */
/*         .  read next line of text                                */
/*         .  MQPUT datagram message with text line as data         */
/*         MQCLOSE target queue                                     */
/*         MQSTAT connection                                        */
/*                                                                  */
/*                                                                  */
/********************************************************************/
/*                                                                  */
/*   AMQSAPT0 has the following parameters                          */
/*       required:                                                  */
/*                 (1) The name of the target queue                 */
/*       optional:                                                  */
/*                 (2) Queue manager name                           */
/*                 (3) The open options                             */
/*                 (4) The close options                            */
/*                 (5) The name of the target queue manager         */
/*                 (6) The name of the dynamic queue                */
/*                                                                  */
/********************************************************************/
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
   /* includes for MQI */
#include <cmqc.h>

int main(int argc, char **argv)
{
  /*  Declare file and character for sample input                   */
  FILE *fp;

  /*   Declare MQI structures needed                                */
  MQOD     od = {MQOD_DEFAULT};    /* Object Descriptor             */
  MQMD     md = {MQMD_DEFAULT};    /* Message Descriptor            */
  MQPMO   pmo = {MQPMO_DEFAULT};   /* put message options           */
  MQSTS   sts = {MQSTS_DEFAULT};   /* status information            */
     /** note, sample uses defaults where it can **/
  MQHCONN  Hcon;                   /* connection handle             */
  MQHOBJ   Hobj;                   /* object handle                 */
  MQLONG   O_options;              /* MQOPEN options                */
  MQLONG   C_options;              /* MQCLOSE options               */
  MQLONG   CompCode;               /* completion code               */
  MQLONG   OpenCode;               /* MQOPEN completion code        */
  MQLONG   Reason;                 /* reason code                   */
  MQLONG   CReason;                /* reason code for MQCONN        */
  MQLONG   messlen;                /* message length                */
  char     buffer[100];            /* message buffer                */
  char     QMName[50];             /* queue manager name            */

  printf("Sample AMQSAPT0 start\n");
  if (argc < 2)
  {
    printf("Required parameter missing - queue name\n");
    exit(99);
  }

  /********************************************************************/
  /*                                                                  */
  /*   Connect to queue manager                                       */
  /*                                                                  */
  /********************************************************************/
  QMName[0] = 0;    /* default */
  if (argc > 2)
    strcpy(QMName, argv[2]);
  MQCONN(QMName,                 /* queue manager                   */
         &Hcon,                  /* connection handle               */
         &Compcode,              /* completion code                 */
         &Reason);               /* reason code                     */
  /* report reason and stop if it failed     */
  if (CompCode == MQCC_FAILED)
```

```
{
  printf("MQCONN ended with reason code %d\n", CReason);
  exit( (int)CReason );
}

/*****************************************************************/
/*                                                               */
/*   Use parameter as the name of the target queue               */
/*                                                               */
/*****************************************************************/
strncpy(od.ObjectName, argv[1], (size_t)MQ_Q_NAME_LENGTH);
printf("target queue is %s\n", od.ObjectName);

if (argc > 5)
{
  strncpy(od.ObjectQMgrName, argv[5], (size_t) MQ_Q_MGR_NAME_LENGTH);
  printf("target queue manager is %s\n", od.ObjectQMgrName);
}

if (argc > 6)
{
  strncpy(od.DynamicQName, argv[6], (size_t) MQ_Q_NAME_LENGTH);
  printf("dynamic queue name is %s\n", od.DynamicQName);
}

/*****************************************************************/
/*                                                               */
/*   Open the target message queue for output                    */
/*                                                               */
/*****************************************************************/
if (argc > 3)
{
  O_options = atoi( argv[3] );
  printf("open  options are %d\n", O_options);
}
else
{
  O_options = MQOO_OUTPUT            /* open queue for output     */
            | MQOO_FAIL_IF_QUIESCING /* but not if MQM stopping   */
            ;                        /* = 0x2010 = 8208 decimal   */
}

MQOPEN(Hcon,                      /* connection handle            */
       &od,                       /* object descriptor for queue  */
       O_options,                 /* open options                 */
       &Hobj,                     /* object handle                */
       &OpenCode,                 /* MQOPEN completion code       */
       &Reason);                  /* reason code                  */

/* report reason, if any; stop if failed      */
if (Reason != MQRC_NONE)
{
  printf("MQOPEN ended with reason code %d\n", Reason);
}

if (OpenCode == MQCC_FAILED)
{
  printf("unable to open queue for output\n");
}

/*****************************************************************/
/*                                                               */
/*   Read lines from the file and put them to the message queue   */
/*   Loop until null line or end of file, or there is a failure   */
/*                                                               */
/*****************************************************************/
CompCode = OpenCode;        /* use MQOPEN result for initial test */
fp = stdin;

memcpy(md.Format,           /* character string format           */
       MQFMT_STRING, (size_t)MQ_FORMAT_LENGTH);

/*****************************************************************/
/* These options specify that put operation should occur         */
/* asynchronously and the application will check the success     */
/* using MQSTAT at a later time.                                 */
/*****************************************************************/
md.Persistence = MQPER_NOT_PERSISTENT;
pmo.Options |= MQPMO_ASYNC_RESPONSE;

/*****************************************************************/
/* These options cause the MsgId and CorrelId to be replaced, so  */
```

```
/* that there is no need to reset them before each MQPUT          */
/*****************************************************************/
pmo.Options |= MQPMO_NEW_MSG_ID;
pmo.Options |= MQPMO_NEW_CORREL_ID;

while (CompCode != MQCC_FAILED)
{
  if (fgets(buffer, sizeof(buffer), fp) != NULL)
  {
    messlen = (MQLONG)strlen(buffer); /* length without null      */
    if (buffer[messlen-1] == '\n')  /* last char is a new-line    */
    {
      buffer[messlen-1]  = '\0';    /* replace new-line with null */
      --messlen;                    /* reduce buffer length       */
    }
  }
  else messlen = 0;        /* treat EOF same as null line         */

  /*****************************************************************/
  /*                                                               */
  /*   Put each buffer to the message queue                        */
  /*                                                               */
  /*****************************************************************/
  if (messlen > 0)
  {
    MQPUT(Hcon,               /* connection handle                 */
          Hobj,               /* object handle                     */
          &md,                /* message descriptor                */
          &pmo,               /* default options (datagram)        */
          messlen,            /* message length                    */
          buffer,             /* message buffer                    */
          &CompCode,          /* completion code                   */
          &Reason);           /* reason code                       */

    /* report reason, if any */
    if (Reason != MQRC_NONE)
    {
      printf("MQPUT ended with reason code %d\n", Reason);
    }
  }
  else   /* satisfy end condition when empty line is read */
    CompCode = MQCC_FAILED;
}

/*****************************************************************/
/*                                                               */
/*   Close the target queue (if it was opened)                   */
/*                                                               */
/*****************************************************************/
if (OpenCode != MQCC_FAILED)
{
  if (argc > 4)
  {
    C_options = atoi( argv[4] );
    printf("close options are %d\n", C_options);
  }
  else
  {
    C_options = MQCO_NONE;        /* no close options            */
  }

  MQCLOSE(Hcon,                   /* connection handle           */
          &Hobj,                  /* object handle               */
          C_options,
          &CompCode,              /* completion code             */
          &Reason);               /* reason code                 */

  /* report reason, if any     */
  if (Reason != MQRC_NONE)
  {
    printf("MQCLOSE ended with reason code %d\n", Reason);
  }
}

/*****************************************************************/
/*                                                               */
/*   Query how many asynchronous puts succeeded                  */
/*                                                               */
/*****************************************************************/
MQSTAT(&Hcon,                   /* connection handle            */
       MQSTAT_TYPE_ASYNC_ERROR, /* status type                  */
       &Sts,                    /* MQSTS structure              */
```

```
          &CompCode,              /* completion code              */
          &Reason);               /* reason code                  */

   /* report reason, if any     */
   if (Reason != MQRC_NONE)
   {
     printf("MQSTAT ended with reason code %d\n", Reason);
   }
   else
   {
     /* Display results */
     printf("Succeeded putting %d messages\n",
            sts.PutSuccessCount);
     printf("%d messages were put with a warning\n",
            sts.PutWarningCount);
     printf("Failed to put %d messages\n",
            sts.PutFailureCount);

     if(sts.CompCode == MQCC_WARNING)
     {
       printf("The first warning that occurred had reason code %d\n",
              sts.Reason);
     }
     else if(sts.CompCode == MQCC_FAILED)
     {
       printf("The first error that occurred had reason code %d\n",
              sts.Reason);
     }
   }

   /*****************************************************************/
   /*                                                               */
   /*   Disconnect from MQM if not already connected                */
   /*                                                               */
   /*****************************************************************/
   if (CReason != MQRC_ALREADY_CONNECTED)
   {
     MQDISC(&Hcon,                   /* connection handle            */
            &CompCode,               /* completion code              */
            &Reason);                /* reason code                  */

     /* report reason, if any     */
     if (Reason != MQRC_NONE)
     {
       printf("MQDISC ended with reason code %d\n", Reason);
     }
   }

   /*****************************************************************/
   /*                                                               */
   /* END OF AMQSAPT0                                               */
   /*                                                               */
   /*****************************************************************/
   printf("Sample AMQSAPT0 end\n");
   return(0);
 }
```

## COBOL examples

This collection of topics is taken from the IBM MQ for z/OS sample applications. They are applicable to all platforms, except where noted.

### *Connecting to a queue manager*

This example demonstrates how to use the MQCONN call to connect a program to a queue manager in z/OS batch.

This extract is taken from the Browse sample application (program CSQ4BVA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
* -------------------------------------------------------*
WORKING-STORAGE SECTION.
* -------------------------------------------------------*
*    W02 - Data fields derived from the PARM field
 01  W02-MQM                     PIC X(48) VALUE SPACES.
```

```
*    W03 - MQM API fields
 01  W03-HCONN                  PIC S9(9) BINARY.
 01  W03-COMPCODE               PIC S9(9) BINARY.
 01  W03-REASON                 PIC S9(9) BINARY.
*
*    MQV contains constants (for filling in the control
*    blocks)
*    and return codes (for testing the result of a call)
*
 01  W05-MQM-CONSTANTS.
 COPY CMQV SUPPRESS.
 ⋮
*    Separate into the relevant fields any data passed
*    in the PARM statement
*
     UNSTRING PARM-STRING DELIMITED BY ALL ','
                            INTO W02-MQM
                                 W02-OBJECT.
     ⋮
*    Connect to the specified queue manager.
*
     CALL 'MQCONN' USING W02-MQM
                         W03-HCONN
                         W03-COMPCODE
                         W03-REASON.
*
*    Test the output of the connect call.  If the call
*    fails, print an error message showing the
*    completion code and reason code.
*
     IF (W03-COMPCODE NOT = MQCC-OK) THEN
     ⋮
     END-IF.
     ⋮
```

### *Disconnecting from a queue manager*

This example demonstrates how to use the MQDISC call to disconnect a program from a queue manager in z/OS batch.

The variables used in this code extract are those that were set in “Connecting to a queue manager” on page 23. This extract is taken from the Browse sample application (program CSQ4BVA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
*
* Disconnect from the queue manager
*
     CALL 'MQDISC' USING W03-HCONN
                         W03-COMPCODE
                         W03-REASON.
*
*    Test the output of the disconnect call.  If the
*    call fails, print an error message showing the
*    completion code and reason code.
*
     IF (W03-COMPCODE NOT = MQCC-OK) THEN
⋮
           END-IF.
⋮
```

### *Creating a dynamic queue*

This example demonstrates how to use the MQOPEN call to create a dynamic queue.

This extract is taken from the Credit Check sample application (program CSQ4CVB1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* -------------------------------------------------------*
WORKING-STORAGE SECTION.
* -------------------------------------------------------*
```

```
*
*    W02 - Queues processed in this program
*
 01  W02-MODEL-QNAME        PIC X(48) VALUE
     'CSQ4SAMP.B1.MODEL                          '.
 01  W02-NAME-PREFIX        PIC X(48) VALUE
     'CSQ4SAMP.B1.*                              '.
 01  W02-TEMPORARY-Q         PIC X(48).
*
*    W03 - MQM API fields
*
 01  W03-HCONN       PIC S9(9) BINARY VALUE ZERO.
 01  W03-OPTIONS     PIC S9(9) BINARY.
 01  W03-HOBJ        PIC S9(9) BINARY.
 01  W03-COMPCODE    PIC S9(9) BINARY.
 01  W03-REASON      PIC S9(9) BINARY.
*
*    API control blocks
*
 01  MQM-OBJECT-DESCRIPTOR.
     COPY CMQODV.
*
*    CMQV contains constants (for setting or testing
*    field values) and return codes (for testing the
*    result of a call)
*
 01  MQM-CONSTANTS.
 COPY CMQV SUPPRESS.
* ---------------------------------------------------------*
 PROCEDURE DIVISION.
* ---------------------------------------------------------*
⋮
* ---------------------------------------------------------*
 OPEN-TEMP-RESPONSE-QUEUE SECTION.
* ---------------------------------------------------------*
```

```
*
*  This section creates a temporary dynamic queue
*  using a model queue
*
* ---------------------------------------------------------*
*
* Change three fields in the Object Descriptor (MQOD)
* control block.  (MQODV initializes the other fields)
*
     MOVE MQOT-Q           TO MQOD-OBJECTTYPE.
     MOVE W02-MODEL-QNAME  TO MQOD-OBJECTNAME.
     MOVE W02-NAME-PREFIX  TO MQOD-DYNAMICQNAME.
*
     COMPUTE W03-OPTIONS = MQOO-INPUT-EXCLUSIVE.
*
     CALL 'MQOPEN' USING W03-HCONN
                         MQOD
                         W03-OPTIONS
                         W03-HOBJ-MODEL
                         W03-COMPCODE
                         W03-REASON.
*
     IF W03-COMPCODE NOT = MQCC-OK
          MOVE 'MQOPEN'      TO M01-MSG4-OPERATION
          MOVE W03-COMPCODE  TO M01-MSG4-COMPCODE
          MOVE W03-REASON    TO M01-MSG4-REASON
          MOVE M01-MESSAGE-4 TO M00-MESSAGE
     ELSE
          MOVE MQOD-OBJECTNAME TO W02-TEMPORARY-Q
     END-IF.
*
 OPEN-TEMP-RESPONSE-QUEUE-EXIT.
*
*    Return to performing section.
*
     EXIT.
     EJECT
*
```

### *Opening an existing queue*

This example demonstrates how to use the MQOPEN call to open an existing queue.

This extract is taken from the Browse sample application (program CSQ4BVA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* -------------------------------------------------------*
 WORKING-STORAGE SECTION.
* -------------------------------------------------------*
*
*    W01 - Fields derived from the command area input
*
 01  W01-OBJECT                 PIC X(48).
*
*    W02 - MQM API fields
*
 01  W02-HCONN        PIC S9(9) BINARY VALUE ZERO.
 01  W02-OPTIONS      PIC S9(9) BINARY.
 01  W02-HOBJ         PIC S9(9) BINARY.
 01  W02-COMPCODE     PIC S9(9) BINARY.
 01  W02-REASON       PIC S9(9) BINARY.
*
*    CMQODV defines the object descriptor (MQOD)
*
 01  MQM-OBJECT-DESCRIPTOR.
     COPY CMQODV.
*
* CMQV contains constants (for setting or testing
* field values) and return codes (for testing the
* result of a call)
*
 01  MQM-CONSTANTS.
 COPY CMQV SUPPRESS.
* -------------------------------------------------------*
 E-OPEN-QUEUE SECTION.
* -------------------------------------------------------*
*                                                        *
* This section opens the queue                           *
*
*    Initialize the Object Descriptor (MQOD) control
*    block
*    (The copy file initializes the remaining fields.)
*
     MOVE MQOT-Q         TO MQOD-OBJECTTYPE.
     MOVE W01-OBJECT     TO MQOD-OBJECTNAME.
*
*    Initialize W02-OPTIONS to open the queue for both
*    inquiring about and setting attributes
*
     COMPUTE W02-OPTIONS = MQOO-INQUIRE + MQOO-SET.
```

```
*
*    Open the queue
*
     CALL 'MQOPEN' USING W02-HCONN
                         MQOD
                         W02-OPTIONS
                         W02-HOBJ
                         W02-COMPCODE
                         W02-REASON.
*
*    Test the output from the open
*
*    If the completion code is not OK, display a
*    separate error message for each of the following
*    errors:
*
*  Q-MGR-NOT-AVAILABLE - MQM is not available
*  CONNECTION-BROKEN   - MQM is no longer connected to CICS
*  UNKNOWN-OBJECT-NAME - The queue does not exist
*  NOT-AUTHORIZED      - The user is not authorized to open
*                        the queue
*
* For any other error, display an error message
```

```
* showing the completion and reason codes
*
  IF W02-COMPCODE NOT = MQCC-OK
     EVALUATE TRUE
*
       WHEN W02-REASON = MQRC-Q-MGR-NOT-AVAILABLE
            MOVE M01-MESSAGE-6 TO M00-MESSAGE
*
       WHEN W02-REASON = MQRC-CONNECTION-BROKEN
            MOVE M01-MESSAGE-6 TO M00-MESSAGE
*
       WHEN W02-REASON = MQRC-UNKNOWN-OBJECT-NAME
            MOVE M01-MESSAGE-2 TO M00-MESSAGE
*
       WHEN W02-REASON = MQRC-NOT-AUTHORIZED
            MOVE M01-MESSAGE-3 TO M00-MESSAGE
*
       WHEN OTHER
            MOVE 'MQOPEN'      TO M01-MSG4-OPERATION
            MOVE W02-COMPCODE  TO M01-MSG4-COMPCODE
            MOVE W02-REASON    TO M01-MSG4-REASON
            MOVE M01-MESSAGE-4 TO M00-MESSAGE
        END-EVALUATE
     END-IF.
 E-EXIT.
*
*    Return to performing section
*
     EXIT.
     EJECT
```

### *Closing a queue*

This example demonstrates how to use the MQCLOSE call.

The variables used in this code extract are those that were set in "Connecting to a queue manager" on page 23. This extract is taken from the Browse sample application (program CSQ4BVA1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
*
*    Close the queue
*
     MOVE MQCO-NONE TO W03-OPTIONS.
*
     CALL 'MQCLOSE' USING W03-HCONN
                          W03-HOBJ
                          W03-OPTIONS
                          W03-COMPCODE
                          W03-REASON.
*
*    Test the output of the MQCLOSE call.  If the call
*    fails, print an error message showing the
*    completion code and reason code.
*
     IF (W03-COMPCODE NOT = MQCC-OK) THEN
        MOVE 'CLOSE'       TO W04-MSG4-TYPE
        MOVE W03-COMPCODE  TO W04-MSG4-COMPCODE
        MOVE W03-REASON    TO W04-MSG4-REASON
        MOVE W04-MESSAGE-4 TO W00-PRINT-DATA
        PERFORM PRINT-LINE
        MOVE W06-CSQ4-ERROR TO W00-RETURN-CODE
     END-IF.
*
```

### *Putting a message using MQPUT*

This example demonstrates how to use the MQPUT call using context.

This extract is taken from the Credit Check sample application (program CSQ4CVB1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
```

```
* -------------------------------------------------------*
 WORKING-STORAGE SECTION.
* -------------------------------------------------------*
*
*    W02 - Queues processed in this program
*
 01  W02-TEMPORARY-Q            PIC X(48).
*
*    W03 - MQM API fields
*
 01  W03-HCONN           PIC S9(9) BINARY VALUE ZERO.
 01  W03-HOBJ-INQUIRY    PIC S9(9) BINARY.
 01  W03-OPTIONS         PIC S9(9) BINARY.
 01  W03-BUFFLEN         PIC S9(9) BINARY.
 01  W03-COMPCODE        PIC S9(9) BINARY.
 01  W03-REASON          PIC S9(9) BINARY.
*
 01  W03-PUT-BUFFER.
*
     05 W03-CSQ4BIIM.
     COPY CSQ4VB1.
*
*    API control blocks
*
 01  MQM-MESSAGE-DESCRIPTOR.
     COPY CMQMDV.
 01  MQM-PUT-MESSAGE-OPTIONS.
     COPY CMQPMOV.
*
*    MQV contains constants (for filling in the
*    control blocks) and return codes (for testing
*    the result of a call).
*
 01  MQM-CONSTANTS.
     COPY CMQV SUPPRESS.
* -------------------------------------------------------*
 PROCEDURE DIVISION.
* -------------------------------------------------------*
⋮
*    Open queue and build message.
⋮
```

```
*
* Set the message descriptor and put-message options to
* the values required to create the message.
* Set the length of the message.
*
  MOVE MQMT-REQUEST         TO MQMD-MSGTYPE.
  MOVE MQCI-NONE            TO MQMD-CORRELID.
  MOVE MQMI-NONE            TO MQMD-MSGID.
  MOVE W02-TEMPORARY-Q      TO MQMD-REPLYTOQ.
  MOVE SPACES               TO MQMD-REPLYTOQMGR.
  MOVE 5                    TO MQMD-PRIORITY.
  MOVE MQPER-NOT-PERSISTENT TO MQMD-PERSISTENCE.
  COMPUTE MQPMO-OPTIONS     =  MQPMO-NO-SYNCPOINT +
                               MQPMO-DEFAULT-CONTEXT.
  MOVE LENGTH OF CSQ4BIIM-MSG TO W03-BUFFLEN.
*
     CALL 'MQPUT' USING W03-HCONN
                        W03-HOBJ-INQUIRY
                        MQMD
                        MQPMO
                        W03-BUFFLEN
                        W03-PUT-BUFFER
                        W03-COMPCODE
                        W03-REASON.
     IF W03-COMPCODE NOT = MQCC-OK
     ⋮
     END-IF.
```

### *Putting a message using MQPUT1*

This example demonstrates how to use the MQPUT1 call.

This extract is taken from the Credit Check sample application (program CSQ4CVB5) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* -------------------------------------------------------*
 WORKING-STORAGE SECTION.
* -------------------------------------------------------*
*
*    W03 - MQM API fields
*
 01  W03-HCONN          PIC S9(9) BINARY VALUE ZERO.
 01  W03-OPTIONS        PIC S9(9) BINARY.
 01  W03-COMPCODE       PIC S9(9) BINARY.
 01  W03-REASON         PIC S9(9) BINARY.
 01  W03-BUFFLEN        PIC S9(9) BINARY.
*
 01  W03-PUT-BUFFER.
     05 W03-CSQ4BQRM.
     COPY CSQ4VB4.
```

```
*
*    API control blocks
*
 01  MQM-OBJECT-DESCRIPTOR.
     COPY CMQODV.
 01  MQM-MESSAGE-DESCRIPTOR.
     COPY CMQMDV.
 01  MQM-PUT-MESSAGE-OPTIONS.
     COPY CMQPMOV.
*
* CMQV contains constants (for filling in the
* control blocks) and return codes (for testing
* the result of a call).
*
 01  MQM-MQV.
 COPY CMQV SUPPRESS.
* -------------------------------------------------------*
 PROCEDURE DIVISION.
* -------------------------------------------------------*
⋮
*    Get the request message.
⋮
* -------------------------------------------------------*
 PROCESS-QUERY SECTION.
* -------------------------------------------------------*
⋮
*    Build the reply message.
⋮
*
* Set the object descriptor, message descriptor and
* put-message options to the values required to create
* the message.
* Set the length of the message.
*
  MOVE MQMD-REPLYTOQ    TO MQOD-OBJECTNAME.
  MOVE MQMD-REPLYTOQMGR TO MQOD-OBJECTQMGRNAME.
  MOVE MQMT-REPLY       TO MQMD-MSGTYPE.
  MOVE SPACES           TO MQMD-REPLYTOQ.
  MOVE SPACES           TO MQMD-REPLYTOQMGR.
  MOVE LOW-VALUES       TO MQMD-MSGID.
  COMPUTE MQPMO-OPTIONS = MQPMO-SYNCPOINT +
                          MQPMO-PASS-IDENTITY-CONTEXT.
  MOVE W03-HOBJ-CHECKQ  TO MQPMO-CONTEXT.
  MOVE LENGTH OF CSQ4BQRM-MSG TO W03-BUFFLEN.
*
     CALL 'MQPUT1' USING W03-HCONN
                         MQOD
                         MQMD
                         MQPMO
                         W03-BUFFLEN
                         W03-PUT-BUFFER
                         W03-COMPCODE
```

```
                        W03-REASON.
     IF W03-COMPCODE NOT = MQCC-OK
         MOVE 'MQPUT1'          TO M02-OPERATION
         MOVE MQOD-OBJECTNAME   TO M02-OBJECTNAME
         PERFORM RECORD-CALL-ERROR
         PERFORM FORWARD-MSG-TO-DLQ
     END-IF.
*
```

### *Getting a message*

This example demonstrates how to use the MQGET call to remove a message from a queue.

This extract is taken from the Credit Check sample application (program CSQ4CVB1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* ------------------------------------------------------------*
 WORKING-STORAGE SECTION.
* ------------------------------------------------------------*
*
*    W03 - MQM API fields
*
 01  W03-HCONN            PIC S9(9) BINARY VALUE ZERO.
 01  W03-HOBJ-RESPONSE    PIC S9(9) BINARY.
 01  W03-OPTIONS          PIC S9(9) BINARY.
 01  W03-BUFFLEN          PIC S9(9) BINARY.
 01  W03-DATALEN          PIC S9(9) BINARY.
 01  W03-COMPCODE         PIC S9(9) BINARY.
 01  W03-REASON           PIC S9(9) BINARY.
*
 01  W03-GET-BUFFER.
     05 W03-CSQ4BAM.
     COPY CSQ4VB2.
*
*    API control blocks
*
 01  MQM-MESSAGE-DESCRIPTOR.
     COPY CMQMDV.
 01  MQM-GET-MESSAGE-OPTIONS.
     COPY CMQGMOV.
*
*    MQV contains constants (for filling in the
*    control blocks) and return codes (for testing
*    the result of a call).
*
 01  MQM-CONSTANTS.
     COPY CMQV SUPPRESS.
* ------------------------------------------------------------*
 A-MAIN SECTION.
* ------------------------------------------------------------*
⋮
*    Open response queue.
⋮
* ------------------------------------------------------------*
 PROCESS-RESPONSE-SCREEN SECTION.
* ------------------------------------------------------------*
*                                                             *
*  This section gets a message from the response queue.       *
*                                                             *
*  When a correct response is received, it is                 *
*  transferred to the map for display; otherwise              *
*  an error message is built.                                 *
*                                                             *
* ------------------------------------------------------------*
```

```
*
*    Set get-message options
*
  COMPUTE MQGMO-OPTIONS = MQGMO-SYNCPOINT +
                          MQGMO-ACCEPT-TRUNCATED-MSG +
                          MQGMO-NO-WAIT.
*
* Set msgid and correlid in MQMD to nulls so that any
* message will qualify.
```

```
* Set length to available buffer length.
*
     MOVE MQMI-NONE TO MQMD-MSGID.
     MOVE MQCI-NONE TO MQMD-CORRELID.
     MOVE LENGTH OF W03-GET-BUFFER TO W03-BUFFLEN.
*
     CALL 'MQGET' USING W03-HCONN
                        W03-HOBJ-RESPONSE
                        MQMD
                        MQGMO
                        W03-BUFFLEN
                        W03-GET-BUFFER
                        W03-DATALEN
                        W03-COMPCODE
                        W03-REASON.
     EVALUATE TRUE
         WHEN W03-COMPCODE NOT = MQCC-FAILED
         ⋮
*            Process the message
             ⋮
         WHEN (W03-COMPCODE = MQCC-FAILED AND
               W03-REASON = MQRC-NO-MSG-AVAILABLE)
                 MOVE M01-MESSAGE-9 TO M00-MESSAGE
                 PERFORM CLEAR-RESPONSE-SCREEN
*
         WHEN OTHER
             MOVE 'MQGET  '     TO M01-MSG4-OPERATION
             MOVE W03-COMPCODE  TO M01-MSG4-COMPCODE
             MOVE W03-REASON    TO M01-MSG4-REASON
             MOVE M01-MESSAGE-4 TO M00-MESSAGE
             PERFORM CLEAR-RESPONSE-SCREEN
     END-EVALUATE.
```

### *Getting a message using the wait option*

This example demonstrates how to use the MQGET call with the wait option and accepting truncated messages.

This extract is taken from the Credit Check sample application (program CSQ4CVB5) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* ------------------------------------------------------------*
 WORKING-STORAGE SECTION.
* ------------------------------------------------------------*
*
*    W00 - General work fields
*
 01  W00-WAIT-INTERVAL   PIC S9(09) BINARY VALUE 30000.
*
*    W03 - MQM API fields
*
 01  W03-HCONN           PIC S9(9) BINARY VALUE ZERO.
 01  W03-OPTIONS         PIC S9(9) BINARY.
 01  W03-HOBJ-CHECKQ     PIC S9(9) BINARY.
 01  W03-COMPCODE        PIC S9(9) BINARY.
 01  W03-REASON          PIC S9(9) BINARY.
 01  W03-DATALEN         PIC S9(9) BINARY.
 01  W03-BUFFLEN         PIC S9(9) BINARY.
*
 01  W03-MSG-BUFFER.
     05 W03-CSQ4BCAQ.
     COPY CSQ4VB3.
*
*    API control blocks
*
 01  MQM-MESSAGE-DESCRIPTOR.
     COPY CMQMDV.
 01  MQM-GET-MESSAGE-OPTIONS.
     COPY CMQGMOV.
*
*    CMQV contains constants (for filling in the
*    control blocks) and return codes (for testing
*    the result of a call).
*
 01  MQM-MQV.
 COPY CMQV SUPPRESS.
```

```
* ----------------------------------------------------------*
 PROCEDURE DIVISION.
* ----------------------------------------------------------*
⋮
*    Open input queue.
⋮
```

```

*
*    Get and process messages.
*
  COMPUTE MQGMO-OPTIONS = MQGMO-WAIT +
                          MQGMO-ACCEPT-TRUNCATED-MSG +
                          MQGMO-SYNCPOINT.
  MOVE LENGTH OF W03-MSG-BUFFER TO W03-BUFFLEN.
  MOVE W00-WAIT-INTERVAL TO MQGMO-WAITINTERVAL.
  MOVE MQMI-NONE TO MQMD-MSGID.
  MOVE MQCI-NONE TO MQMD-CORRELID.
*
*    Make the first MQGET call outside the loop.
*
     CALL 'MQGET' USING W03-HCONN
                        W03-HOBJ-CHECKQ
                        MQMD
                        MQGMO
                        W03-BUFFLEN
                        W03-MSG-BUFFER
                        W03-DATALEN
                        W03-COMPCODE
                        W03-REASON.
*
*    Test the output of the MQGET call using the
*    PERFORM loop that follows.
*
*    Perform whilst no failure occurs
*      - process this message
*      - reset the call parameters
*      - get another message
*    End-perform
*

*
*    Test the output of the MQGET call.  If the call
*    fails, send an error message showing the
*    completion code and reason code, unless the
*    completion code is NO-MSG-AVAILABLE.
*
     IF (W03-COMPCODE NOT = MQCC-FAILED) OR
        (W03-REASON NOT = MQRC-NO-MSG-AVAILABLE)
         MOVE 'MQGET '          TO M02-OPERATION
         MOVE MQOD-OBJECTNAME   TO M02-OBJECTNAME
               PERFORM RECORD-CALL-ERROR
     END-IF.
⋮
```

### *Getting a message using signaling*

This example demonstrates how to use the MQGET call with signaling. This extract is taken from the Credit Check sample application (program CSQ4CVB2) supplied with IBM MQ for z/OS.

*Signaling is available only with IBM MQ for z/OS* .

```

⋮
* ----------------------------------------------------------*
 WORKING-STORAGE SECTION.
* ----------------------------------------------------------*
*
*    W00 - General work fields
 ⋮
 01  W00-WAIT-INTERVAL    PIC S9(09) BINARY VALUE 30000.
*
*    W03 - MQM API fields
*
 01  W03-HCONN            PIC S9(9) BINARY VALUE ZERO.
 01  W03-HOBJ-REPLYQ      PIC S9(9) BINARY.
 01  W03-COMPCODE         PIC S9(9) BINARY.
```

```
 01  W03-REASON           PIC S9(9) BINARY.
 01  W03-DATALEN          PIC S9(9) BINARY.
 01  W03-BUFFLEN          PIC S9(9) BINARY.
 ⋮
 01  W03-GET-BUFFER.
     05 W03-CSQ4BQRM.
     COPY CSQ4VB4.
*
     05 W03-CSQ4BIIM REDEFINES W03-CSQ4BQRM.
     COPY CSQ4VB1.
*
     05 W03-CSQ4BPGM REDEFINES W03-CSQ4BIIM.
     COPY CSQ4VB5.
     ⋮
*    API control blocks
*
 01  MQM-MESSAGE-DESCRIPTOR.
     COPY CMQMDV.
 01  MQM-GET-MESSAGE-OPTIONS.
     COPY CMQGMOV.
     ⋮
*    MQV contains constants (for filling in the
*    control blocks) and return codes (for testing
*    the result of a call).
*
 01  MQM-MQV.
 COPY CMQV SUPPRESS.
* ------------------------------------------------------------*
 LINKAGE SECTION.
* ------------------------------------------------------------*
 01  L01-ECB-ADDR-LIST.
     05  L01-ECB-ADDR1        POINTER.
     05  L01-ECB-ADDR2        POINTER.
```

```
*
 01  L02-ECBS.
     05  L02-INQUIRY-ECB1     PIC S9(09) BINARY.
     05  L02-REPLY-ECB2       PIC S9(09) BINARY.
 01  REDEFINES L02-ECBS.
     05                       PIC  X(02).
     05  L02-INQUIRY-ECB1-CC  PIC S9(04) BINARY.
     05                       PIC  X(02).
     05  L02-REPLY-ECB2-CC    PIC S9(04) BINARY.
*
* ------------------------------------------------------------*
 PROCEDURE DIVISION.
* ------------------------------------------------------------*
⋮
* Initialize variables, open queues, set signal on
* inquiry queue.
⋮
* ------------------------------------------------------------*
 PROCESS-SIGNAL-ACCEPTED SECTION.
* ------------------------------------------------------------*
*  This section gets a message with signal.  If a        *
*  message is received, process it.  If the signal       *
*  is set or is already set, the program goes into       *
*  an operating system wait.                             *
*  Otherwise an error is reported and call error set.    *
* ------------------------------------------------------------*
*
  PERFORM REPLYQ-GETSIGNAL.
*
  EVALUATE TRUE
      WHEN (W03-COMPCODE = MQCC-OK AND
              W03-REASON = MQRC-NONE)
          PERFORM PROCESS-REPLYQ-MESSAGE
*
      WHEN (W03-COMPCODE = MQCC-WARNING AND
              W03-REASON = MQRC-SIGNAL-REQUEST-ACCEPTED)
           OR
           (W03-COMPCODE = MQCC-FAILED AND
              W03-REASON = MQRC-SIGNAL-OUTSTANDING)
          PERFORM EXTERNAL-WAIT
*
      WHEN OTHER
          MOVE 'MQGET SIGNAL'  TO M02-OPERATION
          MOVE MQOD-OBJECTNAME TO M02-OBJECTNAME
          PERFORM RECORD-CALL-ERROR
          MOVE W06-CALL-ERROR  TO W06-CALL-STATUS
```

```
  END-EVALUATE.
*
 PROCESS-SIGNAL-ACCEPTED-EXIT.
*    Return to performing section
     EXIT.
     EJECT
*
```

```
* ------------------------------------------------------*
 EXTERNAL-WAIT SECTION.
* ------------------------------------------------------*
*  This section performs an external CICS wait on two    *
*  ECBs until at least one is posted.  It then calls     *
*  the sections to handle the posted ECB.                *
* ------------------------------------------------------*
     EXEC CICS WAIT EXTERNAL
         ECBLIST(W04-ECB-ADDR-LIST-PTR)
         NUMEVENTS(2)
     END-EXEC.
*
* At least one ECB must have been posted to get to this
* point. Test which ECB has been posted and perform
* the appropriate section.
*
     IF L02-INQUIRY-ECB1 NOT = 0
         PERFORM TEST-INQUIRYQ-ECB
     ELSE
         PERFORM TEST-REPLYQ-ECB
     END-IF.
*
 EXTERNAL-WAIT-EXIT.
*
*    Return to performing section.
*
     EXIT.
     EJECT
     ⋮
* ------------------------------------------------------*
 REPLYQ-GETSIGNAL SECTION.
* ------------------------------------------------------*
*                                                       *
* This section performs an MQGET call (in syncpoint with *
* signal) on the reply queue.  The signal field in the   *
* MQGMO is set to the address of the ECB.               *
* Response handling is done by the performing section.   *
*                                                       *
* ------------------------------------------------------*
*
     COMPUTE MQGMO-OPTIONS         =  MQGMO-SYNCPOINT +
                                      MQGMO-SET-SIGNAL.
     MOVE W00-WAIT-INTERVAL        TO MQGMO-WAITINTERVAL.
     MOVE LENGTH OF W03-GET-BUFFER TO W03-BUFFLEN.
*
     MOVE ZEROS                    TO L02-REPLY-ECB2.
     SET MQGMO-SIGNAL1 TO ADDRESS OF L02-REPLY-ECB2.
```

```
*
*    Set msgid and correlid to nulls so that any message
*    will qualify.
*
     MOVE MQMI-NONE TO MQMD-MSGID.
     MOVE MQCI-NONE TO MQMD-CORRELID.
*
     CALL 'MQGET' USING W03-HCONN
                        W03-HOBJ-REPLYQ
                        MQMD
                        MQGMO
                        W03-BUFFLEN
                        W03-GET-BUFFER
                        W03-DATALEN
                        W03-COMPCODE
                        W03-REASON.
*
 REPLYQ-GETSIGNAL-EXIT.
*
*    Return to performing section.
*
     EXIT.
```

```
     EJECT
*
     ⋮
```

### *Inquiring about the attributes of an object*

This example demonstrates how to use the MQINQ call to inquire about the attributes of a queue.

This extract is taken from the Queue Attributes sample application (program CSQ4CVC1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS ).

```
⋮
* -------------------------------------------------------*
 WORKING-STORAGE SECTION.
* -------------------------------------------------------*
*
*    W02 - MQM API fields
*
 01  W02-SELECTORCOUNT    PIC S9(9) BINARY VALUE 2.
 01  W02-INTATTRCOUNT     PIC S9(9) BINARY VALUE 2.
 01  W02-CHARATTRLENGTH   PIC S9(9) BINARY VALUE ZERO.
 01  W02-CHARATTRS        PIC X     VALUE LOW-VALUES.
 01  W02-HCONN            PIC S9(9) BINARY VALUE ZERO.
 01  W02-HOBJ             PIC S9(9) BINARY.
 01  W02-COMPCODE         PIC S9(9) BINARY.
 01  W02-REASON           PIC S9(9) BINARY.
 01  W02-SELECTORS-TABLE.
     05  W02-SELECTORS    PIC S9(9) BINARY OCCURS 2 TIMES
 01  W02-INTATTRS-TABLE.
     05  W02-INTATTRS     PIC S9(9) BINARY OCCURS 2 TIMES
*
*    CMQODV defines the object descriptor (MQOD).
*
 01  MQM-OBJECT-DESCRIPTOR.
     COPY CMQODV.
*
* CMQV contains constants (for setting or testing field
* values) and return codes (for testing the result of a
* call).
*
 01  MQM-CONSTANTS.
 COPY CMQV SUPPRESS.
* -------------------------------------------------------*
 PROCEDURE DIVISION.
* -------------------------------------------------------*
*
*    Get the queue name and open the queue.
*
     ⋮
*
*    Initialize the variables for the inquiry call:
*     - Set W02-SELECTORS-TABLE to the attributes whose
*    status is required
*     - All other variables are already set
*
     MOVE MQIA-INHIBIT-GET TO W02-SELECTORS(1).
     MOVE MQIA-INHIBIT-PUT TO W02-SELECTORS(2).
```

```
*
*    Inquire about the attributes.
*
     CALL 'MQINQ' USING W02-HCONN,
                        W02-HOBJ,
                        W02-SELECTORCOUNT,
                        W02-SELECTORS-TABLE,
                        W02-INTATTRCOUNT,
                        W02-INTATTRS-TABLE,
                        W02-CHARATTRLENGTH,
                        W02-CHARATTRS,
                        W02-COMPCODE,
                        W02-REASON.
*
* Test the output from the inquiry:
*
* - If the completion code is not OK, display an error
```

```
*   message showing the completion and reason codes
*
* - Otherwise, move the correct attribute status into
*   the relevant screen map fields
*
     IF W02-COMPCODE NOT = MQCC-OK
        MOVE 'MQINQ'       TO M01-MSG4-OPERATION
        MOVE W02-COMPCODE  TO M01-MSG4-COMPCODE
        MOVE W02-REASON    TO M01-MSG4-REASON
        MOVE M01-MESSAGE-4 TO M00-MESSAGE
*
     ELSE
*       Process the changes.
        ⋮
           END-IF.
        ⋮
```

### *Setting the attributes of a queue*

This example demonstrates how to use the MQSET call to change the attributes of a queue.

This extract is taken from the Queue Attributes sample application (program CSQ4CVC1) supplied with IBM MQ for z/OS. For the names and locations of the sample applications on other platforms, see Sample procedural programs (platforms except z/OS )

```
⋮
* ----------------------------------------------------------*
 WORKING-STORAGE SECTION.
* ----------------------------------------------------------*
*
*    W02 - MQM API fields
*
 01  W02-SELECTORCOUNT    PIC S9(9) BINARY VALUE 2.
 01  W02-INTATTRCOUNT     PIC S9(9) BINARY VALUE 2.
 01  W02-CHARATTRLENGTH   PIC S9(9) BINARY VALUE ZERO.
 01  W02-CHARATTRS        PIC X     VALUE LOW-VALUES.
 01  W02-HCONN            PIC S9(9) BINARY VALUE ZERO.
 01  W02-HOBJ             PIC S9(9) BINARY.
 01  W02-COMPCODE         PIC S9(9) BINARY.
 01  W02-REASON           PIC S9(9) BINARY.
 01  W02-SELECTORS-TABLE.
     05  W02-SELECTORS    PIC S9(9) BINARY OCCURS 2 TIMES.
 01  W02-INTATTRS-TABLE.
     05  W02-INTATTRS     PIC S9(9) BINARY OCCURS 2 TIMES.
*
*    CMQODV defines the object descriptor (MQOD).
*
 01  MQM-OBJECT-DESCRIPTOR.
     COPY CMQODV.
*
* CMQV contains constants (for setting or testing
* field values) and return codes (for testing the
* result of a call).
*
 01  MQM-CONSTANTS.
 COPY CMQV SUPPRESS.
* ----------------------------------------------------------*
 PROCEDURE DIVISION.
* ----------------------------------------------------------*
```

```
*
*    Get the queue name and open the queue.
*
⋮
*
*
* Initialize the variables required for the set call:
* - Set W02-SELECTORS-TABLE to the attributes to be set
* - Set W02-INTATTRS-TABLE to the required status
* - All other variables are already set
*
     MOVE MQIA-INHIBIT-GET   TO W02-SELECTORS(1).
     MOVE MQIA-INHIBIT-PUT   TO W02-SELECTORS(2).
     MOVE MQQA-GET-INHIBITED TO W02-INTATTRS(1).
     MOVE MQQA-PUT-INHIBITED TO W02-INTATTRS(2).
*
```

```
*    Set the attributes.
*
     CALL 'MQSET' USING W02-HCONN,
                        W02-HOBJ,
                        W02-SELECTORCOUNT,
                        W02-SELECTORS-TABLE,
                        W02-INTATTRCOUNT,
                        W02-INTATTRS-TABLE,
                        W02-CHARATTRLENGTH,
                        W02-CHARATTRS,
                        W02-COMPCODE,
                        W02-REASON.
*
* Test the output from the call:
*
*  - If the completion code is not OK, display an error
*    message showing the completion and reason codes
*
*  - Otherwise, move 'INHIBITED' into the relevant
*    screen map fields
*
     IF W02-COMPCODE NOT = MQCC-OK
        MOVE 'MQSET'       TO M01-MSG4-OPERATION
        MOVE W02-COMPCODE  TO M01-MSG4-COMPCODE
        MOVE W02-REASON    TO M01-MSG4-REASON
        MOVE M01-MESSAGE-4 TO M00-MESSAGE
     ELSE
*
*       Process the changes.
⋮
     END-IF.
```

## System/390 assembler-language examples

This collection of topics is mostly taken from the IBM MQ for z/OS sample applications.

### *Connecting to a queue manager*

This example demonstrates how to use the MQCONN call to connect a program to a queue manager in z/OS batch.

This extract is taken from the Browse sample program (CSQ4BAA1) supplied with IBM MQ for z/OS.

```
⋮
WORKAREA DSECT
*
PARMLIST CALL ,(0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
COMPCODE DS    F              Completion code
REASON   DS    F              Reason code
HCONN    DS    F              Connection handle
         ORG
PARMADDR DS    F              Address of parm field
PARMLEN  DS    H              Length of parm field
*
MQMNAME  DS    CL48           Queue manager name
*
*
************************************************************
*  SECTION NAME : MAINPARM                                 *
************************************************************
MAINPARM DS    0H
         MVI   MQMNAME,X'40'
         MVC   MQMNAME+1(L'MQMNAME-1),MQMNAME
*
* Space out first byte and initialize
*
*
* Code to address and verify parameters passed omitted
*
*
PARM1MVE DS    0H
         SR    R1,R3           Length of data
         LA    R4,MQMNAME      Address for target
         BCTR  R1,R0           Reduce for execute
         EX    R1,MOVEPARM     Move the data
*
```

```
*********************************************************
* EXECUTES                                              *
*********************************************************
MOVEPARM MVC   0(*-*,R4),0(R3)
*
         EJECT
```

```
*********************************************************
*  SECTION NAME : MAINCONN                              *
*********************************************************
*
*
MAINCONN DS    0H
         XC    HCONN,HCONN       Null connection handle
*
         CALL  MQCONN,                          X
               (MQMNAME,                        X
               HCONN,                           X
               COMPCODE,                        X
               REASON),                         X
               MF=(E,PARMLIST),VL
*
         LA    R0,MQCC_OK        Expected compcode
         C     R0,COMPCODE       As expected?
         BER   R6                Yes .. return to caller
*
         MVC   INF4_TYP,=CL10'CONNECT   '
         BAL   R7,ERRCODE              Translate error
         LA    R0,8                    Set exit code
         ST    R0,EXITCODE             to 8
         B     ENDPROG                 End the program
*
```

### *Disconnecting from a queue manager*

This example demonstrates how to use the MQDISC call to disconnect a program from a queue manager in z/OS batch.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*        ISSUE MQI DISC REQUEST USING REENTRANT FORM
*        OF CALL MACRO
*
*        HCONN WAS SET BY A PREVIOUS MQCONN REQUEST
*        R5 = WORK REGISTER
*
DISC     DS    0H
         CALL  MQDISC,                       X
               (HCONN,                       X
               COMPCODE,                     X
               REASON),                      X
               VL,MF=(E,CALLLST)
*
         LA    R5,MQCC_OK
         C     R5,COMPCODE
         BNE   BADCALL
         ⋮
```

```
BADCALL  DS    0H
⋮
*                   CONSTANTS
*
         CMQA
*
*        WORKING STORAGE (RE-ENTRANT)
*
WEG3     DSECT
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
HCONN    DS   F
COMPCODE DS   F
REASON   DS   F
```

```
*
*
LEG3     EQU  *-WKEG3
         END
```

### *Creating a dynamic queue*

This example demonstrates how to use the MQOPEN call to create a dynamic queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*    R5 = WORK REGISTER.
*
OPEN     DS   0H
*
         MVC  WOD_AREA,MQOD_AREA INITIALIZE WORKING VERSION OF
*                                  MQOD WITH DEFAULTS
         MVC  WOD_OBJECTNAME,MOD_Q    COPY IN THE MODEL Q NAME
         MVC  WOD_DYNAMICQNAME,DYN_Q  COPY IN THE DYNAMIC Q NAME
         L    R5,=AL4(MQOO_OUTPUT)    OPEN FOR OUTPUT AND
         A    R5,=AL4(MQOO_INQUIRE)   INQUIRE
         ST   R5,OPTIONS
```

```
*
* ISSUE MQI OPEN REQUEST USING REENTRANT
* FORM OF CALL MACRO
*
         CALL MQOPEN,                           X
               (HCONN,                          X
               WOD,                             X
               OPTIONS,                         X
               HOBJ,                            X
               COMPCODE,                        X
               REASON),VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK               CHECK THE COMPLETION CODE
         C   R5,COMPCODE              FROM THE REQUEST AND BRANCH
         BNE BADCALL                  TO ERROR ROUTINE IF NOT MQCC_OK
*
         MVC  TEMP_Q,WOD_OBJECTNAME  SAVE NAME OF TEMPORARY Q
*                             CREATED BY OPEN OF MODEL Q
*
⋮
BADCALL  DS   0H
⋮
*
*
*   CONSTANTS:
*
MOD_Q  DC   CL48'QUERY.REPLY.MODEL'  MODEL QUEUE NAME
DYN_Q  DC   CL48'QUERY.TEMPQ.*'      DYNAMIC QUEUE NAME
*
       CMQODA DSECT=NO,LIST=YES  CONSTANT VERSION OF MQOD
       CMQA                      MQI VALUE EQUATES
*
*   WORKING STORAGE
*
         DFHEISTG
HCONN    DS F                      CONNECTION HANDLE
OPTIONS  DS F                      OPEN OPTIONS
HOBJ     DS F                      OBJECT HANDLE
COMPCODE DS F                      MQI COMPLETION CODE
REASON   DS F                      MQI REASON CODE
TEMP_Q   DS CL(MQ_Q_NAME_LENGTH)   SAVED QNAME AFTER OPEN
*
WOD      CMQODA DSECT=NO,LIST=YES  WORKING VERSION OF MQOD
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L  LIST FORM
                                                 OF CALL
*                                                 MACRO
         ⋮
         END
```

### *Opening an existing queue*

This example demonstrates how to use the MQOPEN call to open a queue that has already been defined.

It shows how to specify two options. This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*    R5 = WORK REGISTER.
*
OPEN     DS   0H
*
         MVC  WOD_AREA,MQOD_AREA  INITIALIZE WORKING VERSION OF
*                                 MQOD WITH DEFAULTS
         MVC  WOD_OBJECTNAME,Q_NAME    SPECIFY Q NAME TO OPEN
         LA   R5,MQOO_INPUT_EXCLUSIVE  OPEN FOR MQGET CALLS
*
         ST   R5,OPTIONS
*
* ISSUE MQI OPEN REQUEST USING REENTRANT FORM
* OF CALL MACRO
*
         CALL MQOPEN,                          X
               (HCONN,                         X
               WOD,                            X
               OPTIONS,                        X
               HOBJ,                           X
               COMPCODE,                       X
               REASON),VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK         CHECK THE COMPLETION CODE
         C   R5,COMPCODE        FROM THE REQUEST AND BRANCH
         BNE BADCALL            TO ERROR ROUTINE IF NOT MQCC_OK
*
         ⋮
BADCALL  DS   0H
⋮
*
*
*   CONSTANTS:
*
Q_NAME   DC   CL48'REQUEST.QUEUE'  NAME OF QUEUE TO OPEN
*
         CMQODA DSECT=NO,LIST=YES  CONSTANT VERSION OF MQOD
         CMQA                      MQI VALUE EQUATES
*
*   WORKING STORAGE
*
         DFHEISTG
HCONN    DS F           CONNECTION HANDLE
OPTIONS  DS F           OPEN OPTIONS
HOBJ     DS F           OBJECT HANDLE
COMPCODE DS F           MQI COMPLETION CODE
REASON   DS F           MQI REASON CODE
*
WOD  CMQODA DSECT=NO,LIST=YES  WORKING VERSION OF MQOD
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L  LIST FORM
                                                 OF CALL
*                                                 MACRO
         ⋮
         END
```

### *Closing a queue*

This example demonstrates how to use the MQCLOSE call to close a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
* ISSUE MQI CLOSE REQUEST USING REENTRANT FROM OF
* CALL MACRO
*
*        HCONN WAS SET BY A PREVIOUS MQCONN REQUEST
*        HOBJ  WAS SET BY A PREVIOUS MQOPEN REQUEST
```

```
*        R5 = WORK REGISTER
*
CLOSE    DS    0H
         LA    R5,MQCO_NONE        NO SPECIAL CLOSE OPTIONS
         ST    R5,OPTIONS              ARE REQUIRED.
*
         CALL  MQCLOSE,                        X
               (HCONN,                         X
               HOBJ,                           X
               OPTIONS,                        X
               COMPCODE,                       X
               REASON),                        X
               VL,MF=(E,CALLLST)
*
         LA    R5,MQCC_OK
         C     R5,COMPCODE
         BNE   BADCALL
*
         ⋮
BADCALL  DS    0H
         ⋮
*                   CONSTANTS
*
         CMQA
*
*        WORKING STORAGE (REENTRANT)
*
WEG4     DSECT
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
HCONN    DS   F
HOBJ     DS   F
OPTIONS  DS   F
COMPCODE DS   F
REASON   DS   F
*
*
LEG4     EQU  *-WKEG4
         END
```

### *Putting a message using MQPUT*

This example demonstrates how to use the MQPUT call to put a message on a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*     CONNECT TO QUEUE MANAGER
*
CONN    DS  0H
⋮
*
*     OPEN A QUEUE
*
OPEN    DS  0H
⋮
*
*     R4,R5,R6,R7 = WORK REGISTER.
*
PUT  DS  0H
     LA   R4,MQMD           SET UP ADDRESSES AND
     LA   R5,MQMD_LENGTH    LENGTH FOR USE BY MVCL
     LA   R6,WMD            INSTRUCTION, AS MQMD IS
     LA   R7,WMD_LENGTH     OVER 256 BYES LONG.
     MVCL R6,R4             INITIALIZE WORKING VERSION
*                           OF MESSAGE DESCRIPTOR
*
     MVC  WPMO_AREA,MQPMO_AREA  INITIALIZE WORKING MQPMO
*

     LA   R5,BUFFER_LEN   RETRIEVE THE BUFFER LENGTH
     ST   R5,BUFFLEN      AND SAVE IT FOR MQM USE
*
     MVC  BUFFER,TEST_MSG    SET THE MESSAGE TO BE PUT
*
*    ISSUE MQI PUT REQUEST USING REENTRANT FORM
*    OF CALL MACRO
*
```

```
*        HCONN WAS SET BY PREVIOUS MQCONN REQUEST
*        HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST
*
         CALL MQPUT,                           X
               (HCONN,                         X
               HOBJ,                           X
               WMD,                            X
               WPMO,                           X
               BUFFLEN,                        X
               BUFFER,                         X
               COMPCODE,                       X
               REASON),VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK
         C   R5,COMPCODE
         BNE BADCALL
*
         ⋮
BADCALL DS  0H
⋮
```

```
*
*   CONSTANTS
*
CMQMDA DSECT=NO,LIST=YES,PERSISTENCE=MQPER_PERSISTENT
CMQPMOA DSECT=NO,LIST=YES
CMQA
TEST_MSG DC CL80'THIS IS A TEST MESSAGE'
*
*   WORKING STORAGE DSECT
*
WORKSTG DSECT
*
COMPCODE DS F
REASON  DS F
BUFFLEN DS F
OPTIONS DS F
HCONN  DS F
HOBJ   DS F
*
BUFFER  DS CL80
BUFFER_LEN EQU *-BUFFER
*
WMD   CMQMDA DSECT=NO,LIST=NO
WPMO   CMQPMOA DSECT=NO,LIST=NO
*
CALLLST CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
⋮
END
```

### *Putting a message using MQPUT1*

This example demonstrates how to use the MQPUT1 call to open a queue, put a single message on the queue, then close the queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*     CONNECT TO QUEUE MANAGER
*
CONN    DS  0H
⋮
*
*     R4,R5,R6,R7 = WORK REGISTER.
*
PUT      DS  0H
*
         MVC  WOD_AREA,MQOD_AREA     INITIALIZE WORKING VERSION OF
*                                    MQOD WITH DEFAULTS
         MVC  WOD_OBJECTNAME,Q_NAME  SPECIFY Q NAME FOR PUT1
*
         LA   R4,MQMD           SET UP ADDRESSES AND
         LA   R5,MQMD_LENGTH    LENGTH FOR USE BY MVCL
         LA   R6,WMD            INSTRUCTION, AS MQMD IS
         LA   R7,WMD_LENGTH     OVER 256 BYES LONG.
```

```
         MVCL R6,R4             INITIALIZE WORKING VERSION
*                               OF MESSAGE DESCRIPTOR
```

```
*
         MVC  WPMO_AREA,MQPMO_AREA       INITIALIZE WORKING MQPMO
*
         LA   R5,BUFFER_LEN           RETRIEVE THE BUFFER LENGTH
         ST   R5,BUFFLEN              AND SAVE IT FOR MQM USE
*
         MVC  BUFFER,TEST_MSG         SET THE MESSAGE TO BE PUT
*
* ISSUE MQI PUT REQUEST USING REENTRANT FORM OF CALL MACRO
*
*        HCONN WAS SET BY PREVIOUS MQCONN REQUEST
*        HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST
*
         CALL MQPUT1,                                X
               (HCONN,                               X
                LMQOD,                               X
                LMQMD,                               X
                LMQPMO,                              X
                BUFFERLENGTH,                        X
                BUFFER,                              X
                COMPCODE,                            X
                REASON),VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK
         C   R5,COMPCODE
         BNE BADCALL
*        .
BADCALL DS  0H
.
*
```

```
*      CONSTANTS
*
  CMQMDA DSECT=NO,LIST=YES,PERSISTENCE=MQPER_PERSISTENT
  CMQPMOA DSECT=NO,LIST=YES
  CMQODA DSECT=NO,LIST=YES
  CMQA
*
TEST_MSG DC CL80'THIS IS ANOTHER TEST MESSAGE'
Q_NAME   DC CL48'TEST.QUEUE.NAME'
*
*      WORKING STORAGE DSECT
*
WORKSTG  DSECT
*
COMPCODE DS F
REASON   DS F
BUFFLEN  DS F
OPTIONS  DS F
HCONN    DS F
HOBJ     DS F
*
BUFFER   DS CL80
BUFFER_LEN EQU *-BUFFER
*
WOD      CMQODA DSECT=NO,LIST=YES    WORKING VERSION OF MQOD
WMD      CMQMDA DSECT=NO,LIST=NO
WPMO     CMQPMOA DSECT=NO,LIST=NO
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
         .
         END
```

### *Getting a message*

This example demonstrates how to use the MQGET call to remove a message from a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*   CONNECT TO QUEUE MANAGER
*
CONN    DS  0H
⋮
*
*     OPEN A QUEUE FOR GET
*
OPEN    DS  0H
⋮
*
*     R4,R5,R6,R7 = WORK REGISTER.
*
GET  DS  0H
     LA   R4,MQMD               SET UP ADDRESSES AND
     LA   R5,MQMD_LENGTH        LENGTH FOR USE BY MVCL
     LA   R6,WMD                INSTRUCTION, AS MQMD IS
     LA   R7,WMD_LENGTH         OVER 256 BYES LONG.
     MVCL R6,R4                 INITIALIZE WORKING VERSION
*                                  OF MESSAGE DESCRIPTOR
*
     MVC  WGMO_AREA,MQGMO_AREA  INITIALIZE WORKING MQGMO
*
     LA   R5,BUFFER_LEN         RETRIEVE THE BUFFER LENGTH
     ST   R5,BUFFLEN            AND SAVE IT FOR MQM USE
*
*
* ISSUE MQI GET REQUEST USING REENTRANT FORM OF CALL MACRO
*
*        HCONN WAS SET BY PREVIOUS MQCONN REQUEST
*        HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST
*
         CALL  MQGET,                          X
               (HCONN,                         X
               HOBJ,                           X
               WMD,                            X
               WGMO,                           X
               BUFFLEN,                        X
               BUFFER,                         X
               DATALEN,                        X
               COMPCODE,                       X
               REASON),                        X
               VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK
         C   R5,COMPCODE
         BNE BADCALL
*        ⋮
BADCALL DS  0H
⋮
```

```
*
*      CONSTANTS
*
         CMQMDA DSECT=NO,LIST=YES
         CMQGMOA DSECT=NO,LIST=YES
         CMQA
*
*      WORKING STORAGE DSECT
*
WORKSTG  DSECT
*
COMPCODE DS F
REASON   DS F
BUFFLEN  DS F
DATALEN  DS F
OPTIONS  DS F
HCONN    DS F
HOBJ     DS F
```

```
*
BUFFER   DS CL80
BUFFER_LEN EQU *-BUFFER
*
WMD      CMQMDA DSECT=NO,LIST=NO
WGMO     CMQGMOA DSECT=NO,LIST=NO
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
.
END
```

### *Getting a message using the wait option*

This example demonstrates how to use the wait option of the MQGET call.

This code accepts truncated messages. This extract is not taken from the sample applications supplied with IBM MQ.

```
.
*     CONNECT TO QUEUE MANAGER
CONN    DS  0H
.
*     OPEN A QUEUE FOR GET
OPEN    DS  0H
.
*     R4,R5,R6,R7 = WORK REGISTER.
GET  DS  0H
     LA   R4,MQMD              SET UP ADDRESSES AND
     LA   R5,MQMD_LENGTH       LENGTH FOR USE BY MVCL
     LA   R6,WMD               INSTRUCTION, AS MQMD IS
     LA   R7,WMD_LENGTH        OVER 256 BYES LONG.
     MVCL R6,R4                INITIALIZE WORKING VERSION
*                                  OF MESSAGE DESCRIPTOR
```

```
*
     MVC  WGMO_AREA,MQGMO_AREA   INITIALIZE WORKING MQGMO
     L    R5,=AL4(MQGMO_WAIT)
     A    R5,=AL4(MQGMO_ACCEPT_TRUNCATED_MSG)
     ST   R5,WGMO_OPTIONS
     MVC  WGMO_WAITINTERVAL,TWO_MINUTES   WAIT UP TO TWO
                                          MINUTES BEFORE
                                          FAILING THE
                                          CALL
*
     LA   R5,BUFFER_LEN     RETRIEVE THE BUFFER LENGTH
     ST   R5,BUFFLEN        AND SAVE IT FOR MQM USE
*
*  ISSUE MQI GET REQUEST USING REENTRANT FORM OF CALL MACRO
*
*        HCONN WAS SET BY PREVIOUS MQCONN REQUEST
*        HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST
*
         CALL  MQGET,                            X
               (HCONN,                           X
               HOBJ,                             X
               WMD,                              X
               WGMO,                             X
               BUFFLEN,                          X
               BUFFER,                           X
               DATALEN,                          X
               COMPCODE,                         X
               REASON),                          X
               VL,MF=(E,CALLLST)
*
  LA  R5,MQCC_OK                DID THE MQGET REQUEST
  C   R5,COMPCODE                 WORK OK?
  BE  GETOK                     YES, SO GO AND PROCESS.
  LA  R5,MQCC_WARNING           NO, SO CHECK FOR A WARNING.
  C   R5,COMPCODE               IS THIS A WARNING?
  BE  CHECK_W                   YES, SO CHECK THE REASON.
*
  LA  R5,MQRC_NO_MSG_AVAILABLE  IT MUST BE AN ERROR.
                                IS IT DUE TO AN EMPTY
  C   R5,REASON                 QUEUE?
  BE  NOMSG                     YES, SO HANDLE THE ERROR
  B   BADCALL                   NO, SO GO TO ERROR ROUTINE
```

```
*
CHECK_W  DS  0H
         LA  R5,MQRC_TRUNCATED_MSG_ACCEPTED   IS THIS A
                                              TRUNCATED
         C   R5,REASON                        MESSAGE?
         BE  GETOK                  YES, SO GO AND PROCESS.
         B   BADCALL                NO, SOME OTHER WARNING
*
NOMSG    DS  0H
         ⋮
GETOK    DS  0H
         ⋮
```

```
BADCALL DS  0H
⋮
*
*      CONSTANTS
*
         CMQMDA DSECT=NO,LIST=YES
         CMQGMOA DSECT=NO,LIST=YES
         CMQA
*
TWO_MINUTES DC F'120000'       GET WAIT INTERVAL
*
*      WORKING STORAGE DSECT
```

```
*
WORKSTG  DSECT
*
COMPCODE DS F
REASON   DS F
BUFFLEN  DS F
DATALEN  DS F
OPTIONS  DS F
HCONN    DS F
HOBJ     DS F
*
BUFFER   DS CL80
BUFFER_LEN EQU *-BUFFER
*
WMD      CMQMDA DSECT=NO,LIST=NO
WGMO     CMQGMOA DSECT=NO,LIST=NO
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
         ⋮
         END
```

### *Getting a message using signaling*

This example demonstrates how to use the MQGET call to set a signal so that you are notified when a suitable message arrives on a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
⋮
*
*     CONNECT TO QUEUE MANAGER
*
CONN     DS  0H
         ⋮
*
*     OPEN A QUEUE FOR GET
*
OPEN     DS  0H
         ⋮
*
*     R4,R5,R6,R7 = WORK REGISTER.
*
GET  DS  0H
     LA   R4,MQMD               SET UP ADDRESSES AND
     LA   R5,MQMD_LENGTH        LENGTH FOR USE BY MVCL
     LA   R6,WMD                INSTRUCTION, AS MQMD IS
     LA   R7,WMD_LENGTH         OVER 256 BYES LONG.
```

```
     MVCL R6,R4                 INITIALIZE WORKING VERSION
*                                  OF MESSAGE DESCRIPTOR
```

```
*
     MVC  WGMO_AREA,MQGMO_AREA   INITIALIZE WORKING MQGMO
     LA   R5,MQGMO_SET_SIGNAL
     ST   R5,WGMO_OPTIONS
     MVC  WGMO_WAITINTERVAL,FIVE_MINUTES   WAIT UP TO FIVE
                                           MINUTES BEFORE
*                                          FAILING THE CALL
*
     XC   SIG_ECB,SIG_ECB   CLEAR THE ECB
     LA   R5,SIG_ECB        GET THE ADDRESS OF THE ECB
     ST   R5,WGMO_SIGNAL1   AND PUT IT IN THE WORKING
*                                 MQGMO
*

     LA   R5,BUFFER_LEN     RETRIEVE THE BUFFER LENGTH
     ST   R5,BUFFLEN        AND SAVE IT FOR MQM USE
*
*
*    ISSUE MQI GET REQUEST USING REENTRANT FORM OF CALL MACRO
*
*        HCONN WAS SET BY PREVIOUS MQCONN REQUEST
*        HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST
*
         CALL  MQGET,                          X
               (HCONN,                         X
               HOBJ,                           X
               WMD,                            X
               WGMO,                           X
               BUFFLEN,                        X
               BUFFER,                         X
               DATALEN,                        X
               COMPCODE,                       X
               REASON),                        X
               VL,MF=(E,CALLLST)
*
         LA  R5,MQCC_OK        DID THE MQGET REQUEST
         C   R5,COMPCODE       WORK OK?
         BE  GETOK             YES, SO GO AND PROCESS.
         LA  R5,MQCC_WARNING   NO, SO CHECK FOR A WARNING.
         C   R5,COMPCODE       IS THIS A WARNING?
         BE  CHECK_W           YES, SO CHECK THE REASON.
         B   BADCALL           NO, SO GO TO ERROR ROUTINE
*
```

```
CHECK_W  DS  0H
         LA  R5,MQRC_SIGNAL_REQUEST_ACCEPTED
         C   R5,REASON   SIGNAL REQUEST SIGNAL SET?
         BNE BADCALL     NO, SOME ERROR OCCURRED
         B   DOWORK      YES, SO DO SOMETHING
*                          ELSE
*
CHECKSIG DS  0H
         CLC SIG_ECB+1(3),=AL3(MQEC_MSG_ARRIVED)
                              IS A MESSAGE AVAILABLE?
         BE  GET              YES, SO GO AND GET IT
*
         CLC SIG_ECB+1(3),=AL3(MQEC_WAIT_INTERVAL_EXPIRED)
                            HAVE WE WAITED LONG ENOUGH?
         BE  NOMSG          YES, SO SAY NO MSG AVAILABLE
         B   BADCALL        IF IT'S ANYTHING ELSE
*                           GO TO ERROR ROUTINE.
*
DOWORK   DS  0H
         ⋮
         TM  SIG_ECB,X'40'   HAS THE SIGNAL ECB BEEN POSTED?
         BO  CHECKSIG        YES, SO GO AND CHECK WHY
         B   DOWORK          NO, SO GO AND DO MORE WORK
*
NOMSG    DS  0H
         ⋮
GETOK    DS  0H
         ⋮
BADCALL DS  0H
        ⋮
*
```

```
*      CONSTANTS
*
         CMQMDA DSECT=NO,LIST=YES
         CMQGMOA DSECT=NO,LIST=YES
         CMQA
*
FIVE_MINUTES DC F'300000'        GET SIGNAL INTERVAL
*
*      WORKING STORAGE DSECT
*
WORKSTG  DSECT
*
COMPCODE DS F
REASON   DS F
BUFFLEN  DS F
DATALEN  DS F
OPTIONS  DS F
HCONN    DS F
HOBJ     DS F
SIG_ECB  DS F
```

```
*
BUFFER   DS CL80
BUFFER_LEN EQU *-BUFFER
*
WMD      CMQMDA DSECT=NO,LIST=NO
WGMO     CMQGMOA DSECT=NO,LIST=NO
*
CALLLST  CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*
⋮
END
```

### *Inquiring about and setting the attributes of a queue*

This example demonstrates how to use the MQINQ call to inquire about the attributes of a queue and to use the MQSET call to change the attributes of a queue.

This extract is taken from the Queue Attributes sample application (program CSQ4CAC1) supplied with IBM MQ for z/OS.

```
⋮
DFHEISTG DSECT
         ⋮
OBJDESC  CMQODA LIST=YES   Working object descriptor
*
SELECTORCOUNT   DS F       Number of selectors
INTATTRCOUNT    DS F       Number of integer attributes
CHARATTRLENGTH  DS F       char attributes length
CHARATTRS       DS C       Area for char attributes
*
OPTIONS  DS   F            Command options
HCONN    DS   F            Handle of connection
HOBJ     DS   F            Handle of object
COMPCODE DS   F            Completion code
REASON   DS   F            Reason code
SELECTOR DS   2F           Array of selectors
INTATTRS DS   2F           Array of integer attributes
         ⋮
OBJECT   DS   CL(MQ_Q_NAME_LENGTH)   Name of queue
         ⋮
CALLLIST CALL ,(0,0,0,0,0,0,0,0,0,0,0),VL,MF=L
*************************************************************
*                   PROGRAM EXECUTION STARTS HERE        *
⋮
CSQ4CAC1 DFHEIENT CODEREG=(R3),DATAREG=(R13)
         ⋮
*        Initialize the variables for the set call
*
         SR   R0,R0               Clear register zero
         ST   R0,CHARATTRLENGTH   Set char length to zero
         LA   R0,2                Load to set
         ST   R0,SELECTORCOUNT    selectors add
         ST   R0,INTATTRCOUNT     integer attributes
*
         LA   R0,MQIA_INHIBIT_GET Load q attribute selector
```

```
         ST   R0,SELECTOR+0       Place in field
         LA   R0,MQIA_INHIBIT_PUT Load q attribute selector
         ST   R0,SELECTOR+4       Place in field
*
UPDTEST  DS   0H
         CLC  ACTION,CINHIB       Are we inhibiting?
         BE   UPDINHBT            Yes branch to section
*
         CLC  ACTION,CALLOW       Are we allowing?
         BE   UPDALLOW            Yes branch to section
*
         MVC  M00_MSG,M01_MSG1    Invalid request
         BR   R6                  Return to caller
*
```

```
UPDINHBT DS   0H
         MVC  UPDTYPE,CINHIBIT      Indicate action type
         LA   R0,MQQA_GET_INHIBITED Load attribute value
         ST   R0,INTATTRS+0         Place in field
         LA   R0,MQQA_PUT_INHIBITED Load attribute value
         ST   R0,INTATTRS+4         Place in field
         B    UPDCALL               Go and do call
*
UPDALLOW DS   0H
         MVC  UPDTYPE,CALLOWED      Indicate action type
         LA   R0,MQQA_GET_ALLOWED   Load attribute value
         ST   R0,INTATTRS+0         Place in field
         LA   R0,MQQA_PUT_ALLOWED   Load attribute value
         ST   R0,INTATTRS+4         Place in field
         B    UPDCALL               Go and do call
*
UPDCALL  DS   0H
         CALL MQSET,                          C
               (HCONN,                        C
               HOBJ,                          C
               SELECTORCOUNT,                 C
               SELECTOR,                      C
               INTATTRCOUNT,                  C
               INTATTRS,                      C
               CHARATTRLENGTH,                C
               CHARATTRS,                     C
               COMPCODE,                      C
               REASON),                       C
               VL,MF=(E,CALLLIST)
*
         LA   R0,MQCC_OK    Load expected compcode
         C    R0,COMPCODE   Was set successful?
         ⋮
*  SECTION NAME : INQUIRE                                  *
*  FUNCTION     : Inquires on the objects attributes       *
*  CALLED BY    : PROCESS                                  *
*  CALLS        : OPEN, CLOSE, CODES                       *
*  RETURN       : To Register 6                            *
INQUIRE  DS   0H
         ⋮
```

```
*        Initialize the variables for the inquire call
*
         SR   R0,R0               Clear register zero
         ST   R0,CHARATTRLENGTH   Set char length to zero
         LA   R0,2                Load to set
         ST   R0,SELECTORCOUNT    selectors add
         ST   R0,INTATTRCOUNT     integer attributes
*
         LA   R0,MQIA_INHIBIT_GET Load attribute value
         ST   R0,SELECTOR+0       Place in field
         LA   R0,MQIA_INHIBIT_PUT Load attribute value
         ST   R0,SELECTOR+4       Place in field
         CALL MQINQ,                          C
               (HCONN,                        C
               HOBJ,                          C
               SELECTORCOUNT,                 C
               SELECTOR,                      C
               INTATTRCOUNT,                  C
               INTATTRS,                      C
               CHARATTRLENGTH,                C
               CHARATTRS,                     C
               COMPCODE,                      C
```

```
             REASON),                       C
             VL,MF=(E,CALLLIST)
         LA   R0,MQCC_OK        Load expected compcode
         C    R0,COMPCODE       Was inquire successful?
         ⋮
```

## PL/I examples

The use of PL/I is supported by z/OS only. This collection of topics demonstrates techniques using PL/I examples.

### *Connecting to a queue manager*

This example demonstrates how to use the MQCONN call to connect a program to a queue manager in z/OS batch.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQP);
%INCLUDE SYSLIB(CMQEPP);
:
/*****************************************************/
/* STRUCTURE BASED ON PARAMETER INPUT AREA (PARAM)  */
/*****************************************************/
DCL 1 INPUT_PARAM      BASED(ADDR(PARAM)),
      2 PARAM_LENGTH   FIXED BIN(15),
      2 PARAM_MQMNAME  CHAR(48);
      ⋮
/*****************************************************/
/* WORKING STORAGE DECLARATIONS                      */
/*****************************************************/
DCL MQMNAME                  CHAR(48);
DCL COMPCODE                 BINARY FIXED (31);
DCL REASON                   BINARY FIXED (31);
DCL HCONN                    BINARY FIXED (31);
⋮
/*****************************************************/
/* COPY QUEUE MANAGER NAME PARAMETER                 */
/* TO LOCAL STORAGE                                  */
/*****************************************************/
MQMNAME = ' ';
MQMNAME = SUBSTR(PARAM_MQMNAME,1,PARAM_LENGTH);
⋮
/*****************************************************/
/* CONNECT FROM THE QUEUE MANAGER                    */
/*****************************************************/
CALL MQCONN (MQMNAME,     /* MQM SYSTEM NAME        */
             HCONN,       /* CONNECTION HANDLE      */
             COMPCODE,    /* COMPLETION CODE        */
             REASON);     /* REASON CODE            */

/*****************************************************/
/* TEST THE COMPLETION CODE OF THE CONNECT CALL.     */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE     */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE. */
/*****************************************************/
IF COMPCODE ¬= MQCC_OK
   THEN DO;
     ⋮
     CALL ERROR_ROUTINE;
   END;
```

### *Disconnecting from a queue manager*

This example demonstrates how to use the MQDISC call to disconnect a program from a queue manager in z/OS batch.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQP);
%INCLUDE SYSLIB(CMQEPP);
:
/*****************************************************/
/* WORKING STORAGE DECLARATIONS                      */
```

```
     /*************************************************/
     DCL COMPCODE                  BINARY FIXED (31);
     DCL REASON                    BINARY FIXED (31);
     DCL HCONN                     BINARY FIXED (31);
 ⋮
     /*************************************************/
     /* DISCONNECT FROM THE QUEUE MANAGER             */
     /*************************************************/
     CALL MQDISC (HCONN,       /* CONNECTION HANDLE      */
                  COMPCODE,    /* COMPLETION CODE        */
                  REASON);     /* REASON CODE            */

/*************************************************************/
/* TEST THE COMPLETION CODE OF THE DISCONNECT CALL.          */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE             */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.          */
/*************************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

### *Creating a dynamic queue*

This example demonstrates how to use the MQOPEN call to create a dynamic queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     :
/*********************************************************/
/* WORKING STORAGE DECLARATIONS                          */
/*********************************************************/
DCL COMPCODE                  BINARY FIXED (31);
DCL REASON                    BINARY FIXED (31);
DCL HCONN                     BINARY FIXED (31);
DCL HOBJ                      BINARY FIXED (31);
DCL OPTIONS                   BINARY FIXED (31);
⋮
DCL MODEL_QUEUE_NAME     CHAR(48) INIT('PL1.REPLY.MODEL');
DCL DYNAMIC_NAME_PREFIX  CHAR(48) INIT('PL1.TEMPQ.*');
DCL DYNAMIC_QUEUE_NAME   CHAR(48) INIT(' ');
⋮
/*********************************************************/
/* LOCAL COPY OF OBJECT DESCRIPTOR                       */
/*********************************************************/
DCL 1 LMQOD  LIKE MQOD;
⋮
/*********************************************************/
/* SET UP OBJECT DESCRIPTOR FOR OPEN OF REPLY QUEUE      */
/*********************************************************/
LMQOD.OBJECTTYPE =MQOT_Q;
LMQOD.OBJECTNAME = MODEL_QUEUE_NAME;
LMQOD.DYNAMICQNAME = DYNAMIC_NAME_PREFIX;
OPTIONS = MQOO_INPUT_EXCLUSIVE;

     CALL MQOPEN (HCONN,
                  LMQOD,
                  OPTIONS,
                  HOBJ,
                  COMPCODE,
                  REASON);

/*********************************************************/
/* TEST THE COMPLETION CODE OF THE OPEN CALL.            */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE         */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.      */
/* IF THE CALL HAS SUCCEEDED THEN EXTRACT THE NAME OF    */
/* THE NEWLY CREATED DYNAMIC QUEUE FROM THE OBJECT       */
/* DESCRIPTOR.                                           */
/*********************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

```
        ELSE
          DYNAMIC_QUEUE_NAME = LMQOD_OBJECTNAME;
```

### *Opening an existing queue*

This example demonstrates how to use the MQOPEN call to open an existing queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQP);
%INCLUDE SYSLIB(CMQEPP);
:
/*********************************************************/
/* WORKING STORAGE DECLARATIONS                          */
/*********************************************************/
DCL COMPCODE           BINARY FIXED (31);
DCL REASON             BINARY FIXED (31);
DCL HCONN              BINARY FIXED (31);
DCL HOBJ               BINARY FIXED (31);
DCL OPTIONS            BINARY FIXED (31);
⋮
DCL QUEUE_NAME         CHAR(48) INIT('PL1.LOCAL.QUEUE');
⋮
/*********************************************************/
/* LOCAL COPY OF OBJECT DESCRIPTOR                       */
/*********************************************************/
DCL 1 LMQOD  LIKE MQOD;
⋮
/*********************************************************/
/* SET UP OBJECT DESCRIPTOR FOR OPEN OF REPLY QUEUE      */
/*********************************************************/
LMQOD.OBJECTTYPE = MQOT_Q;
LMQOD.OBJECTNAME = QUEUE_NAME;
OPTIONS = MQOO_INPUT_EXCLUSIVE;

CALL MQOPEN (HCONN,
             LMQOD,
             OPTIONS,
             HOBJ,
             COMPCODE,
             REASON);

/*********************************************************/
/* TEST THE COMPLETION CODE OF THE OPEN CALL.            */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE         */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.      */
/*********************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

### *Closing a queue*

This example demonstrates how to use the MQCLOSE call.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQP);
%INCLUDE SYSLIB(CMQEPP);
:
/*********************************************************/
/* WORKING STORAGE DECLARATIONS                          */
/*********************************************************/
DCL COMPCODE                  BINARY FIXED (31);
DCL REASON                    BINARY FIXED (31);
DCL HCONN                     BINARY FIXED (31);
DCL HOBJ                      BINARY FIXED (31);
DCL OPTIONS                   BINARY FIXED (31);
⋮
/*********************************************************/
/* SET CLOSE OPTIONS                                     */
/*********************************************************/
OPTIONS=MQCO_NONE;

/*********************************************************/
```

```
/* CLOSE QUEUE                                              */
/*********************************************************/
   CALL MQCLOSE (HCONN,      /* CONNECTION HANDLE        */
                 HOBJ,       /* OBJECT HANDLE            */
                 OPTIONS,    /* CLOSE OPTIONS            */
                 COMPCODE,   /* COMPLETION CODE          */
                 REASON);    /* REASON CODE              */

/*********************************************************/
/* TEST THE COMPLETION CODE OF THE CLOSE CALL.           */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE         */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.      */
/*********************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          :
          CALL ERROR_ROUTINE;
        END;
```

### *Putting a message using MQPUT*

This example demonstrates how to use the MQPUT call using context.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQP);
%INCLUDE SYSLIB(CMQEPP);
:
/*********************************************************/
/* WORKING STORAGE DECLARATIONS                          */
/*********************************************************/
DCL COMPCODE                  BINARY FIXED (31);
DCL REASON                    BINARY FIXED (31);
DCL HCONN                     BINARY FIXED (31);
DCL HOBJ                      BINARY FIXED (31);
DCL OPTIONS                   BINARY FIXED (31);
DCL BUFFLEN                   BINARY FIXED (31);
DCL BUFFER                    CHAR(80);
:
DCL PL1_TEST_MESSAGE          CHAR(80)
INIT('*****     THIS IS A TEST MESSAGE     *****');
:
/*********************************************************/
/* LOCAL COPY OF MESSAGE DESCRIPTOR                      */
/* AND PUT MESSAGE OPTIONS                               */
/*********************************************************/
DCL 1 LMQMD  LIKE MQMD;
DCL 1 LMQPMO LIKE MQPMO;
:
/*********************************************************/
/* SET UP MESSAGE DESCRIPTOR                             */
/*********************************************************/
LMQMD.MSGTYPE = MQMT_DATAGRAM;
LMQMD.PRIORITY = 1;
LMQMD.PERSISTENCE = MQPER_PERSISTENT;
LMQMD.REPLYTOQ = ' ';
LMQMD.REPLYTOQMGR = ' ';
LMQMD.MSGID = MQMI_NONE;
LMQMD.CORRELID = MQCI_NONE;

/*********************************************************/
/* SET UP PUT MESSAGE OPTIONS                            */
/*********************************************************/
LMQPMO.OPTIONS = MQPMO_NO_SYNCPOINT;

/*********************************************************/
/* SET UP LENGTH OF MESSAGE BUFFER AND THE MESSAGE       */
/*********************************************************/
BUFFLEN = LENGTH(BUFFER);
BUFFER = PL1_TEST_MESSAGE;
/*********************************************************/
/*                                                       */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.             */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.              */
/*                                                       */
/*********************************************************/
CALL MQPUT (HCONN,
            HOBJ,
            LMQMD,
```

```
            LMQPMO,
            BUFFLEN,
            BUFFER,
            COMPCODE,
            REASON);
```

```
/*********************************************************/
/* TEST THE COMPLETION CODE OF THE PUT CALL.             */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE         */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.      */
/*********************************************************/
    IF COMPCODE ¬= MQCC_OK
       THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

### *Putting a message using MQPUT1*

This example demonstrates how to use the MQPUT1 call.

This extract is not taken from the sample applications supplied with IBM MQ.

```
%INCLUDE SYSLIB(CMQEPP);
%INCLUDE SYSLIB(CMQP);
⋮
/*********************************************************/
/* WORKING STORAGE DECLARATIONS             */
/*********************************************************/
DCL COMPCODE      BINARY FIXED (31);
DCL REASON       BINARY FIXED (31);
DCL HCONN        BINARY FIXED (31);
DCL OPTIONS       BINARY FIXED (31);
DCL BUFFLEN       BINARY FIXED (31);
DCL BUFFER       CHAR(80);
⋮
DCL REPLY_TO_QUEUE   CHAR(48) INIT('PL1.REPLY.QUEUE');
DCL QUEUE_NAME     CHAR(48) INIT('PL1.LOCAL.QUEUE');
DCL PL1_TEST_MESSAGE  CHAR(80)
INIT('***** THIS IS ANOTHER TEST MESSAGE *****');
⋮
/*********************************************************/
/* LOCAL COPY OF OBJECT DESCRIPTOR, MESSAGE DESCRIPTOR  */
/* AND PUT MESSAGE OPTIONS                */
/*********************************************************/
DCL 1 LMQOD LIKE MQOD;
DCL 1 LMQMD LIKE MQMD;
DCL 1 LMQPMO LIKE MQPMO;
⋮
/*********************************************************/
/* SET UP OBJECT DESCRIPTOR AS REQUIRED.         */
/*********************************************************/
LMQOD.OBJECTTYPE = MQOT_Q;
LMQOD.OBJECTNAME = QUEUE_NAME;

/*********************************************************/
/* SET UP MESSAGE DESCRIPTOR AS REQUIRED.        */
/*********************************************************/
LMQMD.MSGTYPE = MQMT_REQUEST;
LMQMD.PRIORITY = 5;
LMQMD.PERSISTENCE = MQPER_PERSISTENT;
LMQMD.REPLYTOQ = REPLY_TO_QUEUE;
LMQMD.REPLYTOQMGR = ' ';
LMQMD.MSGID = MQMI_NONE;
LMQMD.CORRELID = MQCI_NONE;
```

```
/*********************************************************/
/* SET UP PUT MESSAGE OPTIONS AS REQUIRED        */
/*********************************************************/
LMQPMO.OPTIONS = MQPMO_NO_SYNCPOINT;

/*********************************************************/
/* SET UP LENGTH OF MESSAGE BUFFER AND THE MESSAGE    */
/*********************************************************/
BUFFLEN = LENGTH(BUFFER);
```

```
BUFFER = PL1_TEST_MESSAGE;

CALL MQPUT1 (HCONN,
LMQOD,
LMQMD,
LMQPMO,
BUFFLEN,
BUFFER,
COMPCODE,
REASON);

/*********************************************************/
/* TEST THE COMPLETION CODE OF THE PUT1 CALL.      */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE SHOWING */
/* THE COMPLETION CODE AND THE REASON CODE.       */
/*********************************************************/
IF COMPCODE ¬= MQCC_OK
THEN DO;
⋮
CALL ERROR_ROUTINE;
END;
```

### *Getting a message*

This example demonstrates how to use the MQGET call to remove a message from a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     ⋮
/*********************************************************/
/* WORKING STORAGE DECLARATIONS                          */
/*********************************************************/
     DCL COMPCODE                  BINARY FIXED (31);
     DCL REASON                    BINARY FIXED (31);
     DCL HCONN                     BINARY FIXED (31);
     DCL HOBJ                      BINARY FIXED (31);
     DCL BUFFLEN                   BINARY FIXED (31);
     DCL DATALEN                   BINARY FIXED (31);
     DCL BUFFER                    CHAR(80);
⋮
```

```
/*********************************************************/
/* LOCAL COPY OF MESSAGE DESCRIPTOR AND                  */
/* GET MESSAGE OPTIONS                                   */
/*********************************************************/
     DCL 1 LMQMD  LIKE MQMD;
     DCL 1 LMQGMO LIKE MQGMO;
     ⋮
/*********************************************************/
/* SET UP MESSAGE DESCRIPTOR AS REQUIRED.                */
/* MSGID AND CORRELID IN MQMD SET TO NULLS SO FIRST      */
/* AVAILABLE MESSAGE WILL BE RETRIEVED.                  */
/*********************************************************/
     LMQMD.MSGID = MQMI_NONE;
     LMQMD.CORRELID = MQCI_NONE;

/*********************************************************/
/* SET UP GET MESSAGE OPTIONS AS REQUIRED.               */
/*********************************************************/
     LMQGMO.OPTIONS = MQGMO_NO_SYNCPOINT;

/*********************************************************/
/* SET UP LENGTH OF MESSAGE BUFFER.                      */
/*********************************************************/
     BUFFLEN = LENGTH(BUFFER);
/*********************************************************/
/*                                                       */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.             */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.              */
/*                                                       */
/*********************************************************/

     CALL MQGET (HCONN,
                 HOBJ,
                 LMQMD,
```

```
                LMQGMO,
                BUFFERLEN,
                BUFFER,
                DATALEN,
                COMPCODE,
                REASON);

/*************************************************************/
/* TEST THE COMPLETION CODE OF THE GET CALL.                 */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE             */
/* SHOWING THE COMPLETION CODE AND THE REASON CODE.          */
/*************************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

### *Getting a message using the wait option*

This example demonstrates how to use the MQGET call with the wait option and accepting truncated messages.

This extract is not taken from the sample applications supplied with IBM MQ.

```
     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     ⋮
/*************************************************************/
/* WORKING STORAGE DECLARATIONS                              */
/*************************************************************/
     DCL COMPCODE                  BINARY FIXED (31);
     DCL REASON                    BINARY FIXED (31);
     DCL HCONN                     BINARY FIXED (31);
     DCL HOBJ                      BINARY FIXED (31);
     DCL BUFFLEN                   BINARY FIXED (31);
     DCL DATALEN                   BINARY FIXED (31);
     DCL BUFFER                    CHAR(80);
     ⋮
/*************************************************************/
/* LOCAL COPY OF MESSAGE DESCRIPTOR AND GET MESSAGE          */
/* OPTIONS                                                   */
/*************************************************************/
     DCL 1 LMQMD  LIKE MQMD;
     DCL 1 LMQGMO LIKE MQGMO;
     ⋮
/*************************************************************/
/* SET UP MESSAGE DESCRIPTOR AS REQUIRED.                    */
/* MSGID AND CORRELID IN MQMD SET TO NULLS SO FIRST          */
/* AVAILABLE MESSAGE WILL BE RETRIEVED.                      */
/*************************************************************/
     LMQMD.MSGID = MQMI_NONE;
     LMQMD.CORRELID = MQCI_NONE;

/*************************************************************/
/* SET UP GET MESSAGE OPTIONS AS REQUIRED.                   */
/* WAIT INTERVAL SET TO ONE MINUTE.                          */
/*************************************************************/
     LMQGMO.OPTIONS = MQGMO_WAIT +
                      MQGMO_ACCEPT_TRUNCATED_MSG +
                      MQGMO_NO_SYNCPOINT;
     LMQGMO.WAITINTERVAL=60000;

/*************************************************************/
/* SET UP LENGTH OF MESSAGE BUFFER.                          */
/*************************************************************/
     BUFFLEN = LENGTH(BUFFER);
```

```
/*************************************************************/
/*                                                           */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.                 */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.                  */
/*                                                           */
/*************************************************************/

     CALL MQGET (HCONN,
                 HOBJ,
```

```
                LMQMD,
                LMQGMO,
                BUFFERLEN,
                BUFFER,
                DATALEN,
                COMPCODE,
                REASON);

/*******************************************************/
/* TEST THE COMPLETION CODE OF THE GET CALL.           */
/* TAKE APPROPRIATE ACTION BASED ON COMPLETION CODE AND  */
/* REASON CODE.                                        */
/*******************************************************/

     SELECT(COMPCODE);
       WHEN (MQCC_OK) DO;   /* GET WAS SUCCESSFUL */
       :
       END;
       WHEN (MQCC_WARNING) DO;
         IF REASON = MQRC_TRUNCATED_MSG_ACCEPTED
           THEN DO;         /* GET WAS SUCCESSFUL */
           :
           END;
           ELSE DO;
             :
             CALL ERROR_ROUTINE;
           END;
       END;
       WHEN (MQCC_FAILED) DO;
           :
           CALL ERROR_ROUTINE;
         END;
       END;
       OTHERWISE;
     END;
```

### *Getting a message using signaling*

A code extract that demonstrates how to use the MQGET call with signaling.

**Signaling is available only with IBM MQ for z/OS** .

This extract is not taken from the sample applications supplied with IBM MQ.

```


     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     :
/*******************************************************/
/* WORKING STORAGE DECLARATIONS                        */
/*******************************************************/
     DCL COMPCODE                  BINARY FIXED (31);
     DCL REASON                    BINARY FIXED (31);
     DCL HCONN                     BINARY FIXED (31);
     DCL HOBJ                      BINARY FIXED (31);
     DCL DATALEN                   BINARY FIXED (31);
     DCL BUFFLEN                   BINARY FIXED (31);
     DCL BUFFER                    CHAR(80);
     :
     DCL ECB_FIXED           FIXED BIN(31);
     DCL 1 ECB_OVERLAY BASED(ADDR(ECB_FIXED)),
           3 ECB_WAIT    BIT,
           3 ECB_POSTED  BIT,
           3 ECB_FLAG3_8 BIT(6),
           3 ECB_CODE  PIC'999';
     :
/*******************************************************/
/* LOCAL COPY OF MESSAGE DESCRIPTOR AND GET MESSAGE      */
/* OPTIONS                                             */
/*******************************************************/
     DCL 1 LMQMD  LIKE MQMD;
     DCL 1 LMQGMO LIKE MQGMO;
     :
/*******************************************************/
/* CLEAR ECB FIELD.                                    */
/*******************************************************/
     ECB_FIXED = 0;
     :
/*******************************************************/
/* SET UP MESSAGE DESCRIPTOR AS REQUIRED.              */
```

```
/* MSGID AND CORRELID IN MQMD SET TO NULLS SO FIRST      */
/* AVAILABLE MESSAGE WILL BE RETRIEVED.                 */
/******************************************************/
     LMQMD.MSGID = MQMI_NONE;
     LMQMD.CORRELID = MQCI_NONE;
/******************************************************/
/* SET UP GET MESSAGE OPTIONS AS REQUIRED.              */
/* WAIT INTERVAL SET TO ONE MINUTE.                     */
/******************************************************/
     LMQGMO.OPTIONS = MQGMO_SET_SIGNAL +
                      MQGMO_NO_SYNCPOINT;
     LMQGMO.WAITINTERVAL=60000;
     LMQGMO.SIGNAL1 = ADDR(ECB_FIXED);
```

```
/******************************************************/
/* SET UP LENGTH OF MESSAGE BUFFER.                     */
/* CALL MESSGE RETRIEVAL ROUTINE.                       */
/******************************************************/
     BUFFLEN = LENGTH(BUFFER);
     CALL GET_MSG;

/******************************************************/
/* TEST THE COMPLETION CODE OF THE GET CALL.            */
/* TAKE APPROPRIATE ACTION BASED ON COMPLETION CODE AND  */
/* REASON CODE.                                         */
/******************************************************/

     SELECT;
       WHEN ((COMPCODE = MQCC_OK) &
             (REASON = MQCC_NONE)) DO
         ⋮
         CALL MSG_ROUTINE;
         ⋮
       END;
       WHEN ((COMPCODE = MQCC_WARNING) &
             (REASON = MQRC_SIGNAL_REQUEST_ACCEPTED)) DO;
         ⋮
         CALL DO_WORK;
         ⋮
       END;
       WHEN  ((COMPCODE = MQCC_FAILED) &
             (REASON = MQRC_SIGNAL_OUTSTANDING)) DO;
         ⋮
         CALL DO_WORK;
         ⋮
       END;
       OTHERWISE DO;        /* FAILURE CASE */
/******************************************************/
/* ISSUE AN ERROR MESSAGE SHOWING THE COMPLETION CODE    */
/* AND THE REASON CODE.                                 */
/******************************************************/
          ⋮
          CALL ERROR_ROUTINE;
          ⋮
       END;
     END;
     ⋮
```

```
 DO_WORK: PROC;
     ⋮
     IF ECB_POSTED
        THEN DO;
          SELECT(ECB_CODE);
            WHEN(MQEC_MSG_ARRIVED) DO;
              ⋮
              CALL GET_MSG;
              ⋮
            END;
            WHEN(MQEC_WAIT_INTERVAL_EXPIRED) DO;
              ⋮
              CALL NO_MSG;
              ⋮
            END;
            OTHERWISE DO;        /* FAILURE CASE */
/******************************************************/
/* ISSUE AN ERROR MESSAGE SHOWING THE COMPLETION CODE  */
/* AND THE REASON CODE.                                 */
```

```
/*******************************************************/
              ⋮
              CALL ERROR_ROUTINE;
              ⋮
           END;

          END;

       END;
     ⋮
 END DO_WORK;

 GET_MSG: PROC;
```

```
/*******************************************************/
/*                                                     */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.           */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.            */
/* MD AND GMO SET UP AS REQUIRED.                      */
/*                                                     */
/*******************************************************/

     CALL MQGET (HCONN,
                 HOBJ,
                 LMQMD,
                 LMQGMO,
                 BUFFLEN,
                 BUFFER,
                 DATALEN,
                 COMPCODE,
                 REASON);

 END GET_MSG;

 NO_MSG: PROC;
 ⋮
 END NO_MSG;
```

### *Inquiring about the attributes of an object*

This example demonstrates how to use the MQINQ call to inquire about the attributes of a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     :
/*******************************************************/
/* WORKING STORAGE DECLARATIONS                        */
/*******************************************************/
     DCL COMPCODE                  BINARY FIXED (31);
     DCL REASON                    BINARY FIXED (31);
     DCL HCONN                     BINARY FIXED (31);
     DCL HOBJ                      BINARY FIXED (31);
     DCL OPTIONS                   BINARY FIXED (31);
     DCL SELECTORCOUNT             BINARY FIXED (31);
     DCL INTATTRCOUNT              BINARY FIXED (31);
     DCL 1 SELECTOR_TABLE,
         3 SELECTORS(5)            BINARY FIXED (31);
     DCL 1 INTATTR_TABLE,
         3 INTATTRS(5)             BINARY FIXED (31);
     DCL CHARATTRLENGTH            BINARY FIXED (31);
     DCL CHARATTRS                 CHAR(100);
     ⋮

/*******************************************************/
/* SET VARIABLES FOR INQUIRE CALL                      */
/* INQUIRE ON THE CURRENT QUEUE DEPTH                  */
/*******************************************************/

     SELECTORS(01) = MQIA_CURRENT_Q_DEPTH;

     SELECTORCOUNT  = 1;
     INTATTRCOUNT   = 1;

     CHARATTRLENGTH = 0;
/*******************************************************/
```

```
/*                                                            */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.                  */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.                   */
/*                                                            */
/************************************************************/
     CALL MQINQ (HCONN,
                 HOBJ,
                 SELECTORCOUNT,
                 SELECTORS,
                 INTATTRCOUNT,
                 INTATTRS,
                 CHARATTRLENGTH,
                 CHARATTRS,
                 COMPCODE,
                 REASON);
```

```
/************************************************************/
/* TEST THE COMPLETION CODE OF THE INQUIRE CALL.            */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE SHOWING    */
/* THE COMPLETION CODE AND THE REASON CODE.                 */
/************************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

### *Setting the attributes of a queue*

This example demonstrates how to use the MQSET call to change the attributes of a queue.

This extract is not taken from the sample applications supplied with IBM MQ.

```
     %INCLUDE SYSLIB(CMQP);
     %INCLUDE SYSLIB(CMQEPP);
     :
/************************************************************/
/* WORKING STORAGE DECLARATIONS                             */
/************************************************************/
     DCL COMPCODE                 BINARY FIXED (31);
     DCL REASON                   BINARY FIXED (31);
     DCL HCONN                    BINARY FIXED (31);
     DCL HOBJ                     BINARY FIXED (31);
     DCL OPTIONS                  BINARY FIXED (31);
     DCL SELECTORCOUNT            BINARY FIXED (31);
     DCL INTATTRCOUNT             BINARY FIXED (31);
     DCL 1 SELECTOR_TABLE,
         3 SELECTORS(5)           BINARY FIXED (31);
     DCL 1 INTATTR_TABLE,
         3 INTATTRS(5)            BINARY FIXED (31);
     DCL CHARATTRLENGTH           BINARY FIXED (31);
     DCL CHARATTRS                CHAR(100);
     ⋮

/************************************************************/
/* SET VARIABLES FOR SET CALL                               */
/* SET GET AND PUT INHIBITED                                */
/************************************************************/

     SELECTORS(01) = MQIA_INHIBIT_GET;
     SELECTORS(02) = MQIA_INHIBIT_PUT;

     INTATTRS(01) = MQQA_GET_INHIBITED;
     INTATTRS(02) = MQQA_PUT_INHIBITED;

     SELECTORCOUNT  = 2;
     INTATTRCOUNT   = 2;

     CHARATTRLENGTH = 0;
```

```
/************************************************************/
/*                                                          */
/* HCONN WAS SET BY PREVIOUS MQCONN REQUEST.                */
/* HOBJ WAS SET BY PREVIOUS MQOPEN REQUEST.                 */
/*                                                          */
```

```
/*********************************************************/
     CALL MQSET (HCONN,
                 HOBJ,
                 SELECTORCOUNT,
                 SELECTORS,
                 INTATTRCOUNT,
                 INTATTRS,
                 CHARATTRLENGTH,
                 CHARATTRS,
                 COMPCODE,
                 REASON);

/*********************************************************/
/* TEST THE COMPLETION CODE OF THE SET CALL.             */
/* IF THE CALL HAS FAILED ISSUE AN ERROR MESSAGE SHOWING */
/* THE COMPLETION CODE AND THE REASON CODE.       */
/*********************************************************/
     IF COMPCODE ¬= MQCC_OK
        THEN DO;
          ⋮
          CALL ERROR_ROUTINE;
        END;
```

# Constants

Use the reference information in this section to accomplish the tasks that address your business needs.

## IBM MQ COPY, header, include, and module files

This information is general-use programming interface information.

This section contains information to help you use the MQI for various programming languages, as follows.

### *C header files*

Header files are provided to help you write C application programs that use the MQI. These header files are summarized in the table:

*Table 1. C header files - call prototypes, data types, return codes, constants, and structures*

| File name | Description | IBM i | UNIX and Linux® systems | Windows | z/OS |
|---|---|---|---|---|---|
| **Call prototypes, data types, return codes, constants, and structures** | | | | | |
| CMQC | MQI definitions | C | C | C | C |
| CMQBC | MQAI definitions | C | C | C | |
| CMQEC | Interface Entry Points definition (includes CMQC, CMQXC and CMQZC) | | C | C | |
| CMQCFC | PCF definitions | C | C | C | C |
| CMQPSC | Publish/Subscribe definitions | C | C | C | C |
| CMQXC | Channel and exit definitions | C | C | C | C |
| CMQZC | Installable services definitions | C | C | C | |
| **Key:** C= Files provided | | | | | |

### *COBOL COPY files*

Various COPY files are provided to help you write COBOL application programs that use the MQI. These files are summarized in the table:

| *Table 2. COBOL copy files - return codes, constants, and structures* | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| **Return codes and constants** | | | | | |
| CMQx | MQI definitions | V | V | V | V |
| CMQCFx | PCF definitions | V | V | V | V |
| CMQPSx | Publish/Subscribe definitions | V | V | V | V |
| CMQXx | Channel and exit definitions | V | V | V | V |
| **Structures** | | | | | |
| CMQAIRx | MQAIR - Authentication information record | | V L | V L | |
| CMQBOx | MQBO - Begin options | V L | V L | V L | |
| CMQCDx | MQCD - Channel definition | V L | V L | V L | V L |
| CMQCFBFx | MQCFBF - PCF byte string filter parameter | V L | V L | V L | V L |
| CMQCFBSx | MQCFBS - PCF byte string parameter | V L | V L | V L | V L |
| CMQCFGRx | MQCFGR - PCF group parameter | V L | V L | V L | V L |
| CMQCFHx | MQCFH - PCF header | V L | V L | V L | V L |
| CMQCFIFx | MQCFIF - PCF integer filter parameter | V L | V L | V L | V L |
| CMQCFILx | MQCFIL - PCF integer list parameter | V L | V L | V L | V L |
| CMQCFINx | MQCFIN - PCF integer parameter | V L | V L | V L | V L |
| CMQCFSFx | MQCFSF - PCF string filter parameter | V L | V L | V L | V L |
| CMQCFSLx | MQCFSL - PCF string list parameter | V L | V L | V L | V L |
| CMQCFSTx | MQCFST - PCF string parameter | V L | V L | V L | V L |
| CMQCFXLx | MQCFIL64 - PCF 64-bit integer list parameter | V L | V L | V L | V L |
| CMQCFXNx | MQCFIN64 - PCF 64-bit integer parameter | V L | V L | V L | V L |
| CMQCHRVx | MQCHARV - Variable length string | V L | V L | V L | V L |
| CMQCIHx | MQCIH - CICS® bridge header | V L | V L | V L | V L |
| CMQCNOx | MQCNO - Connect options | V L | V L | V L | V L |
| CMQCSPx | MQCSP - Security parameters | V L | V L | V L | V L |
| CMQCXPx | MQCXP - Channel exit parameters | V L | | | V L |
| CMQDHx | MQDH - Distribution header | V L | V L | V L | V L |
| CMQDLHx | MQDLH - Dead-letter header | V L | V L | V L | V L |

*Table 2. COBOL copy files - return codes, constants, and structures (continued)*

| File name | Description | IBM i | UNIX systems | Windows | z/OS |
|---|---|---|---|---|---|
| CMQDXPx | MQDXP - Data conversion exit parameters | V L | | V L | |
| CMQEPHx | MQEPH - Embedded PCF header | V L | V L | V L | V L |
| CMQGMOx | MQGMO - Get message options | V L | V L | V L | V L |
| CMQIIHx | MQIIH - IMS information header | V L | V L | V L | V L |
| CMQMDx | MQMD - Message descriptor | V L | V L | V L | V L |
| CMQMD1x | MQMD1 - Message descriptor version 1 | V L | V L | V L | V L |
| CMQMD2x | MQMD2 - Message descriptor version 2 | V L | V L | V L | V L |
| CMQMDEx | MQMDE - Message descriptor extended | V L | V L | V L | V L |
| CMQODx | MQOD - Object descriptor | V L | V L | V L | V L |
| CMQORx | MQOR - Object record | V L | V L | V L | V L |
| CMQPMOx | MQPMO - Put message options | V L | V L | V L | V L |
| CMQRFHx | MQRFH - Rules and formatting header | V L | V L | V L | V L |
| CMQRFH2x | MQRFH2 - Rules and formatting header 2 | V L | V L | V L | V L |
| CMQRMHx | MQRMH - Reference message header | V L | V L | V L | V L |
| CMQRRx | MQRR - Response record | V L | V L | V L | |
| CMQSCOx | MQSCO - SSL configuraton options | | V L | V L | |
| CMQTMx | MQTM - Trigger message | V L | | V L | V L |
| CMQTMCx | MQTMC - Trigger message character | V L | V L | | |
| CMQTMC2x | MQTMC2 - Trigger message 2 character | V L | V L | V L | V L |
| CMQWIHx | MQWIH - Work information header | V L | V L | V L | V L |
| CMQXQHx | MQXQH - Transmission queue header | V L | V L | V L | V L |

**Key:**

- Files with initial values provided, x=V
- Files without initial values provided, x=L

### *PL/I include files*

The following INCLUDE files are provided for the PL/I programming language. These files are available on z/OS only.

| Table 3. PL/I include files - data types, return codes, constants, and structures | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| **Data types, return codes, constants, and structures** | | | | | |
| CMQP | MQI definitions | | | | P |
| CMQCFP | PCF definitions | | | | P |
| CMQEPP | Entry point definitions | | | | P |
| CMQPSP | Publish/Subscribe definitions | | | | P |
| CMQXP | Channel and exit definitions | | | | P |
| **Key:** P= File provided | | | | | |

### *RPG copy files*

The following COPY files are provided for the RPG programming language. These files are available only on IBM i.

| Table 4. RPG copy files - return codes, constants, and structures | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| **Return codes and constants** | | | | | |
| CMQx | MQI definitions | G R | | | |
| CMQCFx | PCF definitions | G | | | |
| CMQPSx | Publish/Subscribe definitions | G | | | |
| CMQXx | Channel and exit definitions | G R | | | |
| **Structures** | | | | | |
| CMQBOx | MQBO - Begin options | G H | | | |
| CMQCDx | MQCD - Channel definition | G H R | | | |
| CMQCFBFx | MQCFBF - PCF byte string filter parameter | G H | | | |
| CMQCFBSx | MQCFBS - PCF byte string parameter | G H | | | |
| CMQCFGRx | MQCFGR - PCF group parameter | G H | | | |
| CMQCFHx | MQCFH - PCF header | G H | | | |
| CMQCFIFx | MQCFIF - PCF integer filter parameter | G H | | | |
| CMQCFILx | MQCFIL - PCF integer list parameter | G H | | | |
| CMQCFINx | MQCFIN - PCF integer parameter | G H | | | |
| CMQCFSFx | MQCFSF - PCF string filter parameter | G H | | | |
| CMQCFSLx | MQCFSL - PCF string list parameter | G H | | | |
| CMQCFSTx | MQCFST - PCF string parameter | G H | | | |

*Table 4. RPG copy files - return codes, constants, and structures (continued)*

| File name | Description | IBM i | UNIX systems | Windows | z/OS |
|---|---|---|---|---|---|
| CMQCFXLx | MQCFIL64 - PCF 64-bit integer list parameter | G H | | | |
| CMQCFXNx | MQCFIN64 - PCF 64-bit integer parameter | G H | | | |
| CMQCHARVx | MQCHARV - Variable length string | G H | | | |
| CMQCIHx | MQCIH - CICS bridge header | G H | | | |
| CMQCNOx | MQCNO - Connect options | G H | | | |
| CMQCSPx | MQCSP - Security parameters | G H | | | |
| CMQCXPx | MQCXP - Channel exit parameters | G H R | | | |
| CMQDHx | MQDH - Distribution header | G H R | | | |
| CMQDLHx | MQDLH - Dead-letter header | G H R | | | |
| CMQDXPx | MQDXP - Data conversion exit parameters | G H R | | | |
| CMQEPHx | MQEPH - Embedded PCF header | G H | | | |
| CMQGMOx | MQGMO - Get message options | G H R | | | |
| CMQIIHx | MQIIH - IMS information header | G H R | | | |
| CMQMDx | MQMD - Message descriptor | G H R | | | |
| CMQMD1x | MQMD1 - Message descriptor version 1 | G H R | | | |
| CMQMD2x | MQMD2 - Message descriptor version 2 | G H | | | |
| CMQMDEx | MQMDE - Message descriptor extended | G H R | | | |
| CMQODx | MQOD - Object descriptor | G H R | | | |
| CMQORx | MQOR - Object record | G H R | | | |
| CMQPMOx | MQPMO - Put message options | G H R | | | |
| CMQPXPx | MQPXP - Publish/Subscribe routing exit parameters | G H | | | |
| CMQRFHx | MQRFH - Rules and formatting header | G H | | | |
| CMQRFH2x | MQRFH2 - Rules and formatting header 2 | G H | | | |
| CMQRMHx | MQRMH - Reference message header | G H R | | | |
| CMQRRx | MQRR - Response record | G H R | | | |
| CMQTMx | MQTM - Trigger message | G H R | | | |
| CMQTMCx | MQTMC - Trigger message character | G H R | | | |

| *Table 4. RPG copy files - return codes, constants, and structures (continued)* | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| CMQTMC2x | MQTMC2 - Trigger message 2 character | G H R | | | |
| CMQWIHx | MQWIH - Work information header | G H | | | |
| CMQXQHx | MQXQH - Transmission queue header | G H R | | | |

**Key:**

- File for static linkage, initialized, provided x=G
- File for static linkage, not initialized, provided x=H
- File for dynamic linkage, initialized, provided, x=R

### *Visual Basic module files*

Header (or form) files are provided to help you write Visual Basic application programs that use the MQI. These header files are supplied in 32-bit versions only and are summarized in the table:

| *Table 5. Visual Basic module files - call declarations, data types, return codes, constants, and structures* | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX and Linux systems** | **Windows** | **z/OS** |
| **Call declarations, data types, return codes, constants, and structures** | | | | | |
| CMQB | MQI definitions | | | B | |
| CMQBB | MQAI definitions | | | B | |
| CMQCFB | PCF definitions | | | B | |
| CMQXB | Channel and exit definitions | | | B | |

**Key:** B= File provided

### *z/OS Assembler COPY files*

Various COPY files are provided to help you write z/OS Assembler application programs that use the MQI. These files are summarized in the table:

| *Table 6. z/OS Assembler copy files - data types, return codes, constants, and structures* | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| **Data types, return codes, and constants** | | | | | |
| CMQA | MQI definitions | | | | A |
| CMQCFA | PCF definitions | | | | A |
| CMQPSA | Publish/Subscribe definitions | | | | A |
| CMQVERA | Structure version control | | | | A |
| CMQXA | Channel and exit definitions | | | | A |
| **Structures** | | | | | |

*Table 6. z/OS Assembler copy files - data types, return codes, constants, and structures (continued)*

| File name | Description | IBM i | UNIX systems | Windows | z/OS |
|---|---|---|---|---|---|
| CMQCDA | MQCD - Channel definition | | | | |
| CMQCFBFA | MQCFBF - PCF byte string filter parameter | | | | |
| CMQCFBSA | MQCFBS - PCF byte string parameter | | | | A |
| CMQCFGRA | MQCFGR - PCF group parameter | | | | A |
| CMQCFHA | MQCFH - PCF header | | | | A |
| CMQCFIFA | MQCFIF - PCF integer filter parameter | | | | A |
| CMQCFILA | MQCFIL - PCF integer list parameter | | | | A |
| CMQCFINA | MQCFIN - PCF integer parameter | | | | A |
| CMQCFSFA | MQCFSF - PCF string filter parameter | | | | A |
| CMQCFSLA | MQCFSL - PCF string list parameter | | | | A |
| CMQCFSTA | MQCFST - PCF string parameter | | | | A |
| CMQCFXLA | MQCFIL64 - PCF 64-bit integer list parameter | | | | A |
| CMQCFXNA | MQCFIN64 - PCF 64-bit integer parameter | | | | A |
| CMQCHARVA | MQCHARV - Variable length string | | | | A |
| CMQCIHA | MQCIH - CICS bridge header | | | | A |
| CMQCNOA | MQCNO - Connect options | | | | A |
| CMQCSPA | MQCSP - Security parameters | | | | A |
| CMQCXPA | MQCXP - Channel exit parameters | | | | A |
| CMQDHA | MQDH - Distribution header | | | | A |
| CMQDLHA | MQDLH - Dead-letter header | | | | A |
| CMQDXPA | MQDXP - Data conversion exit parameters | | | | A |
| CMQEPHA | MQEPH - Embedded PCF header | | | | A |
| CMQGMOA | MQGMO - Get message options | | | | A |
| CMQIIHA | MQIIH - IMS information header | | | | A |
| CMQMDA | MQMD - Message descriptor | | | | A |
| CMQMD1A | MQMD1 - Message descriptor version 1 | | | | A |
| CMQMD2A | MQMD2 - Message descriptor version 2 | | | | A |

| *Table 6. z/OS Assembler copy files - data types, return codes, constants, and structures (continued)* | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| CMQMDEA | MQMDE - Message descriptor extended | | | | A |
| CMQODA | MQOD - Object descriptor | | | | A |
| CMQORA | MQOR - Object record | | | | A |
| CMQPMOA | MQPMO - Put message options | | | | A |
| CMQRFHA | MQRFH - Rules and formatting header | | | | A |
| CMQRFH2A | MQRFH2 - Rules and formatting header 2 | | | | A |
| CMQRMHA | MQRMH - Reference message header | | | | A |
| CMQTMA | MQTM - Trigger message | | | | A |
| CMQTMC2A | MQTMC2 - Trigger message 2 character | | | | A |
| CMQWCRA | MQWCR - Cluster workload cluster record | | | | A |
| CMQWDRA | MQWDR - Cluster workload destination record | | | | A |
| CMQWDR1A | MQWDR1 - Cluster workload destination record version 1 | | | | A |
| CMQWDR2A | MQWDR2 - Cluster workload destination record version 2 | | | | A |
| CMQWIHA | MQWIH - Work information header | | | | A |
| CMQWQRA | MQWQR - Cluster workload queue record | | | | A |
| CMQWQR1A | MQWQR1 - Cluster workload queue record version 1 | | | | A |
| CMQWQR2A | MQWQR2 - Cluster workload queue record version 2 | | | | A |
| CMQWXPA | MQWXP - Cluster workload exit parameters | | | | A |
| CMQWXP1A | MQWXP1 - Cluster workload exit parameters version 1 | | | | A |
| CMQWXP2A | MQWXP2 - Cluster workload exit parameters version 2 | | | | A |
| CMQWXP3A | MQWXP3 - Cluster workload exit parameters version 3 | | | | A |
| CMQXPA | MQXP - CICS API-crossing exit parameters | | | | A |

| Table 6. z/OS Assembler copy files - data types, return codes, constants, and structures (continued) | | | | | |
|---|---|---|---|---|---|
| **File name** | **Description** | **IBM i** | **UNIX systems** | **Windows** | **z/OS** |
| CMQXQHA | MQXQH - Transmission queue header | | | | A |
| CMQXWDA | MQXWD - Exit wait descriptor | | | | A |
| **Key:** A= File provided | | | | | |

## MQ_* (String Lengths)

| Table 7. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQ_ABEND_CODE_LENGTH | 4 | X'00000004' |
| MQ_ACCOUNTING_TOKEN_LENGTH | 32 | X'00000020' |
| MQ_APPL_IDENTITY_DATA_LENGTH | 32 | X'00000020' |
| MQ_APPL_NAME_LENGTH | 28 | X'0000001C' |
| MQ_APPL_ORIGIN_DATA_LENGTH | 4 | X'00000004' |
| MQ_APPL_TAG_LENGTH | 28 | X'0000001C' |
| MQ_ARM_SUFFIX_LENGTH | 2 | X'00000002' |
| MQ_ATTENTION_ID_LENGTH | 4 | X'00000004' |
| MQ_AUTH_INFO_CONN_NAME_LENGTH | 264 | X'00000108' |
| MQ_AUTH_INFO_DESC_LENGTH | 64 | X'00000040' |
| MQ_AUTH_INFO_NAME_LENGTH | 48 | X'00000030' |
| MQ_AUTH_INFO_OCSP_URL_LENGTH | 256 | X'00000100' |
| MQ_AUTHENTICATOR_LENGTH | 8 | X'00000008' |
| MQ_AUTO_REORG_CATALOG_LENGTH | 44 | X'0000002C' |
| MQ_AUTO_REORG_TIME_LENGTH | 4 | X'00000004' |
| MQ_BATCH_INTERFACE_ID_LENGTH | 8 | X'00000008' |
| MQ_BRIDGE_NAME_LENGTH | 24 | X'00000018' |
| MQ_CANCEL_CODE_LENGTH | 4 | X'00000004' |
| MQ_CF_STRUC_DESC_LENGTH | 64 | X'00000040' |
| MQ_CF_STRUC_NAME_LENGTH | 12 | X'0000000C' |
| MQ_CHANNEL_DATE_LENGTH | 12 | X'0000000C' |
| MQ_CHANNEL_DESC_LENGTH | 64 | X'00000040' |
| MQ_CHANNEL_NAME_LENGTH | 20 | X'00000014' |
| MQ_CHANNEL_TIME_LENGTH | 8 | X'00000008' |
| MQ_CHINIT_SERVICE_PARM_LENGTH | 32 | X'00000020' |
| MQ_CICS_FILE_NAME_LENGTH | 8 | X'00000008' |
| MQ_CLIENT_ID_LENGTH | 23 | X'00000017' |
| MQ_CLUSTER_NAME_LENGTH | 48 | X'00000030' |
| MQ_CONN_NAME_LENGTH | 264 | X'00000108' |
| MQ_CONN_TAG_LENGTH | 128 | X'00000080' |

*Table 7. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQ_CONNECTION_ID_LENGTH | 24 | X'00000018' |
| MQ_CORREL_ID_LENGTH | 24 | X'00000018' |
| MQ_CREATION_DATE_LENGTH | 12 | X'0000000C' |
| MQ_CREATION_TIME_LENGTH | 8 | X'00000008' |
| MQ_DATE_LENGTH | 12 | X'0000000C' |
| MQ_DISTINGUISHED_NAME_LENGTH | 1024 | X'00000400' |
| MQ_DNS_GROUP_NAME_LENGTH | 18 | X'00000012' |
| MQ_EXIT_DATA_LENGTH | 32 | X'00000020' |
| MQ_EXIT_INFO_NAME_LENGTH | 48 | X'00000030' |
| MQ_EXIT_NAME_LENGTH | (value differs by platform or version) | |
| MQ_EXIT_PD_AREA_LENGTH | 48 | X'00000030' |
| MQ_EXIT_USER_AREA_LENGTH | 16 | X'00000010' |
| MQ_FACILITY_LENGTH | 8 | X'00000008' |
| MQ_FACILITY_LIKE_LENGTH | 4 | X'00000004' |
| MQ_FORMAT_LENGTH | 8 | X'00000008' |
| MQ_FUNCTION_LENGTH | 4 | X'00000004' |
| MQ_GROUP_ID_LENGTH | 24 | X'00000018' |
| MQ_LDAP_PASSWORD_LENGTH | 32 | X'00000020' |
| MQ_LISTENER_NAME_LENGTH | 48 | X'00000030' |
| MQ_LISTENER_DESC_LENGTH | 64 | X'00000040' |
| MQ_LOCAL_ADDRESS_LENGTH | 48 | X'00000030' |
| MQ_LTERM_OVERRIDE_LENGTH | 8 | X'00000008' |
| MQ_LU_NAME_LENGTH | 8 | X'00000008' |
| MQ_LUWID_LENGTH | 16 | X'00000010' |
| MQ_MAX_EXIT_NAME_LENGTH | 128 | X'00000080' |
| MQ_MAX_MCA_USER_ID_LENGTH | 64 | X'00000040' |
| MQ_MAX_PROPERTY_NAME_LENGTH | 4095 | X'00000FFF' |
| MQ_MAX_USER_ID_LENGTH | 64 | X'00000040' |
| MQ_MCA_JOB_NAME_LENGTH | 28 | X'0000001C' |
| MQ_MCA_NAME_LENGTH | 20 | X'00000014' |
| MQ_MCA_USER_DATA_LENGTH | 32 | X'00000020' |
| MQ_MCA_USER_ID_LENGTH | (value differs by platform or version) | |
| MQ_MFS_MAP_NAME_LENGTH | 8 | X'00000008' |
| MQ_MODE_NAME_LENGTH | 8 | X'00000008' |
| MQ_MSG_HEADER_LENGTH | 4000 | X'00000FA0' |
| MQ_MSG_ID_LENGTH | 24 | X'00000018' |
| MQ_MSG_TOKEN_LENGTH | 16 | X'00000010' |
| MQ_NAMELIST_DESC_LENGTH | 64 | X'00000040' |

*Table 7. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQ_NAMELIST_NAME_LENGTH | 48 | X'00000030' |
| MQ_OBJECT_INSTANCE_ID_LENGTH | 24 | X'00000018' |
| MQ_OBJECT_NAME_LENGTH | 48 | X'00000030' |
| MQ_PASS_TICKET_APPL_LENGTH | 8 | X'00000008' |
| MQ_PASSWORD_LENGTH | 12 | X'0000000C' |
| MQ_PROCESS_APPL_ID_LENGTH | 256 | X'00000100' |
| MQ_PROCESS_DESC_LENGTH | 64 | X'00000040' |
| MQ_PROCESS_ENV_DATA_LENGTH | 128 | X'00000080' |
| MQ_PROCESS_NAME_LENGTH | 48 | X'00000030' |
| MQ_PROCESS_USER_DATA_LENGTH | 128 | X'00000080' |
| MQ_PROGRAM_NAME_LENGTH | 20 | X'00000014' |
| MQ_PUT_APPL_NAME_LENGTH | 28 | X'0000001C' |
| MQ_PUT_DATE_LENGTH | 8 | X'00000008' |
| MQ_PUT_TIME_LENGTH | 8 | X'00000008' |
| MQ_Q_DESC_LENGTH | 64 | X'00000040' |
| MQ_Q_MGR_DESC_LENGTH | 64 | X'00000040' |
| MQ_Q_MGR_IDENTIFIER_LENGTH | 48 | X'00000030' |
| MQ_Q_MGR_NAME_LENGTH | 48 | X'00000030' |
| MQ_Q_NAME_LENGTH | 48 | X'00000030' |
| MQ_QSG_NAME_LENGTH | 4 | X'00000004' |
| MQ_REMOTE_SYS_ID_LENGTH | 4 | X'00000004' |
| MQ_SECURITY_ID_LENGTH | 40 | X'00000028' |
| MQ_SELECTOR_LENGTH | 10240 | X'00002800' |
| MQ_SERVICE_ARGS_LENGTH | 255 | X'000000FF' |
| MQ_SERVICE_COMMAND_LENGTH | 255 | X'000000FF' |
| MQ_SERVICE_DESC_LENGTH | 64 | X'00000040' |
| MQ_SERVICE_NAME_LENGTH | 32 | X'00000020' |
| MQ_SERVICE_PATH_LENGTH | 255 | X'000000FF' |
| MQ_SERVICE_STEP_LENGTH | 8 | X'00000008' |
| MQ_SHORT_CONN_NAME_LENGTH | 20 | X'00000014' |
| MQ_SHORT_DNAME_LENGTH | 256 | X'00000100' |
| MQ_SSL_CIPHER_SPEC_LENGTH | 32 | X'00000020' |
| MQ_SSL_CRYPTO_HARDWARE_LENGTH | 256 | X'00000100' |
| MQ_SSL_HANDSHAKE_STAGE_LENGTH | 32 | X'00000020' |
| MQ_SSL_KEY_LIBRARY_LENGTH | 44 | X'0000002C' |
| MQ_SSL_KEY_MEMBER_LENGTH | 8 | X'00000008' |
| MQ_SSL_KEY_REPOSITORY_LENGTH | 256 | X'00000100' |
| MQ_SSL_PEER_NAME_LENGTH | 1024 | X'00000400' |
| MQ_SSL_SHORT_PEER_NAME_LENGTH | 256 | X'00000100' |

| Table 7. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQ_START_CODE_LENGTH | 4 | X'00000004' |
| MQ_STORAGE_CLASS_DESC_LENGTH | 64 | X'00000040' |
| MQ_STORAGE_CLASS_LENGTH | 8 | X'00000008' |
| MQ_SUB_IDENTITY_LENGTH | 128 | X'00000080' |
| MQ_SUB_POINT_LENGTH | 128 | X'00000080' |
| MQ_SUITE_B_128_BIT | 2 | X'00000002' |
| MQ_SUITE_B_192_BIT | 4 | X'00000004' |
| MQ_SUITE_B_NONE | 1 | X'00000001' |
| MQ_SUITE_B_NOT_AVAILABLE | 0 | X'00000000' |
| MQ_TCP_NAME_LENGTH | 8 | X'00000008' |
| MQ_TIME_LENGTH | 8 | X'00000008' |
| MQ_TOPIC_DESC_LENGTH | 64 | X'00000040' |
| MQ_TOPIC_NAME_LENGTH | 48 | X'00000030' |
| MQ_TOPIC_STR_LENGTH | 10240 | X'00002800' |
| MQ_TOTAL_EXIT_DATA_LENGTH | 999 | X'000003E7' |
| MQ_TOTAL_EXIT_NAME_LENGTH | 999 | X'000003E7' |
| MQ_TP_NAME_LENGTH | 64 | X'00000040' |
| MQ_TPIPE_NAME_LENGTH | 8 | X'00000008' |
| MQ_TRAN_INSTANCE_ID_LENGTH | 16 | X'00000010' |
| MQ_TRANSACTION_ID_LENGTH | 4 | X'00000004' |
| MQ_TRIGGER_DATA_LENGTH | 64 | X'00000040' |
| MQ_TRIGGER_PROGRAM_NAME_LENGTH | 8 | X'00000008' |
| MQ_TRIGGER_TERM_ID_LENGTH | 4 | X'00000004' |
| MQ_TRIGGER_TRANS_ID_LENGTH | 4 | X'00000004' |
| MQ_USER_ID_LENGTH | 12 | X'0000000C' |
| MQ_VERSION_LENGTH | 8 | X'00000008' |
| MQ_XCF_GROUP_NAME_LENGTH | 8 | X'00000008' |
| MQ_XCF_MEMBER_NAME_LENGTH | 16 | X'00000010' |

## MQ_* (Command format String Lengths)

| Table 8. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQ_ARCHIVE_PFX_LENGTH | 36 | X'00000024' |
| MQ_ARCHIVE_UNIT_LENGTH | 8 | X'00000008' |
| MQ_ASID_LENGTH | 4 | X'00000004' |
| MQ_AUTH_PROFILE_NAME_LENGTH | 48 | X'00000030' |
| MQ_CF_LEID_LENGTH | 12 | X'0000000C' |
| MQ_COMMAND_MQSC_LENGTH | 32768 | X'00008000' |
| MQ_DATA_SET_NAME_LENGTH | 44 | X'0000002C' |

| Table 8. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQ_DB2_NAME_LENGTH | 4 | X'00000004' |
| MQ_DSG_NAME_LENGTH | 8 | X'00000008' |
| V 8.0.0.2 V 8.0.0.2 MQ_ENTITY_NAME_LENGTH | 1024 | X'00000400' |
| MQ_ENV_INFO_LENGTH | 96 | X'00000060' |
| MQ_IP_ADDRESS_LENGTH | 48 | X'00000030' |
| MQ_LOG_CORREL_ID_LENGTH | 8 | X'00000008' |
| MQ_LOG_EXTENT_NAME_LENGTH | 24 | X'00000018' |
| MQ_LOG_PATH_LENGTH | 1024 | X'00000400' |
| MQ_LRSN_LENGTH | 12 | X'0000000C' |
| MQ_ORIGIN_NAME_LENGTH | 8 | X'00000008' |
| MQ_PSB_NAME_LENGTH | 8 | X'00000008' |
| MQ_PST_ID_LENGTH | 8 | X'00000008' |
| MQ_Q_MGR_CPF_LENGTH | 4 | X'00000004' |
| MQ_RESPONSE_ID_LENGTH | 24 | X'00000018' |
| MQ_RBA_LENGTH | 16 | X'00000010' |
| MQ_SECURITY_PROFILE_LENGTH | 40 | X'00000028' |
| MQ_SERVICE_COMPONENT_LENGTH | 48 | X'00000030' |
| MQ_SUB_NAME_LENGTH | 10240 | X'00002800' |
| MQ_SYSP_SERVICE_LENGTH | 32 | X'00000020' |
| MQ_SYSTEM_NAME_LENGTH | 8 | X'00000008' |
| MQ_TASK_NUMBER_LENGTH | 8 | X'00000008' |
| MQ_TPIPE_PFX_LENGTH | 4 | X'00000004' |
| MQ_UOW_ID_LENGTH | 256 | X'00000100' |
| MQ_USER_DATA_LENGTH | 10240 | X'00002800' |
| MQ_VOLSER_LENGTH | 6 | X'00000006' |

## MQACH_* (API exit chain area header structure)

| Table 9. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQACH_STRUC_ID | "ACH¬" |
| MQACH_STRUC_ID_ARRAY | 'A','C','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 10. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQACH_VERSION_1 | 1 | X'00000001' |
| MQACH_CURRENT_VERSION | 1 | X'00000001' |
| MQACH_LENGTH_1 | (value differs by platform or version) | |

| Table 10. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQACH_CURRENT_LENGTH | (value differs by platform or version) | |

## MQACT_* (Accounting Token)

| Table 11. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQACT_NONE | X'00...00' (32 nulls) |
| MQACT_NONE_ARRAY | '\0','\0',... (32 nulls) |

## MQACT_* (Command format Action Options)

| Table 12. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQACT_FORCE_REMOVE | 1 | X'00000001' |
| MQACT_ADVANCE_LOG | 2 | X'00000002' |
| MQACT_COLLECT_STATISTICS | 3 | X'00000003' |
| MQACT_PUBSUB | 4 | X'00000004' |

## MQACTP_* (Action)

| Table 13. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQACTP_NEW | 0 | X'00000000' |
| MQACTP_FORWARD | 1 | X'00000001' |
| MQACTP_REPLY | 2 | X'00000002' |
| MQACTP_REPORT | 3 | X'00000003' |

## MQACTT_* (Accounting Token Types)

| Table 14. Values of constants | |
|---|---|
| **Name** | **Hexadecimal value** |
| MQACTT_UNKNOWN | X'00' |
| MQACTT_CICS_LUOW_ID | X'01' |
| MQACTT_OS2_DEFAULT | X'04' |
| MQACTT_DOS_DEFAULT | X'05' |
| MQACTT_UNIX_NUMERIC_ID | X'06' |
| MQACTT_OS400_ACCOUNT_TOKEN | X'08' |
| MQACTT_WINDOWS_DEFAULT | X'09' |
| MQACTT_NT_SECURITY_ID | X'0B' |
| MQACTT_USER | X'19' |

## MQADOPT_* (Adopt New MCA Checks and Adopt New MCA Types)

### Adopt New MCA Checks

*Table 15. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQADOPT_CHECK_NONE | 0 | X'00000000' |
| MQADOPT_CHECK_ALL | 1 | X'00000001' |
| MQADOPT_CHECK_Q_MGR_NAME | 2 | X'00000002' |
| MQADOPT_CHECK_NET_ADDR | 4 | X'00000004' |

### Adopt New MCA Types

*Table 16. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQADOPT_TYPE_NO | 0 | X'00000000' |
| MQADOPT_TYPE_ALL | 1 | X'00000001' |
| MQADOPT_TYPE_SVR | 2 | X'00000002' |
| MQADOPT_TYPE_SDR | 4 | X'00000004' |
| MQADOPT_TYPE_RCVR | 8 | X'00000008' |
| MQADOPT_TYPE_CLUSRCVR | 16 | X'00000010' |

## MQAIR_* (Authentication information record structure)

*Table 17. Structures of constants*

| Name | Structure |
|---|---|
| MQAIR_STRUC_ID | "AIR¬" |
| MQAIR_STRUC_ID_ARRAY | 'A','I','R','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 18. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQAIR_VERSION_1 | 1 | X'00000001' |
| MQAIR_VERSION_2 | 2 | X'00000002' |
| MQAIR_CURRENT_VERSION | 2 | X'00000002' |

## MQAIT_* (Authentication Information Type)

*Table 19. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQAIT_ALL | 0 | X'00000000' |
| MQAIT_CRL_LDAP | 1 | X'00000001' |
| MQAIT_OCSP | 2 | X'00000002' |
| MQAIT_IDPW_OS | 3 | X'00000003' |
| MQAIT_IDPW_LDAP | 4 | X'00000004' |

## MQAS_* (Command format Asynchronous State Values)

*Table 20. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQAS_NONE | 0 | X'00000000' |
| MQAS_STARTED | 1 | X'00000001' |
| MQAS_START_WAIT | 2 | X'00000002' |
| MQAS_STOPPED | 3 | X'00000003' |
| MQAS_SUSPENDED | 4 | X'00000004' |
| MQAS_SUSPENDED_TEMPORARY | 5 | X'00000005' |
| MQAS_ACTIVE | 6 | X'00000006' |
| MQAS_INACTIVE | 7 | X'00000007' |

## MQAT_* (Put Application Types)

*Table 21. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQAT_UNKNOWN | -1 | X'FFFFFFFF' |
| MQAT_NO_CONTEXT | 0 | X'00000000' |
| MQAT_CICS | 1 | X'00000001' |
| MQAT_MVS | 2 | X'00000002' |
| MQAT_OS390 | 2 | X'00000002' |
| MQAT_ZOS | 2 | X'00000002' |
| MQAT_IMS | 3 | X'00000003' |
| MQAT_OS2 | 4 | X'00000004' |
| MQAT_DOS | 5 | X'00000005' |
| MQAT_AIX® | 6 | X'00000006' |
| MQAT_UNIX | 6 | X'00000006' |
| MQAT_QMGR | 7 | X'00000007' |
| MQAT_OS400 | 8 | X'00000008' |
| MQAT_WINDOWS | 9 | X'00000009' |
| MQAT_CICS_VSE | 10 | X'0000000A' |
| MQAT_WINDOWS_NT | 11 | X'0000000B' |
| MQAT_VMS | 12 | X'0000000C' |
| MQAT_GUARDIAN | 13 | X'0000000D' |
| MQAT_NSK | 13 | X'0000000D' |
| MQAT_VOS | 14 | X'0000000E' |
| MQAT_OPEN_TP1 | 15 | X'0000000F' |
| MQAT_VM | 18 | X'00000012' |
| MQAT_IMS_BRIDGE | 19 | X'00000013' |
| MQAT_XCF | 20 | X'00000014' |
| MQAT_CICS_BRIDGE | 21 | X'00000015' |
| MQAT_NOTES_AGENT | 22 | X'00000016' |

| Table 21. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAT_TPF | 23 | X'00000017' |
| MQAT_USER | 25 | X'00000019' |
| MQAT_BROKER | 26 | X'0000001A' |
| MQAT_QMGR_PUBLISH | 26 | X'0000001A' |
| MQAT_JAVA | 28 | X'0000001C' |
| MQAT_DQM | 29 | X'0000001D' |
| MQAT_CHANNEL_INITIATOR | 30 | X'0000001E' |
| MQAT_WLM | 31 | X'0000001F' |
| MQAT_BATCH | 32 | X'00000020' |
| MQAT_RRS_BATCH | 33 | X'00000021' |
| MQAT_SIB | 34 | X'00000022' |
| MQAT_DEFAULT | (value differs by platform or version) | |
| MQAT_USER_FIRST | 65536 | X'00010000' |
| MQAT_USER_LAST | 999999999 | X'3B9AC9FF' |

## MQAUTH_* (Command format Authority Values)

| Table 22. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAUTH_NONE | 0 | X'00000000' |
| MQAUTH_ALT_USER_AUTHORITY | 1 | X'00000001' |
| MQAUTH_BROWSE | 2 | X'00000002' |
| MQAUTH_CHANGE | 3 | X'00000003' |
| MQAUTH_CLEAR | 4 | X'00000004' |
| MQAUTH_CONNECT | 5 | X'00000005' |
| MQAUTH_CREATE | 6 | X'00000006' |
| MQAUTH_DELETE | 7 | X'00000007' |
| MQAUTH_DISPLAY | 8 | X'00000008' |
| MQAUTH_INPUT | 9 | X'00000009' |
| MQAUTH_INQUIRE | 10 | X'0000000A' |
| MQAUTH_OUTPUT | 11 | X'0000000B' |
| MQAUTH_PASS_ALL_CONTEXT | 12 | X'0000000C' |
| MQAUTH_PASS_IDENTITY_CONTEXT | 13 | X'0000000D' |
| MQAUTH_SET | 14 | X'0000000E' |
| MQAUTH_SET_ALL_CONTEXT | 15 | X'0000000F' |
| MQAUTH_SET_IDENTITY_CONTEXT | 16 | X'00000010' |
| MQAUTH_CONTROL | 17 | X'00000011' |
| MQAUTH_CONTROL_EXTENDED | 18 | X'00000012' |
| MQAUTH_PUBLISH | 19 | X'00000013' |
| MQAUTH_SUBSCRIBE | 20 | X'00000014' |

| Table 22. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAUTH_RESUME | 21 | X'00000015' |
| MQAUTH_SYSTEM | 22 | X'00000016' |

## MQAUTHOPT_* (Command format Authority Options)

| Table 23. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAUTHOPT_CUMULATIVE | 256 | X'00000100' |
| MQAUTHOPT_ENTITY_EXPLICIT | 1 | X'00000001' |
| MQAUTHOPT_ENTITY_SET | 2 | X'00000002' |
| MQAUTHOPT_NAME_ALL_MATCHING | 32 | X'00000020' |
| MQAUTHOPT_NAME_AS_WILDCARD | 64 | X'00000040' |
| MQAUTHOPT_NAME_EXPLICIT | 16 | X'00000010' |

## MQAXC_* (API exit context structure)

| Table 24. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQAXC_STRUC_ID | "AXC¬" |
| MQAXC_STRUC_ID_ARRAY | 'A','X','C','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 25. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAXC_VERSION_1 | 1 | X'00000001' |
| MQAXC_CURRENT_VERSION | 1 | X'00000001' |

## MQAXP_* (API exit parameter structure)

| Table 26. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQAXP_STRUC_ID | "AXP¬" |
| MQAXP_STRUC_ID_ARRAY | 'A','X','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 27. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQAXP_VERSION_1 | 1 | X'00000001' |
| MQAXP_VERSION_2 | 2 | X'00000002' |
| MQAXP_CURRENT_VERSION | 2 | X'00000002' |

## MQBA_* (Byte Attribute Selectors)

*Table 28. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQBA_FIRST | 6001 | X'00001771' |
| MQBA_LAST | 8000 | X'00001F40' |

## MQBACF_* (Command format Byte Parameter Types)

*Table 29. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQBACF_FIRST | 7001 | X'00001B59' |
| MQBACF_EVENT_ACCOUNTING_TOKEN | 7001 | X'00001B59' |
| MQBACF_EVENT_SECURITY_ID | 7002 | X'00001B5A' |
| MQBACF_RESPONSE_SET | 7003 | X'00001B5B' |
| MQBACF_RESPONSE_ID | 7004 | X'00001B5C' |
| MQBACF_EXTERNAL_UOW_ID | 7005 | X'00001B5D' |
| MQBACF_CONNECTION_ID | 7006 | X'00001B5E' |
| MQBACF_GENERIC_CONNECTION_ID | 7007 | X'00001B5F' |
| MQBACF_ORIGIN_UOW_ID | 7008 | X'00001B60' |
| MQBACF_Q_MGR_UOW_ID | 7009 | X'00001B61' |
| MQBACF_ACCOUNTING_TOKEN | 7010 | X'00001B62' |
| MQBACF_CORREL_ID | 7011 | X'00001B63' |
| MQBACF_GROUP_ID | 7012 | X'00001B64' |
| MQBACF_MSG_ID | 7013 | X'00001B65' |
| MQBACF_CF_LEID | 7014 | X'00001B66' |
| MQBACF_DESTINATION_CORREL_ID | 7015 | X'00001B67' |
| MQBACF_SUB_ID | 7016 | X'00001B68' |
| MQBACF_LAST_USED | 7016 | X'00001B68' |

## MQBL_* (Buffer Length for mqAddString and mqSetString)

*Table 30. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQBL_NULL_TERMINATED | -1 | X'FFFFFFFF' |

## MQBMHO_* (Buffer to message handle options and structure)

### Buffer to message handle options structure

*Table 31. Structures of constants*

| Name | Structure |
|---|---|
| MQBMHO_STRUC_ID | "BMHO" |
| MQBMHO_STRUC_ID_ARRAY | 'B','M','H','O' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 32. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBMHO_VERSION_1 | 1 | X'00000001' |
| MQBMHO_CURRENT_VERSION | 1 | X'00000001' |

### Buffer To Message Handle Options

| *Table 33. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBMHO_NONE | 0 | X'00000000' |
| MQBMHO_DELETE_PROPERTIES | 1 | X'00000001' |

## MQBND_* (Default Bindings)

| *Table 34. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBND_BIND_ON_OPEN | 0 | X'00000000' |
| MQBND_BIND_NOT_FIXED | 1 | X'00000001' |
| MQBND_BIND_ON_GROUP | 2 | X'00000002' |

## MQBO_* (Begin options and structure)

### Begin options structure

| *Table 35. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQBO_STRUC_ID | "BO¬¬" |
| MQBO_STRUC_ID_ARRAY | 'B','O','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 36. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBO_VERSION_1 | 1 | X'00000001' |
| MQBO_CURRENT_VERSION | 1 | X'00000001' |

### Begin Options

| *Table 37. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBO_NONE | 0 | X'00000000' |

## MQBT_* (Command format Bridge Types)

| *Table 38. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQBT_OTMA | 1 | X'00000001' |

## MQCA_* (Character Attribute Selectors)

*Table 39. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCA_ADMIN_TOPIC_NAME | 2105 | X'00000839' |
| MQCA_ALTERATION_DATE | 2027 | X'000007EB' |
| MQCA_ALTERATION_TIME | 2028 | X'000007EC' |
| MQCA_APPL_ID | 2001 | X'000007D1' |
| MQCA_AUTH_INFO_CONN_NAME | 2053 | X'00000805' |
| MQCA_AUTH_INFO_DESC | 2046 | X'000007FE' |
| MQCA_AUTH_INFO_NAME | 2045 | X'000007FD' |
| MQCA_AUTH_INFO_OCSP_URL | 2109 | X'0000083D' |
| MQCA_AUTO_REORG_CATALOG | 2091 | X'0000082B' |
| MQCA_AUTO_REORG_START_TIME | 2090 | X'0000082A' |
| MQCA_BACKOUT_REQ_Q_NAME | 2019 | X'000007E3' |
| MQCA_BASE_OBJECT_NAME | 2002 | X'000007D2' |
| MQCA_BASE_Q_NAME | 2002 | X'000007D2' |
| MQCA_BATCH_INTERFACE_ID | 2068 | X'00000814' |
| MQCA_CF_STRUC_DESC | 2052 | X'00000804' |
| MQCA_CF_STRUC_NAME | 2039 | X'000007F7' |
| MQCA_CHANNEL_AUTO_DEF_EXIT | 2026 | X'000007EA' |
| MQCA_CHILD | 2101 | X'00000835' |
| MQCA_CHINIT_SERVICE_PARM | 2076 | X'0000081C' |
| MQCA_CICS_FILE_NAME | 2060 | X'0000080C' |
| MQCA_CLUS_CHL_NAME | 2124 | X'0000084C' |
| MQCA_CLUSTER_DATE | 2037 | X'000007F5' |
| MQCA_CLUSTER_NAME | 2029 | X'000007ED' |
| MQCA_CLUSTER_NAMELIST | 2030 | X'000007EE' |
| MQCA_CLUSTER_Q_MGR_NAME | 2031 | X'000007EF' |
| MQCA_CLUSTER_TIME | 2038 | X'000007F6' |
| MQCA_CLUSTER_WORKLOAD_DATA | 2034 | X'000007F2' |
| MQCA_CLUSTER_WORKLOAD_EXIT | 2033 | X'000007F1' |
| MQCA_COMMAND_INPUT_Q_NAME | 2003 | X'000007D3' |
| MQCA_COMMAND_REPLY_Q_NAME | 2067 | X'00000813' |
| MQCA_CREATION_DATE | 2004 | X'000007D4' |
| MQCA_CREATION_TIME | 2005 | X'000007D5' |
| MQCA_DEAD_LETTER_Q_NAME | 2006 | X'000007D6' |
| MQCA_DEF_XMIT_Q_NAME | 2025 | X'000007E9' |
| MQCA_DNS_GROUP | 2071 | X'00000817' |
| MQCA_ENV_DATA | 2007 | X'000007D7' |
| MQCA_FIRST | 2001 | X'000007D1' |
| MQCA_IGQ_USER_ID | 2041 | X'000007F9' |

*Table 39. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCA_INITIATION_Q_NAME | 2008 | X'000007D8' |
| MQCA_LAST | 4000 | X'00000FA0' |
| MQCA_LAST_USED | 2109 | X'0000083D' |
| MQCA_LDAP_PASSWORD | 2048 | X'00000800' |
| MQCA_LDAP_USER_NAME | 2047 | X'000007FF' |
| MQCA_LU_GROUP_NAME | 2072 | X'00000818' |
| MQCA_LU_NAME | 2073 | X'00000819' |
| MQCA_LU62_ARM_SUFFIX | 2074 | X'0000081A' |
| MQCA_MODEL_DURABLE_Q | 2096 | X'00000830' |
| MQCA_MODEL_NON_DURABLE_Q | 2097 | X'00000831' |
| MQCA_MONITOR_Q_NAME | 2066 | X'00000812' |
| MQCA_NAMELIST_DESC | 2009 | X'000007D9' |
| MQCA_NAMELIST_NAME | 2010 | X'000007DA' |
| MQCA_NAMES | 2020 | X'000007E4' |
| MQCA_PARENT | 2102 | X'00000836' |
| MQCA_PASS_TICKET_APPL | 2086 | X'00000826' |
| MQCA_PROCESS_DESC | 2011 | X'000007DB' |
| MQCA_PROCESS_NAME | 2012 | X'000007DC' |
| MQCA_Q_DESC | 2013 | X'000007DD' |
| MQCA_Q_MGR_DESC | 2014 | X'000007DE' |
| MQCA_Q_MGR_IDENTIFIER | 2032 | X'000007F0' |
| MQCA_Q_MGR_NAME | 2015 | X'000007DF' |
| MQCA_Q_NAME | 2016 | X'000007E0' |
| MQCA_QSG_NAME | 2040 | X'000007F8' |
| MQCA_REMOTE_Q_MGR_NAME | 2017 | X'000007E1' |
| MQCA_REMOTE_Q_NAME | 2018 | X'000007E2' |
| MQCA_REPOSITORY_NAME | 2035 | X'000007F3' |
| MQCA_REPOSITORY_NAMELIST | 2036 | X'000007F4' |
| MQCA_RESUME_DATE | 2098 | X'00000832' |
| MQCA_RESUME_TIME | 2099 | X'00000833' |
| MQCA_SERVICE_DESC | 2078 | X'0000081E' |
| MQCA_SERVICE_NAME | 2077 | X'0000081D' |
| MQCA_SERVICE_START_ARGS | 2080 | X'00000820' |
| MQCA_SERVICE_START_COMMAND | 2079 | X'0000081F' |
| MQCA_SERVICE_STOP_ARGS | 2082 | X'00000822' |
| MQCA_SERVICE_STOP_COMMAND | 2081 | X'00000821' |
| MQCA_STDERR_DESTINATION | 2084 | X'00000824' |
| MQCA_STDOUT_DESTINATION | 2083 | X'00000823' |
| MQCA_SSL_CRL_NAMELIST | 2050 | X'00000802' |

*Table 39. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCA_SSL_CRYPTO_HARDWARE | 2051 | X'00000803' |
| MQCA_SSL_KEY_LIBRARY | 2069 | X'00000815' |
| MQCA_SSL_KEY_MEMBER | 2070 | X'00000816' |
| MQCA_SSL_KEY_REPOSITORY | 2049 | X'00000801' |
| MQCA_STORAGE_CLASS | 2022 | X'000007E6' |
| MQCA_STORAGE_CLASS_DESC | 2042 | X'000007FA' |
| MQCA_SYSTEM_LOG_Q_NAME | 2065 | X'00000811' |
| MQCA_TCP_NAME | 2075 | X'0000081B' |
| MQCA_TOPIC_DESC | 2093 | X'0000082D' |
| MQCA_TOPIC_NAME | 2092 | X'0000082C' |
| MQCA_TOPIC_STRING_FILTER | 2108 | X'0000083C' |
| MQCA_TOPIC_STRING | 2094 | X'0000082E' |
| MQCA_TPIPE_NAME | 2085 | X'00000825' |
| MQCA_TRIGGER_CHANNEL_NAME | 2064 | X'00000810' |
| MQCA_TRIGGER_DATA | 2023 | X'000007E7' |
| MQCA_TRIGGER_PROGRAM_NAME | 2062 | X'0000080E' |
| MQCA_TRIGGER_TERM_ID | 2063 | X'0000080F' |
| MQCA_TRIGGER_TRANS_ID | 2061 | X'0000080D' |
| MQCA_USER_DATA | 2021 | X'000007E5' |
| MQCA_USER_LIST | 4000 | X'00000FA0' |
| MQCA_VERSION | 2120 | X'00000848' |
| MQCA_XCF_GROUP_NAME | 2043 | X'000007FB' |
| MQCA_XCF_MEMBER_NAME | 2044 | X'000007FC' |
| MQCA_XMIT_Q_NAME | 2024 | X'000007E8' |

## MQCACF_* (Command format Character Parameter Types)

*Table 40. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACF_FIRST | 3001 | X'00000BB9' |
| MQCACF_FROM_Q_NAME | 3001 | X'00000BB9' |
| MQCACF_TO_Q_NAME | 3002 | X'00000BBA' |
| MQCACF_FROM_PROCESS_NAME | 3003 | X'00000BBB' |
| MQCACF_TO_PROCESS_NAME | 3004 | X'00000BBC' |
| MQCACF_FROM_NAMELIST_NAME | 3005 | X'00000BBD' |
| MQCACF_TO_NAMELIST_NAME | 3006 | X'00000BBE' |
| MQCACF_FROM_CHANNEL_NAME | 3007 | X'00000BBF' |
| MQCACF_TO_CHANNEL_NAME | 3008 | X'00000BC0' |
| MQCACF_FROM_AUTH_INFO_NAME | 3009 | X'00000BC1' |
| MQCACF_TO_AUTH_INFO_NAME | 3010 | X'00000BC2' |

*Table 40. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACF_Q_NAMES | 3011 | X'00000BC3' |
| MQCACF_PROCESS_NAMES | 3012 | X'00000BC4' |
| MQCACF_NAMELIST_NAMES | 3013 | X'00000BC5' |
| MQCACF_ESCAPE_TEXT | 3014 | X'00000BC6' |
| MQCACF_LOCAL_Q_NAMES | 3015 | X'00000BC7' |
| MQCACF_MODEL_Q_NAMES | 3016 | X'00000BC8' |
| MQCACF_ALIAS_Q_NAMES | 3017 | X'00000BC9' |
| MQCACF_REMOTE_Q_NAMES | 3018 | X'00000BCA' |
| MQCACF_SENDER_CHANNEL_NAMES | 3019 | X'00000BCB' |
| MQCACF_SERVER_CHANNEL_NAMES | 3020 | X'00000BCC' |
| MQCACF_REQUESTER_CHANNEL_NAMES | 3021 | X'00000BCD' |
| MQCACF_RECEIVER_CHANNEL_NAMES | 3022 | X'00000BCE' |
| MQCACF_OBJECT_Q_MGR_NAME | 3023 | X'00000BCF' |
| MQCACF_APPL_NAME | 3024 | X'00000BD0' |
| MQCACF_USER_IDENTIFIER | 3025 | X'00000BD1' |
| MQCACF_AUX_ERROR_DATA_STR_1 | 3026 | X'00000BD2' |
| MQCACF_AUX_ERROR_DATA_STR_2 | 3027 | X'00000BD3' |
| MQCACF_AUX_ERROR_DATA_STR_3 | 3028 | X'00000BD4' |
| MQCACF_BRIDGE_NAME | 3029 | X'00000BD5' |
| MQCACF_STREAM_NAME | 3030 | X'00000BD6' |
| MQCACF_TOPIC | 3031 | X'00000BD7' |
| MQCACF_PARENT_Q_MGR_NAME | 3032 | X'00000BD8' |
| MQCACF_CORREL_ID | 3033 | X'00000BD9' |
| MQCACF_PUBLISH_TIMESTAMP | 3034 | X'00000BDA' |
| MQCACF_STRING_DATA | 3035 | X'00000BDB' |
| MQCACF_SUPPORTED_STREAM_NAME | 3036 | X'00000BDC' |
| MQCACF_REG_TOPIC | 3037 | X'00000BDD' |
| MQCACF_REG_TIME | 3038 | X'00000BDE' |
| MQCACF_REG_USER_ID | 3039 | X'00000BDF' |
| MQCACF_CHILD_Q_MGR_NAME | 3040 | X'00000BE0' |
| MQCACF_REG_STREAM_NAME | 3041 | X'00000BE1' |
| MQCACF_REG_Q_MGR_NAME | 3042 | X'00000BE2' |
| MQCACF_REG_Q_NAME | 3043 | X'00000BE3' |
| MQCACF_REG_CORREL_ID | 3044 | X'00000BE4' |
| MQCACF_EVENT_USER_ID | 3045 | X'00000BE5' |
| MQCACF_OBJECT_NAME | 3046 | X'00000BE6' |
| MQCACF_EVENT_Q_MGR | 3047 | X'00000BE7' |
| MQCACF_AUTH_INFO_NAMES | 3048 | X'00000BE8' |
| MQCACF_EVENT_APPL_IDENTITY | 3049 | X'00000BE9' |

*Table 40. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACF_EVENT_APPL_NAME | 3050 | X'00000BEA' |
| MQCACF_EVENT_APPL_ORIGIN | 3051 | X'00000BEB' |
| MQCACF_SUBSCRIPTION_NAME | 3052 | X'00000BEC' |
| MQCACF_REG_SUB_NAME | 3053 | X'00000BED' |
| MQCACF_SUBSCRIPTION_IDENTITY | 3054 | X'00000BEE' |
| MQCACF_REG_SUB_IDENTITY | 3055 | X'00000BEF' |
| MQCACF_SUBSCRIPTION_USER_DATA | 3056 | X'00000BF0' |
| MQCACF_REG_SUB_USER_DATA | 3057 | X'00000BF1' |
| MQCACF_APPL_TAG | 3058 | X'00000BF2' |
| MQCACF_DATA_SET_NAME | 3059 | X'00000BF3' |
| MQCACF_UOW_START_DATE | 3060 | X'00000BF4' |
| MQCACF_UOW_START_TIME | 3061 | X'00000BF5' |
| MQCACF_UOW_LOG_START_DATE | 3062 | X'00000BF6' |
| MQCACF_UOW_LOG_START_TIME | 3063 | X'00000BF7' |
| MQCACF_UOW_LOG_EXTENT_NAME | 3064 | X'00000BF8' |
| MQCACF_PRINCIPAL_ENTITY_NAMES | 3065 | X'00000BF9' |
| MQCACF_GROUP_ENTITY_NAMES | 3066 | X'00000BFA' |
| MQCACF_AUTH_PROFILE_NAME | 3067 | X'00000BFB' |
| MQCACF_ENTITY_NAME | 3068 | X'00000BFC' |
| MQCACF_SERVICE_COMPONENT | 3069 | X'00000BFD' |
| MQCACF_RESPONSE_Q_MGR_NAME | 3070 | X'00000BFE' |
| MQCACF_CURRENT_LOG_EXTENT_NAME | 3071 | X'00000BFF' |
| MQCACF_RESTART_LOG_EXTENT_NAME | 3072 | X'00000C00' |
| MQCACF_MEDIA_LOG_EXTENT_NAME | 3073 | X'00000C01' |
| MQCACF_LOG_PATH | 3074 | X'00000C02' |
| MQCACF_COMMAND_MQSC | 3075 | X'00000C03' |
| MQCACF_Q_MGR_CPF | 3076 | X'00000C04' |
| MQCACF_USAGE_LOG_RBA | 3078 | X'00000C06' |
| MQCACF_USAGE_LOG_LRSN | 3079 | X'00000C07' |
| MQCACF_COMMAND_SCOPE | 3080 | X'00000C08' |
| MQCACF_ASID | 3081 | X'00000C09' |
| MQCACF_PSB_NAME | 3082 | X'00000C0A' |
| MQCACF_PST_ID | 3083 | X'00000C0B' |
| MQCACF_TASK_NUMBER | 3084 | X'00000C0C' |
| MQCACF_TRANSACTION_ID | 3085 | X'00000C0D' |
| MQCACF_Q_MGR_UOW_ID | 3086 | X'00000C0E' |
| MQCACF_ORIGIN_NAME | 3088 | X'00000C10' |
| MQCACF_ENV_INFO | 3089 | X'00000C11' |
| MQCACF_SECURITY_PROFILE | 3090 | X'00000C12' |

*Table 40. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACF_CONFIGURATION_DATE | 3091 | X'00000C13' |
| MQCACF_CONFIGURATION_TIME | 3092 | X'00000C14' |
| MQCACF_FROM_CF_STRUC_NAME | 3093 | X'00000C15' |
| MQCACF_TO_CF_STRUC_NAME | 3094 | X'00000C16' |
| MQCACF_CF_STRUC_NAMES | 3095 | X'00000C17' |
| MQCACF_FAIL_DATE | 3096 | X'00000C18' |
| MQCACF_FAIL_TIME | 3097 | X'00000C19' |
| MQCACF_BACKUP_DATE | 3098 | X'00000C1A' |
| MQCACF_BACKUP_TIME | 3099 | X'00000C1B' |
| MQCACF_SYSTEM_NAME | 3100 | X'00000C1C' |
| MQCACF_CF_STRUC_BACKUP_START | 3101 | X'00000C1D' |
| MQCACF_CF_STRUC_BACKUP_END | 3102 | X'00000C1E' |
| MQCACF_CF_STRUC_LOG_Q_MGRS | 3103 | X'00000C1F' |
| MQCACF_FROM_STORAGE_CLASS | 3104 | X'00000C20' |
| MQCACF_TO_STORAGE_CLASS | 3105 | X'00000C21' |
| MQCACF_STORAGE_CLASS_NAMES | 3106 | X'00000C22' |
| MQCACF_DSG_NAME | 3108 | X'00000C24' |
| MQCACF_DB2_NAME | 3109 | X'00000C25' |
| MQCACF_SYSP_CMD_USER_ID | 3110 | X'00000C26' |
| MQCACF_SYSP_OTMA_GROUP | 3111 | X'00000C27' |
| MQCACF_SYSP_OTMA_MEMBER | 3112 | X'00000C28' |
| MQCACF_SYSP_OTMA_DRU_EXIT | 3113 | X'00000C29' |
| MQCACF_SYSP_OTMA_TPIPE_PFX | 3114 | X'00000C2A' |
| MQCACF_SYSP_ARCHIVE_PFX1 | 3115 | X'00000C2B' |
| MQCACF_SYSP_ARCHIVE_UNIT1 | 3116 | X'00000C2C' |
| MQCACF_SYSP_LOG_CORREL_ID | 3117 | X'00000C2D' |
| MQCACF_SYSP_UNIT_VOLSER | 3118 | X'00000C2E' |
| MQCACF_SYSP_Q_MGR_TIME | 3119 | X'00000C2F' |
| MQCACF_SYSP_Q_MGR_DATE | 3120 | X'00000C30' |
| MQCACF_SYSP_Q_MGR_RBA | 3121 | X'00000C31' |
| MQCACF_SYSP_LOG_RBA | 3122 | X'00000C32' |
| MQCACF_SYSP_SERVICE | 3123 | X'00000C33' |
| MQCACF_FROM_LISTENER_NAME | 3124 | X'00000C34' |
| MQCACF_TO_LISTENER_NAME | 3125 | X'00000C35' |
| MQCACF_FROM_SERVICE_NAME | 3126 | X'00000C36' |
| MQCACF_TO_SERVICE_NAME | 3127 | X'00000C37' |
| MQCACF_LAST_PUT_DATE | 3128 | X'00000C38' |
| MQCACF_LAST_PUT_TIME | 3129 | X'00000C39' |
| MQCACF_LAST_GET_DATE | 3130 | X'00000C3A' |

*Table 40. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACF_LAST_GET_TIME | 3131 | X'00000C3B' |
| MQCACF_OPERATION_DATE | 3132 | X'00000C3C' |
| MQCACF_OPERATION_TIME | 3133 | X'00000C3D' |
| MQCACF_ACTIVITY_DESC | 3134 | X'00000C3E' |
| MQCACF_APPL_IDENTITY_DATA | 3135 | X'00000C3F' |
| MQCACF_APPL_ORIGIN_DATA | 3136 | X'00000C40' |
| MQCACF_PUT_DATE | 3137 | X'00000C41' |
| MQCACF_PUT_TIME | 3138 | X'00000C42' |
| MQCACF_REPLY_TO_Q | 3139 | X'00000C43' |
| MQCACF_REPLY_TO_Q_MGR | 3140 | X'00000C44' |
| MQCACF_RESOLVED_Q_NAME | 3141 | X'00000C45' |
| MQCACF_STRUC_ID | 3142 | X'00000C46' |
| MQCACF_VALUE_NAME | 3143 | X'00000C47' |
| MQCACF_SERVICE_START_DATE | 3144 | X'00000C48' |
| MQCACF_SERVICE_START_TIME | 3145 | X'00000C49' |
| MQCACF_SYSP_OFFLINE_RBA | 3146 | X'00000C4A' |
| MQCACF_SYSP_ARCHIVE_PFX2 | 3147 | X'00000C4B' |
| MQCACF_SYSP_ARCHIVE_UNIT2 | 3148 | X'00000C4C' |
| MQCACF_TO_TOPIC_NAME | 3149 | X'00000C4D' |
| MQCACF_FROM_TOPIC_NAME | 3150 | X'00000C4E' |
| MQCACF_TOPIC_NAMES | 3151 | X'00000C4F' |
| MQCACF_SUB_NAME | 3152 | X'00000C50' |
| MQCACF_DESTINATION_Q_MGR | 3153 | X'00000C51' |
| MQCACF_DESTINATION | 3154 | X'00000C52' |
| MQCACF_SUB_USER_ID | 3156 | X'00000C54' |
| MQCACF_SUB_USER_DATA | 3159 | X'00000C57' |
| MQCACF_SUB_SELECTOR | 3160 | X'00000C58' |
| MQCACF_LAST_PUB_DATE | 3161 | X'00000C59' |
| MQCACF_LAST_PUB_TIME | 3162 | X'00000C5A' |
| MQCACF_FROM_SUB_NAME | 3163 | X'00000C5B' |
| MQCACF_TO_SUB_NAME | 3164 | X'00000C5C' |
| MQCACF_LAST_MSG_TIME | 3167 | X'00000C5F' |
| MQCACF_LAST_MSG_DATE | 3168 | X'00000C60' |
| MQCACF_SUBSCRIPTION_POINT | 3169 | X'00000C61' |
| MQCACF_FILTER | 3170 | X'00000C62' |
| MQCACF_NONE | 3171 | X'00000C63' |
| MQCACF_ADMIN_TOPIC_NAMES | 3172 | X'00000C64' |
| MQCACF_LAST_USED | 3172 | X'00000C64' |

## MQCACH_* (Command format Character Channel Parameter Types)

*Table 41. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCACH_FIRST | 3501 | X'00000DAD' |
| MQCACH_CHANNEL_NAME | 3501 | X'00000DAD' |
| MQCACH_DESC | 3502 | X'00000DAE' |
| MQCACH_MODE_NAME | 3503 | X'00000DAF' |
| MQCACH_TP_NAME | 3504 | X'00000DB0' |
| MQCACH_XMIT_Q_NAME | 3505 | X'00000DB1' |
| MQCACH_CONNECTION_NAME | 3506 | X'00000DB2' |
| MQCACH_MCA_NAME | 3507 | X'00000DB3' |
| MQCACH_SEC_EXIT_NAME | 3508 | X'00000DB4' |
| MQCACH_MSG_EXIT_NAME | 3509 | X'00000DB5' |
| MQCACH_SEND_EXIT_NAME | 3510 | X'00000DB6' |
| MQCACH_RCV_EXIT_NAME | 3511 | X'00000DB7' |
| MQCACH_CHANNEL_NAMES | 3512 | X'00000DB8' |
| MQCACH_SEC_EXIT_USER_DATA | 3513 | X'00000DB9' |
| MQCACH_MSG_EXIT_USER_DATA | 3514 | X'00000DBA' |
| MQCACH_SEND_EXIT_USER_DATA | 3515 | X'00000DBB' |
| MQCACH_RCV_EXIT_USER_DATA | 3516 | X'00000DBC' |
| MQCACH_USER_ID | 3517 | X'00000DBD' |
| MQCACH_PASSWORD | 3518 | X'00000DBE' |
| MQCACH_LOCAL_ADDRESS | 3520 | X'00000DC0' |
| MQCACH_LOCAL_NAME | 3521 | X'00000DC1' |
| MQCACH_LAST_MSG_TIME | 3524 | X'00000DC4' |
| MQCACH_LAST_MSG_DATE | 3525 | X'00000DC5' |
| MQCACH_MCA_USER_ID | 3527 | X'00000DC7' |
| MQCACH_CHANNEL_START_TIME | 3528 | X'00000DC8' |
| MQCACH_CHANNEL_START_DATE | 3529 | X'00000DC9' |
| MQCACH_MCA_JOB_NAME | 3530 | X'00000DCA' |
| MQCACH_LAST_LUWID | 3531 | X'00000DCB' |
| MQCACH_CURRENT_LUWID | 3532 | X'00000DCC' |
| MQCACH_FORMAT_NAME | 3533 | X'00000DCD' |
| MQCACH_MR_EXIT_NAME | 3534 | X'00000DCE' |
| MQCACH_MR_EXIT_USER_DATA | 3535 | X'00000DCF' |
| MQCACH_SSL_CIPHER_SPEC | 3544 | X'00000DD8' |
| MQCACH_SSL_PEER_NAME | 3545 | X'00000DD9' |
| MQCACH_SSL_HANDSHAKE_STAGE | 3546 | X'00000DDA' |
| MQCACH_SSL_SHORT_PEER_NAME | 3547 | X'00000DDB' |
| MQCACH_REMOTE_APPL_TAG | 3548 | X'00000DDC' |
| MQCACH_SSL_CERT_USER_ID | 3549 | X'00000DDD' |

| Table 41. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCACH_SSL_CERT_ISSUER_NAME | 3550 | X'00000DDE' |
| MQCACH_LU_NAME | 3551 | X'00000DDF' |
| MQCACH_IP_ADDRESS | 3552 | X'00000DE0' |
| MQCACH_TCP_NAME | 3553 | X'00000DE1' |
| MQCACH_LISTENER_NAME | 3554 | X'00000DE2' |
| MQCACH_LISTENER_DESC | 3555 | X'00000DE3' |
| MQCACH_LISTENER_START_DATE | 3556 | X'00000DE4' |
| MQCACH_LISTENER_START_TIME | 3557 | X'00000DE5' |
| MQCACH_SSL_KEY_RESET_DATE | 3558 | X'00000DE6' |
| MQCACH_SSL_KEY_RESET_TIME | 3559 | X'00000DE7' |
| MQCACH_LAST_USED | 3559 | X'00000DE7' |

## MQCADSD_* ( CICS information header ADS Descriptors)

| Table 42. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCADSD_NONE | 0 | X'00000000' |
| MQCADSD_SEND | 1 | X'00000001' |
| MQCADSD_RECV | 16 | X'00000010' |
| MQCADSD_MSGFORMAT | 256 | X'00000100' |

## MQCAFTY_* (Connection Affinity Values)

| Table 43. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCAFTY_NONE | 0 | X'00000000' |
| MQCAFTY_PREFERRED | 1 | X'00000001' |

## MQCAMO_* (Command format Character Monitoring Parameter Types)

| Table 44. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCAMO_FIRST | 2701 | X'00000A8D' |
| MQCAMO_CLOSE_DATE | 2701 | X'00000A8D' |
| MQCAMO_CLOSE_TIME | 2702 | X'00000A8E' |
| MQCAMO_CONN_DATE | 2703 | X'00000A8F' |
| MQCAMO_CONN_TIME | 2704 | X'00000A90' |
| MQCAMO_DISC_DATE | 2705 | X'00000A91' |
| MQCAMO_DISC_TIME | 2706 | X'00000A92' |
| MQCAMO_END_DATE | 2707 | X'00000A93' |
| MQCAMO_END_TIME | 2708 | X'00000A94' |
| MQCAMO_OPEN_DATE | 2709 | X'00000A95' |
| MQCAMO_OPEN_TIME | 2710 | X'00000A96' |

| Table 44. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCAMO_START_DATE | 2711 | X'00000A97' |
| MQCAMO_START_TIME | 2712 | X'00000A98' |
| MQCAMO_LAST_USED | 2712 | X'00000A98' |

## MQCBC_* (MQCBC constants structure)

| Table 45. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCBC_STRUC_ID | "CBC¬" |
| MQCBC_STRUC_ID_ARRAY | 'C','B','C','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 46. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBC_VERSION_1 | 1 | X'00000001' |
| MQCBC_CURRENT_VERSION | 1 | X'00000001' |

## MQCBCF_* (MQCBC constants Flags)

| Table 47. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBCF_NONE | 0 | X'00000000' |
| MQCBCF_READA_BUFFER_EMPTY | 1 | X'00000001' |

## MQCBCT_* (MQCBC constants Callback type)

| Table 48. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBCT_START_CALL | 1 | X'00000001' |
| MQCBCT_STOP_CALL | 2 | X'00000002' |
| MQCBCT_REGISTER_CALL | 3 | X'00000003' |
| MQCBCT_DEREGISTER_CALL | 4 | X'00000004' |
| MQCBCT_EVENT_CALL | 5 | X'00000005' |
| MQCBCT_MSG_REMOVED | 6 | X'00000006' |
| MQCBCT_MSG_NOT_REMOVED | 7 | X'00000007' |

## MQCBD_* (MQCBD constants structure)

| Table 49. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCBD_STRUC_ID | "CBD¬" |
| MQCBD_STRUC_ID_ARRAY | 'C','B','D','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 50. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBD_VERSION_1 | 1 | X'00000001' |
| MQCBD_CURRENT_VERSION | 1 | X'00000001' |

## MQCBDO_* (MQCBD constants Callback Options)

| Table 51. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBDO_NONE | 0 | X'00000000' |
| MQCBDO_START_CALL | 1 | X'00000001' |
| MQCBDO_STOP_CALL | 4 | X'00000004' |
| MQCBDO_REGISTER_CALL | 256 | X'00000100' |
| MQCBDO_DEREGISTER_CALL | 512 | X'00000200' |
| MQCBDO_FAIL_IF_QUIESCING | 8192 | X'00002000' |

## MQCBO_* (Create-Bag Options for mqCreateBag)

| Table 52. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBO_NONE | 0 | X'00000000' |
| MQCBO_USER_BAG | 0 | X'00000000' |
| MQCBO_ADMIN_BAG | 1 | X'00000001' |
| MQCBO_COMMAND_BAG | 16 | X'00000010' |
| MQCBO_SYSTEM_BAG | 32 | X'00000020' |
| MQCBO_GROUP_BAG | 64 | X'00000040' |
| MQCBO_LIST_FORM_ALLOWED | 2 | X'00000002' |
| MQCBO_LIST_FORM_INHIBITED | 0 | X'00000000' |
| MQCBO_REORDER_AS_REQUIRED | 4 | X'00000004' |
| MQCBO_DO_NOT_REORDER | 0 | X'00000000' |
| MQCBO_CHECK_SELECTORS | 8 | X'00000008' |
| MQCBO_DO_NOT_CHECK_SELECTORS | 0 | X'00000000' |

## MQCBT_* (MQCBD constants This is the type of the Callback Function)

| Table 53. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCBT_MESSAGE_CONSUMER | 1 | X'00000001' |
| MQCBT_EVENT_HANDLER | 2 | X'00000002' |

## MQCC_* (Completion Codes)

| Table 54. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCC_OK | 0 | X'00000000' |
| MQCC_WARNING | 1 | X'00000001' |

| Table 54. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCC_FAILED | 2 | X'00000002' |
| MQCC_UNKNOWN | -1 | X'FFFFFFFF' |

## MQCCSI_* (Coded Character Set Identifiers)

| Table 55. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCCSI_UNDEFINED | 0 | X'00000000' |
| MQCCSI_DEFAULT | 0 | X'00000000' |
| MQCCSI_Q_MGR | 0 | X'00000000' |
| MQCCSI_INHERIT | -2 | X'FFFFFFFE' |
| MQCCSI_EMBEDDED | -1 | X'FFFFFFFF' |
| MQCCSI_APPL | -3 | X'FFFFFFFD' |

## MQCCT_* ( CICS information header Conversational Task Options)

| Table 56. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCCT_YES | 1 | X'00000001' |
| MQCCT_NO | 0 | X'00000000' |

## MQCD_* (Channel definition structure)

| Table 57. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCD_VERSION_1 | 1 | X'00000001' |
| MQCD_VERSION_2 | 2 | X'00000002' |
| MQCD_VERSION_3 | 3 | X'00000003' |
| MQCD_VERSION_4 | 4 | X'00000004' |
| MQCD_VERSION_5 | 5 | X'00000005' |
| MQCD_VERSION_6 | 6 | X'00000006' |
| MQCD_VERSION_7 | 7 | X'00000007' |
| MQCD_VERSION_8 | 8 | X'00000008' |
| MQCD_VERSION_9 | 9 | X'00000009' |
| MQCD_VERSION_10 | 10 | X'0000000A' |
| MQCD_VERSION_11 | 11 | X'0000000B' |
| MQCD_CURRENT_VERSION | 11 | X'0000000B' |
| MQCD_LENGTH_4 | (value differs by platform or version) | |
| MQCD_LENGTH_5 | (value differs by platform or version) | |
| MQCD_LENGTH_6 | (value differs by platform or version) | |

| Table 57. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCD_LENGTH_7 | (value differs by platform or version) | |
| MQCD_LENGTH_8 | (value differs by platform or version) | |
| MQCD_LENGTH_9 | (value differs by platform or version) | |
| MQCD_LENGTH_10 | (value differs by platform or version) | |
| MQCD_LENGTH_11 | (value differs by platform or version) | |
| MQCD_CURRENT_LENGTH | (value differs by platform or version) | |

## MQCDC_* (Channel Data Conversion)

| Table 58. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCDC_SENDER_CONVERSION | 1 | X'00000001' |
| MQCDC_NO_SENDER_CONVERSION | 0 | X'00000000' |

## MQCERT_* (Certificate Validation Policy Type)

| | | |
|---|---|---|
| MQ_CERT_VAL_POLICY_DEFAULT | 0 | X'00000000' |
| MQ_CERT_VAL_POLICY_ANY | 0 | X'00000000' |
| MQ_CERT_VAL_POLICY_RFC5280 | 1 | X'00000001' |

## MQCF_* (Capability Flags)

| Table 59. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCF_NONE | 0 | X'00000000' |
| MQCF_DIST_LISTS | 1 | X'00000001' |

## MQCFAC_* ( CICS information header Facility)

| Table 60. Constant names and values | |
|---|---|
| **Name** | **Hexadecimal value** |
| MQCFAC_NONE | X'00...00' (8 nulls) |
| MQCFAC_NONE_ARRAY | '\0','\0',... (8 nulls) |

## MQCFBF_* (Command format byte string filter parameter structure)

| Table 61. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCFBF_STRUC_LENGTH_FIXED | 20 | X'00000014' |

## MQCFBS_* (Command format byte string parameter structure)

*Table 62. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFBS_STRUC_LENGTH_FIXED | 16 | X'00000010' |

## MQCFC_* (Command format header Control Options)

*Table 63. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFC_LAST | 1 | X'00000001' |
| MQCFC_NOT_LAST | 0 | X'00000000' |

## MQCFGR_* (Command format group parameter structure)

*Table 64. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFGR_STRUC_LENGTH | 16 | X'00000010' |

## MQCFH_* (Command format header structure)

*Table 65. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFH_STRUC_LENGTH | 36 | X'00000024' |
| MQCFH_VERSION_1 | 1 | X'00000001' |
| MQCFH_VERSION_2 | 2 | X'00000002' |
| MQCFH_VERSION_3 | 3 | X'00000003' |
| MQCFH_CURRENT_VERSION | 3 | X'00000003' |

## MQCFIF_* (Command format integer filter parameter structure)

*Table 66. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFIF_STRUC_LENGTH | 20 | X'00000014' |

## MQCFIL_* (Command format integer list parameter structure)

*Table 67. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFIL_STRUC_LENGTH_FIXED | 16 | X'00000010' |

## MQCFIL64_* (Command format 64-bit integer list parameter structure)

*Table 68. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFIL64_STRUC_LENGTH_FIXED | 16 | X'00000010' |

## MQCFIN_* (Command format integer parameter structure)

*Table 69. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFIN_STRUC_LENGTH | 16 | X'00000010' |

## MQCFIN64_* (Command format 64-bit integer parameter structure)

*Table 70. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFIN64_STRUC_LENGTH | 24 | X'00000018' |

## MQCFO_* (Command format Refresh Repository Options and Command format Remove Queues Options )

### Command format Refresh Repository Options

*Table 71. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFO_REFRESH_REPOSITORY_YES | 1 | X'00000001' |
| MQCFO_REFRESH_REPOSITORY_NO | 0 | X'00000000' |

### Command format Remove Queues Options

*Table 72. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFO_REMOVE_QUEUES_YES | 1 | X'00000001' |
| MQCFO_REMOVE_QUEUES_NO | 0 | X'00000000' |

## MQCFOP_* (Command format Filter Operators)

*Table 73. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFOP_LESS | 1 | X'00000001' |
| MQCFOP_EQUAL | 2 | X'00000002' |
| MQCFOP_GREATER | 4 | X'00000004' |
| MQCFOP_NOT_LESS | 6 | X'00000006' |
| MQCFOP_NOT_EQUAL | 5 | X'00000005' |
| MQCFOP_NOT_GREATER | 3 | X'00000003' |
| MQCFOP_LIKE | 18 | X'00000012' |
| MQCFOP_NOT_LIKE | 21 | X'00000015' |
| MQCFOP_CONTAINS | 10 | X'0000000A' |
| MQCFOP_EXCLUDES | 13 | X'0000000D' |
| MQCFOP_CONTAINS_GEN | 26 | X'0000001A' |
| MQCFOP_EXCLUDES_GEN | 29 | X'0000001D' |

## MQCFR_* (CF Recoverability)

*Table 74. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFR_YES | 1 | X'00000001' |
| MQCFR_NO | 0 | X'00000000' |

## MQCFSF_* (Command format string filter parameter structure)

*Table 75. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFSF_STRUC_LENGTH_FIXED | 24 | X'00000018' |

## MQCFSL_* (Command format string list parameter structure)

*Table 76. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFSL_STRUC_LENGTH_FIXED | 24 | X'00000018' |

## MQCFST_* (Command format string parameter structure)

*Table 77. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFST_STRUC_LENGTH_FIXED | 20 | X'00000014' |

## MQCFSTATUS_* (Command format CF Status)

*Table 78. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFSTATUS_NOT_FOUND | 0 | X'00000000' |
| MQCFSTATUS_ACTIVE | 1 | X'00000001' |
| MQCFSTATUS_IN_RECOVER | 2 | X'00000002' |
| MQCFSTATUS_IN_BACKUP | 3 | X'00000003' |
| MQCFSTATUS_FAILED | 4 | X'00000004' |
| MQCFSTATUS_NONE | 5 | X'00000005' |
| MQCFSTATUS_UNKNOWN | 6 | X'00000006' |
| MQCFSTATUS_ADMIN_INCOMPLETE | 20 | X'00000014' |
| MQCFSTATUS_NEVER_USED | 21 | X'00000015' |
| MQCFSTATUS_NO_BACKUP | 22 | X'00000016' |
| MQCFSTATUS_NOT_FAILED | 23 | X'00000017' |
| MQCFSTATUS_NOT_RECOVERABLE | 24 | X'00000018' |
| MQCFSTATUS_XES_ERROR | 25 | X'00000019' |

## MQCFT_* (Command format Types of Structure)

*Table 79. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFT_NONE | 0 | X'00000000' |
| MQCFT_COMMAND | 1 | X'00000001' |
| MQCFT_RESPONSE | 2 | X'00000002' |
| MQCFT_INTEGER | 3 | X'00000003' |
| MQCFT_STRING | 4 | X'00000004' |
| MQCFT_INTEGER_LIST | 5 | X'00000005' |
| MQCFT_STRING_LIST | 6 | X'00000006' |
| MQCFT_EVENT | 7 | X'00000007' |
| MQCFT_USER | 8 | X'00000008' |
| MQCFT_BYTE_STRING | 9 | X'00000009' |
| MQCFT_TRACE_ROUTE | 10 | X'0000000A' |
| MQCFT_REPORT | 12 | X'0000000C' |
| MQCFT_INTEGER_FILTER | 13 | X'0000000D' |
| MQCFT_STRING_FILTER | 14 | X'0000000E' |
| MQCFT_BYTE_STRING_FILTER | 15 | X'0000000F' |
| MQCFT_COMMAND_XR | 16 | X'00000010' |
| MQCFT_XR_MSG | 17 | X'00000011' |
| MQCFT_XR_ITEM | 18 | X'00000012' |
| MQCFT_XR_SUMMARY | 19 | X'00000013' |
| MQCFT_GROUP | 20 | X'00000014' |
| MQCFT_STATISTICS | 21 | X'00000015' |
| MQCFT_ACCOUNTING | 22 | X'00000016' |
| MQCFT_INTEGER64 | 23 | X'00000017' |
| MQCFT_INTEGER64_LIST | 25 | X'00000019' |

## MQCFTYPE_* (Command format CF Types)

*Table 80. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCFTYPE_APPL | 0 | X'00000000' |
| MQCFTYPE_ADMIN | 1 | X'00000001' |

## MQCFUNC_* ( CICS information header Functions)

*Table 81. Structures of constants*

| Name | Structure |
|---|---|
| MQCFUNC_MQCONN | "CONN" |
| MQCFUNC_MQGET | "GET¬" |
| MQCFUNC_MQINQ | "INQ¬" |
| MQCFUNC_MQOPEN | "OPEN" |

| Table 81. Structures of constants (continued) | |
|---|---|
| **Name** | **Structure** |
| MQCFUNC_MQPUT | "PUT¬" |
| MQCFUNC_MQPUT1 | "PUT1" |
| MQCFUNC_NONE | "¬¬¬¬" |
| MQCFUNC_MQCONN_ARRAY | 'C','O','N','N' |
| MQCFUNC_MQGET_ARRAY | 'G','E','T','¬' |
| MQCFUNC_MQINQ_ARRAY | 'I','N','Q','¬' |
| MQCFUNC_MQOPEN_ARRAY | 'O','P','E','N' |
| MQCFUNC_MQPUT_ARRAY | 'P','U','T','¬' |
| MQCFUNC_MQPUT1_ARRAY | 'P','U','T','1' |
| MQCFUNC_NONE_ARRAY | '¬','¬','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

## MQCGWI_* ( CICS information header Get Wait Interval)

| Table 82. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCGWI_DEFAULT | -2 | X'FFFFFFFE' |

## MQCHAD_* (Channel Auto Definition)

| Table 83. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHAD_DISABLED | 0 | X'00000000' |
| MQCHAD_ENABLED | 1 | X'00000001' |

## MQCHIDS_* (Command format Indoubt Status)

| Table 84. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHIDS_NOT_INDOUBT | 0 | X'00000000' |
| MQCHIDS_INDOUBT | 1 | X'00000001' |

## MQCHLD_* (Command format Channel Dispositions)

| Table 85. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHLD_ALL | -1 | X'FFFFFFFF' |
| MQCHLD_DEFAULT | 1 | X'00000001' |
| MQCHLD_SHARED | 2 | X'00000002' |
| MQCHLD_PRIVATE | 4 | X'00000004' |
| MQCHLD_FIXSHARED | 5 | X'00000005' |

## MQCHS_* (Command format Channel Status)

*Table 86. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCHS_INACTIVE | 0 | X'00000000' |
| MQCHS_BINDING | 1 | X'00000001' |
| MQCHS_STARTING | 2 | X'00000002' |
| MQCHS_RUNNING | 3 | X'00000003' |
| MQCHS_STOPPING | 4 | X'00000004' |
| MQCHS_RETRYING | 5 | X'00000005' |
| MQCHS_STOPPED | 6 | X'00000006' |
| MQCHS_REQUESTING | 7 | X'00000007' |
| MQCHS_PAUSED | 8 | X'00000008' |
| MQCHS_INITIALIZING | 13 | X'0000000D' |
| MQCHS_SWITCHING | 14 | X'0000000E' |

## MQCHSH_* (Command format Channel Shared Restart Options)

*Table 87. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCHSH_RESTART_NO | 0 | X'00000000' |
| MQCHSH_RESTART_YES | 1 | X'00000001' |

## MQCHSR_* (Command format Channel Stop Options)

*Table 88. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCHSR_STOP_NOT_REQUESTED | 0 | X'00000000' |
| MQCHSR_STOP_REQUESTED | 1 | X'00000001' |

## MQCHSSTATE_* (Command format Channel Substates)

*Table 89. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCHSSTATE_OTHER | 0 | X'00000000' |
| MQCHSSTATE_END_OF_BATCH | 100 | X'00000064' |
| MQCHSSTATE_SENDING | 200 | X'000000C8' |
| MQCHSSTATE_RECEIVING | 300 | X'0000012C' |
| MQCHSSTATE_SERIALIZING | 400 | X'00000190' |
| MQCHSSTATE_RESYNCHING | 500 | X'000001F4' |
| MQCHSSTATE_HEARTBEATING | 600 | X'00000258' |
| MQCHSSTATE_IN_SCYEXIT | 700 | X'000002BC' |
| MQCHSSTATE_IN_RCVEXIT | 800 | X'00000320' |
| MQCHSSTATE_IN_SENDEXIT | 900 | X'00000384' |
| MQCHSSTATE_IN_MSGEXIT | 1000 | X'000003E8' |

| Table 89. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHSSTATE_IN_MREXIT | 1100 | X'0000044C' |
| MQCHSSTATE_IN_CHADEXIT | 1200 | X'000004B0' |
| MQCHSSTATE_NET_CONNECTING | 1250 | X'000004E2' |
| MQCHSSTATE_SSL_HANDSHAKING | 1300 | X'00000514' |
| MQCHSSTATE_NAME_SERVER | 1400 | X'00000578' |
| MQCHSSTATE_IN_MQPUT | 1500 | X'000005DC' |
| MQCHSSTATE_IN_MQGET | 1600 | X'00000640' |
| MQCHSSTATE_IN_MQI_CALL | 1700 | X'000006A4' |
| MQCHSSTATE_COMPRESSING | 1800 | X'00000708' |

## MQCHT_* (Channel Types)

| Table 90. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHT_SENDER | 1 | X'00000001' |
| MQCHT_SERVER | 2 | X'00000002' |
| MQCHT_RECEIVER | 3 | X'00000003' |
| MQCHT_REQUESTER | 4 | X'00000004' |
| MQCHT_ALL | 5 | X'00000005' |
| MQCHT_CLNTCONN | 6 | X'00000006' |
| MQCHT_SVRCONN | 7 | X'00000007' |
| MQCHT_CLUSRCVR | 8 | X'00000008' |
| MQCHT_CLUSSDR | 9 | X'00000009' |

## MQCHTAB_* (Command format Channel Table Types)

| Table 91. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCHTAB_Q_MGR | 1 | X'00000001' |
| MQCHTAB_CLNTCONN | 2 | X'00000002' |

## MQCI_* (Correlation Identifier)

| Table 92. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQCI_NONE | X'00...00' (24 nulls) |
| MQCI_NONE_ARRAY | '\0','\0',... (24 nulls) |
| MQCI_NEW_SESSION | X'414D5121...' |
| MQCI_NEW_SESSION_ARRAY | '\x41','\x4D','\51','\x21',... |

## MQCIH_* ( CICS information header structure and Flags)

### CICS information header structure

*Table 93. Structures of constants*

| Name | Structure |
|---|---|
| MQCIH_STRUC_ID | "CIH¬" |
| MQCIH_STRUC_ID_ARRAY | 'C','I','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 94. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCIH_VERSION_1 | 1 | X'00000001' |
| MQCIH_VERSION_2 | 2 | X'00000002' |
| MQCIH_CURRENT_VERSION | 2 | X'00000002' |
| MQCIH_LENGTH_1 | 164 | X'000000A4' |
| MQCIH_LENGTH_2 | 180 | X'000000B4' |
| MQCIH_CURRENT_LENGTH | 180 | X'000000B4' |

### CICS information header Flags

*Table 95. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCIH_NONE | 0 | X'00000000' |
| MQCIH_PASS_EXPIRATION | 1 | X'00000001' |
| MQCIH_UNLIMITED_EXPIRATION | 0 | X'00000000' |
| MQCIH_REPLY_WITHOUT_NULLS | 2 | X'00000002' |
| MQCIH_REPLY_WITH_NULLS | 0 | X'00000000' |
| MQCIH_SYNC_ON_RETURN | 4 | X'00000004' |
| MQCIH_NO_SYNC_ON_RETURN | 0 | X'00000000' |

## MQCLCT_* (Cluster Cache Types)

*Table 96. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCLCT_STATIC | 0 | X'00000000' |
| MQCLCT_DYNAMIC | 1 | X'00000001' |

## MQCLRS_* (Command format Clear Topic String Scope)

*Table 97. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCLRS_LOCAL | 1 | X'00000001' |
| MQCLRS_GLOBAL | 2 | X'00000002' |

## MQCLRT_* (Command format Clear Topic String Type)

| *Table 98. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCLRT_RETAINED | 1 | X'00000001' |

## MQCLT_* ( CICS information header Link Types)

| *Table 99. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCLT_PROGRAM | 1 | X'00000001' |
| MQCLT_TRANSACTION | 2 | X'00000002' |

## MQCLWL_* (Cluster Workload)

| *Table 100. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCLWL_USEQ_LOCAL | 0 | X'00000000' |
| MQCLWL_USEQ_ANY | 1 | X'00000001' |
| MQCLWL_USEQ_AS_Q_MGR | -3 | X'FFFFFFFD' |

## MQCLXQ_* (Cluster transmission queue type)

MQCLXQ_* are the values you can set in the DEFCLXQ queue manager attribute. The DEFCLXQ attribute controls which transmission queue is selected by default by cluster-sender channels to get messages from, to send the messages to cluster-receiver channels.

| *Table 101. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCLXQ_SCTQ | 0 | X'00000000' |
| MQCLXQ_CHANNEL | 1 | X'00000001' |

**Related reference**

"DefClusterXmitQueueType (MQLONG)" on page 791
The DefClusterXmitQueueType attribute controls which transmission queue is selected by default by cluster-sender channels to get messages from, to send the messages to cluster-receiver channels.

Change Queue Manager

Inquire Queue Manager

Inquire Queue Manager (Response)

"MQINQ - Inquire object attributes" on page 685
The MQINQ call returns an array of integers and a set of character strings containing the attributes of an object.

## MQCMD_* (Command Codes)

| *Table 102. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCMD_NONE | 0 | X'00000000' |
| MQCMD_CHANGE_Q_MGR | 1 | X'00000001' |
| MQCMD_INQUIRE_Q_MGR | 2 | X'00000002' |

*Table 102. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCMD_CHANGE_PROCESS | 3 | X'00000003' |
| MQCMD_COPY_PROCESS | 4 | X'00000004' |
| MQCMD_CREATE_PROCESS | 5 | X'00000005' |
| MQCMD_DELETE_PROCESS | 6 | X'00000006' |
| MQCMD_INQUIRE_PROCESS | 7 | X'00000007' |
| MQCMD_CHANGE_Q | 8 | X'00000008' |
| MQCMD_CLEAR_Q | 9 | X'00000009' |
| MQCMD_COPY_Q | 10 | X'0000000A' |
| MQCMD_CREATE_Q | 11 | X'0000000B' |
| MQCMD_DELETE_Q | 12 | X'0000000C' |
| MQCMD_INQUIRE_Q | 13 | X'0000000D' |
| MQCMD_REFRESH_Q_MGR | 16 | X'00000010' |
| MQCMD_RESET_Q_STATS | 17 | X'00000011' |
| MQCMD_INQUIRE_Q_NAMES | 18 | X'00000012' |
| MQCMD_INQUIRE_PROCESS_NAMES | 19 | X'00000013' |
| MQCMD_INQUIRE_CHANNEL_NAMES | 20 | X'00000014' |
| MQCMD_CHANGE_CHANNEL | 21 | X'00000015' |
| MQCMD_COPY_CHANNEL | 22 | X'00000016' |
| MQCMD_CREATE_CHANNEL | 23 | X'00000017' |
| MQCMD_DELETE_CHANNEL | 24 | X'00000018' |
| MQCMD_INQUIRE_CHANNEL | 25 | X'00000019' |
| MQCMD_PING_CHANNEL | 26 | X'0000001A' |
| MQCMD_RESET_CHANNEL | 27 | X'0000001B' |
| MQCMD_START_CHANNEL | 28 | X'0000001C' |
| MQCMD_STOP_CHANNEL | 29 | X'0000001D' |
| MQCMD_START_CHANNEL_INIT | 30 | X'0000001E' |
| MQCMD_START_CHANNEL_LISTENER | 31 | X'0000001F' |
| MQCMD_CHANGE_NAMELIST | 32 | X'00000020' |
| MQCMD_COPY_NAMELIST | 33 | X'00000021' |
| MQCMD_CREATE_NAMELIST | 34 | X'00000022' |
| MQCMD_DELETE_NAMELIST | 35 | X'00000023' |
| MQCMD_INQUIRE_NAMELIST | 36 | X'00000024' |
| MQCMD_INQUIRE_NAMELIST_NAMES | 37 | X'00000025' |
| MQCMD_ESCAPE | 38 | X'00000026' |
| MQCMD_RESOLVE_CHANNEL | 39 | X'00000027' |
| MQCMD_PING_Q_MGR | 40 | X'00000028' |
| MQCMD_INQUIRE_Q_STATUS | 41 | X'00000029' |
| MQCMD_INQUIRE_CHANNEL_STATUS | 42 | X'0000002A' |
| MQCMD_CONFIG_EVENT | 43 | X'0000002B' |

*Table 102. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCMD_Q_MGR_EVENT | 44 | X'0000002C' |
| MQCMD_PERFM_EVENT | 45 | X'0000002D' |
| MQCMD_CHANNEL_EVENT | 46 | X'0000002E' |
| MQCMD_DELETE_PUBLICATION | 60 | X'0000003C' |
| MQCMD_DEREGISTER_PUBLISHER | 61 | X'0000003D' |
| MQCMD_DEREGISTER_SUBSCRIBER | 62 | X'0000003E' |
| MQCMD_PUBLISH | 63 | X'0000003F' |
| MQCMD_REGISTER_PUBLISHER | 64 | X'00000040' |
| MQCMD_REGISTER_SUBSCRIBER | 65 | X'00000041' |
| MQCMD_REQUEST_UPDATE | 66 | X'00000042' |
| MQCMD_BROKER_INTERNAL | 67 | X'00000043' |
| MQCMD_ACTIVITY_MSG | 69 | X'00000045' |
| MQCMD_INQUIRE_CLUSTER_Q_MGR | 70 | X'00000046' |
| MQCMD_RESUME_Q_MGR_CLUSTER | 71 | X'00000047' |
| MQCMD_SUSPEND_Q_MGR_CLUSTER | 72 | X'00000048' |
| MQCMD_REFRESH_CLUSTER | 73 | X'00000049' |
| MQCMD_RESET_CLUSTER | 74 | X'0000004A' |
| MQCMD_TRACE_ROUTE | 75 | X'0000004B' |
| MQCMD_REFRESH_SECURITY | 78 | X'0000004E' |
| MQCMD_CHANGE_AUTH_INFO | 79 | X'0000004F' |
| MQCMD_COPY_AUTH_INFO | 80 | X'00000050' |
| MQCMD_CREATE_AUTH_INFO | 81 | X'00000051' |
| MQCMD_DELETE_AUTH_INFO | 82 | X'00000052' |
| MQCMD_INQUIRE_AUTH_INFO | 83 | X'00000053' |
| MQCMD_INQUIRE_AUTH_INFO_NAMES | 84 | X'00000054' |
| MQCMD_INQUIRE_CONNECTION | 85 | X'00000055' |
| MQCMD_STOP_CONNECTION | 86 | X'00000056' |
| MQCMD_INQUIRE_AUTH_RECS | 87 | X'00000057' |
| MQCMD_INQUIRE_ENTITY_AUTH | 88 | X'00000058' |
| MQCMD_DELETE_AUTH_REC | 89 | X'00000059' |
| MQCMD_SET_AUTH_REC | 90 | X'0000005A' |
| MQCMD_LOGGER_EVENT | 91 | X'0000005B' |
| MQCMD_RESET_Q_MGR | 92 | X'0000005C' |
| MQCMD_CHANGE_LISTENER | 93 | X'0000005D' |
| MQCMD_COPY_LISTENER | 94 | X'0000005E' |
| MQCMD_CREATE_LISTENER | 95 | X'0000005F' |
| MQCMD_DELETE_LISTENER | 96 | X'00000060' |
| MQCMD_INQUIRE_LISTENER | 97 | X'00000061' |
| MQCMD_INQUIRE_LISTENER_STATUS | 98 | X'00000062' |

*Table 102. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCMD_COMMAND_EVENT | 99 | X'00000063' |
| MQCMD_CHANGE_SECURITY | 100 | X'00000064' |
| MQCMD_CHANGE_CF_STRUC | 101 | X'00000065' |
| MQCMD_CHANGE_STG_CLASS | 102 | X'00000066' |
| MQCMD_CHANGE_TRACE | 103 | X'00000067' |
| MQCMD_ARCHIVE_LOG | 104 | X'00000068' |
| MQCMD_BACKUP_CF_STRUC | 105 | X'00000069' |
| MQCMD_CREATE_BUFFER_POOL | 106 | X'0000006A' |
| MQCMD_CREATE_PAGE_SET | 107 | X'0000006B' |
| MQCMD_CREATE_CF_STRUC | 108 | X'0000006C' |
| MQCMD_CREATE_STG_CLASS | 109 | X'0000006D' |
| MQCMD_COPY_CF_STRUC | 110 | X'0000006E' |
| MQCMD_COPY_STG_CLASS | 111 | X'0000006F' |
| MQCMD_DELETE_CF_STRUC | 112 | X'00000070' |
| MQCMD_DELETE_STG_CLASS | 113 | X'00000071' |
| MQCMD_INQUIRE_ARCHIVE | 114 | X'00000072' |
| MQCMD_INQUIRE_CF_STRUC | 115 | X'00000073' |
| MQCMD_INQUIRE_CF_STRUC_STATUS | 116 | X'00000074' |
| MQCMD_INQUIRE_CMD_SERVER | 117 | X'00000075' |
| MQCMD_INQUIRE_CHANNEL_INIT | 118 | X'00000076' |
| MQCMD_INQUIRE_QSG | 119 | X'00000077' |
| MQCMD_INQUIRE_LOG | 120 | X'00000078' |
| MQCMD_INQUIRE_SECURITY | 121 | X'00000079' |
| MQCMD_INQUIRE_STG_CLASS | 122 | X'0000007A' |
| MQCMD_INQUIRE_SYSTEM | 123 | X'0000007B' |
| MQCMD_INQUIRE_THREAD | 124 | X'0000007C' |
| MQCMD_INQUIRE_TRACE | 125 | X'0000007D' |
| MQCMD_INQUIRE_USAGE | 126 | X'0000007E' |
| MQCMD_MOVE_Q | 127 | X'0000007F' |
| MQCMD_RECOVER_BSDS | 128 | X'00000080' |
| MQCMD_RECOVER_CF_STRUC | 129 | X'00000081' |
| MQCMD_RESET_TPIPE | 130 | X'00000082' |
| MQCMD_RESOLVE_INDOUBT | 131 | X'00000083' |
| MQCMD_RESUME_Q_MGR | 132 | X'00000084' |
| MQCMD_REVERIFY_SECURITY | 133 | X'00000085' |
| MQCMD_SET_ARCHIVE | 134 | X'00000086' |
| MQCMD_SET_LOG | 136 | X'00000088' |
| MQCMD_SET_SYSTEM | 137 | X'00000089' |
| MQCMD_START_CMD_SERVER | 138 | X'0000008A' |

*Table 102. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCMD_START_Q_MGR | 139 | X'0000008B' |
| MQCMD_START_TRACE | 140 | X'0000008C' |
| MQCMD_STOP_CHANNEL_INIT | 141 | X'0000008D' |
| MQCMD_STOP_CHANNEL_LISTENER | 142 | X'0000008E' |
| MQCMD_STOP_CMD_SERVER | 143 | X'0000008F' |
| MQCMD_STOP_Q_MGR | 144 | X'00000090' |
| MQCMD_STOP_TRACE | 145 | X'00000091' |
| MQCMD_SUSPEND_Q_MGR | 146 | X'00000092' |
| MQCMD_INQUIRE_CF_STRUC_NAMES | 147 | X'00000093' |
| MQCMD_INQUIRE_STG_CLASS_NAMES | 148 | X'00000094' |
| MQCMD_CHANGE_SERVICE | 149 | X'00000095' |
| MQCMD_COPY_SERVICE | 150 | X'00000096' |
| MQCMD_CREATE_SERVICE | 151 | X'00000097' |
| MQCMD_DELETE_SERVICE | 152 | X'00000098' |
| MQCMD_INQUIRE_SERVICE | 153 | X'00000099' |
| MQCMD_INQUIRE_SERVICE_STATUS | 154 | X'0000009A' |
| MQCMD_START_SERVICE | 155 | X'0000009B' |
| MQCMD_STOP_SERVICE | 156 | X'0000009C' |
| MQCMD_DELETE_BUFFER_POOL | 157 | X'0000009D' |
| MQCMD_DELETE_PAGE_SET | 158 | X'0000009E' |
| MQCMD_CHANGE_BUFFER_POOL | 159 | X'0000009F' |
| MQCMD_CHANGE_PAGE_SET | 160 | X'000000A0' |
| MQCMD_INQUIRE_Q_MGR_STATUS | 161 | X'000000A1' |
| MQCMD_CREATE_LOG | 162 | X'000000A2' |
| MQCMD_STATISTICS_MQI | 164 | X'000000A4' |
| MQCMD_STATISTICS_Q | 165 | X'000000A5' |
| MQCMD_STATISTICS_CHANNEL | 166 | X'000000A6' |
| MQCMD_ACCOUNTING_MQI | 167 | X'000000A7' |
| MQCMD_ACCOUNTING_Q | 168 | X'000000A8' |
| MQCMD_INQUIRE_AUTH_SERVICE | 169 | X'000000A9' |
| MQCMD_CHANGE_TOPIC | 170 | X'000000AA' |
| MQCMD_COPY_TOPIC | 171 | X'000000AB' |
| MQCMD_CREATE_TOPIC | 172 | X'000000AC' |
| MQCMD_DELETE_TOPIC | 173 | X'000000AD' |
| MQCMD_INQUIRE_TOPIC | 174 | X'000000AE' |
| MQCMD_INQUIRE_TOPIC_NAMES | 175 | X'000000AF' |
| MQCMD_INQUIRE_SUBSCRIPTION | 176 | X'000000B0' |
| MQCMD_CREATE_SUBSCRIPTION | 177 | X'000000B1' |
| MQCMD_CHANGE_SUBSCRIPTION | 178 | X'000000B2' |

| Table 102. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCMD_DELETE_SUBSCRIPTION | 179 | X'000000B3' |
| MQCMD_COPY_SUBSCRIPTION | 181 | X'000000B5' |
| MQCMD_INQUIRE_SUB_STATUS | 182 | X'000000B6' |
| MQCMD_INQUIRE_TOPIC_STATUS | 183 | X'000000B7' |
| MQCMD_CLEAR_TOPIC_STRING | 184 | X'000000B8' |
| MQCMD_INQUIRE_PUBSUB_STATUS | 185 | X'000000B9' |
| MQCMD_PURGE_CHANNEL | 195 | X'000000C3' |

## MQCMDI_* (Command format Command Information Values)

| Table 103. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCMDI_CMDSCOPE_ACCEPTED | 1 | X'00000001' |
| MQCMDI_CMDSCOPE_GENERATED | 2 | X'00000002' |
| MQCMDI_CMDSCOPE_COMPLETED | 3 | X'00000003' |
| MQCMDI_QSG_DISP_COMPLETED | 4 | X'00000004' |
| MQCMDI_COMMAND_ACCEPTED | 5 | X'00000005' |
| MQCMDI_CLUSTER_REQUEST_QUEUED | 6 | X'00000006' |
| MQCMDI_CHANNEL_INIT_STARTED | 7 | X'00000007' |
| MQCMDI_RECOVER_STARTED | 11 | X'0000000B' |
| MQCMDI_BACKUP_STARTED | 12 | X'0000000C' |
| MQCMDI_RECOVER_COMPLETED | 13 | X'0000000D' |
| MQCMDI_SEC_TIMER_ZERO | 14 | X'0000000E' |
| MQCMDI_REFRESH_CONFIGURATION | 16 | X'00000010' |
| MQCMDI_SEC_SIGNOFF_ERROR | 17 | X'00000011' |
| MQCMDI_IMS_BRIDGE_SUSPENDED | 18 | X'00000012' |
| MQCMDI_DB2_SUSPENDED | 19 | X'00000013' |
| MQCMDI_DB2_OBSOLETE_MSGS | 20 | X'00000014' |
| MQCMDI_SEC_UPPERCASE | 21 | X'00000015' |
| MQCMDI_SEC_MIXEDCASE | 22 | X'00000016' |

## MQCMDL_* (Command Levels)

| Table 104. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQCMDL_LEVEL_600 | 600 |
| MQCMDL_LEVEL_700 | 700 |
| MQCMDL_LEVEL_701 | 701 |
| MQCMDL_LEVEL_710 | 710 |
| MQCMDL_LEVEL_711 | 711 |
| MQCMDL_LEVEL_750 | 750 |
| MQCMDL_LEVEL_800 | 800 |

| Table 104. Constant names and values (continued) | |
|---|---|
| **Name** | **Value** |
| V 8.0.0.2 V 8.0.0.2 MQCMDL_LEVEL_801 | 801 |
| V 8.0.0.3 V 8.0.0.3 MQCMDL_LEVEL_802 | 802 |

**Notes:**

1. MQCMDL_LEVEL_801 applies only to UNIX platforms and IBM i, when you install IBM MQ 8.0.0, Fix Pack 2.
2. V 8.0.0.3 MQCMDL_LEVEL_802 applies only to Windows, UNIX platforms, and IBM i, when you install IBM MQ Version 8.0.0, Fix Pack 3

## MQCMHO_* (Create message handle options and structure)

### Create message handle options structure

| Table 105. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCMHO_STRUC_ID | "CMHO" |
| MQCMHO_STRUC_ID_ARRAY | 'C','M','H','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 106. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCMHO_VERSION_1 | 1 | X'00000001' |
| MQCMHO_CURRENT_VERSION | 1 | X'00000001' |

### Create Message Handle Options

| Table 107. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCMHO_DEFAULT_VALIDATION | 0 | X'00000000' |
| MQCMHO_NO_VALIDATION | 1 | X'00000001' |
| MQCMHO_VALIDATE | 2 | X'00000002' |
| MQCMHO_NONE | 0 | X'00000000' |

## MQCNO_* (Connect options and structure)

### Connect options structure

| Table 108. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCNO_STRUC_ID | "CNO¬" |
| MQCNO_STRUC_ID_ARRAY | 'C','N','O','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 109. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCNO_VERSION_1 | 1 | X'00000001' |
| MQCNO_VERSION_2 | 2 | X'00000002' |
| MQCNO_VERSION_3 | 3 | X'00000003' |
| MQCNO_VERSION_4 | 4 | X'00000004' |
| MQCNO_VERSION_5 | 5 | X'00000005' |
| MQCNO_CURRENT_VERSION | 5 | X'00000005' |

## Connect Options

| *Table 110. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCNO_STANDARD_BINDING | 0 | X'00000000' |
| MQCNO_FASTPATH_BINDING | 1 | X'00000001' |
| MQCNO_SERIALIZE_CONN_TAG_Q_MGR | 2 | X'00000002' |
| MQCNO_SERIALIZE_CONN_TAG_QSG | 4 | X'00000004' |
| MQCNO_RESTRICT_CONN_TAG_Q_MGR | 8 | X'00000008' |
| MQCNO_RESTRICT_CONN_TAG_QSG | 16 | X'00000010' |
| MQCNO_HANDLE_SHARE_NONE | 32 | X'00000020' |
| MQCNO_HANDLE_SHARE_BLOCK | 64 | X'00000040' |
| MQCNO_HANDLE_SHARE_NO_BLOCK | 128 | X'00000080' |
| MQCNO_SHARED_BINDING | 256 | X'00000100' |
| MQCNO_ISOLATED_BINDING | 512 | X'00000200' |
| MQCNO_LOCAL_BINDING | 1024 | X'00000400' |
| MQCNO_CLIENT_BINDING | 2048 | X'00000800' |
| MQCNO_ACCOUNTING_MQI_ENABLED | 4096 | X'00001000' |
| MQCNO_ACCOUNTING_MQI_DISABLED | 8192 | X'00002000' |
| MQCNO_ACCOUNTING_Q_ENABLED | 16384 | X'00004000' |
| MQCNO_ACCOUNTING_Q_DISABLED | 32768 | X'00008000' |
| MQCNO_NO_CONV_SHARING | 65536 | X'00010000' |
| MQCNO_ALL_CONVS_SHARE | 262144 | X'00040000' |
| MQCNO_CD_FOR_OUTPUT_ONLY | 524288 | X'00080000' |
| MQCNO_USE_CD_SELECTION | 1048576 | X'00100000' |
| MQCNO_RECONNECT | 16777216 | X'01000000' |
| MQCNO_RECONNECT_AS_DEF | 0 | X'00000000' |
| MQCNO_RECONNECT_DISABLED | 33554432 | X'02000000' |
| MQCNO_RECONNECT_Q_MGR | 67108864 | X'04000000' |
| MQCNO_ACTIVITY_TRACE_ENABLED | 134217728 | X'08000000' |
| MQCNO_ACTIVITY_TRACE_DISABLED | 268435456 | X'10000000' |
| MQCNO_NONE | 0 | X'00000000' |

## MQCO_* (Close Options)

*Table 111. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCO_IMMEDIATE | 0 | X'00000000' |
| MQCO_NONE | 0 | X'00000000' |
| MQCO_DELETE | 1 | X'00000001' |
| MQCO_DELETE_PURGE | 2 | X'00000002' |
| MQCO_KEEP_SUB | 4 | X'00000004' |
| MQCO_REMOVE_SUB | 8 | X'00000008' |
| MQCO_QUIESCE | 32 | X'00000020' |

## MQCODL_* ( CICS information header Output Data Length)

*Table 112. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCODL_AS_INPUT | -1 | X'FFFFFFFF' |

## MQCOMPRESS_* (Channel Compression)

*Table 113. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCOMPRESS_NOT_AVAILABLE | -1 | X'FFFFFFFF' |
| MQCOMPRESS_NONE | 0 | X'00000000' |
| MQCOMPRESS_RLE | 1 | X'00000001' |
| MQCOMPRESS_ZLIBFAST | 2 | X'00000002' |
| MQCOMPRESS_ZLIBHIGH | 4 | X'00000004' |
| MQCOMPRESS_SYSTEM | 8 | X'00000008' |
| MQCOMPRESS_ANY | 268435455 | X'0FFFFFFF' |

## MQCONNID_* (Connection Identifier)

*Table 114. Constant names and values*

| Name | Value |
|---|---|
| MQCONNID_NONE | X'00...00' (24 nulls) |
| MQCONNID_NONE_ARRAY | '\0','\0',... (24 nulls) |

## MQCOPY_* (Property Copy Options)

*Table 115. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQCOPY_NONE | 0 | X'00000000' |
| MQCOPY_ALL | 1 | X'00000001' |
| MQCOPY_FORWARD | 2 | X'00000002' |
| MQCOPY_PUBLISH | 4 | X'00000004' |
| MQCOPY_REPLY | 8 | X'00000008' |

| Table 115. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCOPY_REPORT | 16 | X'00000010' |
| MQCOPY_DEFAULT | 22 | X'00000016' |

## MQCQT_* (Cluster Queue Types)

| Table 116. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCQT_LOCAL_Q | 1 | X'00000001' |
| MQCQT_ALIAS_Q | 2 | X'00000002' |
| MQCQT_REMOTE_Q | 3 | X'00000003' |
| MQCQT_Q_MGR_ALIAS | 4 | X'00000004' |

## MQCRC_* ( CICS information header Return Codes)

| Table 117. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCRC_OK | 0 | X'00000000' |
| MQCRC_CICS_EXEC_ERROR | 1 | X'00000001' |
| MQCRC_MQ_API_ERROR | 2 | X'00000002' |
| MQCRC_BRIDGE_ERROR | 3 | X'00000003' |
| MQCRC_BRIDGE_ABEND | 4 | X'00000004' |
| MQCRC_APPLICATION_ABEND | 5 | X'00000005' |
| MQCRC_SECURITY_ERROR | 6 | X'00000006' |
| MQCRC_PROGRAM_NOT_AVAILABLE | 7 | X'00000007' |
| MQCRC_BRIDGE_TIMEOUT | 8 | X'00000008' |
| MQCRC_TRANSID_NOT_AVAILABLE | 9 | X'00000009' |

## MQCS_* (MQCBC constants Consumer state)

| Table 118. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCS_NONE | 0 | X'00000000' |
| MQCS_SUSPENDED_TEMPORARY | 1 | X'00000001' |
| MQCS_SUSPENDED_USER_ACTION | 2 | X'00000002' |
| MQCS_SUSPENDED | 3 | X'00000003' |
| MQCS_STOPPED | 4 | X'00000004' |

## MQCSC_* ( CICS information header Start Codes)

| Table 119. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCSC_START | "S¬¬¬" |
| MQCSC_STARTDATA | "SD¬¬" |
| MQCSC_TERMINPUT | "TD¬¬" |

| *Table 119. Structures of constants (continued)* | |
|---|---|
| **Name** | **Structure** |
| MQCSC_NONE | "¬¬¬¬" |
| MQCSC_START_ARRAY | 'S','¬','¬','¬' |
| MQCSC_STARTDATA_ARRAY | 'S','D','¬','¬' |
| MQCSC_TERMINPUT_ARRAY | 'T','D','¬','¬' |
| MQCSC_NONE_ARRAY | '¬','¬','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

## MQCSP_* (Connection security parameters structure and Authentication Types)

### Connection security parameters structure

| *Table 120. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQCSP_STRUC_ID | "CSP¬" |
| MQCSP_STRUC_ID_ARRAY | 'C','S','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 121. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCSP_VERSION_1 | 1 | X'00000001' |
| MQCSP_CURRENT_VERSION | 1 | X'00000001' |

### Connection security parameters Authentication Types

| *Table 122. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCSP_AUTH_NONE | 0 | X'00000000' |
| MQCSP_AUTH_USER_ID_AND_PWD | 1 | X'00000001' |

## MQCSRV_* (Command Server Options)

| *Table 123. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCSRV_CONVERT_NO | 0 | X'00000000' |
| MQCSRV_CONVERT_YES | 1 | X'00000001' |
| MQCSRV_DLQ_NO | 0 | X'00000000' |
| MQCSRV_DLQ_YES | 1 | X'00000001' |

## MQCT_* (Queue Manager Connection Tag)

| *Table 124. Constant names and values* | |
|---|---|
| **Name** | **Value** |
| MQCT_NONE | X'00...00' (128 nulls) |

| Table 124. Constant names and values (continued) | |
|---|---|
| **Name** | **Value** |
| MQCT_NONE_ARRAY | '\0','\0',... (128 nulls) |

## MQCTES_* ( CICS information header Task End Status)

| Table 125. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCTES_NOSYNC | 0 | X'00000000' |
| MQCTES_COMMIT | 256 | X'00000100' |
| MQCTES_BACKOUT | 4352 | X'00001100' |
| MQCTES_ENDTASK | 65536 | X'00010000' |

## MQCTLO_* (MQCTL options structure and Consumer Control Options)

### MQCTL options structure

| Table 126. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCTLO_STRUC_ID | "CTLO" |
| MQCTLO_STRUC_ID_ARRAY | 'C','T','L','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 127. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCTLO_VERSION_1 | 1 | X'00000001' |
| MQCTLO_CURRENT_VERSION | 1 | X'00000001' |

### MQCTL options Consumer Control Options

| Table 128. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCTLO_NONE | 0 | X'00000000' |
| MQCTLO_THREAD_AFFINITY | 1 | X'00000001' |
| MQCTLO_FAIL_IF_QUIESCING | 8192 | X'00002000' |

## MQCUOWC_* ( CICS information header Unit-of-Work Controls)

| Table 129. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCUOWC_ONLY | 273 | X'00000111' |
| MQCUOWC_CONTINUE | 65536 | X'00010000' |
| MQCUOWC_FIRST | 17 | X'00000011' |
| MQCUOWC_MIDDLE | 16 | X'00000010' |
| MQCUOWC_LAST | 272 | X'00000110' |
| MQCUOWC_COMMIT | 256 | X'00000100' |

| Table 129. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCUOWC_BACKOUT | 4352 | X'00001100' |

## MQCXP_* (Channel exit parameter structure)

| Table 130. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQCXP_STRUC_ID | "CXP¬" |
| MQCXP_STRUC_ID_ARRAY | 'C','X','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 131. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQCXP_VERSION_1 | 1 | X'00000001' |
| MQCXP_VERSION_2 | 2 | X'00000002' |
| MQCXP_VERSION_3 | 3 | X'00000003' |
| MQCXP_VERSION_4 | 4 | X'00000004' |
| MQCXP_VERSION_5 | 5 | X'00000005' |
| MQCXP_VERSION_6 | 6 | X'00000006' |
| MQCXP_VERSION_7 | 7 | X'00000007' |
| MQCXP_VERSION_8 | 8 | X'00000008' |
| MQCXP_VERSION_9 | 9 | X'00000009' |
| z/OS z/OS MQCXP_CURRENT_VERSION | 8 | X'00000008' |
| distributed distributed MQCXP_CURRENT_VERSION | 9 | X'00000009' |

## MQDC_* (Destination Class)

| Table 132. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDC_MANAGED | 1 | X'00000001' |
| MQDC_PROVIDED | 2 | X'00000002' |

## MQDCC_* (Conversion Options, and Masks and Factors)

### Conversion Options

| Table 133. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDCC_DEFAULT_CONVERSION | 1 | X'00000001' |
| MQDCC_FILL_TARGET_BUFFER | 2 | X'00000002' |
| MQDCC_INT_DEFAULT_CONVERSION | 4 | X'00000004' |
| MQDCC_SOURCE_ENC_NATIVE | (value differs by platform or version) | |
| MQDCC_SOURCE_ENC_NORMAL | 16 | X'00000010' |

| Table 133. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDCC_SOURCE_ENC_REVERSED | 32 | X'00000020' |
| MQDCC_SOURCE_ENC_UNDEFINED | 0 | X'00000000' |
| MQDCC_TARGET_ENC_NATIVE | (value differs by platform or version) | |
| MQDCC_TARGET_ENC_NORMAL | 256 | X'00000100' |
| MQDCC_TARGET_ENC_REVERSED | 512 | X'00000200' |
| MQDCC_TARGET_ENC_UNDEFINED | 0 | X'00000000' |
| MQDCC_NONE | 0 | X'00000000' |

### Conversion Options Masks and Factors

| Table 134. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDCC_SOURCE_ENC_MASK | 240 | X'000000F0' |
| MQDCC_TARGET_ENC_MASK | 3840 | X'00000F00' |
| MQDCC_SOURCE_ENC_FACTOR | 16 | X'00000010' |
| MQDCC_TARGET_ENC_FACTOR | 256 | X'00000100' |

## MQDELO_* (Publish/Subscribe Delete Options)

| Table 135. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDELO_NONE | 0 | X'00000000' |
| MQDELO_LOCAL | 4 | X'00000004' |

## MQDH_* (Distribution header structure)

| Table 136. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQDH_STRUC_ID | "DH¬¬" |
| MQDH_STRUC_ID_ARRAY | 'D','H','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 137. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDH_VERSION_1 | 1 | X'00000001' |
| MQDH_CURRENT_VERSION | 1 | X'00000001' |

## MQDHF_* (Distribution header Flags)

| Table 138. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDHF_NEW_MSG_IDS | 1 | X'00000001' |
| MQDHF_NONE | 0 | X'00000000' |

## MQDISCONNECT_* (Command format Disconnect Types)

*Table 139. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQDISCONNECT_NORMAL | 0 | X'00000000' |
| MQDISCONNECT_IMPLICIT | 1 | X'00000001' |
| MQDISCONNECT_Q_MGR | 2 | X'00000002' |

## MQDL_* (Distribution Lists)

*Table 140. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQDL_SUPPORTED | 1 | X'00000001' |
| MQDL_NOT_SUPPORTED | 0 | X'00000000' |

## MQDLH_* (Dead-letter header structure)

*Table 141. Structures of constants*

| Name | Structure |
|---|---|
| MQDLH_STRUC_ID | "DLH¬" |
| MQDLH_STRUC_ID_ARRAY | 'D','L','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 142. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQDLH_VERSION_1 | 1 | X'00000001' |
| MQDLH_CURRENT_VERSION | 1 | X'00000001' |

## MQDLV_* (Persistent/Non-persistent Message Delivery)

*Table 143. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQDLV_AS_PARENT | 0 | X'00000000' |
| MQDLV_ALL | 1 | X'00000001' |
| MQDLV_ALL_DUR | 2 | X'00000002' |
| MQDLV_ALL_AVAIL | 3 | X'00000003' |

## MQDMHO_* (Delete message handle options and structure)

### Delete message handle options structure

*Table 144. Structures of constants*

| Name | Structure |
|---|---|
| MQDMHO_STRUC_ID | "DMHO" |
| MQDMHO_STRUC_ID_ARRAY | 'D','M','H','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 145. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDMHO_VERSION_1 | 1 | X'00000001' |
| MQDMHO_CURRENT_VERSION | 1 | X'00000001' |

### Delete Message Handle Options

| Table 146. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDMHO_NONE | 0 | X'00000000' |

## MQDMPO_* (Delete message property options and structure)

### Delete message property options structure

| Table 147. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQDMPO_STRUC_ID | "DMPO" |
| MQDMPO_STRUC_ID_ARRAY | 'D','M','P','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 148. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDMPO_VERSION_1 | 1 | X'00000001' |
| MQDMPO_CURRENT_VERSION | 1 | X'00000001' |

### Delete Message Property Options

| Table 149. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDMPO_DEL_FIRST | 0 | X'00000000' |
| MQDMPO_DEL_PROP_UNDER_CURSOR | 1 | X'00000001' |
| MQDMPO_NONE | 0 | X'00000000' |

## MQDNSWLM_* (DNS WLM)

| Table 150. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDNSWLM_NO | 0 | X'00000000' |
| MQDNSWLM_YES | 1 | X'00000001' |

## MQDT_* (Destination Types)

| Table 151. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQDT_APPL | 1 | X'00000001' |
| MQDT_BROKER | 2 | X'00000002' |

## MQDXP_* (Conversion exit parameter structure)

*Table 152. Structures of constants*

| Name | Structure |
|---|---|
| MQDXP_STRUC_ID | "DXP¬" |
| MQDXP_STRUC_ID_ARRAY | 'D','X','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 153. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQDXP_VERSION_1 | 1 | X'00000001' |
| MQDXP_VERSION_2 | 2 | X'00000002' |
| MQDXP_CURRENT_VERSION | 2 | X'00000002' |

## MQEC_* (Signal Values)

*Table 154. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQEC_MSG_ARRIVED | 2 | X'00000002' |
| MQEC_WAIT_INTERVAL_EXPIRED | 3 | X'00000003' |
| MQEC_WAIT_CANCELED | 4 | X'00000004' |
| MQEC_Q_MGR_QUIESCING | 5 | X'00000005' |
| MQEC_CONNECTION_QUIESCING | 6 | X'00000006' |

## MQEI_* (Expiry)

*Table 155. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQEI_UNLIMITED | -1 | X'FFFFFFFF' |

## MQENC_* (Encoding)

## MQENC_* (Encoding)

*Table 156. Values of constants by platform*

| Name | Platform | Decimal value | Hexadecimal value |
|---|---|---|---|
| MQENC_NATIVE | IBM i | 273 | X'00000111' |
| | Linux | 546 | X'00000222' |
| | Linux on SPARC | 273 | X'00000111' |
| | Linux on x86 | 546 | X'00000222' |
| | Solaris on SPARC | 273 | X'00000111' |
| | UNIX systems | 273 | X'00000111' |
| | Windows | 546 | X'00000222' |
| | Micro Focus COBOL on Windows | 17 | X'00000011' |
| | z/OS | 785 | X'00000311' |

### MQENC_* (Encoding Masks)

*Table 157. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQENC_INTEGER_MASK | 15 | X'0000000F' |
| MQENC_DECIMAL_MASK | 240 | X'000000F0' |
| MQENC_FLOAT_MASK | 3840 | X'00000F00' |
| MQENC_RESERVED_MASK | -4096 | X'FFFFF000' |

### MQENC_* (Encodings for Binary Integers)

*Table 158. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQENC_INTEGER_UNDEFINED | 0 | X'00000000' |
| MQENC_INTEGER_NORMAL | 1 | X'00000001' |
| MQENC_INTEGER_REVERSED | 2 | X'00000002' |

### MQENC_* (Encodings for Packed Decimal Integers)

*Table 159. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQENC_DECIMAL_UNDEFINED | 0 | X'00000000' |
| MQENC_DECIMAL_NORMAL | 16 | X'00000010' |
| MQENC_DECIMAL_REVERSED | 32 | X'00000020' |

### MQENC_* (Encodings for Floating Point Numbers)

*Table 160. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQENC_FLOAT_UNDEFINED | 0 | X'00000000' |
| MQENC_FLOAT_IEEE_NORMAL | 256 | X'00000100' |
| MQENC_FLOAT_IEEE_REVERSED | 512 | X'00000200' |
| MQENC_FLOAT_S390 | 768 | X'00000300' |
| MQENC_FLOAT_TNS | 1024 | X'00000400' |

## MQEPH_* (Embedded command format header structure and Flags)

### Embedded command format header structure

*Table 161. Structures of constants*

| Name | Structure |
|---|---|
| MQEPH_STRUC_ID | "EPH¬" |
| MQEPH_STRUC_ID_ARRAY | 'E','P','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 162. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQEPH_STRUC_LENGTH_FIXED | 68 | X'00000044' |
| MQEPH_VERSION_1 | 1 | X'00000001' |
| MQEPH_CURRENT_VERSION | 1 | X'00000001' |

### Embedded command format header Flags

| *Table 163. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQEPH_NONE | 0 | X'00000000' |
| MQEPH_CCSID_EMBEDDED | 1 | X'00000001' |

## MQET_* (Command format Escape Types)

| *Table 164. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQET_MQSC | 1 | X'00000001' |

## MQEVO_* (Command format Event Origins)

| *Table 165. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQEVO_OTHER | 0 | X'00000000' |
| MQEVO_CONSOLE | 1 | X'00000001' |
| MQEVO_INIT | 2 | X'00000002' |
| MQEVO_MSG | 3 | X'00000003' |
| MQEVO_MQSET | 4 | X'00000004' |
| MQEVO_INTERNAL | 5 | X'00000005' |

## MQEVR_* (Command format Event Recording)

| *Table 166. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQEVR_DISABLED | 0 | X'00000000' |
| MQEVR_ENABLED | 1 | X'00000001' |
| MQEVR_EXCEPTION | 2 | X'00000002' |
| MQEVR_NO_DISPLAY | 3 | X'00000003' |

## MQEXPI_* (Expiration Scan Interval)

| *Table 167. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQEXPI_OFF | 0 | X'00000000' |

## MQFB_* (Feedback Values)

*Table 168. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQFB_NONE | 0 | X'00000000' |
| MQFB_SYSTEM_FIRST | 1 | X'00000001' |
| MQFB_QUIT | 256 | X'00000100' |
| MQFB_EXPIRATION | 258 | X'00000102' |
| MQFB_COA | 259 | X'00000103' |
| MQFB_COD | 260 | X'00000104' |
| MQFB_CHANNEL_COMPLETED | 262 | X'00000106' |
| MQFB_CHANNEL_FAIL_RETRY | 263 | X'00000107' |
| MQFB_CHANNEL_FAIL | 264 | X'00000108' |
| MQFB_APPL_CANNOT_BE_STARTED | 265 | X'00000109' |
| MQFB_TM_ERROR | 266 | X'0000010A' |
| MQFB_APPL_TYPE_ERROR | 267 | X'0000010B' |
| MQFB_STOPPED_BY_MSG_EXIT | 268 | X'0000010C' |
| MQFB_ACTIVITY | 269 | X'0000010D' |
| MQFB_XMIT_Q_MSG_ERROR | 271 | X'0000010F' |
| MQFB_PAN | 275 | X'00000113' |
| MQFB_NAN | 276 | X'00000114' |
| MQFB_STOPPED_BY_CHAD_EXIT | 277 | X'00000115' |
| MQFB_STOPPED_BY_PUBSUB_EXIT | 279 | X'00000117' |
| MQFB_NOT_A_REPOSITORY_MSG | 280 | X'00000118' |
| MQFB_BIND_OPEN_CLUSRCVR_DEL | 281 | X'00000119' |
| MQFB_MAX_ACTIVITIES | 282 | X'0000011A' |
| MQFB_NOT_FORWARDED | 283 | X'0000011B' |
| MQFB_NOT_DELIVERED | 284 | X'0000011C' |
| MQFB_UNSUPPORTED_FORWARDING | 285 | X'0000011D' |
| MQFB_UNSUPPORTED_DELIVERY | 286 | X'0000011E' |
| MQFB_DATA_LENGTH_ZERO | 291 | X'00000123' |
| MQFB_DATA_LENGTH_NEGATIVE | 292 | X'00000124' |
| MQFB_DATA_LENGTH_TOO_BIG | 293 | X'00000125' |
| MQFB_BUFFER_OVERFLOW | 294 | X'00000126' |
| MQFB_LENGTH_OFF_BY_ONE | 295 | X'00000127' |
| MQFB_IIH_ERROR | 296 | X'00000128' |
| MQFB_NOT_AUTHORIZED_FOR_IMS | 298 | X'0000012A' |
| MQFB_IMS_ERROR | 300 | X'0000012C' |
| MQFB_IMS_FIRST | 301 | X'0000012D' |
| MQFB_IMS_LAST | 399 | X'0000018F' |
| MQFB_CICS_INTERNAL_ERROR | 401 | X'00000191' |
| MQFB_CICS_NOT_AUTHORIZED | 402 | X'00000192' |

| Table 168. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQFB_CICS_BRIDGE_FAILURE | 403 | X'00000193' |
| MQFB_CICS_CORREL_ID_ERROR | 404 | X'00000194' |
| MQFB_CICS_CCSID_ERROR | 405 | X'00000195' |
| MQFB_CICS_ENCODING_ERROR | 406 | X'00000196' |
| MQFB_CICS_CIH_ERROR | 407 | X'00000197' |
| MQFB_CICS_UOW_ERROR | 408 | X'00000198' |
| MQFB_CICS_COMMAREA_ERROR | 409 | X'00000199' |
| MQFB_CICS_APPL_NOT_STARTED | 410 | X'0000019A' |
| MQFB_CICS_APPL_ABENDED | 411 | X'0000019B' |
| MQFB_CICS_DLQ_ERROR | 412 | X'0000019C' |
| MQFB_CICS_UOW_BACKED_OUT | 413 | X'0000019D' |
| MQFB_PUBLICATIONS_ON_REQUEST | 501 | X'000001F5' |
| MQFB_SUBSCRIBER_IS_PUBLISHER | 502 | X'000001F6' |
| MQFB_MSG_SCOPE_MISMATCH | 503 | X'000001F7' |
| MQFB_SELECTOR_MISMATCH | 504 | X'000001F8' |
| MQFB_IMS_NACK_1A_REASON_FIRST | 600 | X'00000258' |
| MQFB_IMS_NACK_1A_REASON_LAST | 855 | X'00000357' |
| MQFB_SYSTEM_LAST | 65535 | X'0000FFFF' |
| MQFB_APPL_FIRST | 65536 | X'00010000' |
| MQFB_APPL_LAST | 999999999 | X'3B9AC9FF' |

## MQFC_* (Command format Force Options)

| Table 169. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQFC_YES | 1 | X'00000001' |
| MQFC_NO | 0 | X'00000000' |

## MQFMT_* (Formats)

| Table 170. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQFMT_NONE | "¬¬¬¬¬¬¬¬" |
| MQFMT_ADMIN | "MQADMIN¬" |
| MQFMT_CHANNEL_COMPLETED | "MQCHCOM¬" |
| MQFMT_CICS | "MQCICS¬¬" |
| MQFMT_COMMAND_1 | "MQCMD1¬¬" |
| MQFMT_COMMAND_2 | "MQCMD2¬¬" |
| MQFMT_DEAD_LETTER_HEADER | "MQDEAD¬¬" |
| MQFMT_DIST_HEADER | "MQHDIST¬" |
| MQFMT_EMBEDDED_PCF | "MQHEPCF¬" |

*Table 170. Constant names and values (continued)*

| Name | Value |
|---|---|
| MQFMT_EVENT | "MQEVENT¬" |
| MQFMT_IMS | "MQIMS¬¬¬" |
| MQFMT_IMS_VAR_STRING | "MQIMSVS¬" |
| MQFMT_MD_EXTENSION | "MQHMDE¬¬" |
| MQFMT_PCF | "MQPCF¬¬¬" |
| MQFMT_REF_MSG_HEADER | "MQHREF¬¬" |
| MQFMT_RF_HEADER | "MQHRF¬¬¬" |
| MQFMT_RF_HEADER_1 | "MQHRF¬¬¬" |
| MQFMT_RF_HEADER_2 | "MQHRF2¬¬" |
| MQFMT_STRING | "MQSTR¬¬¬" |
| MQFMT_TRIGGER | "MQTRIG¬¬" |
| MQFMT_WORK_INFO_HEADER | "MQHWIH¬¬" |
| MQFMT_XMIT_Q_HEADER | "MQXMIT¬¬" |
| MQFMT_NONE_ARRAY | '¬','¬','¬','¬','¬','¬','¬','¬' |
| MQFMT_ADMIN_ARRAY | 'M','Q','A','D','M','I','N','¬' |
| MQFMT_CHANNEL_COMPLETED_ARRAY | 'M','Q','C','H','C','O','M','¬' |
| MQFMT_CICS_ARRAY | 'M','Q','C','I','C','S','¬','¬' |
| MQFMT_COMMAND_1_ARRAY | 'M','Q','C','M','D','1','¬','¬' |
| MQFMT_COMMAND_2_ARRAY | 'M','Q','C','M','D','2','¬','¬' |
| MQFMT_DEAD_LETTER_HEADER_ARRAY | 'M','Q','D','E','A','D','¬','¬' |
| MQFMT_DIST_HEADER_ARRAY | 'M','Q','H','D','I','S','T','¬' |
| MQFMT_EMBEDDED_PCF_ARRAY | 'M','Q','H','E','P','C','F','¬' |
| MQFMT_EVENT_ARRAY | 'M','Q','E','V','E','N','T','¬' |
| MQFMT_IMS_ARRAY | 'M','Q','I','M','S','¬','¬','¬' |
| MQFMT_IMS_VAR_STRING_ARRAY | 'M','Q','I','M','S','V','S','¬' |
| MQFMT_MD_EXTENSION_ARRAY | 'M','Q','H','M','D','E','¬','¬' |
| MQFMT_PCF_ARRAY | 'M','Q','P','C','F','¬','¬','¬' |
| MQFMT_REF_MSG_HEADER_ARRAY | 'M','Q','H','R','E','F','¬','¬' |
| MQFMT_RF_HEADER_ARRAY | 'M','Q','H','R','F','¬','¬','¬' |
| MQFMT_RF_HEADER_1_ARRAY | 'M','Q','H','R','F','¬','¬','¬' |
| MQFMT_RF_HEADER_2_ARRAY | 'M','Q','H','R','F','2','¬','¬' |
| MQFMT_STRING_ARRAY | 'M','Q','S','T','R','¬','¬','¬' |
| MQFMT_TRIGGER_ARRAY | 'M','Q','T','R','I','G','¬','¬' |
| MQFMT_WORK_INFO_HEADER_ARRAY | 'M','Q','H','W','I','H','¬','¬' |
| MQFMT_XMIT_Q_HEADER_ARRAY | 'M','Q','X','M','I','T','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

## MQGA_* (Group Attribute Selectors)

*Table 171. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQGA_FIRST | 8001 | X'00001F41' |
| MQGA_LAST | 9000 | X'00002328' |

## MQGACF_* (Command format Group Parameter Types)

*Table 172. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQGACF_FIRST | 8001 | X'00001F41' |
| MQGACF_COMMAND_CONTEXT | 8001 | X'00001F41' |
| MQGACF_COMMAND_DATA | 8002 | X'00001F42' |
| MQGACF_TRACE_ROUTE | 8003 | X'00001F43' |
| MQGACF_OPERATION | 8004 | X'00001F44' |
| MQGACF_ACTIVITY | 8005 | X'00001F45' |
| MQGACF_EMBEDDED_MQMD | 8006 | X'00001F46' |
| MQGACF_MESSAGE | 8007 | X'00001F47' |
| MQGACF_MQMD | 8008 | X'00001F48' |
| MQGACF_VALUE_NAMING | 8009 | X'00001F49' |
| MQGACF_Q_ACCOUNTING_DATA | 8010 | X'00001F4A' |
| MQGACF_Q_STATISTICS_DATA | 8011 | X'00001F4B' |
| MQGACF_CHL_STATISTICS_DATA | 8012 | X'00001F4C' |
| MQGACF_LAST_USED | 8012 | X'00001F4C' |

## MQGI_* (Group Identifier)

*Table 173. Constant names and values*

| Name | Value |
|---|---|
| MQGI_NONE | X'00...00' (24 nulls) |
| MQGI_NONE_ARRAY | '\0','\0',... (24 nulls) |

## MQGMO_* (Get message options and structure)

### Get message options structure

*Table 174. Structures of constants*

| Name | Structure |
|---|---|
| MQGMO_STRUC_ID | "GMO¬" |
| MQGMO_STRUC_ID_ARRAY | 'G','M','O','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 175. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQGMO_VERSION_1 | 1 | X'00000001' |

| Table 175. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQGMO_VERSION_2 | 2 | X'00000002' |
| MQGMO_VERSION_3 | 3 | X'00000003' |
| MQGMO_VERSION_4 | 4 | X'00000004' |
| MQGMO_CURRENT_VERSION | 4 | X'00000004' |

## Get Message Options

| Table 176. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQGMO_WAIT | 1 | X'00000001' |
| MQGMO_NO_WAIT | 0 | X'00000000' |
| MQGMO_SET_SIGNAL | 8 | X'00000008' |
| MQGMO_FAIL_IF_QUIESCING | 8192 | X'00002000' |
| MQGMO_SYNCPOINT | 2 | X'00000002' |
| MQGMO_SYNCPOINT_IF_PERSISTENT | 4096 | X'00001000' |
| MQGMO_NO_SYNCPOINT | 4 | X'00000004' |
| MQGMO_MARK_SKIP_BACKOUT | 128 | X'00000080' |
| MQGMO_BROWSE_FIRST | 16 | X'00000010' |
| MQGMO_BROWSE_NEXT | 32 | X'00000020' |
| MQGMO_BROWSE_MSG_UNDER_CURSOR | 2048 | X'00000800' |
| MQGMO_BROWSE_HANDLE | 17825808 | X'01100010' |
| MQGMO_BROWSE_CO_OP | 18874384 | X'01200010' |
| MQGMO_MSG_UNDER_CURSOR | 256 | X'00000100' |
| MQGMO_LOCK | 512 | X'00000200' |
| MQGMO_UNLOCK | 1024 | X'00000400' |
| MQGMO_ACCEPT_TRUNCATED_MSG | 64 | X'00000040' |
| MQGMO_CONVERT | 16384 | X'00004000' |
| MQGMO_LOGICAL_ORDER | 32768 | X'00008000' |
| MQGMO_COMPLETE_MSG | 65536 | X'00010000' |
| MQGMO_ALL_MSGS_AVAILABLE | 131072 | X'00020000' |
| MQGMO_ALL_SEGMENTS_AVAILABLE | 262144 | X'00040000' |
| MQGMO_MARK_BROWSE_HANDLE | 1048576 | X'00100000' |
| MQGMO_MARK_BROWSE_CO_OP | 2097152 | X'00200000' |
| MQGMO_UNMARK_BROWSE_CO_OP | 4194304 | X'00400000' |
| MQGMO_UNMARK_BROWSE_HANDLE | 8388608 | X'00800000' |
| MQGMO_UNMARKED_BROWSE_MSG | 16777216 | X'01000000' |
| MQGMO_PROPERTIES_FORCE_MQRFH2 | 33554432 | X'02000000' |
| MQGMO_NO_PROPERTIES | 67108864 | X'04000000' |
| MQGMO_PROPERTIES_IN_HANDLE | 134217728 | X'08000000' |
| MQGMO_PROPERTIES_COMPATIBILITY | 268435456 | X'10000000' |

| Table 176. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQGMO_PROPERTIES_AS_Q_DEF | 0 | X'00000000' |
| MQGMO_NONE | 0 | X'00000000' |

## MQGS_* (Group Status)

| Table 177. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQGS_NOT_IN_GROUP | '¬' |
| MQGS_MSG_IN_GROUP | 'G' |
| MQGS_LAST_MSG_IN_GROUP | 'L' |

**Note:** The symbol ¬ represents a single blank character.

## MQHA_* (Handle Selectors)

| Table 178. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQHA_FIRST | 4001 | X'00000FA1' |
| MQHA_BAG_HANDLE | 4001 | X'00000FA1' |
| MQHA_LAST_USED | 4001 | X'00000FA1' |
| MQHA_LAST | 6000 | X'00001770' |

## MQHB_* (Bag Handles)

| Table 179. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQHB_UNUSABLE_HBAG | -1 | X'FFFFFFFF' |
| MQHB_NONE | -2 | X'FFFFFFFE' |

## MQHC_* (Connection Handles)

| Table 180. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQHC_DEF_HCONN | 0 | X'00000000' |
| MQHC_UNUSABLE_HCONN | -1 | X'FFFFFFFF' |
| MQHC_UNASSOCIATED_HCONN | -3 | X'FFFFFFFD' |

## MQHM_* (Message handle)

| Table 181. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQHM_UNUSABLE_HMSG | -1 | X'FFFFFFFF' |
| MQHM_NONE | 0 | X'00000000' |

## MQHO_* (Object Handle)

*Table 182. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQHO_UNUSABLE_HOBJ | -1 | X'FFFFFFFF' |
| MQHO_NONE | 0 | X'00000000' |

## MQHSTATE_* (Command format Handle States)

*Table 183. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQHSTATE_INACTIVE | 0 | X'00000000' |
| MQHSTATE_ACTIVE | 1 | X'00000001' |

## MQIA_* (Integer Attribute Selectors)

*Table 184. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIA_ACCOUNTING_CONN_OVERRIDE | 136 | X'00000088' |
| MQIA_ACCOUNTING_INTERVAL | 135 | X'00000087' |
| MQIA_ACCOUNTING_MQI | 133 | X'00000085' |
| MQIA_ACCOUNTING_Q | 134 | X'00000086' |
| MQIA_ACTIVE_CHANNELS | 100 | X'00000064' |
| MQIA_ACTIVITY_CONN_OVERRIDE | 239 | X'000000EF' |
| MQIA_ACTIVITY_RECORDING | 138 | X'0000008A' |
| MQIA_ACTIVITY_TRACE | 240 | X'000000F0' |
| MQIA_ADOPTNEWMCA_CHECK | 102 | X'00000066' |
| MQIA_ADOPTNEWMCA_TYPE | 103 | X'00000067' |
| MQIA_ADOPTNEWMCA_INTERVAL | 104 | X'00000068' |
| MQIA_APPL_TYPE | 1 | X'00000001' |
| MQIA_ADOPT_CONTEXT | 260 | X'00000104' |
| MQIA_AMQP_CAPABILITY | 265 | X'00000109' |
| MQIA_ARCHIVE | 60 | X'0000003C' |
| MQIA_AUTHENTICATION_FAIL_DELAY | 259 | X'00000103' |
| MQIA_AUTHENTICATION_METHOD | 266 | X'0000010A' |
| MQIA_AUTH_INFO_TYPE | 66 | X'00000042' |
| MQIA_AUTHORITY_EVENT | 47 | X'0000002F' |
| MQIA_AUTO_REORG_INTERVAL | 174 | X'000000AE' |
| MQIA_AUTO_REORGANIZATION | 173 | X'000000AD' |
| MQIA_BACKOUT_THRESHOLD | 22 | X'00000016' |
| MQIA_BASE_TYPE | 193 | X'000000C1' |
| MQIA_BATCH_INTERFACE_AUTO | 86 | X'00000056' |
| MQIA_BRIDGE_EVENT | 74 | X'0000004A' |
| MQIA_CF_LEVEL | 70 | X'00000046' |

*Table 184. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIA_CF_RECOVER | 71 | X'00000047' |
| MQIA_CHANNEL_AUTO_DEF | 55 | X'00000037' |
| MQIA_CHANNEL_AUTO_DEF_EVENT | 56 | X'00000038' |
| MQIA_CHANNEL_EVENT | 73 | X'00000049' |
| MQIA_CHECK_CLIENT_BINDING | 258 | X'00000102' |
| MQIA_CHECK_LOCAL_BINDING | 257 | X'00000101' |
| MQIA_CHINIT_ADAPTERS | 101 | X'00000065' |
| MQIA_CHINIT_CONTROL | 119 | X'00000077' |
| MQIA_CHINIT_DISPATCHERS | 105 | X'00000069' |
| MQIA_CHINIT_TRACE_AUTO_START | 117 | X'00000075' |
| MQIA_CHINIT_TRACE_TABLE_SIZE | 118 | X'00000076' |
| MQIA_CLUSTER_OBJECT_STATE | 256 | X'00000100' |
| MQIA_CLUSTER_PUB_ROUTE | 255 | X'000000FF' |
| MQIA_CLUSTER_Q_TYPE | 59 | X'0000003B' |
| MQIA_CLUSTER_WORKLOAD_LENGTH | 58 | X'0000003A' |
| MQIA_CLWL_MRU_CHANNELS | 97 | X'00000061' |
| MQIA_CLWL_Q_RANK | 95 | X'0000005F' |
| MQIA_CLWL_Q_PRIORITY | 96 | X'00000060' |
| MQIA_CLWL_USEQ | 98 | X'00000062' |
| MQIA_CMD_SERVER_AUTO | 87 | X'00000057' |
| MQIA_CMD_SERVER_CONTROL | 120 | X'00000078' |
| MQIA_CMD_SERVER_CONVERT_MSG | 88 | X'00000058' |
| MQIA_CMD_SERVER_DLQ_MSG | 89 | X'00000059' |
| MQIA_CODED_CHAR_SET_ID | 2 | X'00000002' |
| MQIA_COMM_EVENT | 232 | X'000000E8' |
| MQIA_COMMAND_EVENT | 99 | X'00000063' |
| MQIA_COMMAND_LEVEL | 31 | X'0000001F' |
| MQIA_CONFIGURATION_EVENT | 51 | X'00000033' |
| MQIA_CPI_LEVEL | 27 | X'0000001B' |
| MQIA_CURRENT_Q_DEPTH | 3 | X'00000003' |
| MQIA_DEF_BIND | 61 | X'0000003D' |
| MQIA_DEF_CLUSTER_XMIT_Q_TYPE | 250 | X'000000FA' |
| MQIA_DEF_INPUT_OPEN_OPTION | 4 | X'00000004' |
| MQIA_DEF_PERSISTENCE | 5 | X'00000005' |
| MQIA_DEF_PRIORITY | 6 | X'00000006' |
| MQIA_DEF_PUT_RESPONSE_TYPE | 184 | X'000000B8' |
| MQIA_DEF_READ_AHEAD | 188 | X'000000BC' |
| MQIA_DEFINITION_TYPE | 7 | X'00000007' |
| MQIA_DISPLAY_TYPE | 262 | X'00000106' |

*Table 184. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIA_DIST_LISTS | 34 | X'00000022' |
| MQIA_DNS_WLM | 106 | X'0000006A' |
| MQIA_DURABLE_SUB | 175 | X'000000AF' |
| MQIA_EXPIRY_INTERVAL | 39 | X'00000027' |
| MQIA_FIRST | 1 | X'00000001' |
| MQIA_GROUP_UR | 221 | X'000000DD' |
| MQIA_HARDEN_GET_BACKOUT | 8 | X'00000008' |
| MQIA_HIGH_Q_DEPTH | 36 | X'00000024' |
| MQIA_IGQ_PUT_AUTHORITY | 65 | X'00000041' |
| MQIA_INDEX_TYPE | 57 | X'00000039' |
| MQIA_INHIBIT_EVENT | 48 | X'00000030' |
| MQIA_INHIBIT_GET | 9 | X'00000009' |
| MQIA_INHIBIT_PUB | 181 | X'000000B5' |
| MQIA_INHIBIT_PUT | 10 | X'0000000A' |
| MQIA_INHIBIT_SUB | 182 | X'000000B6' |
| MQIA_INTRA_GROUP_queuing | 64 | X'00000040' |
| MQIA_IP_ADDRESS_VERSION | 93 | X'0000005D' |
| MQIA_LAST | 2000 | X'000007D0' |
| MQIA_LAST_USED | 266 | X'0000010A' |
| MQIA_LDAP_AUTHORMD | 263 | X'00000107' |
| MQIA_LDAP_NESTGRP | 264 | X'00000108' |
| MQIA_LDAP_SECURE_COMM | 261 | X'00000105' |
| MQIA_LISTENER_PORT_NUMBER | 85 | X'00000055' |
| MQIA_LISTENER_TIMER | 107 | X'0000006B' |
| MQIA_LOGGER_EVENT | 94 | X'0000005E' |
| MQIA_LU62_CHANNELS | 108 | X'0000006C' |
| MQIA_LOCAL_EVENT | 49 | X'00000031' |
| MQIA_MSG_MARK_BROWSE_INTERVAL | 68 | X'00000044' |
| MQIA_MAX_CHANNELS | 109 | X'0000006D' |
| MQIA_MAX_CLIENTS | 172 | X'000000AC' |
| MQIA_MAX_GLOBAL_LOCKS | 83 | X'00000053' |
| MQIA_MAX_HANDLES | 11 | X'0000000B' |
| MQIA_MAX_LOCAL_LOCKS | 84 | X'00000054' |
| MQIA_MAX_MSG_LENGTH | 13 | X'0000000D' |
| MQIA_MAX_OPEN_Q | 80 | X'00000050' |
| MQIA_MAX_PRIORITY | 14 | X'0000000E' |
| MQIA_MAX_PROPERTIES_LENGTH | 192 | X'000000C0' |
| MQIA_MAX_Q_DEPTH | 15 | X'0000000F' |
| MQIA_MAX_Q_TRIGGERS | 90 | X'0000005A' |

*Table 184. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIA_MAX_RECOVERY_TASKS | 171 | X'000000AB' |
| MQIA_MAX_UNCOMMITTED_MSGS | 33 | X'00000021' |
| MQIA_MCAST_BRIDGE | 233 | X'000000E9' |
| MQIA_MONITOR_INTERVAL | 81 | X'00000051' |
| MQIA_MONITORING_AUTO_CLUSSDR | 124 | X'0000007C' |
| MQIA_MONITORING_CHANNEL | 122 | X'0000007A' |
| MQIA_MONITORING_Q | 123 | X'0000007B' |
| MQIA_MSG_DELIVERY_SEQUENCE | 16 | X'00000010' |
| MQIA_MSG_DEQ_COUNT | 38 | X'00000026' |
| MQIA_MSG_ENQ_COUNT | 37 | X'00000025' |
| MQIA_NAME_COUNT | 19 | X'00000013' |
| MQIA_NAMELIST_TYPE | 72 | X'00000048' |
| MQIA_NPM_CLASS | 78 | X'0000004E' |
| MQIA_NPM_DELIVERY | 196 | X'000000C4' |
| MQIA_OPEN_INPUT_COUNT | 17 | X'00000011' |
| MQIA_OPEN_OUTPUT_COUNT | 18 | X'00000012' |
| MQIA_OUTBOUND_PORT_MAX | 140 | X'0000008C' |
| MQIA_OUTBOUND_PORT_MIN | 110 | X'0000006E' |
| MQIA_PAGESET_ID | 62 | X'0000003E' |
| MQIA_PERFORMANCE_EVENT | 53 | X'00000035' |
| MQIA_PLATFORM | 32 | X'00000020' |
| MQIA_PM_DELIVERY | 195 | X'000000C3' |
| MQIA_PROPERTY_CONTROL | 190 | X'000000BE' |
| MQIA_PROT_POLICY_CAPABILITY | 251 | X'000000FB' |
| MQIA_PROXY_SUB | 199 | X'000000C7' |
| MQIA_PUB_COUNT | 215 | X'000000D7' |
| MQIA_PUB_SCOPE | 219 | X'000000DB' |
| MQIA_PUBSUB_CLUSTER | 249 | X'000000F9' |
| MQIA_PUBSUB_MAXMSG_RETRY_COUNT | 206 | X'000000CE' |
| MQIA_PUBSUB_MODE | 187 | X'000000BB' |
| MQIA_PUBSUB_NP_MSG | 203 | X'000000CB' |
| MQIA_PUBSUB_NP_RESP | 205 | X'000000CD' |
| MQIA_PUBSUB_SYNC_PT | 207 | X'000000CF' |
| MQIA_Q_DEPTH_HIGH_EVENT | 43 | X'0000002B' |
| MQIA_Q_DEPTH_HIGH_LIMIT | 40 | X'00000028' |
| MQIA_Q_DEPTH_LOW_EVENT | 44 | X'0000002C' |
| MQIA_Q_DEPTH_LOW_LIMIT | 41 | X'00000029' |
| MQIA_Q_DEPTH_MAX_EVENT | 42 | X'0000002A' |
| MQIA_Q_SERVICE_INTERVAL | 54 | X'00000036' |

*Table 184. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIA_Q_SERVICE_INTERVAL_EVENT | 46 | X'0000002E' |
| MQIA_Q_TYPE | 20 | X'00000014' |
| MQIA_Q_USERS | 82 | X'00000052' |
| MQIA_QMGR_CFCONLOS | 245 | X'000000F5' |
| MQIA_QMOPT_CONS_COMMS_MSGS | 155 | X'0000009B' |
| MQIA_QMOPT_CONS_CRITICAL_MSGS | 154 | X'0000009A' |
| MQIA_QMOPT_CONS_ERROR_MSGS | 153 | X'00000099' |
| MQIA_QMOPT_CONS_INFO_MSGS | 151 | X'00000097' |
| MQIA_QMOPT_CONS_REORG_MSGS | 156 | X'0000009C' |
| MQIA_QMOPT_CONS_SYSTEM_MSGS | 157 | X'0000009D' |
| MQIA_QMOPT_CONS_WARNING_MSGS | 152 | X'00000098' |
| MQIA_QMOPT_CSMT_ON_ERROR | 150 | X'00000096' |
| MQIA_QMOPT_INTERNAL_DUMP | 170 | X'000000AA' |
| MQIA_QMOPT_LOG_COMMS_MSGS | 162 | X'000000A2' |
| MQIA_QMOPT_LOG_CRITICAL_MSGS | 161 | X'000000A1' |
| MQIA_QMOPT_LOG_ERROR_MSGS | 160 | X'000000A0' |
| MQIA_QMOPT_LOG_INFO_MSGS | 158 | X'0000009E' |
| MQIA_QMOPT_LOG_REORG_MSGS | 163 | X'000000A3' |
| MQIA_QMOPT_LOG_SYSTEM_MSGS | 164 | X'000000A4' |
| MQIA_QMOPT_LOG_WARNING_MSGS | 159 | X'0000009F' |
| MQIA_QMOPT_TRACE_COMMS | 166 | X'000000A6' |
| MQIA_QMOPT_TRACE_CONVERSION | 168 | X'000000A8' |
| MQIA_QMOPT_TRACE_REORG | 167 | X'000000A7' |
| MQIA_QMOPT_TRACE_MQI_CALLS | 165 | X'000000A5' |
| MQIA_QMOPT_TRACE_SYSTEM | 169 | X'000000A9' |
| MQIA_QSG_DISP | 63 | X'0000003F' |
| MQIA_READ_AHEAD | 189 | X'000000BD' |
| MQIA_RECEIVE_TIMEOUT | 111 | X'0000006F' |
| MQIA_RECEIVE_TIMEOUT_MIN | 113 | X'00000071' |
| MQIA_RECEIVE_TIMEOUT_TYPE | 112 | X'00000070' |
| MQIA_REMOTE_EVENT | 50 | X'00000032' |
| MQIA_RETENTION_INTERVAL | 21 | X'00000015' |
| MQIA_REVERSE_DNS_LOOKUP | 254 | X'000000FE' |
| MQIA_SCOPE | 45 | X'0000002D' |
| MQIA_SECURITY_CASE | 141 | X'0000008D' |
| MQIA_SERVICE_CONTROL | 139 | X'0000008B' |
| MQIA_SERVICE_TYPE | 121 | X'00000079' |
| MQIA_SHAREABILITY | 23 | X'00000017' |
| MQIA_SHARED_Q_Q_MGR_NAME | 77 | X'0000004D' |

| Table 184. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIA_SSL_EVENT | 75 | X'0000004B' |
| MQIA_SSL_FIPS_REQUIRED | 92 | X'0000005C' |
| MQIA_SSL_RESET_COUNT | 76 | X'0000004C' |
| MQIA_SSL_TASKS | 69 | X'00000045' |
| MQIA_START_STOP_EVENT | 52 | X'00000034' |
| MQIA_STATISTICS_CHANNEL | 129 | X'00000081' |
| MQIA_STATISTICS_AUTO_CLUSSDR | 130 | X'00000082' |
| MQIA_STATISTICS_INTERVAL | 131 | X'00000083' |
| MQIA_STATISTICS_MQI | 127 | X'0000007F' |
| MQIA_STATISTICS_Q | 128 | X'00000080' |
| MQIA_SUB_COUNT | 204 | X'000000CC' |
| MQIA_SUB_SCOPE | 218 | X'000000DA' |
| MQIA_SYNCPOINT | 30 | X'0000001E' |
| MQIA_TCP_CHANNELS | 114 | X'00000072' |
| MQIA_TCP_KEEP_ALIVE | 115 | X'00000073' |
| MQIA_TCP_STACK_TYPE | 116 | X'00000074' |
| MQIA_TIME_SINCE_RESET | 35 | X'00000023' |
| MQIA_TOPIC_DEF_PERSISTENCE | 185 | X'000000B9' |
| MQIA_TOPIC_NODE_COUNT | 253 | X'000000FD' |
| MQIA_TOPIC_TYPE | 208 | X'000000D0' |
| MQIA_TRACE_ROUTE_RECORDING | 137 | X'00000089' |
| MQIA_TREE_LIFE_TIME | 183 | X'000000B7' |
| MQIA_TRIGGER_CONTROL | 24 | X'00000018' |
| MQIA_TRIGGER_DEPTH | 29 | X'0000001D' |
| MQIA_TRIGGER_INTERVAL | 25 | X'00000019' |
| MQIA_TRIGGER_MSG_PRIORITY | 26 | X'0000001A' |
| MQIA_TRIGGER_TYPE | 28 | X'0000001C' |
| MQIA_TRIGGER_RESTART | 91 | X'0000005B' |
| MQIA_USAGE | 12 | X'0000000C' |
| MQIA_USE_DEAD_LETTER_Q | 234 | X'000000EA' |
| MQIA_USER_LIST | 2000 | X'000007D0' |
| MQIA_WILDCARD_OPERATION | 216 | X'000000D8' |
| MQIA_XR_CAPABILITY | 243 | X'000000F3' |

## MQIACF_* (Command format Integer Parameter Types)

| Table 185. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIACF_FIRST | 1001 | X'000003E9' |
| MQIACF_Q_MGR_ATTRS | 1001 | X'000003E9' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_Q_ATTRS | 1002 | X'000003EA' |
| MQIACF_PROCESS_ATTRS | 1003 | X'000003EB' |
| MQIACF_NAMELIST_ATTRS | 1004 | X'000003EC' |
| MQIACF_FORCE | 1005 | X'000003ED' |
| MQIACF_REPLACE | 1006 | X'000003EE' |
| MQIACF_PURGE | 1007 | X'000003EF' |
| MQIACF_QUIESCE | 1008 | X'000003F0' |
| MQIACF_MODE | 1008 | X'000003F0' |
| MQIACF_ALL | 1009 | X'000003F1' |
| MQIACF_EVENT_APPL_TYPE | 1010 | X'000003F2' |
| MQIACF_EVENT_ORIGIN | 1011 | X'000003F3' |
| MQIACF_PARAMETER_ID | 1012 | X'000003F4' |
| MQIACF_ERROR_ID | 1013 | X'000003F5' |
| MQIACF_ERROR_IDENTIFIER | 1013 | X'000003F5' |
| MQIACF_SELECTOR | 1014 | X'000003F6' |
| MQIACF_CHANNEL_ATTRS | 1015 | X'000003F7' |
| MQIACF_OBJECT_TYPE | 1016 | X'000003F8' |
| MQIACF_ESCAPE_TYPE | 1017 | X'000003F9' |
| MQIACF_ERROR_OFFSET | 1018 | X'000003FA' |
| MQIACF_AUTH_INFO_ATTRS | 1019 | X'000003FB' |
| MQIACF_REASON_QUALIFIER | 1020 | X'000003FC' |
| MQIACF_COMMAND | 1021 | X'000003FD' |
| MQIACF_OPEN_OPTIONS | 1022 | X'000003FE' |
| MQIACF_OPEN_TYPE | 1023 | X'000003FF' |
| MQIACF_PROCESS_ID | 1024 | X'00000400' |
| MQIACF_THREAD_ID | 1025 | X'00000401' |
| MQIACF_Q_STATUS_ATTRS | 1026 | X'00000402' |
| MQIACF_UNCOMMITTED_MSGS | 1027 | X'00000403' |
| MQIACF_HANDLE_STATE | 1028 | X'00000404' |
| MQIACF_AUX_ERROR_DATA_INT_1 | 1070 | X'0000042E' |
| MQIACF_AUX_ERROR_DATA_INT_2 | 1071 | X'0000042F' |
| MQIACF_CONV_REASON_CODE | 1072 | X'00000430' |
| MQIACF_BRIDGE_TYPE | 1073 | X'00000431' |
| MQIACF_INQUIRY | 1074 | X'00000432' |
| MQIACF_WAIT_INTERVAL | 1075 | X'00000433' |
| MQIACF_OPTIONS | 1076 | X'00000434' |
| MQIACF_BROKER_OPTIONS | 1077 | X'00000435' |
| MQIACF_REFRESH_TYPE | 1078 | X'00000436' |
| MQIACF_SEQUENCE_NUMBER | 1079 | X'00000437' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_INTEGER_DATA | 1080 | X'00000438' |
| MQIACF_REGISTRATION_OPTIONS | 1081 | X'00000439' |
| MQIACF_PUBLICATION_OPTIONS | 1082 | X'0000043A' |
| MQIACF_CLUSTER_INFO | 1083 | X'0000043B' |
| MQIACF_Q_MGR_DEFINITION_TYPE | 1084 | X'0000043C' |
| MQIACF_Q_MGR_TYPE | 1085 | X'0000043D' |
| MQIACF_ACTION | 1086 | X'0000043E' |
| MQIACF_SUSPEND | 1087 | X'0000043F' |
| MQIACF_BROKER_COUNT | 1088 | X'00000440' |
| MQIACF_APPL_COUNT | 1089 | X'00000441' |
| MQIACF_ANONYMOUS_COUNT | 1090 | X'00000442' |
| MQIACF_REG_REG_OPTIONS | 1091 | X'00000443' |
| MQIACF_DELETE_OPTIONS | 1092 | X'00000444' |
| MQIACF_CLUSTER_Q_MGR_ATTRS | 1093 | X'00000445' |
| MQIACF_REFRESH_INTERVAL | 1094 | X'00000446' |
| MQIACF_REFRESH_REPOSITORY | 1095 | X'00000447' |
| MQIACF_REMOVE_QUEUES | 1096 | X'00000448' |
| MQIACF_OPEN_INPUT_TYPE | 1098 | X'0000044A' |
| MQIACF_OPEN_OUTPUT | 1099 | X'0000044B' |
| MQIACF_OPEN_SET | 1100 | X'0000044C' |
| MQIACF_OPEN_INQUIRE | 1101 | X'0000044D' |
| MQIACF_OPEN_BROWSE | 1102 | X'0000044E' |
| MQIACF_Q_STATUS_TYPE | 1103 | X'0000044F' |
| MQIACF_Q_HANDLE | 1104 | X'00000450' |
| MQIACF_Q_STATUS | 1105 | X'00000451' |
| MQIACF_SECURITY_TYPE | 1106 | X'00000452' |
| MQIACF_CONNECTION_ATTRS | 1107 | X'00000453' |
| MQIACF_CONNECT_OPTIONS | 1108 | X'00000454' |
| MQIACF_CONN_INFO_TYPE | 1110 | X'00000456' |
| MQIACF_CONN_INFO_CONN | 1111 | X'00000457' |
| MQIACF_CONN_INFO_HANDLE | 1112 | X'00000458' |
| MQIACF_CONN_INFO_ALL | 1113 | X'00000459' |
| MQIACF_AUTH_PROFILE_ATTRS | 1114 | X'0000045A' |
| MQIACF_AUTHORIZATION_LIST | 1115 | X'0000045B' |
| MQIACF_AUTH_ADD_AUTHS | 1116 | X'0000045C' |
| MQIACF_AUTH_REMOVE_AUTHS | 1117 | X'0000045D' |
| MQIACF_ENTITY_TYPE | 1118 | X'0000045E' |
| MQIACF_COMMAND_INFO | 1120 | X'00000460' |
| MQIACF_CMDSCOPE_Q_MGR_COUNT | 1121 | X'00000461' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_Q_MGR_SYSTEM | 1122 | X'00000462' |
| MQIACF_Q_MGR_EVENT | 1123 | X'00000463' |
| MQIACF_Q_MGR_DQM | 1124 | X'00000464' |
| MQIACF_Q_MGR_CLUSTER | 1125 | X'00000465' |
| MQIACF_QSG_DISPS | 1126 | X'00000466' |
| MQIACF_UOW_STATE | 1128 | X'00000468' |
| MQIACF_SECURITY_ITEM | 1129 | X'00000469' |
| MQIACF_CF_STRUC_STATUS | 1130 | X'0000046A' |
| MQIACF_UOW_TYPE | 1132 | X'0000046C' |
| MQIACF_CF_STRUC_ATTRS | 1133 | X'0000046D' |
| MQIACF_EXCLUDE_INTERVAL | 1134 | X'0000046E' |
| MQIACF_CF_STATUS_TYPE | 1135 | X'0000046F' |
| MQIACF_CF_STATUS_SUMMARY | 1136 | X'00000470' |
| MQIACF_CF_STATUS_CONNECT | 1137 | X'00000471' |
| MQIACF_CF_STATUS_BACKUP | 1138 | X'00000472' |
| MQIACF_CF_STRUC_TYPE | 1139 | X'00000473' |
| MQIACF_CF_STRUC_SIZE_MAX | 1140 | X'00000474' |
| MQIACF_CF_STRUC_SIZE_USED | 1141 | X'00000475' |
| MQIACF_CF_STRUC_ENTRIES_MAX | 1142 | X'00000476' |
| MQIACF_CF_STRUC_ENTRIES_USED | 1143 | X'00000477' |
| MQIACF_CF_STRUC_BACKUP_SIZE | 1144 | X'00000478' |
| MQIACF_MOVE_TYPE | 1145 | X'00000479' |
| MQIACF_MOVE_TYPE_MOVE | 1146 | X'0000047A' |
| MQIACF_MOVE_TYPE_ADD | 1147 | X'0000047B' |
| MQIACF_Q_MGR_NUMBER | 1148 | X'0000047C' |
| MQIACF_Q_MGR_STATUS | 1149 | X'0000047D' |
| MQIACF_DB2_CONN_STATUS | 1150 | X'0000047E' |
| MQIACF_SECURITY_ATTRS | 1151 | X'0000047F' |
| MQIACF_SECURITY_TIMEOUT | 1152 | X'00000480' |
| MQIACF_SECURITY_INTERVAL | 1153 | X'00000481' |
| MQIACF_SECURITY_SWITCH | 1154 | X'00000482' |
| MQIACF_SECURITY_SETTING | 1155 | X'00000483' |
| MQIACF_STORAGE_CLASS_ATTRS | 1156 | X'00000484' |
| MQIACF_USAGE_TYPE | 1157 | X'00000485' |
| MQIACF_BUFFER_POOL_ID | 1158 | X'00000486' |
| MQIACF_USAGE_TOTAL_PAGES | 1159 | X'00000487' |
| MQIACF_USAGE_UNUSED_PAGES | 1160 | X'00000488' |
| MQIACF_USAGE_PERSIST_PAGES | 1161 | X'00000489' |
| MQIACF_USAGE_NONPERSIST_PAGES | 1162 | X'0000048A' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_USAGE_RESTART_EXTENTS | 1163 | X'0000048B' |
| MQIACF_USAGE_EXPAND_COUNT | 1164 | X'0000048C' |
| MQIACF_PAGESET_STATUS | 1165 | X'0000048D' |
| MQIACF_USAGE_TOTAL_BUFFERS | 1166 | X'0000048E' |
| MQIACF_USAGE_DATA_SET_TYPE | 1167 | X'0000048F' |
| MQIACF_USAGE_PAGESET | 1168 | X'00000490' |
| MQIACF_USAGE_DATA_SET | 1169 | X'00000491' |
| MQIACF_USAGE_BUFFER_POOL | 1170 | X'00000492' |
| MQIACF_MOVE_COUNT | 1171 | X'00000493' |
| MQIACF_EXPIRY_Q_COUNT | 1172 | X'00000494' |
| MQIACF_CONFIGURATION_OBJECTS | 1173 | X'00000495' |
| MQIACF_CONFIGURATION_EVENTS | 1174 | X'00000496' |
| MQIACF_SYSP_TYPE | 1175 | X'00000497' |
| MQIACF_SYSP_DEALLOC_INTERVAL | 1176 | X'00000498' |
| MQIACF_SYSP_MAX_ARCHIVE | 1177 | X'00000499' |
| MQIACF_SYSP_MAX_READ_TAPES | 1178 | X'0000049A' |
| MQIACF_SYSP_IN_BUFFER_SIZE | 1179 | X'0000049B' |
| MQIACF_SYSP_OUT_BUFFER_SIZE | 1180 | X'0000049C' |
| MQIACF_SYSP_OUT_BUFFER_COUNT | 1181 | X'0000049D' |
| MQIACF_SYSP_ARCHIVE | 1182 | X'0000049E' |
| MQIACF_SYSP_DUAL_ACTIVE | 1183 | X'0000049F' |
| MQIACF_SYSP_DUAL_ARCHIVE | 1184 | X'000004A0' |
| MQIACF_SYSP_DUAL_BSDS | 1185 | X'000004A1' |
| MQIACF_SYSP_MAX_CONNS | 1186 | X'000004A2' |
| MQIACF_SYSP_MAX_CONNS_FORE | 1187 | X'000004A3' |
| MQIACF_SYSP_MAX_CONNS_BACK | 1188 | X'000004A4' |
| MQIACF_SYSP_EXIT_INTERVAL | 1189 | X'000004A5' |
| MQIACF_SYSP_EXIT_TASKS | 1190 | X'000004A6' |
| MQIACF_SYSP_CHKPOINT_COUNT | 1191 | X'000004A7' |
| MQIACF_SYSP_OTMA_INTERVAL | 1192 | X'000004A8' |
| MQIACF_SYSP_Q_INDEX_DEFER | 1193 | X'000004A9' |
| MQIACF_SYSP_DB2_TASKS | 1194 | X'000004AA' |
| MQIACF_SYSP_RESLEVEL_AUDIT | 1195 | X'000004AB' |
| MQIACF_SYSP_ROUTING_CODE | 1196 | X'000004AC' |
| MQIACF_SYSP_SMF_ACCOUNTING | 1197 | X'000004AD' |
| MQIACF_SYSP_SMF_STATS | 1198 | X'000004AE' |
| MQIACF_SYSP_SMF_INTERVAL | 1199 | X'000004AF' |
| MQIACF_SYSP_TRACE_CLASS | 1200 | X'000004B0' |
| MQIACF_SYSP_TRACE_SIZE | 1201 | X'000004B1' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_SYSP_WLM_INTERVAL | 1202 | X'000004B2' |
| MQIACF_SYSP_ALLOC_UNIT | 1203 | X'000004B3' |
| MQIACF_SYSP_ARCHIVE_RETAIN | 1204 | X'000004B4' |
| MQIACF_SYSP_ARCHIVE_WTOR | 1205 | X'000004B5' |
| MQIACF_SYSP_BLOCK_SIZE | 1206 | X'000004B6' |
| MQIACF_SYSP_CATALOG | 1207 | X'000004B7' |
| MQIACF_SYSP_COMPACT | 1208 | X'000004B8' |
| MQIACF_SYSP_ALLOC_PRIMARY | 1209 | X'000004B9' |
| MQIACF_SYSP_ALLOC_SECONDARY | 1210 | X'000004BA' |
| MQIACF_SYSP_PROTECT | 1211 | X'000004BB' |
| MQIACF_SYSP_QUIESCE_INTERVAL | 1212 | X'000004BC' |
| MQIACF_SYSP_TIMESTAMP | 1213 | X'000004BD' |
| MQIACF_SYSP_UNIT_ADDRESS | 1214 | X'000004BE' |
| MQIACF_SYSP_UNIT_STATUS | 1215 | X'000004BF' |
| MQIACF_SYSP_LOG_COPY | 1216 | X'000004C0' |
| MQIACF_SYSP_LOG_USED | 1217 | X'000004C1' |
| MQIACF_SYSP_LOG_SUSPEND | 1218 | X'000004C2' |
| MQIACF_SYSP_OFFLOAD_STATUS | 1219 | X'000004C3' |
| MQIACF_SYSP_TOTAL_LOGS | 1220 | X'000004C4' |
| MQIACF_SYSP_FULL_LOGS | 1221 | X'000004C5' |
| MQIACF_LISTENER_ATTRS | 1222 | X'000004C6' |
| MQIACF_LISTENER_STATUS_ATTRS | 1223 | X'000004C7' |
| MQIACF_SERVICE_ATTRS | 1224 | X'000004C8' |
| MQIACF_SERVICE_STATUS_ATTRS | 1225 | X'000004C9' |
| MQIACF_Q_TIME_INDICATOR | 1226 | X'000004CA' |
| MQIACF_OLDEST_MSG_AGE | 1227 | X'000004CB' |
| MQIACF_AUTH_OPTIONS | 1228 | X'000004CC' |
| MQIACF_Q_MGR_STATUS_ATTRS | 1229 | X'000004CD' |
| MQIACF_CONNECTION_COUNT | 1230 | X'000004CE' |
| MQIACF_Q_MGR_FACILITY | 1231 | X'000004CF' |
| MQIACF_CHINIT_STATUS | 1232 | X'000004D0' |
| MQIACF_CMD_SERVER_STATUS | 1233 | X'000004D1' |
| MQIACF_ROUTE_DETAIL | 1234 | X'000004D2' |
| MQIACF_RECORDED_ACTIVITIES | 1235 | X'000004D3' |
| MQIACF_MAX_ACTIVITIES | 1236 | X'000004D4' |
| MQIACF_DISCONTINUITY_COUNT | 1237 | X'000004D5' |
| MQIACF_ROUTE_ACCUMULATION | 1238 | X'000004D6' |
| MQIACF_ROUTE_DELIVERY | 1239 | X'000004D7' |
| MQIACF_OPERATION_TYPE | 1240 | X'000004D8' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_BACKOUT_COUNT | 1241 | X'000004D9' |
| MQIACF_COMP_CODE | 1242 | X'000004DA' |
| MQIACF_ENCODING | 1243 | X'000004DB' |
| MQIACF_EXPIRY | 1244 | X'000004DC' |
| MQIACF_FEEDBACK | 1245 | X'000004DD' |
| MQIACF_MSG_FLAGS | 1247 | X'000004DF' |
| MQIACF_MSG_LENGTH | 1248 | X'000004E0' |
| MQIACF_MSG_TYPE | 1249 | X'000004E1' |
| MQIACF_OFFSET | 1250 | X'000004E2' |
| MQIACF_ORIGINAL_LENGTH | 1251 | X'000004E3' |
| MQIACF_PERSISTENCE | 1252 | X'000004E4' |
| MQIACF_PRIORITY | 1253 | X'000004E5' |
| MQIACF_REASON_CODE | 1254 | X'000004E6' |
| MQIACF_REPORT | 1255 | X'000004E7' |
| MQIACF_VERSION | 1256 | X'000004E8' |
| MQIACF_UNRECORDED_ACTIVITIES | 1257 | X'000004E9' |
| MQIACF_MONITORING | 1258 | X'000004EA' |
| MQIACF_ROUTE_FORWARDING | 1259 | X'000004EB' |
| MQIACF_SERVICE_STATUS | 1260 | X'000004EC' |
| MQIACF_Q_TYPES | 1261 | X'000004ED' |
| MQIACF_USER_ID_SUPPORT | 1262 | X'000004EE' |
| MQIACF_INTERFACE_VERSION | 1263 | X'000004EF' |
| MQIACF_AUTH_SERVICE_ATTRS | 1264 | X'000004F0' |
| MQIACF_USAGE_EXPAND_TYPE | 1265 | X'000004F1' |
| MQIACF_SYSP_CLUSTER_CACHE | 1266 | X'000004F2' |
| MQIACF_SYSP_DB2_BLOB_TASKS | 1267 | X'000004F3' |
| MQIACF_SYSP_WLM_INT_UNITS | 1268 | X'000004F4' |
| MQIACF_TOPIC_ATTRS | 1269 | X'000004F5' |
| MQIACF_PUBSUB_PROPERTIES | 1271 | X'000004F7' |
| MQIACF_DESTINATION_CLASS | 1273 | X'000004F9' |
| MQIACF_DURABLE_SUBSCRIPTION | 1274 | X'000004FA' |
| MQIACF_SUBSCRIPTION_SCOPE | 1275 | X'000004FB' |
| MQIACF_VARIABLE_USER_ID | 1277 | X'000004FD' |
| MQIACF_REQUEST_ONLY | 1280 | X'00000500' |
| MQIACF_PUB_PRIORITY | 1283 | X'00000503' |
| MQIACF_SUB_ATTRS | 1287 | X'00000507' |
| MQIACF_WILDCARD_SCHEMA | 1288 | X'00000508' |
| MQIACF_SUB_TYPE | 1289 | X'00000509' |
| MQIACF_MESSAGE_COUNT | 1290 | X'0000050A' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_Q_MGR_PUBSUB | 1291 | X'0000050B' |
| MQIACF_Q_MGR_VERSION | 1292 | X'0000050C' |
| MQIACF_SUB_STATUS_ATTRS | 1294 | X'0000050E' |
| MQIACF_TOPIC_STATUS | 1295 | X'0000050F' |
| MQIACF_TOPIC_SUB | 1296 | X'00000510' |
| MQIACF_TOPIC_PUB | 1297 | X'00000511' |
| MQIACF_RETAINED_PUBLICATION | 1300 | X'00000514' |
| MQIACF_TOPIC_STATUS_ATTRS | 1301 | X'00000515' |
| MQIACF_TOPIC_STATUS_TYPE | 1302 | X'00000516' |
| MQIACF_SUB_OPTIONS | 1303 | X'00000517' |
| MQIACF_PUBLISH_COUNT | 1304 | X'00000518' |
| MQIACF_CLEAR_TYPE | 1305 | X'00000519' |
| MQIACF_CLEAR_SCOPE | 1306 | X'0000051A' |
| MQIACF_SUB_LEVEL | 1307 | X'0000051B' |
| MQIACF_ASYNC_STATE | 1308 | X'0000051C' |
| MQIACF_SUB_SUMMARY | 1309 | X'0000051D' |
| MQIACF_OBSOLETE_MSGS | 1310 | X'0000051E' |
| MQIACF_PUBSUB_STATUS | 1311 | X'0000051F' |
| MQIACF_PS_STATUS_TYPE | 1314 | X'00000522' |
| MQIACF_PUBSUB_STATUS_ATTRS | 1318 | X'00000526' |
| MQIACF_SELECTOR_TYPE | 1321 | X'00000529' |
| MQIACF_MCAST_REL_INDICATOR | 1351 | X'00000547' |
| MQIACF_CHLAUTH_TYPE | 1352 | X'00000548' |
| MQXR_DIAGNOSTICS_TYPE | 1354 | X'0000054A' |
| MQIACF_CHLAUTH_ATTRS | 1355 | X'0000054B' |
| MQIACF_OPERATION_ID | 1356 | X'0000054C' |
| MQIACF_API_CALLER_TYPE | 1357 | X'0000054D' |
| MQIACF_API_ENVIRONMENT | 1358 | X'0000054E' |
| MQIACF_TRACE_DETAIL | 1359 | X'0000054F' |
| MQIACF_HOBJ | 1360 | X'00000550' |
| MQIACF_CALL_TYPE | 1361 | X'00000551' |
| MQIACF_MQCB_OPERATION | 1362 | X'00000552' |
| MQIACF_MQCB_TYPE | 1363 | X'00000553' |
| MQIACF_MQCB_OPTIONS | 1364 | X'00000554' |
| MQIACF_CLOSE_OPTIONS | 1365 | X'00000555' |
| MQIACF_CTL_OPERATION | 1366 | X'00000556' |
| MQIACF_GET_OPTIONS | 1367 | X'00000557' |
| MQIACF_RECS_PRESENT | 1368 | X'00000558' |
| MQIACF_KNOWN_DEST_COUNT | 1369 | X'00000559' |

*Table 185. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACF_UNKNOWN_DEST_COUNT | 1370 | X'0000055A' |
| MQIACF_INVALID_DEST_COUNT | 1371 | X'0000055B' |
| MQIACF_RESOLVED_TYPE | 1372 | X'0000055C' |
| MQIACF_PUT_OPTIONS | 1373 | X'0000055D' |
| MQIACF_BUFFER_LENGTH | 1374 | X'0000055E' |
| MQIACF_TRACE_DATA_LENGTH | 1375 | X'0000055F' |
| MQIACF_SMDS_EXPANDST | 1376 | X'00000560' |
| MQIACF_STRUC_LENGTH | 1377 | X'00000561' |
| MQIACF_ITEM_COUNT | 1378 | X'00000562' |
| MQIACF_EXPIRY_TIME | 1379 | X'00000563' |
| MQIACF_CONNECT_TIME | 1380 | X'00000564' |
| MQIACF_DISCONNECT_TIME | 1381 | X'00000565' |
| MQIACF_HSUB | 1382 | X'00000566' |
| MQIACF_SUBRQ_OPTIONS | 1383 | X'00000567' |
| MQIACF_XA_RMID | 1384 | X'00000568' |
| MQIACF_XA_FLAGS | 1385 | X'00000569' |
| MQIACF_XA_RETCODE | 1386 | X'0000056A' |
| MQIACF_XA_HANDLE | 1387 | X'0000056B' |
| MQIACF_XA_RETVAL | 1388 | X'0000056C' |
| MQIACF_STATUS_TYPE | 1389 | X'0000056D' |
| MQIACF_XA_COUNT | 1390 | X'0000056E' |
| MQIACF_SELECTOR_COUNT | 1391 | X'0000056F' |
| MQIACF_SELECTORS | 1392 | X'00000570' |
| MQIACF_INTATTR_COUNT | 1393 | X'00000571' |
| MQIACF_INTATTRS | 1394 | X'00000572' |
| MQIACF_SUBRQ_ACTION | 1395 | X'00000573' |
| MQIACF_NUM_PUBS | 1396 | X'00000574' |
| MQIACF_POINTER_SIZE | 1397 | X'00000575' |
| MQIACF_REMOVE_AUTHREC | 1398 | X'00000576' |
| MQIACF_XR_ATTRS | 1399 | X'00000577' |
| MQIACF_APPL_FUNCTION_TYPE | 1400 | X'00000578' |
| MQIACF_AMQP_ATTRS | 1401 | X'00000579' |
| MQIACF_EXPORT_TYPE | 1402 | X'0000057A' |
| MQIACF_EXPORT_ATTRS | 1403 | X'0000057B' |
| MQIACF_SYSTEM_OBJECTS | 1404 | X'0000057C' |
| MQIACF_CONNECTION_SWAP | 1405 | X'0000057D' |
| MQIACF_AMQP_DIAGNOSTICS_TYPE | 1406 | X'0000057E' |
| MQIACF_BUFFER_POOL_LOCATION | 1408 | X'00000580' |
| MQIACF_LDAP_CONNECTION_STATUS | 1409 | X'00000581' |

| Table 185. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIACF_SYSP_MAX_ACE_POOL | 1410 | X'00000582' |
| MQIACF_PAGECLAS | 1411 | X'00000583' |
| V 8.0.0.4 V 8.0.0.4 MQIACF_AUTH_REC_TYPE | 1412 | X'00000584' |
| MQIACF_LAST_USED | 1412 | X'00000584' |

## MQIACH_* (Command format Integer Channel Types)

| Table 186. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIACH_FIRST | 1501 | X'000005DD' |
| MQIACH_XMIT_PROTOCOL_TYPE | 1501 | X'000005DD' |
| MQIACH_BATCH_SIZE | 1502 | X'000005DE' |
| MQIACH_DISC_INTERVAL | 1503 | X'000005DF' |
| MQIACH_SHORT_TIMER | 1504 | X'000005E0' |
| MQIACH_SHORT_RETRY | 1505 | X'000005E1' |
| MQIACH_LONG_TIMER | 1506 | X'000005E2' |
| MQIACH_LONG_RETRY | 1507 | X'000005E3' |
| MQIACH_PUT_AUTHORITY | 1508 | X'000005E4' |
| MQIACH_SEQUENCE_NUMBER_WRAP | 1509 | X'000005E5' |
| MQIACH_MAX_MSG_LENGTH | 1510 | X'000005E6' |
| MQIACH_CHANNEL_TYPE | 1511 | X'000005E7' |
| MQIACH_DATA_COUNT | 1512 | X'000005E8' |
| MQIACH_NAME_COUNT | 1513 | X'000005E9' |
| MQIACH_MSG_SEQUENCE_NUMBER | 1514 | X'000005EA' |
| MQIACH_DATA_CONVERSION | 1515 | X'000005EB' |
| MQIACH_IN_DOUBT | 1516 | X'000005EC' |
| MQIACH_MCA_TYPE | 1517 | X'000005ED' |
| MQIACH_SESSION_COUNT | 1518 | X'000005EE' |
| MQIACH_ADAPTER | 1519 | X'000005EF' |
| MQIACH_COMMAND_COUNT | 1520 | X'000005F0' |
| MQIACH_SOCKET | 1521 | X'000005F1' |
| MQIACH_PORT | 1522 | X'000005F2' |
| MQIACH_CHANNEL_INSTANCE_TYPE | 1523 | X'000005F3' |
| MQIACH_CHANNEL_INSTANCE_ATTRS | 1524 | X'000005F4' |
| MQIACH_CHANNEL_ERROR_DATA | 1525 | X'000005F5' |
| MQIACH_CHANNEL_TABLE | 1526 | X'000005F6' |
| MQIACH_CHANNEL_STATUS | 1527 | X'000005F7' |
| MQIACH_INDOUBT_STATUS | 1528 | X'000005F8' |
| MQIACH_LAST_SEQ_NUMBER | 1529 | X'000005F9' |
| MQIACH_LAST_SEQUENCE_NUMBER | 1529 | X'000005F9' |

*Table 186. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACH_CURRENT_MSGS | 1531 | X'000005FB' |
| MQIACH_CURRENT_SEQ_NUMBER | 1532 | X'000005FC' |
| MQIACH_CURRENT_SEQUENCE_NUMBER | 1532 | X'000005FC' |
| MQIACH_SSL_RETURN_CODE | 1533 | X'000005FD' |
| MQIACH_MSGS | 1534 | X'000005FE' |
| MQIACH_BYTES_SENT | 1535 | X'000005FF' |
| MQIACH_BYTES_RCVD | 1536 | X'00000600' |
| MQIACH_BYTES_RECEIVED | 1536 | X'00000600' |
| MQIACH_BATCHES | 1537 | X'00000601' |
| MQIACH_BUFFERS_SENT | 1538 | X'00000602' |
| MQIACH_BUFFERS_RCVD | 1539 | X'00000603' |
| MQIACH_BUFFERS_RECEIVED | 1539 | X'00000603' |
| MQIACH_LONG_RETRIES_LEFT | 1540 | X'00000604' |
| MQIACH_SHORT_RETRIES_LEFT | 1541 | X'00000605' |
| MQIACH_MCA_STATUS | 1542 | X'00000606' |
| MQIACH_STOP_REQUESTED | 1543 | X'00000607' |
| MQIACH_MR_COUNT | 1544 | X'00000608' |
| MQIACH_MR_INTERVAL | 1545 | X'00000609' |
| MQIACH_NPM_SPEED | 1562 | X'0000061A' |
| MQIACH_HB_INTERVAL | 1563 | X'0000061B' |
| MQIACH_BATCH_INTERVAL | 1564 | X'0000061C' |
| MQIACH_NETWORK_PRIORITY | 1565 | X'0000061D' |
| MQIACH_KEEP_ALIVE_INTERVAL | 1566 | X'0000061E' |
| MQIACH_BATCH_HB | 1567 | X'0000061F' |
| MQIACH_SSL_CLIENT_AUTH | 1568 | X'00000620' |
| MQIACH_ALLOC_RETRY | 1570 | X'00000622' |
| MQIACH_ALLOC_FAST_TIMER | 1571 | X'00000623' |
| MQIACH_ALLOC_SLOW_TIMER | 1572 | X'00000624' |
| MQIACH_DISC_RETRY | 1573 | X'00000625' |
| MQIACH_PORT_NUMBER | 1574 | X'00000626' |
| MQIACH_HDR_COMPRESSION | 1575 | X'00000627' |
| MQIACH_MSG_COMPRESSION | 1576 | X'00000628' |
| MQIACH_CLWL_CHANNEL_RANK | 1577 | X'00000629' |
| MQIACH_CLWL_CHANNEL_PRIORITY | 1578 | X'0000062A' |
| MQIACH_CLWL_CHANNEL_WEIGHT | 1579 | X'0000062B' |
| MQIACH_CHANNEL_DISP | 1580 | X'0000062C' |
| MQIACH_INBOUND_DISP | 1581 | X'0000062D' |
| MQIACH_CHANNEL_TYPES | 1582 | X'0000062E' |
| MQIACH_ADAPS_STARTED | 1583 | X'0000062F' |

*Table 186. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIACH_ADAPS_MAX | 1584 | X'00000630' |
| MQIACH_DISPS_STARTED | 1585 | X'00000631' |
| MQIACH_DISPS_MAX | 1586 | X'00000632' |
| MQIACH_SSLTASKS_STARTED | 1587 | X'00000633' |
| MQIACH_SSLTASKS_MAX | 1588 | X'00000634' |
| MQIACH_CURRENT_CHL | 1589 | X'00000635' |
| MQIACH_CURRENT_CHL_MAX | 1590 | X'00000636' |
| MQIACH_CURRENT_CHL_TCP | 1591 | X'00000637' |
| MQIACH_CURRENT_CHL_LU62 | 1592 | X'00000638' |
| MQIACH_ACTIVE_CHL | 1593 | X'00000639' |
| MQIACH_ACTIVE_CHL_MAX | 1594 | X'0000063A' |
| MQIACH_ACTIVE_CHL_PAUSED | 1595 | X'0000063B' |
| MQIACH_ACTIVE_CHL_STARTED | 1596 | X'0000063C' |
| MQIACH_ACTIVE_CHL_STOPPED | 1597 | X'0000063D' |
| MQIACH_ACTIVE_CHL_RETRY | 1598 | X'0000063E' |
| MQIACH_LISTENER_STATUS | 1599 | X'0000063F' |
| MQIACH_SHARED_CHL_RESTART | 1600 | X'00000640' |
| MQIACH_LISTENER_CONTROL | 1601 | X'00000641' |
| MQIACH_BACKLOG | 1602 | X'00000642' |
| MQIACH_XMITQ_TIME_INDICATOR | 1604 | X'00000644' |
| MQIACH_NETWORK_TIME_INDICATOR | 1605 | X'00000645' |
| MQIACH_EXIT_TIME_INDICATOR | 1606 | X'00000646' |
| MQIACH_BATCH_SIZE_INDICATOR | 1607 | X'00000647' |
| MQIACH_XMITQ_MSGS_AVAILABLE | 1608 | X'00000648' |
| MQIACH_CHANNEL_SUBSTATE | 1609 | X'00000649' |
| MQIACH_SSL_KEY_RESETS | 1610 | X'0000064A' |
| MQIACH_COMPRESSION_RATE | 1611 | X'0000064B' |
| MQIACH_COMPRESSION_TIME | 1612 | X'0000064C' |
| MQIACH_MAX_XMIT_SIZE | 1613 | X'0000064D' |
| MQIACH_DEF_CHANNEL_DISP | 1614 | X'0000064E' |
| MQIACH_SHARING_CONVERSATIONS | 1615 | X'0000064F' |
| MQIACH_MAX_SHARING_CONVS | 1616 | X'00000650' |
| MQIACH_CURRENT_SHARING_CONVS | 1617 | X'00000651' |
| MQIACH_MAX_INSTANCES | 1618 | X'00000652' |
| MQIACH_MAX_INSTS_PER_CLIENT | 1619 | X'00000653' |
| MQIACH_CLIENT_CHANNEL_WEIGHT | 1620 | X'00000654' |
| MQIACH_CONNECTION_AFFINITY | 1621 | X'00000655' |
| MQIACH_RESET_REQUESTED | 1623 | X'00000657' |
| MQIACH_BATCH_DATA_LIMIT | 1624 | X'00000658' |

| Table 186. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIACH_MSG_HISTORY | 1625 | X'00000659' |
| MQIACH_MULTICAST_PROPERTIES | 1626 | X'0000065A' |
| MQIACH_NEW_SUBSCRIBER_HISTORY | 1627 | X'0000065B' |
| MQIACH_MC_HB_INTERVAL | 1628 | X'0000065C' |
| MQIACH_USE_CLIENT_ID | 1629 | X'0000065D' |
| MQIACH_MQTT_KEEP_ALIVE | 1630 | X'0000065E' |
| MQIACH_IN_DOUBT_IN | 1631 | X'0000065F' |
| MQIACH_IN_DOUBT_OUT | 1632 | X'00000660' |
| MQIACH_MSGS_SENT< | 1633 | X'00000661' |
| MQIACH_MSGS_RECEIVED | 1634 | X'00000662' |
| MQIACH_MSGS_RCVD | 1634 | X'00000662' |
| MQIACH_PENDING_OUT | 1635 | X'00000663' |
| MQIACH_AVAILABLE_CIPHERSPECS | 1636 | X'00000664' |
| MQIACH_MATCH | 1637 | X'00000665' |
| MQIACH_USER_SOURCE | 1638 | X'00000666' |
| MQIACH_WARNING | 1639 | X'00000667' |
| MQIACH_DEF_RECONNECT | 1640 | X'00000668' |
| MQIACH_CHANNEL_SUMMARY_ATTRS | 1642 | X'0000066A' |
| MQIACH_PROTOCOL | 1643 | X'0000066B' |
| MQIACH_AMQPKEEPALIVE | 1644 | X'0000066C' |
| MQIACH_SECURITY_PROTOCOL | 1645 | X'0000066D' |
| MQIACH_LAST_USED | 1645 | X'0000066D' |

## MQIAMO_* (Command format Integer Monitoring Parameter Types)

| Table 187. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIAMO_FIRST | 701 | X'000002BD' |
| MQIAMO_AVG_BATCH_SIZE | 702 | X'000002BE' |
| MQIAMO_AVG_Q_TIME | 703 | X'000002BF' |
| MQIAMO_BACKOUTS | 704 | X'000002C0' |
| MQIAMO_BROWSES | 705 | X'000002C1' |
| MQIAMO_BROWSE_MAX_BYTES | 706 | X'000002C2' |
| MQIAMO_BROWSE_MIN_BYTES | 707 | X'000002C3' |
| MQIAMO_BROWSES_FAILED | 708 | X'000002C4' |
| MQIAMO_CLOSES | 709 | X'000002C5' |
| MQIAMO_COMMITS | 710 | X'000002C6' |
| MQIAMO_COMMITS_FAILED | 711 | X'000002C7' |
| MQIAMO_CONNS | 712 | X'000002C8' |
| MQIAMO_CONNS_MAX | 713 | X'000002C9' |

*Table 187. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIAMO_DISCS | 714 | X'000002CA' |
| MQIAMO_DISCS_IMPLICIT | 715 | X'000002CB' |
| MQIAMO_DISC_TYPE | 716 | X'000002CC' |
| MQIAMO_EXIT_TIME_AVG | 717 | X'000002CD' |
| MQIAMO_EXIT_TIME_MAX | 718 | X'000002CE' |
| MQIAMO_EXIT_TIME_MIN | 719 | X'000002CF' |
| MQIAMO_FULL_BATCHES | 720 | X'000002D0' |
| MQIAMO_GENERATED_MSGS | 721 | X'000002D1' |
| MQIAMO_GETS | 722 | X'000002D2' |
| MQIAMO_GET_MAX_BYTES | 723 | X'000002D3' |
| MQIAMO_GET_MIN_BYTES | 724 | X'000002D4' |
| MQIAMO_GETS_FAILED | 725 | X'000002D5' |
| MQIAMO_INCOMPLETE_BATCHES | 726 | X'000002D6' |
| MQIAMO_INQS | 727 | X'000002D7' |
| MQIAMO_MSGS | 728 | X'000002D8' |
| MQIAMO_NET_TIME_AVG | 729 | X'000002D9' |
| MQIAMO_NET_TIME_MAX | 730 | X'000002DA' |
| MQIAMO_NET_TIME_MIN | 731 | X'000002DB' |
| MQIAMO_OBJECT_COUNT | 732 | X'000002DC' |
| MQIAMO_OPENS | 733 | X'000002DD' |
| MQIAMO_PUT1S | 734 | X'000002DE' |
| MQIAMO_PUTS | 735 | X'000002DF' |
| MQIAMO_PUT_MAX_BYTES | 736 | X'000002E0' |
| MQIAMO_PUT_MIN_BYTES | 737 | X'000002E1' |
| MQIAMO_PUT_RETRIES | 738 | X'000002E2' |
| MQIAMO_Q_MAX_DEPTH | 739 | X'000002E3' |
| MQIAMO_Q_MIN_DEPTH | 740 | X'000002E4' |
| MQIAMO_Q_TIME_AVG | 741 | X'000002E5' |
| MQIAMO_Q_TIME_MAX | 742 | X'000002E6' |
| MQIAMO_Q_TIME_MIN | 743 | X'000002E7' |
| MQIAMO_SETS | 744 | X'000002E8' |
| MQIAMO_CONNS_FAILED | 749 | X'000002ED' |
| MQIAMO_OPENS_FAILED | 751 | X'000002EF' |
| MQIAMO_INQS_FAILED | 752 | X'000002F0' |
| MQIAMO_SETS_FAILED | 753 | X'000002F1' |
| MQIAMO_PUTS_FAILED | 754 | X'000002F2' |
| MQIAMO_PUT1S_FAILED | 755 | X'000002F3' |
| MQIAMO_CLOSES_FAILED | 757 | X'000002F5' |
| MQIAMO_MSGS_EXPIRED | 758 | X'000002F6' |

*Table 187. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIAMO_MSGS_NOT_QUEUED | 759 | X'000002F7' |
| MQIAMO_MSGS_PURGED | 760 | X'000002F8' |
| MQIAMO_SUBS_DUR | 764 | X'000002FC' |
| MQIAMO_SUBS_NDUR | 765 | X'000002FD' |
| MQIAMO_SUBS_FAILED | 766 | X'000002FE' |
| MQIAMO_SUBRQS | 767 | X'000002FF' |
| MQIAMO_SUBRQS_FAILED | 768 | X'00000300' |
| MQIAMO_CBS | 769 | X'00000301' |
| MQIAMO_CBS_FAILED | 770 | X'00000302' |
| MQIAMO_CTLS | 771 | X'00000303' |
| MQIAMO_CTLS_FAILED | 772 | X'00000304' |
| MQIAMO_STATS | 773 | X'00000305' |
| MQIAMO_STATS_FAILED | 774 | X'00000306' |
| MQIAMO_SUB_DUR_HIGHWATER | 775 | X'00000307' |
| MQIAMO_SUB_DUR_LOWWATER | 776 | X'00000308' |
| MQIAMO_SUB_NDUR_HIGHWATER | 777 | X'00000309' |
| MQIAMO_SUB_NDUR_LOWWATER | 778 | X'0000030A' |
| MQIAMO_TOPIC_PUTS | 779 | X'0000030B' |
| MQIAMO_TOPIC_PUTS_FAILED | 780 | X'0000030C' |
| MQIAMO_TOPIC_PUT1S | 781 | X'0000030D' |
| MQIAMO_TOPIC_PUT1S_FAILED | 782 | X'0000030E' |
| MQIAMO_PUBLISH_MSG_COUNT | 784 | X'00000310' |
| MQIAMO_UNSUBS_DUR | 786 | X'00000312' |
| MQIAMO_UNSUBS_NDUR | 787 | X'00000313' |
| MQIAMO_UNSUBS_FAILED | 788 | X'00000314' |
| MQIAMO_INTERVAL | 789 | X'00000315' |
| MQIAMO_MSGS_SENT | 790 | X'00000316' |
| MQIAMO_BYTES_SENT | 791 | X'00000317' |
| MQIAMO_REPAIR_BYTES | 792 | X'00000318' |
| MQIAMO_FEEDBACK_MODE | 793 | X'00000319' |
| MQIAMO_RELIABILITY_TYPE | 794 | X'0000031A' |
| MQIAMO_LATE_JOIN_MARK | 795 | X'0000031B' |
| MQIAMO_NACKS_RCVD | 796 | X'0000031C' |
| MQIAMO_REPAIR_PKTS | 797 | X'0000031D' |
| MQIAMO_HISTORY_PKTS | 798 | X'0000031E' |
| MQIAMO_PENDING_PKTS | 799 | X'0000031F' |
| MQIAMO_PKT_RATE | 800 | X'00000320' |
| MQIAMO_MCAST_XMIT_RATE | 801 | X'00000321' |
| MQIAMO_MCAST_BATCH_TIME | 802 | X'00000322' |

*Table 187. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIAMO_MCAST_HEARTBEAT | 803 | X'00000323' |
| MQIAMO_DEST_DATA_PORT | 804 | X'00000324' |
| MQIAMO_DEST_REPAIR_PORT | 805 | X'00000325' |
| MQIAMO_ACKS_RCVD | 806 | X'00000326' |
| MQIAMO_ACTIVE_ACKERS | 807 | X'00000327' |
| MQIAMO_PKTS_SENT | 808 | X'00000328' |
| MQIAMO_TOTAL_REPAIR_PKTS | 809 | X'00000329' |
| MQIAMO_TOTAL_PKTS_SENT | 810 | X'0000032A' |
| MQIAMO_TOTAL_MSGS_SENT | 811 | X'0000032B' |
| MQIAMO_TOTAL_BYTES_SENT | 812 | X'0000032C' |
| MQIAMO_NUM_STREAMS | 813 | X'0000032D' |
| MQIAMO_ACK_FEEDBACK | 814 | X'0000032E' |
| MQIAMO_NACK_FEEDBACK | 815 | X'0000032F' |
| MQIAMO_PKTS_LOST | 816 | X'00000330' |
| MQIAMO_MSGS_RCVD | 817 | X'00000331' |
| MQIAMO_MSG_BYTES_RCVD | 818 | X'00000332' |
| MQIAMO_MSGS_DELIVERED | 819 | X'00000333' |
| MQIAMO_PKTS_PROCESSED | 820 | X'00000334' |
| MQIAMO_PKTS_DLVD | 821 | X'00000335' |
| MQIAMO_PKTS_DROPPED | 822 | X'00000336' |
| MQIAMO_PKTS_DUPLICATED | 823 | X'00000337' |
| MQIAMO_NACKS_CREATED | 824 | X'00000338' |
| MQIAMO_NACK_PKTS_SENT | 825 | X'00000339' |
| MQIAMO_REPAIR_PKTS_RQSTD | 826 | X'0000033A' |
| MQIAMO_REPAIR_PKTS_RCVD | 827 | X'0000033B' |
| MQIAMO_PKTS_REPAIRED | 828 | X'0000033C' |
| MQIAMO_TOTAL_MSGS_RCVD | 829 | X'0000033D' |
| MQIAMO_TOTAL_MSGS_BYTES_RCVD | 830 | X'0000033E' |
| MQIAMO_TOTAL_REPAIR_PKTS_RCVD | 831 | X'0000033F' |
| MQIAMO_TOTAL_REPAIR_PKTS_RQSTD | 832 | X'00000340' |
| MQIAMO_TOTAL_MSGS_PROCESSED | 833 | X'00000341' |
| MQIAMO_TOTAL_MSGS_SELECTED | 834 | X'00000342' |
| MQIAMO_TOTAL_MSGS_EXPIRED | 835 | X'00000343' |
| MQIAMO_TOTAL_MSGS_DELIVERED | 836 | X'00000344' |
| MQIAMO_TOTAL_MSGS_RETURNED | 837 | X'00000345' |
| MQIAMO_LAST_USED | 837 | X'00000345' |

## MQIAMO64_* (Command format 64-bit Integer Monitoring Parameter Types)

*Table 188. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIAMO64_AVG_Q_TIME | 703 | X'000002BF' |
| MQIAMO64_Q_TIME_AVG | 741 | X'000002E5' |
| MQIAMO64_Q_TIME_MAX | 742 | X'000002E6' |
| MQIAMO64_Q_TIME_MIN | 743 | X'000002E7' |
| MQIAMO64_BROWSE_BYTES | 745 | X'000002E9' |
| MQIAMO64_BYTES | 746 | X'000002EA' |
| MQIAMO64_GET_BYTES | 747 | X'000002EB' |
| MQIAMO64_PUT_BYTES | 748 | X'000002EC' |
| MQIAMO64_TOPIC_PUT_BYTES | 783 | X'0000030F' |
| MQIAMO64_PUBLISH_MSG_BYTES | 785 | X'00000311' |

## MQIASY_* (Integer System Selectors)

*Table 189. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIASY_FIRST | -1 | X'FFFFFFFF' |
| MQIASY_CODED_CHAR_SET_ID | -1 | X'FFFFFFFF' |
| MQIASY_TYPE | -2 | X'FFFFFFFE' |
| MQIASY_COMMAND | -3 | X'FFFFFFFD' |
| MQIASY_MSG_SEQ_NUMBER | -4 | X'FFFFFFFC' |
| MQIASY_CONTROL | -5 | X'FFFFFFFB' |
| MQIASY_COMP_CODE | -6 | X'FFFFFFFA' |
| MQIASY_REASON | -7 | X'FFFFFFF9' |
| MQIASY_BAG_OPTIONS | -8 | X'FFFFFFF8' |
| MQIASY_VERSION | -9 | X'FFFFFFF7' |
| MQIASY_LAST_USED | -9 | X'FFFFFFF7' |
| MQIASY_LAST | -2000 | X'FFFFF830' |

## MQIAUT_* ( IMS information header Authenticator)

*Table 190. Constant names and values*

| Name | Value |
|---|---|
| MQIAUT_NONE | "¬¬¬¬¬¬¬¬" |
| MQIAUT_NONE_ARRAY | '¬','¬','¬','¬','¬','¬','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

## MQIAV_* (Integer Attribute Values)

*Table 191. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIAV_NOT_APPLICABLE | -1 | X'FFFFFFFF' |

| Table 191. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIAV_UNDEFINED | -2 | X'FFFFFFFE' |

## MQICM_* ( IMS information header Commit Modes)

| Table 192. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQICM_COMMIT_THEN_SEND | '0' |
| MQICM_SEND_THEN_COMMIT | '1' |

## MQIDO_* (Command format Indoubt Options)

| Table 193. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIDO_COMMIT | 1 | X'00000001' |
| MQIDO_BACKOUT | 2 | X'00000002' |

## MQIEP_* (Interface entry points)

### Connection security parameters structure

| Table 194. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQIEP_STRUC_ID | "IEP¬" |
| MQIEP_STRUC_ID_ARRAY | 'I','E','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 195. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIEP_VERSION_1 | 1 | X'00000001' |
| MQDXP_CURRENT_VERSION | 1 | X'00000001' |

## MQIGQ_* (Intra-Group queuing)

| Table 196. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIGQ_DISABLED | 0 | X'00000000' |
| MQIGQ_ENABLED | 1 | X'00000001' |

## MQIGQPA_* (Intra-Group queuing Put Authority)

| Table 197. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIGQPA_DEFAULT | 1 | X'00000001' |
| MQIGQPA_CONTEXT | 2 | X'00000002' |
| MQIGQPA_ONLY_IGQ | 3 | X'00000003' |

| Table 197. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIGQPA_ALTERNATE_OR_IGQ | 4 | X'00000004' |

## MQIIH_* ( IMS information header structure and Flags)

### IMS information header structure

| Table 198. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQIIH_STRUC_ID | "IIH¬" |
| MQIIH_STRUC_ID_ARRAY | 'I','I','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 199. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIIH_VERSION_1 | 1 | X'00000001' |
| MQIIH_CURRENT_VERSION | 1 | X'00000001' |
| MQIIH_LENGTH_1 | 84 | X'00000054' |

### IMS information header Flags

| Table 200. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIIH_NONE | 0 | X'00000000' |
| MQIIH_PASS_EXPIRATION | 1 | X'00000001' |
| MQIIH_UNLIMITED_EXPIRATION | 0 | X'00000000' |
| MQIIH_REPLY_FORMAT_NONE | 8 | X'00000008' |
| MQIIH_IGNORE_PURG | 16 | X'00000010' |
| MQIIH_CM0_REQUEST_RESPONSE | 32 | X'00000020' |

## MQIMPO_* (Inquire message property options and structure)

### Inquire message property options structure

| Table 201. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQIMPO_STRUC_ID | "IMPO" |
| MQIMPO_STRUC_ID_ARRAY | 'I','M','P','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 202. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIMPO_VERSION_1 | 1 | X'00000001' |
| MQIMPO_CURRENT_VERSION | 1 | X'00000001' |

### Inquire Message Property Options

*Table 203. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIMPO_CONVERT_TYPE | 2 | X'00000002' |
| MQIMPO_QUERY_LENGTH | 4 | X'00000004' |
| MQIMPO_INQ_FIRST | 0 | X'00000000' |
| MQIMPO_INQ_NEXT | 8 | X'00000008' |
| MQIMPO_INQ_PROP_UNDER_CURSOR | 16 | X'00000010' |
| MQIMPO_CONVERT_VALUE | 32 | X'00000020' |
| MQIMPO_NONE | 0 | X'00000000' |

## MQINBD_* (Command format Inbound Dispositions)

*Table 204. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQINBD_Q_MGR | 0 | X'00000000' |
| MQINBD_GROUP | 3 | X'00000003' |

## MQIND_* (Special Index Values)

*Table 205. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIND_NONE | -1 | X'FFFFFFFF' |
| MQIND_ALL | -2 | X'FFFFFFFE' |

## MQIPADDR_* (IP Address Versions)

*Table 206. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIPADDR_IPv4 | 0 | X'00000000' |
| MQIPADDR_IPv6 | 1 | X'00000001' |

## MQISS_* ( IMS information header Security Scopes)

*Table 207. Constant names and values*

| Name | Value |
|---|---|
| MQISS_CHECK | 'C' |
| MQISS_FULL | 'F' |

## MQIT_* (Index Types)

*Table 208. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQIT_NONE | 0 | X'00000000' |
| MQIT_MSG_ID | 1 | X'00000001' |
| MQIT_CORREL_ID | 2 | X'00000002' |

| Table 208. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQIT_MSG_TOKEN | 4 | X'00000004' |
| MQIT_GROUP_ID | 5 | X'00000005' |

## MQITEM_* (Item Type for mqInquireItemInfo)

| Table 209. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQITEM_INTEGER | 1 | X'00000001' |
| MQITEM_STRING | 2 | X'00000002' |
| MQITEM_BAG | 3 | X'00000003' |
| MQITEM_BYTE_STRING | 4 | X'00000004' |
| MQITEM_INTEGER_FILTER | 5 | X'00000005' |
| MQITEM_STRING_FILTER | 6 | X'00000006' |
| MQITEM_INTEGER64 | 7 | X'00000007' |
| MQITEM_BYTE_STRING_FILTER | 8 | X'00000008' |

## MQITII_* ( IMS information header Transaction Instance Identifier)

| Table 210. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQITII_NONE | X'00...00' (16 nulls) |
| MQITII_NONE_ARRAY | '\0','\0',... (16 nulls) |

## MQITS_* ( IMS information header Transaction States)

| Table 211. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQITS_IN_CONVERSATION | 'C' |
| MQITS_NOT_IN_CONVERSATION | '¬' |
| MQITS_ARCHITECTED | 'A' |

**Note:** The symbol ¬ represents a single blank character.

## MQKAI_* (KeepAlive Interval)

| Table 212. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQKAI_AUTO | -1 | X'FFFFFFFF' |

## MQMASTER_* (Master administration)

| Table 213. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQMASTER_NO | 0 | X'00000000' |
| MQMASTER_YES | 1 | X'00000001' |

## MQMCAS_* (Command format Message Channel Agent Status)

*Table 214. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMCAS_STOPPED | 0 | X'00000000' |
| MQMCAS_RUNNING | 3 | X'00000003' |

## MQMCAT_* (MCA Types)

*Table 215. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMCAT_PROCESS | 1 | X'00000001' |
| MQMCAT_THREAD | 2 | X'00000002' |

## MQMCD_* (Publish/Subscribe Options Tag Information)

### Publish/Subscribe Options Tag Message Content Descriptor (mcd) Tags

*Table 216. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMCD_FOLDER_VERSION | 1 | X'00000001' |

### Publish/Subscribe Options Tag Tag names

*Table 217. Constant names and values*

| Name | Value |
|---|---|
| MQMCD_MSG_DOMAIN | "Msd" |
| MQMCD_MSG_SET | "Set" |
| MQMCD_MSG_TYPE | "Type" |
| MQMCD_MSG_FORMAT | "Fmt" |

### Publish/Subscribe Options Tag XML tag names

*Table 218. Constant names and values*

| Name | Value |
|---|---|
| MQMCD_MSG_DOMAIN_B | "<Msd>" |
| MQMCD_MSG_DOMAIN_E | "</Msd>" |
| MQMCD_MSG_SET_B | "<Set>" |
| MQMCD_MSG_SET_E | "</Set>" |
| MQMCD_MSG_TYPE_B | "<Type>" |
| MQMCD_MSG_TYPE_E | "</Type>" |
| MQMCD_MSG_FORMAT_B | "<Fmt>" |
| MQMCD_MSG_FORMAT_E | "</Fmt>" |

### Publish/Subscribe Options Tag Tag values

*Table 219. Constant names and values*

| Name | Value |
|---|---|
| MQMCD_DOMAIN_NONE | "none" |
| MQMCD_DOMAIN_NEON | "neon" |
| MQMCD_DOMAIN_MRM | "mrm" |
| MQMCD_DOMAIN_JMS_NONE | "jms_none" |
| MQMCD_DOMAIN_JMS_TEXT | "jms_text" |
| MQMCD_DOMAIN_JMS_OBJECT | "jms_object" |
| MQMCD_DOMAIN_JMS_MAP | "jms_map" |
| MQMCD_DOMAIN_JMS_STREAM | "jms_stream" |
| MQMCD_DOMAIN_JMS_BYTES | "jms_bytes" |

## MQMD_* (Message descriptor structure)

*Table 220. Structures of constants*

| Name | Structure |
|---|---|
| MQMD_STRUC_ID | "MD¬¬" |
| MQMD_STRUC_ID_ARRAY | 'M','D','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 221. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMD_VERSION_1 | 1 | X'00000001' |
| MQMD_VERSION_2 | 2 | X'00000002' |
| MQMD_CURRENT_VERSION | 2 | X'00000002' |

## MQMDE_* (Message descriptor extension structure)

*Table 222. Structures of constants*

| Name | Structure |
|---|---|
| MQMDE_STRUC_ID | "MDE¬" |
| MQMDE_STRUC_ID_ARRAY | 'M','D','E','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 223. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMDE_VERSION_2 | 2 | X'00000002' |
| MQMDE_CURRENT_VERSION | 2 | X'00000002' |
| MQMDE_LENGTH_2 | 72 | X'00000048' |

## MQMDEF_* (Message descriptor extension Flags)

*Table 224. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMDEF_NONE | 0 | X'00000000' |

## MQMDS_* (Message Delivery Sequence)

*Table 225. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMDS_PRIORITY | 0 | X'00000000' |
| MQMDS_FIFO | 1 | X'00000001' |

## MQMF_* (Message Flags)

*Table 226. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMF_SEGMENTATION_INHIBITED | 0 | X'00000000' |
| MQMF_SEGMENTATION_ALLOWED | 1 | X'00000001' |
| MQMF_MSG_IN_GROUP | 8 | X'00000008' |
| MQMF_LAST_MSG_IN_GROUP | 16 | X'00000010' |
| MQMF_SEGMENT | 2 | X'00000002' |
| MQMF_LAST_SEGMENT | 4 | X'00000004' |
| MQMF_NONE | 0 | X'00000000' |

## MQMHBO_* (Message handle to buffer options and structure)

### Message handle to buffer options structure

*Table 227. Structures of constants*

| Name | Structure |
|---|---|
| MQMHBO_STRUC_ID | "MHBO" |
| MQMHBO_STRUC_ID_ARRAY | 'M','H','B','O' |

**Note:** The symbol ¬ represents a single blank character.

*Table 228. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMHBO_VERSION_1 | 1 | X'00000001' |
| MQMHBO_CURRENT_VERSION | 1 | X'00000001' |

### Message Handle To Buffer Options

*Table 229. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMHBO_PROPERTIES_IN_MQRFH2 | 1 | X'00000001' |
| MQMHBO_DELETE_PROPERTIES | 2 | X'00000002' |
| MQMHBO_NONE | 0 | X'00000000' |

## MQMI_* (Message Identifier)

*Table 230. Constant names and values*

| Name | Value |
|---|---|
| MQMI_NONE | X'00...00' (24 nulls) |
| MQMI_NONE_ARRAY | '\0','\0',... (24 nulls) |

## MQMMBI_* (Message Mark-Browse Interval)

*Table 231. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMMBI_UNLIMITED | -1 | X'FFFFFFFF' |

## MQMO_* (Match Options)

*Table 232. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMO_MATCH_MSG_ID | 1 | X'00000001' |
| MQMO_MATCH_CORREL_ID | 2 | X'00000002' |
| MQMO_MATCH_GROUP_ID | 4 | X'00000004' |
| MQMO_MATCH_MSG_SEQ_NUMBER | 8 | X'00000008' |
| MQMO_MATCH_OFFSET | 16 | X'00000010' |
| MQMO_MATCH_MSG_TOKEN | 32 | X'00000020' |
| MQMO_NONE | 0 | X'00000000' |

## MQMODE_* (Command format Mode Options)

*Table 233. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMODE_FORCE | 0 | X'00000000' |
| MQMODE_QUIESCE | 1 | X'00000001' |
| MQMODE_TERMINATE | 2 | X'00000002' |

## MQMON_* (Monitoring Values)

*Table 234. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQMON_NOT_AVAILABLE | -1 | X'FFFFFFFF' |
| MQMON_NONE | -1 | X'FFFFFFFF' |
| MQMON_Q_MGR | -3 | X'FFFFFFFD' |
| MQMON_OFF | 0 | X'00000000' |
| MQMON_ON | 1 | X'00000001' |
| MQMON_DISABLED | 0 | X'00000000' |
| MQMON_ENABLED | 1 | X'00000001' |
| MQMON_LOW | 17 | X'00000011' |
| MQMON_MEDIUM | 33 | X'00000021' |

| Table 234. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQMON_HIGH | 65 | X'00000041' |

## MQMT_* (Message Types)

| Table 235. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQMT_SYSTEM_FIRST | 1 | X'00000001' |
| MQMT_REQUEST | 1 | X'00000001' |
| MQMT_REPLY | 2 | X'00000002' |
| MQMT_DATAGRAM | 8 | X'00000008' |
| MQMT_REPORT | 4 | X'00000004' |
| MQMT_MQE_FIELDS_FROM_MQE | 112 | X'00000070' |
| MQMT_MQE_FIELDS | 113 | X'00000071' |
| MQMT_SYSTEM_LAST | 65535 | X'0000FFFF' |
| MQMT_APPL_FIRST | 65536 | X'00010000' |
| MQMT_APPL_LAST | 999999999 | X'3B9AC9FF' |

## MQMTOK_* (Message Token)

| Table 236. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQMTOK_NONE | X'00...00' (16 nulls) |
| MQMTOK_NONE_ARRAY | '\0','\0',... (16 nulls) |

| Table 237. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQMTOK_NONE | X'00...00' | (16 nulls) |
| MQMTOK_NONE_ARRAY | '\0','\0',... | (16 nulls) |

## MQNC_* (Name Count)

| Table 238. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQNC_MAX_NAMELIST_NAME_COUNT | 256 | X'00000100' |

## MQNPM_* (Nonpersistent Message Class)

| Table 239. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQNPM_CLASS_NORMAL | 0 | X'00000000' |
| MQNPM_CLASS_HIGH | 10 | X'0000000A' |

## MQNPMS_* (NonPersistent-Message Speeds)

*Table 240. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQNPMS_NORMAL | 1 | X'00000001' |
| MQNPMS_FAST | 2 | X'00000002' |

## MQNT_* (Namelist Types)

*Table 241. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQNT_NONE | 0 | X'00000000' |
| MQNT_Q | 1 | X'00000001' |
| MQNT_CLUSTER | 2 | X'00000002' |
| MQNT_AUTH_INFO | 4 | X'00000004' |
| MQNT_ALL | 1001 | X'000003E9' |

## MQNVS_* (Names for Name/Value String)

*Table 242. Constant names and values*

| Name | Value |
|---|---|
| MQNVS_APPL_TYPE | "OPT_APP_GRP¬" |
| MQNVS_MSG_TYPE | "OPT_MSG_TYPE¬" |

**Note:** The symbol ¬ represents a single blank character.

## MQOA_* (Limits for Selectors for Object Attributes)

*Table 243. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQOA_FIRST | 1 | X'00000001' |
| MQOA_LAST | 9000 | X'00002328' |

## MQOD_* (Object descriptor structure)

*Table 244. Structures of constants*

| Name | Structure |
|---|---|
| MQOD_STRUC_ID | "OD¬¬" |
| MQOD_STRUC_ID_ARRAY | 'O','D','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 245. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQOD_VERSION_1 | 1 | X'00000001' |
| MQOD_VERSION_2 | 2 | X'00000002' |
| MQOD_VERSION_3 | 3 | X'00000003' |
| MQOD_VERSION_4 | 4 | X'00000004' |

| Table 245. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOD_CURRENT_VERSION | 4 | X'00000004' |
| MQOD_CURRENT_LENGTH | (value differs by platform or version) | |

## MQOII_* (Object Instance Identifier)

| Table 246. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQOII_NONE | X'00...00' (24 nulls) |
| MQOII_NONE_ARRAY | '\0','\0',... (24 nulls) |

## MQOL_* (Original Length)

| Table 247. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOL_UNDEFINED | -1 | X'FFFFFFFF' |

## MQOM_* (Obsolete Db2 Messages options on Inquire Group)

| Table 248. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOM_NO | 0 | X'00000000' |
| MQOM_YES | 1 | X'00000001' |

## MQOO_* (Open Options)

| Table 249. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOO_BIND_AS_Q_DEF | 0 | X'00000000' |
| MQOO_READ_AHEAD_AS_Q_DEF | 0 | X'00000000' |
| MQOO_INPUT_AS_Q_DEF | 1 | X'00000001' |
| MQOO_INPUT_SHARED | 2 | X'00000002' |
| MQOO_INPUT_EXCLUSIVE | 4 | X'00000004' |
| MQOO_BROWSE | 8 | X'00000008' |
| MQOO_OUTPUT | 16 | X'00000010' |
| MQOO_INQUIRE | 32 | X'00000020' |
| MQOO_SET | 64 | X'00000040' |
| MQOO_SAVE_ALL_CONTEXT | 128 | X'00000080' |
| MQOO_PASS_IDENTITY_CONTEXT | 256 | X'00000100' |
| MQOO_PASS_ALL_CONTEXT | 512 | X'00000200' |
| MQOO_SET_IDENTITY_CONTEXT | 1024 | X'00000400' |
| MQOO_SET_ALL_CONTEXT | 2048 | X'00000800' |
| MQOO_ALTERNATE_USER_AUTHORITY | 4096 | X'00001000' |
| MQOO_FAIL_IF_QUIESCING | 8192 | X'00002000' |

| Table 249. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOO_BIND_ON_OPEN | 16384 | X'00004000' |
| MQOO_BIND_NOT_FIXED | 32768 | X'00008000' |
| MQOO_CO_OP | 131072 | X'00020000' |
| MQOO_RESOLVE_LOCAL_TOPIC | 262144 | X'00040000' |
| MQOO_NO_READ_AHEAD | 524288 | X'00080000' |
| MQOO_READ_AHEAD | 1048576 | X'00100000' |
| MQOO_BIND_ON_GROUP | 4194304 | X'00400000' |

### MQOO_* (Following used in C++ only)

| Table 250. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOO_RESOLVE_NAMES | 65536 | X'00010000' |
| MQOO_RESOLVE_LOCAL_Q | 262144 | X'00040000' |

## MQOP_* (Operation codes for MQCTL and MQCB)

### Operation codes for MQCTL

| Table 251. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOP_START | 1 | X'00000001' |
| MQOP_START_WAIT | 2 | X'00000002' |
| MQOP_STOP | 4 | X'00000004' |

### Operation codes for MQCB

| Table 252. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOP_REGISTER | 256 | X'00000100' |
| MQOP_DEREGISTER | 512 | X'00000200' |

### Operation codes for MQCTL and MQCB

| Table 253. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOP_SUSPEND | 65536 | X'00010000' |
| MQOP_RESUME | 131072 | X'00020000' |

## MQOPEN_* (Values related to MQOPEN_PRIV structure)

| Table 254. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQOPEN_PRIV_VERSION_1 | 1 | X'00000001' |
| MQOPEN_PRIV_CURRENT_VERSION | 1 | X'00000001' |

## MQOPER_* (Activity Operations)

*Table 255. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQOPER_SYSTEM_FIRST | 0 | X'00000000' |
| MQOPER_UNKNOWN | 0 | X'00000000' |
| MQOPER_BROWSE | 1 | X'00000001' |
| MQOPER_DISCARD | 2 | X'00000002' |
| MQOPER_GET | 3 | X'00000003' |
| MQOPER_PUT | 4 | X'00000004' |
| MQOPER_PUT_REPLY | 5 | X'00000005' |
| MQOPER_PUT_REPORT | 6 | X'00000006' |
| MQOPER_RECEIVE | 7 | X'00000007' |
| MQOPER_SEND | 8 | X'00000008' |
| MQOPER_TRANSFORM | 9 | X'00000009' |
| MQOPER_PUBLISH | 10 | X'0000000A' |
| MQOPER_EXCLUDED_PUBLISH | 11 | X'0000000B' |
| MQOPER_DISCARDED_PUBLISH | 12 | X'0000000C' |
| MQOPER_SYSTEM_LAST | 65535 | X'0000FFFF' |
| MQOPER_APPL_FIRST | 65536 | X'00010000' |
| MQOPER_APPL_LAST | 999999999 | X'3B9AC9FF' |

## MQOT_* (Object Types and Extended Object Types)

### Object Types

*Table 256. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQOT_NONE | 0 | X'00000000' |
| MQOT_Q | 1 | X'00000001' |
| MQOT_NAMELIST | 2 | X'00000002' |
| MQOT_PROCESS | 3 | X'00000003' |
| MQOT_STORAGE_CLASS | 4 | X'00000004' |
| MQOT_Q_MGR | 5 | X'00000005' |
| MQOT_CHANNEL | 6 | X'00000006' |
| MQOT_AUTH_INFO | 7 | X'00000007' |
| MQOT_TOPIC | 8 | X'00000008' |
| MQOT_CF_STRUC | 10 | X'0000000A' |
| MQOT_LISTENER | 11 | X'0000000B' |
| MQOT_SERVICE | 12 | X'0000000C' |
| MQOT_RESERVED_1 | 999 | X'000003E7' |

### Extended Object Types

*Table 257. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQOT_ALL | 1001 | X'000003E9' |
| MQOT_ALIAS_Q | 1002 | X'000003EA' |
| MQOT_MODEL_Q | 1003 | X'000003EB' |
| MQOT_LOCAL_Q | 1004 | X'000003EC' |
| MQOT_REMOTE_Q | 1005 | X'000003ED' |
| MQOT_SENDER_CHANNEL | 1007 | X'000003EF' |
| MQOT_SERVER_CHANNEL | 1008 | X'000003F0' |
| MQOT_REQUESTER_CHANNEL | 1009 | X'000003F1' |
| MQOT_RECEIVER_CHANNEL | 1010 | X'000003F2' |
| MQOT_CURRENT_CHANNEL | 1011 | X'000003F3' |
| MQOT_SAVED_CHANNEL | 1012 | X'000003F4' |
| MQOT_SVRCONN_CHANNEL | 1013 | X'000003F5' |
| MQOT_CLNTCONN_CHANNEL | 1014 | X'000003F6' |
| MQOT_SHORT_CHANNEL | 1015 | X'000003F7' |
| MQOT_CHLAUTH | 1016 | X'000003F8' |
| MQOT_REMOTE_Q_MGR_NAME | 1017 | X'000003F9' |
| MQOT_PROT_POLICY | 1019 | X'000003FB' |
| MQOT_TT_CHANNEL | 1020 | X'000003FC' |
| MQOT_AMQP_CHANNEL | 1021 | X'000003FD' |
| V 8.0.0.4 V 8.0.0.4 MQOT_AUTH_REC | 1022 | X'000003FE' |

## MQPA_* (Put Authority)

*Table 258. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPA_DEFAULT | 1 | X'00000001' |
| MQPA_CONTEXT | 2 | X'00000002' |
| MQPA_ONLY_MCA | 3 | X'00000003' |
| MQPA_ALTERNATE_OR_MCA | 4 | X'00000004' |

## MQPD_* (Property descriptor, support and context)

### Property descriptor structure

*Table 259. Structures of constants*

| Name | Structure |
|---|---|
| MQPD_STRUC_ID | "PD¬¬" |
| MQPD_STRUC_ID_ARRAY | 'P','D','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 260. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPD_VERSION_1 | 1 | X'00000001' |
| MQPD_CURRENT_VERSION | 1 | X'00000001' |

**Note:** The symbol ¬ represents a single blank character.

### Property Descriptor Options

| Table 261. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPD_NONE | 0 | X'00000000' |

### Property Support Options

| Table 262. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPD_SUPPORT_OPTIONAL | 1 | X'00000001' |
| MQPD_SUPPORT_REQUIRED | 1048576 | X'00100000' |
| MQPD_SUPPORT_REQUIRED_IF_LOCAL | 1024 | X'00000400' |
| MQPD_REJECT_UNSUP_MASK | -1048576 | X'FFF00000' |
| MQPD_ACCEPT_UNSUP_IF_XMIT_MASK | 1047552 | X'000FFC00' |
| MQPD_ACCEPT_UNSUP_MASK | 1023 | X'000003FF' |

### Property Context

| Table 263. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPD_NO_CONTEXT | 0 | X'00000000' |
| MQPD_USER_CONTEXT | 1 | X'00000001' |

## MQPER_* (Persistence Values)

| Table 264. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPER_PERSISTENCE_AS_PARENT | -1 | X'FFFFFFFF' |
| MQPER_NOT_PERSISTENT | 0 | X'00000000' |
| MQPER_PERSISTENT | 1 | X'00000001' |
| MQPER_PERSISTENCE_AS_Q_DEF | 2 | X'00000002' |
| MQPER_PERSISTENCE_AS_TOPIC_DEF | 2 | X'00000002' |

## MQPL_* (Platforms)

| Table 265. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPL_MVS | 1 | X'00000001' |
| MQPL_OS390 | 1 | X'00000001' |

| Table 265. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPL_ZOS | 1 | X'00000001' |
| MQPL_OS2 | 2 | X'00000002' |
| MQPL_AIX | 3 | X'00000003' |
| MQPL_UNIX | 3 | X'00000003' |
| MQPL_OS400 | 4 | X'00000004' |
| MQPL_WINDOWS | 5 | X'00000005' |
| MQPL_WINDOWS_NT | 11 | X'0000000B' |
| MQPL_VMS | 12 | X'0000000C' |
| MQPL_NSK | 13 | X'0000000D' |
| MQPL_NSS | 13 | X'0000000D' |
| MQPL_OPEN_TP1 | 15 | X'0000000F' |
| MQPL_VM | 18 | X'00000012' |
| MQPL_TPF | 23 | X'00000017' |
| MQPL_VSE | 27 | X'0000001B' |
| V 8.0.0.2 V 8.0.0.2 MQPL_APPLIANCE | 28 | X'0000001C' |
| MQPL_NATIVE | 1 | X'00000001' |

## MQPMO_* (Put message options and structure for publish mask)

### Put message options structure

| Table 266. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQPMO_STRUC_ID | "PMO¬" |
| MQPMO_STRUC_ID_ARRAY | 'P','M','O','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 267. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPMO_VERSION_1 | 1 | X'00000001' |
| MQPMO_VERSION_2 | 2 | X'00000002' |
| MQPMO_VERSION_3 | 3 | X'00000003' |
| MQPMO_CURRENT_VERSION | 3 | X'00000003' |
| MQPMO_CURRENT_LENGTH | (value differs by platform or version) | |

### Put Message Options

| Table 268. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPMO_SYNCPOINT | 2 | X'00000002' |
| MQPMO_NO_SYNCPOINT | 4 | X'00000004' |

| Table 268. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPMO_DEFAULT_CONTEXT | 32 | X'00000020' |
| MQPMO_NEW_MSG_ID | 64 | X'00000040' |
| MQPMO_NEW_CORREL_ID | 128 | X'00000080' |
| MQPMO_PASS_IDENTITY_CONTEXT | 256 | X'00000100' |
| MQPMO_PASS_ALL_CONTEXT | 512 | X'00000200' |
| MQPMO_SET_IDENTITY_CONTEXT | 1024 | X'00000400' |
| MQPMO_SET_ALL_CONTEXT | 2048 | X'00000800' |
| MQPMO_ALTERNATE_USER_AUTHORITY | 4096 | X'00001000' |
| MQPMO_FAIL_IF_QUIESCING | 8192 | X'00002000' |
| MQPMO_NO_CONTEXT | 16384 | X'00004000' |
| MQPMO_LOGICAL_ORDER | 32768 | X'00008000' |
| MQPMO_ASYNC_RESPONSE | 65536 | X'00010000' |
| MQPMO_SYNC_RESPONSE | 131072 | X'00020000' |
| MQPMO_RESOLVE_LOCAL_Q | 262144 | X'00040000' |
| MQPMO_RETAIN | 2097152 | X'00200000' |
| MQPMO_MD_FOR_OUTPUT_ONLY | 8388608 | X'00800000' |
| MQPMO_SCOPE_QMGR | 67108864 | X'04000000' |
| MQPMO_SUPPRESS_REPLYTO | 134217728 | X'08000000' |
| MQPMO_NOT_OWN_SUBS | 268435456 | X'10000000' |
| MQPMO_RESPONSE_AS_Q_DEF | 0 | X'00000000' |
| MQPMO_RESPONSE_AS_TOPIC_DEF | 0 | X'00000000' |
| MQPMO_NONE | 0 | X'00000000' |

### Put Message Options for publish mask

| Table 269. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPMO_PUB_OPTIONS_MASK | 2097152 | X'00200000' |

## MQPMRF_* (Put Message Record Fields)

| Table 270. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPMRF_MSG_ID | 1 | X'00000001' |
| MQPMRF_CORREL_ID | 2 | X'00000002' |
| MQPMRF_GROUP_ID | 4 | X'00000004' |
| MQPMRF_FEEDBACK | 8 | X'00000008' |
| MQPMRF_ACCOUNTING_TOKEN | 16 | X'00000010' |
| MQPMRF_NONE | 0 | X'00000000' |

## MQPO_* (Command format Purge Options)

*Table 271. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPO_YES | 1 | X'00000001' |
| MQPO_NO | 0 | X'00000000' |

## MQPRI_* (Priority)

*Table 272. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPRI_PRIORITY_AS_Q_DEF | -1 | X'FFFFFFFF' |
| MQPRI_PRIORITY_AS_PARENT | -2 | X'FFFFFFFE' |
| MQPRI_PRIORITY_AS_PUBLISHED | -3 | X'FFFFFFFD' |
| MQPRI_PRIORITY_AS_TOPIC_DEF | -1 | X'FFFFFFFF' |

## MQPROP_* (Queue and Channel Property Control Values and Maximum Properties Length)

### Queue and Channel Property Control Values

*Table 273. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPROP_COMPATIBILITY | 0 | X'00000000' |
| MQPROP_NONE | 1 | X'00000001' |
| MQPROP_ALL | 2 | X'00000002' |
| MQPROP_FORCE_MQRFH2 | 3 | X'00000003' |

### Maximum Properties Length

*Table 274. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPROP_UNRESTRICTED_LENGTH | -1 | X'FFFFFFFF' |

## MQPRT_* (Put Response Values)

*Table 275. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPRT_RESPONSE_AS_PARENT | 0 | X'00000000' |
| MQPRT_SYNC_RESPONSE | 1 | X'00000001' |
| MQPRT_ASYNC_RESPONSE | 2 | X'00000002' |

## MQPS_* (Publish/Subscribe)

### Command format Publish/Subscribe Status

*Table 276. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPS_STATUS_INACTIVE | 0 | X'00000000' |
| MQPS_STATUS_STARTING | 1 | X'00000001' |
| MQPS_STATUS_STOPPING | 2 | X'00000002' |
| MQPS_STATUS_ACTIVE | 3 | X'00000003' |
| MQPS_STATUS_COMPAT | 4 | X'00000004' |
| MQPS_STATUS_ERROR | 5 | X'00000005' |
| MQPS_STATUS_REFUSED | 6 | X'00000006' |

### Publish/Subscribe Tags as strings

| | |
|---|---|
| MQPS_COMMAND | "MQPSCommand" |
| MQPS_COMP_CODE | "MQPSCompCode" |
| MQPS_CORREL_ID | "MQPSCorrelId" |
| MQPS_DELETE_OPTIONS | "MQPSDelOpts" |
| MQPS_ERROR_ID | "MQPSErrorId" |
| MQPS_ERROR_POS | "MQPSErrorPos" |
| MQPS_INTEGER_DATA | "MQPSIntData" |
| MQPS_PARAMETER_ID | "MQPSParmId" |
| MQPS_PUBLICATION_OPTIONS | "MQPSPubOpts" |
| MQPS_PUBLISH_TIMESTAMP | "MQPSPubTime" |
| MQPS_Q_MGR_NAME | "MQPSQMgrName" |
| MQPS_Q_NAME | "MQPSQName" |
| MQPS_REASON | "MQPSReason" |
| MQPS_REASON_TEXT | "MQPSReasonText" |
| MQPS_REGISTRATION_OPTIONS | "MQPSRegOpts" |
| MQPS_SEQUENCE_NUMBER | "MQPSSeqNum" |
| MQPS_STREAM_NAME | "MQPSStreamName" |
| MQPS_STRING_DATA | "MQPSStringData" |
| MQPS_SUBSCRIPTION_IDENTITY | "MQPSSubIdentity" |
| MQPS_SUBSCRIPTION_NAME | "MQPSSubName" |
| MQPS_SUBSCRIPTION_USER_DATA | "MQPSSubUserData" |
| MQPS_TOPIC | "MQPSTopic" |
| MQPS_USER_ID | "MQPSUserId" |

### Publish/Subscribe Tags as blank-enclosed strings

| | |
|---|---|
| MQPS_COMMAND_B | "¬MQPSCommand¬" |
| MQPS_COMP_CODE_B | "¬MQPSCompCode¬" |
| MQPS_CORREL_ID_B | "¬MQPSCorrelId¬" |
| MQPS_DELETE_OPTIONS_B | "¬MQPSDelOpts¬" |
| MQPS_ERROR_ID_B | "¬MQPSErrorId¬" |
| MQPS_ERROR_POS_B | "¬MQPSErrorPos¬" |
| MQPS_INTEGER_DATA_B | "¬MQPSIntData¬" |
| MQPS_PARAMETER_ID_B | "¬MQPSParmId¬" |
| MQPS_PUBLICATION_OPTIONS_B | "¬MQPSPubOpts¬" |
| MQPS_PUBLISH_TIMESTAMP_B | "¬MQPSPubTime¬" |
| MQPS_Q_MGR_NAME_B | "¬MQPSQMgrName¬" |
| MQPS_Q_NAME_B | "¬MQPSQName¬" |
| MQPS_REASON_B | "¬MQPSReason¬" |
| MQPS_REASON_TEXT_B | "¬MQPSReasonText¬" |
| MQPS_REGISTRATION_OPTIONS_B | "¬MQPSRegOpts¬" |
| MQPS_SEQUENCE_NUMBER_B | "¬MQPSSeqNum¬" |
| MQPS_STREAM_NAME_B | "¬MQPSStreamName¬" |
| MQPS_STRING_DATA_B | "¬MQPSStringData¬" |
| MQPS_SUBSCRIPTION_IDENTITY_B | "¬MQPSSubIdentity¬" |
| MQPS_SUBSCRIPTION_NAME_B | "¬MQPSSubName¬" |
| MQPS_SUBSCRIPTION_USER_DATA_B | "¬MQPSSubUserData¬" |
| MQPS_TOPIC_B | "¬MQPSTopic¬" |
| MQPS_USER_ID_B | "¬MQPSUserId¬" |

**Note:** The symbol ¬ represents a single blank character.

### Publish/Subscribe Command Tag Values as strings

| | |
|---|---|
| MQPS_DELETE_PUBLICATION | "DeletePub" |
| MQPS_DEREGISTER_PUBLISHER | "DeregPub" |
| MQPS_DEREGISTER_SUBSCRIBER | "DeregSub" |
| MQPS_PUBLISH | "Publish" |
| MQPS_REGISTER_PUBLISHER | "RegPub" |
| MQPS_REGISTER_SUBSCRIBER | "RegSub" |
| MQPS_REQUEST_UPDATE | "ReqUpdate" |

### Publish/Subscribe Command Tag Values as blank-enclosed strings

| | |
|---|---|
| MQPS_DELETE_PUBLICATION_B | "¬DeletePub¬" |
| MQPS_DEREGISTER_PUBLISHER_B | "¬DeregPub¬" |
| MQPS_DEREGISTER_SUBSCRIBER_B | "¬DeregSub¬" |
| MQPS_PUBLISH_B | "¬Publish¬" |
| MQPS_REGISTER_PUBLISHER_B | "¬RegPub¬" |
| MQPS_REGISTER_SUBSCRIBER_B | "¬RegSub¬" |
| MQPS_REQUEST_UPDATE_B | "¬ReqUpdate¬" |

**Note:** The symbol ¬ represents a single blank character.

### Publish/Subscribe Options Tag Values as strings

| | |
|---|---|
| MQPS_ADD_NAME | "AddName" |
| MQPS_ANONYMOUS | "Anon" |
| MQPS_CORREL_ID_AS_IDENTITY | "CorrelAsId" |
| MQPS_DEREGISTER_ALL | "DeregAll" |
| MQPS_DIRECT_REQUESTS | "DirectReq" |
| MQPS_DUPLICATES_OK | "DupsOK" |
| MQPS_FULL_RESPONSE | "FullResp" |
| MQPS_INCLUDE_STREAM_NAME | "InclStreamName" |
| MQPS_INFORM_IF_RETAINED | "InformIfRet" |
| MQPS_IS_RETAINED_PUBLICATION | "IsRetainedPub" |
| MQPS_JOIN_EXCLUSIVE | "JoinExcl" |
| MQPS_JOIN_SHARED | "JoinShared" |
| MQPS_LEAVE_ONLY | "LeaveOnly" |
| MQPS_LOCAL | "Local" |
| MQPS_LOCKED | "Locked" |
| MQPS_NEW_PUBLICATIONS_ONLY | "NewPubsOnly" |
| MQPS_NO_ALTERATION | "NoAlter" |
| MQPS_NO_REGISTRATION | "NoReg" |
| MQPS_NON_PERSISTENT | "NonPers" |
| MQPS_NONE | "None" |
| MQPS_OTHER_SUBSCRIBERS_ONLY | "OtherSubsOnly" |
| MQPS_PERSISTENT | "Pers" |
| MQPS_PERSISTENT_AS_PUBLISH | "PersAsPub" |
| MQPS_PERSISTENT_AS_Q | "PersAsQueue" |
| MQPS_PUBLISH_ON_REQUEST_ONLY | "PubOnReqOnly" |

| | |
|---|---|
| MQPS_RETAIN_PUBLICATION | "RetainPub" |
| MQPS_VARIABLE_USER_ID | "VariableUserId" |

### Publish/Subscribe Options Tag Values as blank-enclosed strings

| | |
|---|---|
| MQPS_ADD_NAME_B | "¬AddName¬" |
| MQPS_ANONYMOUS_B | "¬Anon¬" |
| MQPS_CORREL_ID_AS_IDENTITY_B | "¬CorrelAsId¬" |
| MQPS_DEREGISTER_ALL_B | "¬DeregAll¬" |
| MQPS_DIRECT_REQUESTS_B | "¬DirectReq¬" |
| MQPS_DUPLICATES_OK_B | "¬DupsOK¬" |
| MQPS_FULL_RESPONSE_B | "¬FullResp¬" |
| MQPS_INCLUDE_STREAM_NAME_B | "¬InclStreamName¬" |
| MQPS_INFORM_IF_RETAINED_B | "¬InformIfRet¬" |
| MQPS_IS_RETAINED_PUBLICATION_B | "¬IsRetainedPub¬" |
| MQPS_JOIN_EXCLUSIVE_B | "¬JoinExcl¬" |
| MQPS_JOIN_SHARED_B | "¬JoinShared¬" |
| MQPS_LEAVE_ONLY_B | "¬LeaveOnly¬" |
| MQPS_LOCAL_B | "¬Local¬" |
| MQPS_LOCKED_B | "¬Locked¬" |
| MQPS_NEW_PUBLICATIONS_ONLY_B | "¬NewPubsOnly¬" |
| MQPS_NO_ALTERATION_B | "¬NoAlter¬" |
| MQPS_NO_REGISTRATION_B | "¬NoReg¬" |
| MQPS_NON_PERSISTENT_B | "¬NonPers¬" |
| MQPS_NONE_B | "¬None¬" |
| MQPS_OTHER_SUBSCRIBERS_ONLY_B | "¬OtherSubsOnly¬" |
| MQPS_PERSISTENT_B | "¬Pers¬" |
| MQPS_PERSISTENT_AS_PUBLISH_B | "¬PersAsPub¬" |
| MQPS_PERSISTENT_AS_Q_B | "¬PersAsQueue¬" |
| MQPS_PUBLISH_ON_REQUEST_ONLY_B | "¬PubOnReqOnly¬" |
| MQPS_RETAIN_PUBLICATION_B | "¬RetainPub¬" |
| MQPS_VARIABLE_USER_ID_B | "¬VariableUserId¬" |

**Note:** The symbol ¬ represents a single blank character.

## MQPSC_* (Publish/Subscribe Options Tag Publish/Subscribe Command Folder (psc) Tags)

*Table 277. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPSC_FOLDER_VERSION | 1 | X'00000001' |

## MQPSC_* (Publish/Subscribe Options Tag Tag names)

| | |
|---|---|
| MQPSC_COMMAND | "Command" |
| MQPSC_REGISTRATION_OPTION | "RegOpt" |
| MQPSC_PUBLICATION_OPTION | "PubOpt" |
| MQPSC_DELETE_OPTION | "DelOpt" |
| MQPSC_TOPIC | "Topic" |
| MQPSC_SUBSCRIPTION_POINT | "SubPoint" |
| MQPSC_FILTER | "Filter" |
| MQPSC_Q_MGR_NAME | "QMgrName" |
| MQPSC_Q_NAME | "QName" |
| MQPSC_PUBLISH_TIMESTAMP | "PubTime" |
| MQPSC_SEQUENCE_NUMBER | "SeqNum" |
| MQPSC_SUBSCRIPTION_NAME | "SubName" |
| MQPSC_SUBSCRIPTION_IDENTITY | "SubIdentity" |
| MQPSC_SUBSCRIPTION_USER_DATA | "SubUserData" |
| MQPSC_CORREL_ID | "CorrelId" |

## MQPSC_* (Publish/Subscribe Options Tag XML tag names)

| | |
|---|---|
| MQPSC_COMMAND_B | "<Command>" |
| MQPSC_COMMAND_E | "</Command>" |
| MQPSC_REGISTRATION_OPTION_B | "<RegOpt>" |
| MQPSC_REGISTRATION_OPTION_E | "</RegOpt>" |
| MQPSC_PUBLICATION_OPTION_B | "<PubOpt>" |
| MQPSC_PUBLICATION_OPTION_E | "</PubOpt>" |
| MQPSC_DELETE_OPTION_B | "<DelOpt>" |
| MQPSC_DELETE_OPTION_E | "</DelOpt>" |
| MQPSC_TOPIC_B | "<Topic>" |
| MQPSC_TOPIC_E | "</Topic>" |
| MQPSC_SUBSCRIPTION_POINT_B | "<SubPoint>" |
| MQPSC_SUBSCRIPTION_POINT_E | "</SubPoint>" |
| MQPSC_FILTER_B | "<Filter>" |

| | |
|---|---|
| MQPSC_FILTER_E | "</Filter>" |
| MQPSC_Q_MGR_NAME_B | "<QMgrName>" |
| MQPSC_Q_MGR_NAME_E | "</QMgrName>" |
| MQPSC_Q_NAME_B | "<QName>" |
| MQPSC_Q_NAME_E | "</QName>" |
| MQPSC_PUBLISH_TIMESTAMP_B | "<PubTime>" |
| MQPSC_PUBLISH_TIMESTAMP_E | "</PubTime>" |
| MQPSC_SEQUENCE_NUMBER_B | "<SeqNum>" |
| MQPSC_SEQUENCE_NUMBER_E | "</SeqNum>" |
| MQPSC_SUBSCRIPTION_NAME_B | "<SubName>" |
| MQPSC_SUBSCRIPTION_NAME_E | "</SubName>" |
| MQPSC_SUBSCRIPTION_IDENTITY_B | "<SubIdentity>" |
| MQPSC_SUBSCRIPTION_IDENTITY_E | "</SubIdentity>" |
| MQPSC_SUBSCRIPTION_USER_DATA_B | "<SubUserData>" |
| MQPSC_SUBSCRIPTION_USER_DATA_E | "</SubUserData>" |
| MQPSC_CORREL_ID_B | "<CorrelId>" |
| MQPSC_CORREL_ID_E | "</CorrelId>" |

### MQPSC_* (Publish/Subscribe Options Tag Values as strings)

| | |
|---|---|
| MQPSC_DELETE_PUBLICATION | "DeletePub" |
| MQPSC_DEREGISTER_SUBSCRIBER | "DeregSub" |
| MQPSC_PUBLISH | "Publish" |
| MQPSC_REGISTER_SUBSCRIBER | "RegSub" |
| MQPSC_REQUEST_UPDATE | "ReqUpdate" |

### MQPSC_* (Publish/Subscribe Options Tag Values as strings)

| | |
|---|---|
| MQPSC_ADD_NAME | "AddName" |
| MQPSC_CORREL_ID_AS_IDENTITY | "CorrelAsId" |
| MQPSC_DEREGISTER_ALL | "DeregAll" |
| MQPSC_DUPLICATES_OK | "DupsOK" |
| MQPSC_FULL_RESPONSE | "FullResp" |
| MQPSC_INFORM_IF_RETAINED | "InformIfRet" |
| MQPSC_IS_RETAINED_PUB | "IsRetainedPub" |
| MQPSC_JOIN_SHARED | "JoinShared" |
| MQPSC_JOIN_EXCLUSIVE | "JoinExcl" |
| MQPSC_LEAVE_ONLY | "LeaveOnly" |
| MQPSC_LOCAL | "Local" |

| | |
|---|---|
| MQPSC_LOCKED | "Locked" |
| MQPSC_NEW_PUBS_ONLY | "NewPubsOnly" |
| MQPSC_NO_ALTERATION | "NoAlter" |
| MQPSC_NON_PERSISTENT | "NonPers" |
| MQPSC_OTHER_SUBS_ONLY | "OtherSubsOnly" |
| MQPSC_PERSISTENT | "Pers" |
| MQPSC_PERSISTENT_AS_PUBLISH | "PersAsPub" |
| MQPSC_PERSISTENT_AS_Q | "PersAsQueue" |
| MQPSC_NONE | "None" |
| MQPSC_PUB_ON_REQUEST_ONLY | "PubOnReqOnly" |
| MQPSC_RETAIN_PUB | "RetainPub" |
| MQPSC_VARIABLE_USER_ID | "VariableUserId" |

## MQPSCR_* (Publish/Subscribe Options)

### Publish/Subscribe Options Tag Publish/Subscribe Response Folder (pscr) Tags

*Table 278. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPSCR_FOLDER_VERSION | 1 | X'00000001' |

### Publish/Subscribe Options Tag Tag names

| | |
|---|---|
| MQPSCR_COMPLETION | "Completion" |
| MQPSCR_RESPONSE | "Response" |
| MQPSCR_REASON | "Reason" |

### Publish/Subscribe Options Tag XML tag names

| | |
|---|---|
| MQPSCR_COMPLETION_B | "<Completion>" |
| MQPSCR_COMPLETION_E | "</Completion>" |
| MQPSCR_RESPONSE_B | "<Response>" |
| MQPSCR_RESPONSE_E | "</Response>" |
| MQPSCR_REASON_B | "<Reason>" |
| MQPSCR_REASON_E | "</Reason>" |

### Publish/Subscribe Options Tag Tag values

| | |
|---|---|
| MQPSCR_OK | "ok" |
| MQPSCR_WARNING | "warning" |
| MQPSCR_ERROR | "error" |

## MQPSM_* (Pub/Sub Mode)

*Table 279. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPSM_DISABLED | 0 | X'00000000' |
| MQPSM_COMPAT | 1 | X'00000001' |
| MQPSM_ENABLED | 2 | X'00000002' |

## MQPSPROP_* (Pub/Sub Message Properties)

*Table 280. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPSPROP_NONE | 0 | X'00000000' |
| MQPSPROP_COMPAT | 1 | X'00000001' |
| MQPSPROP_RFH2 | 2 | X'00000002' |
| MQPSPROP_MSGPROP | 3 | X'00000003' |

## MQPSST_* (Command format Pub/Sub Status Type)

*Table 281. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPSST_ALL | 0 | X'00000000' |
| MQPSST_LOCAL | 1 | X'00000001' |
| MQPSST_PARENT | 2 | X'00000002' |
| MQPSST_CHILD | 3 | X'00000003' |

## MQPUBO_* (Publish/Subscribe Publication Options)

*Table 282. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQPUBO_NONE | 0 | X'00000000' |
| MQPUBO_CORREL_ID_AS_IDENTITY | 1 | X'00000001' |
| MQPUBO_RETAIN_PUBLICATION | 2 | X'00000002' |
| MQPUBO_OTHER_SUBSCRIBERS_ONLY | 4 | X'00000004' |
| MQPUBO_NO_REGISTRATION | 8 | X'00000008' |
| MQPUBO_IS_RETAINED_PUBLICATION | 16 | X'00000010' |

## MQPXP_* (Publish/subscribe routing exit parameter structure)

*Table 283. Structures of constants*

| Name | Structure |
|---|---|
| MQPXP_STRUC_ID | "PXP¬" |
| MQPXP_STRUC_ID_ARRAY | 'P','X','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 284. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQPXP_VERSION_1 | 1 | X'00000001' |
| MQPXP_CURRENT_VERSION | 1 | X'00000001' |

## MQQA_* (Queue attributes)

### Inhibit Get Values

| Table 285. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQA_GET_INHIBITED | 1 | X'00000001' |
| MQQA_GET_ALLOWED | 0 | X'00000000' |

### Inhibit Put Values

| Table 286. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQA_PUT_INHIBITED | 1 | X'00000001' |
| MQQA_PUT_ALLOWED | 0 | X'00000000' |

### Queue Shareability

| Table 287. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQA_SHAREABLE | 1 | X'00000001' |
| MQQA_NOT_SHAREABLE | 0 | X'00000000' |

### Back-Out Hardening

| Table 288. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQA_BACKOUT_HARDENED | 1 | X'00000001' |
| MQQA_BACKOUT_NOT_HARDENED | 0 | X'00000000' |

## MQQDT_* (Queue Definition Types)

| Table 289. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQDT_PREDEFINED | 1 | X'00000001' |
| MQQDT_PERMANENT_DYNAMIC | 2 | X'00000002' |
| MQQDT_TEMPORARY_DYNAMIC | 3 | X'00000003' |
| MQQDT_SHARED_DYNAMIC | 4 | X'00000004' |

## MQQF_* (Queue Flags)

*Table 290. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQF_LOCAL_Q | 1 | X'00000001' |
| MQQF_CLWL_USEQ_ANY | 64 | X'00000040' |
| MQQF_CLWL_USEQ_LOCAL | 128 | X'00000080' |

## MQQMDT_* (Command format Queue Manager Definition Types)

*Table 291. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQMDT_EXPLICIT_CLUSTER_SENDER | 1 | X'00000001' |
| MQQMDT_AUTO_CLUSTER_SENDER | 2 | X'00000002' |
| MQQMDT_AUTO_EXP_CLUSTER_SENDER | 4 | X'00000004' |
| MQQMDT_CLUSTER_RECEIVER | 3 | X'00000003' |

## MQQMF_* (Queue Manager Flags)

*Table 292. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQMF_REPOSITORY_Q_MGR | 2 | X'00000002' |
| MQQMF_CLUSSDR_USER_DEFINED | 8 | X'00000008' |
| MQQMF_CLUSSDR_AUTO_DEFINED | 16 | X'00000010' |
| MQQMF_AVAILABLE | 32 | X'00000020' |

## MQQMFAC_* (Command format Queue Manager Facility)

*Table 293. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQMFAC_IMS_BRIDGE | 1 | X'00000001' |
| MQQMFAC_DB2 | 2 | X'00000002' |

## MQQMSTA_* (Command format Queue Manager Status)

*Table 294. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQMSTA_STARTING | 1 | X'00000001' |
| MQQMSTA_RUNNING | 2 | X'00000002' |
| MQQMSTA_QUIESCING | 3 | X'00000003' |

## MQQMT_* (Command format Queue Manager Types)

*Table 295. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQMT_NORMAL | 0 | X'00000000' |
| MQQMT_REPOSITORY | 1 | X'00000001' |

## MQQO_* (Command format Quiesce Options)

*Table 296. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQO_YES | 1 | X'00000001' |
| MQQO_NO | 0 | X'00000000' |

## MQQSGD_* (Queue Sharing Group Dispositions)

*Table 297. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQSGD_ALL | -1 | X'FFFFFFFF' |
| MQQSGD_Q_MGR | 0 | X'00000000' |
| MQQSGD_COPY | 1 | X'00000001' |
| MQQSGD_SHARED | 2 | X'00000002' |
| MQQSGD_GROUP | 3 | X'00000003' |
| MQQSGD_PRIVATE | 4 | X'00000004' |
| MQQSGD_LIVE | 6 | X'00000006' |

## MQQSGS_* (Command format QSG Status)

*Table 298. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQSGS_UNKNOWN | 0 | X'00000000' |
| MQQSGS_CREATED | 1 | X'00000001' |
| MQQSGS_ACTIVE | 2 | X'00000002' |
| MQQSGS_INACTIVE | 3 | X'00000003' |
| MQQSGS_FAILED | 4 | X'00000004' |
| MQQSGS_PENDING | 5 | X'00000005' |

## MQQSIE_* (Command format Queue Service-Interval Events)

*Table 299. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQSIE_NONE | 0 | X'00000000' |
| MQQSIE_HIGH | 1 | X'00000001' |
| MQQSIE_OK | 2 | X'00000002' |

## MQQSO_* (Command format Queue Status Open Options for SET, BROWSE, INPUT)

*Table 300. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQQSO_NO | 0 | X'00000000' |
| MQQSO_YES | 1 | X'00000001' |
| MQQSO_SHARED | 1 | X'00000001' |

| *Table 300. Values of constants (continued)* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQSO_EXCLUSIVE | 2 | X'00000002' |

## MQQSOT_* (Command format Queue Status Open Types)

| *Table 301. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQSOT_ALL | 1 | X'00000001' |
| MQQSOT_INPUT | 2 | X'00000002' |
| MQQSOT_OUTPUT | 3 | X'00000003' |

## MQQSUM_* (Command format Queue Status Uncommitted Messages)

| *Table 302. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQSUM_YES | 1 | X'00000001' |
| MQQSUM_NO | 0 | X'00000000' |

## MQQT_* (Queue Types and Extended Queue Types)

### Queue Types

| *Table 303. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQT_LOCAL | 1 | X'00000001' |
| MQQT_MODEL | 2 | X'00000002' |
| MQQT_ALIAS | 3 | X'00000003' |
| MQQT_REMOTE | 6 | X'00000006' |
| MQQT_CLUSTER | 7 | X'00000007' |

### Extended Queue Types

| *Table 304. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQQT_ALL | 1001 | X'000003E9' |

## MQRC_* (Reason Codes)

| *Table 305. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRC_NONE | 0 | X'00000000' |
| MQRC_APPL_FIRST | 900 | X'00000384' |
| MQRC_APPL_LAST | 999 | X'000003E7' |
| MQRC_ALIAS_BASE_Q_TYPE_ERROR | 2001 | X'000007D1' |
| MQRC_ALREADY_CONNECTED | 2002 | X'000007D2' |
| MQRC_BACKED_OUT | 2003 | X'000007D3' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_BUFFER_ERROR | 2004 | X'000007D4' |
| MQRC_BUFFER_LENGTH_ERROR | 2005 | X'000007D5' |
| MQRC_CHAR_ATTR_LENGTH_ERROR | 2006 | X'000007D6' |
| MQRC_CHAR_ATTRS_ERROR | 2007 | X'000007D7' |
| MQRC_CHAR_ATTRS_TOO_SHORT | 2008 | X'000007D8' |
| MQRC_CONNECTION_BROKEN | 2009 | X'000007D9' |
| MQRC_DATA_LENGTH_ERROR | 2010 | X'000007DA' |
| MQRC_DYNAMIC_Q_NAME_ERROR | 2011 | X'000007DB' |
| MQRC_ENVIRONMENT_ERROR | 2012 | X'000007DC' |
| MQRC_EXPIRY_ERROR | 2013 | X'000007DD' |
| MQRC_FEEDBACK_ERROR | 2014 | X'000007DE' |
| MQRC_GET_INHIBITED | 2016 | X'000007E0' |
| MQRC_HANDLE_NOT_AVAILABLE | 2017 | X'000007E1' |
| MQRC_HCONN_ERROR | 2018 | X'000007E2' |
| MQRC_HOBJ_ERROR | 2019 | X'000007E3' |
| MQRC_INHIBIT_VALUE_ERROR | 2020 | X'000007E4' |
| MQRC_INT_ATTR_COUNT_ERROR | 2021 | X'000007E5' |
| MQRC_INT_ATTR_COUNT_TOO_SMALL | 2022 | X'000007E6' |
| MQRC_INT_ATTRS_ARRAY_ERROR | 2023 | X'000007E7' |
| MQRC_SYNCPOINT_LIMIT_REACHED | 2024 | X'000007E8' |
| MQRC_MAX_CONNS_LIMIT_REACHED | 2025 | X'000007E9' |
| MQRC_MD_ERROR | 2026 | X'000007EA' |
| MQRC_MISSING_REPLY_TO_Q | 2027 | X'000007EB' |
| MQRC_MSG_TYPE_ERROR | 2029 | X'000007ED' |
| MQRC_MSG_TOO_BIG_FOR_Q | 2030 | X'000007EE' |
| MQRC_MSG_TOO_BIG_FOR_Q_MGR | 2031 | X'000007EF' |
| MQRC_NO_MSG_AVAILABLE | 2033 | X'000007F1' |
| MQRC_NO_MSG_UNDER_CURSOR | 2034 | X'000007F2' |
| MQRC_NOT_AUTHORIZED | 2035 | X'000007F3' |
| MQRC_NOT_OPEN_FOR_BROWSE | 2036 | X'000007F4' |
| MQRC_NOT_OPEN_FOR_INPUT | 2037 | X'000007F5' |
| MQRC_NOT_OPEN_FOR_INQUIRE | 2038 | X'000007F6' |
| MQRC_NOT_OPEN_FOR_OUTPUT | 2039 | X'000007F7' |
| MQRC_NOT_OPEN_FOR_SET | 2040 | X'000007F8' |
| MQRC_OBJECT_CHANGED | 2041 | X'000007F9' |
| MQRC_OBJECT_IN_USE | 2042 | X'000007FA' |
| MQRC_OBJECT_TYPE_ERROR | 2043 | X'000007FB' |
| MQRC_OD_ERROR | 2044 | X'000007FC' |
| MQRC_OPTION_NOT_VALID_FOR_TYPE | 2045 | X'000007FD' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_OPTIONS_ERROR | 2046 | X'000007FE' |
| MQRC_PERSISTENCE_ERROR | 2047 | X'000007FF' |
| MQRC_PERSISTENT_NOT_ALLOWED | 2048 | X'00000800' |
| MQRC_PRIORITY_EXCEEDS_MAXIMUM | 2049 | X'00000801' |
| MQRC_PRIORITY_ERROR | 2050 | X'00000802' |
| MQRC_PUT_INHIBITED | 2051 | X'00000803' |
| MQRC_Q_DELETED | 2052 | X'00000804' |
| MQRC_Q_FULL | 2053 | X'00000805' |
| MQRC_Q_NOT_EMPTY | 2055 | X'00000807' |
| MQRC_Q_SPACE_NOT_AVAILABLE | 2056 | X'00000808' |
| MQRC_Q_TYPE_ERROR | 2057 | X'00000809' |
| MQRC_Q_MGR_NAME_ERROR | 2058 | X'0000080A' |
| MQRC_Q_MGR_NOT_AVAILABLE | 2059 | X'0000080B' |
| MQRC_REPORT_OPTIONS_ERROR | 2061 | X'0000080D' |
| MQRC_SECOND_MARK_NOT_ALLOWED | 2062 | X'0000080E' |
| MQRC_SECURITY_ERROR | 2063 | X'0000080F' |
| MQRC_SELECTOR_COUNT_ERROR | 2065 | X'00000811' |
| MQRC_SELECTOR_LIMIT_EXCEEDED | 2066 | X'00000812' |
| MQRC_SELECTOR_ERROR | 2067 | X'00000813' |
| MQRC_SELECTOR_NOT_FOR_TYPE | 2068 | X'00000814' |
| MQRC_SIGNAL_OUTSTANDING | 2069 | X'00000815' |
| MQRC_SIGNAL_REQUEST_ACCEPTED | 2070 | X'00000816' |
| MQRC_STORAGE_NOT_AVAILABLE | 2071 | X'00000817' |
| MQRC_SYNCPOINT_NOT_AVAILABLE | 2072 | X'00000818' |
| MQRC_TRIGGER_CONTROL_ERROR | 2075 | X'0000081B' |
| MQRC_TRIGGER_DEPTH_ERROR | 2076 | X'0000081C' |
| MQRC_TRIGGER_MSG_PRIORITY_ERR | 2077 | X'0000081D' |
| MQRC_TRIGGER_TYPE_ERROR | 2078 | X'0000081E' |
| MQRC_TRUNCATED_MSG_ACCEPTED | 2079 | X'0000081F' |
| MQRC_TRUNCATED_MSG_FAILED | 2080 | X'00000820' |
| MQRC_UNKNOWN_ALIAS_BASE_Q | 2082 | X'00000822' |
| MQRC_UNKNOWN_OBJECT_NAME | 2085 | X'00000825' |
| MQRC_UNKNOWN_OBJECT_Q_MGR | 2086 | X'00000826' |
| MQRC_UNKNOWN_REMOTE_Q_MGR | 2087 | X'00000827' |
| MQRC_WAIT_INTERVAL_ERROR | 2090 | X'0000082A' |
| MQRC_XMIT_Q_TYPE_ERROR | 2091 | X'0000082B' |
| MQRC_XMIT_Q_USAGE_ERROR | 2092 | X'0000082C' |
| MQRC_NOT_OPEN_FOR_PASS_ALL | 2093 | X'0000082D' |
| MQRC_NOT_OPEN_FOR_PASS_IDENT | 2094 | X'0000082E' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_NOT_OPEN_FOR_SET_ALL | 2095 | X'0000082F' |
| MQRC_NOT_OPEN_FOR_SET_IDENT | 2096 | X'00000830' |
| MQRC_CONTEXT_HANDLE_ERROR | 2097 | X'00000831' |
| MQRC_CONTEXT_NOT_AVAILABLE | 2098 | X'00000832' |
| MQRC_SIGNAL1_ERROR | 2099 | X'00000833' |
| MQRC_OBJECT_ALREADY_EXISTS | 2100 | X'00000834' |
| MQRC_OBJECT_DAMAGED | 2101 | X'00000835' |
| MQRC_RESOURCE_PROBLEM | 2102 | X'00000836' |
| MQRC_ANOTHER_Q_MGR_CONNECTED | 2103 | X'00000837' |
| MQRC_UNKNOWN_REPORT_OPTION | 2104 | X'00000838' |
| MQRC_STORAGE_CLASS_ERROR | 2105 | X'00000839' |
| MQRC_COD_NOT_VALID_FOR_XCF_Q | 2106 | X'0000083A' |
| MQRC_XWAIT_CANCELED | 2107 | X'0000083B' |
| MQRC_XWAIT_ERROR | 2108 | X'0000083C' |
| MQRC_SUPPRESSED_BY_EXIT | 2109 | X'0000083D' |
| MQRC_FORMAT_ERROR | 2110 | X'0000083E' |
| MQRC_SOURCE_CCSID_ERROR | 2111 | X'0000083F' |
| MQRC_SOURCE_INTEGER_ENC_ERROR | 2112 | X'00000840' |
| MQRC_SOURCE_DECIMAL_ENC_ERROR | 2113 | X'00000841' |
| MQRC_SOURCE_FLOAT_ENC_ERROR | 2114 | X'00000842' |
| MQRC_TARGET_CCSID_ERROR | 2115 | X'00000843' |
| MQRC_TARGET_INTEGER_ENC_ERROR | 2116 | X'00000844' |
| MQRC_TARGET_DECIMAL_ENC_ERROR | 2117 | X'00000845' |
| MQRC_TARGET_FLOAT_ENC_ERROR | 2118 | X'00000846' |
| MQRC_NOT_CONVERTED | 2119 | X'00000847' |
| MQRC_CONVERTED_MSG_TOO_BIG | 2120 | X'00000848' |
| MQRC_TRUNCATED | 2120 | X'00000848' |
| MQRC_NO_EXTERNAL_PARTICIPANTS | 2121 | X'00000849' |
| MQRC_PARTICIPANT_NOT_AVAILABLE | 2122 | X'0000084A' |
| MQRC_OUTCOME_MIXED | 2123 | X'0000084B' |
| MQRC_OUTCOME_PENDING | 2124 | X'0000084C' |
| MQRC_BRIDGE_STARTED | 2125 | X'0000084D' |
| MQRC_BRIDGE_STOPPED | 2126 | X'0000084E' |
| MQRC_ADAPTER_STORAGE_SHORTAGE | 2127 | X'0000084F' |
| MQRC_UOW_IN_PROGRESS | 2128 | X'00000850' |
| MQRC_ADAPTER_CONN_LOAD_ERROR | 2129 | X'00000851' |
| MQRC_ADAPTER_SERV_LOAD_ERROR | 2130 | X'00000852' |
| MQRC_ADAPTER_DEFS_ERROR | 2131 | X'00000853' |
| MQRC_ADAPTER_DEFS_LOAD_ERROR | 2132 | X'00000854' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_ADAPTER_CONV_LOAD_ERROR | 2133 | X'00000855' |
| MQRC_BO_ERROR | 2134 | X'00000856' |
| MQRC_DH_ERROR | 2135 | X'00000857' |
| MQRC_MULTIPLE_REASONS | 2136 | X'00000858' |
| MQRC_OPEN_FAILED | 2137 | X'00000859' |
| MQRC_ADAPTER_DISC_LOAD_ERROR | 2138 | X'0000085A' |
| MQRC_CNO_ERROR | 2139 | X'0000085B' |
| MQRC_CICS_WAIT_FAILED | 2140 | X'0000085C' |
| MQRC_DLH_ERROR | 2141 | X'0000085D' |
| MQRC_HEADER_ERROR | 2142 | X'0000085E' |
| MQRC_SOURCE_LENGTH_ERROR | 2143 | X'0000085F' |
| MQRC_TARGET_LENGTH_ERROR | 2144 | X'00000860' |
| MQRC_SOURCE_BUFFER_ERROR | 2145 | X'00000861' |
| MQRC_TARGET_BUFFER_ERROR | 2146 | X'00000862' |
| MQRC_IIH_ERROR | 2148 | X'00000864' |
| MQRC_PCF_ERROR | 2149 | X'00000865' |
| MQRC_DBCS_ERROR | 2150 | X'00000866' |
| MQRC_OBJECT_NAME_ERROR | 2152 | X'00000868' |
| MQRC_OBJECT_Q_MGR_NAME_ERROR | 2153 | X'00000869' |
| MQRC_RECS_PRESENT_ERROR | 2154 | X'0000086A' |
| MQRC_OBJECT_RECORDS_ERROR | 2155 | X'0000086B' |
| MQRC_RESPONSE_RECORDS_ERROR | 2156 | X'0000086C' |
| MQRC_ASID_MISMATCH | 2157 | X'0000086D' |
| MQRC_PMO_RECORD_FLAGS_ERROR | 2158 | X'0000086E' |
| MQRC_PUT_MSG_RECORDS_ERROR | 2159 | X'0000086F' |
| MQRC_CONN_ID_IN_USE | 2160 | X'00000870' |
| MQRC_Q_MGR_QUIESCING | 2161 | X'00000871' |
| MQRC_Q_MGR_STOPPING | 2162 | X'00000872' |
| MQRC_DUPLICATE_RECOV_COORD | 2163 | X'00000873' |
| MQRC_PMO_ERROR | 2173 | X'0000087D' |
| MQRC_API_EXIT_NOT_FOUND | 2182 | X'00000886' |
| MQRC_API_EXIT_LOAD_ERROR | 2183 | X'00000887' |
| MQRC_REMOTE_Q_NAME_ERROR | 2184 | X'00000888' |
| MQRC_INCONSISTENT_PERSISTENCE | 2185 | X'00000889' |
| MQRC_GMO_ERROR | 2186 | X'0000088A' |
| MQRC_CICS_BRIDGE_RESTRICTION | 2187 | X'0000088B' |
| MQRC_STOPPED_BY_CLUSTER_EXIT | 2188 | X'0000088C' |
| MQRC_CLUSTER_RESOLUTION_ERROR | 2189 | X'0000088D' |
| MQRC_CONVERTED_STRING_TOO_BIG | 2190 | X'0000088E' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_TMC_ERROR | 2191 | X'0000088F' |
| MQRC_PAGESET_FULL | 2192 | X'00000890' |
| MQRC_STORAGE_MEDIUM_FULL | 2192 | X'00000890' |
| MQRC_PAGESET_ERROR | 2193 | X'00000891' |
| MQRC_NAME_NOT_VALID_FOR_TYPE | 2194 | X'00000892' |
| MQRC_UNEXPECTED_ERROR | 2195 | X'00000893' |
| MQRC_UNKNOWN_XMIT_Q | 2196 | X'00000894' |
| MQRC_UNKNOWN_DEF_XMIT_Q | 2197 | X'00000895' |
| MQRC_DEF_XMIT_Q_TYPE_ERROR | 2198 | X'00000896' |
| MQRC_DEF_XMIT_Q_USAGE_ERROR | 2199 | X'00000897' |
| MQRC_MSG_MARKED_BROWSE_CO_OP | 2200 | X'00000898' |
| MQRC_NAME_IN_USE | 2201 | X'00000899' |
| MQRC_CONNECTION_QUIESCING | 2202 | X'0000089A' |
| MQRC_CONNECTION_STOPPING | 2203 | X'0000089B' |
| MQRC_ADAPTER_NOT_AVAILABLE | 2204 | X'0000089C' |
| MQRC_MSG_ID_ERROR | 2206 | X'0000089E' |
| MQRC_CORREL_ID_ERROR | 2207 | X'0000089F' |
| MQRC_FILE_SYSTEM_ERROR | 2208 | X'000008A0' |
| MQRC_NO_MSG_LOCKED | 2209 | X'000008A1' |
| MQRC_SOAP_DOTNET_ERROR | 2210 | X'000008A2' |
| MQRC_SOAP_AXIS_ERROR | 2211 | X'000008A3' |
| MQRC_SOAP_URL_ERROR | 2212 | X'000008A4' |
| MQRC_FILE_NOT_AUDITED | 2216 | X'000008A8' |
| MQRC_CONNECTION_NOT_AUTHORIZED | 2217 | X'000008A9' |
| MQRC_MSG_TOO_BIG_FOR_CHANNEL | 2218 | X'000008AA' |
| MQRC_CALL_IN_PROGRESS | 2219 | X'000008AB' |
| MQRC_RMH_ERROR | 2220 | X'000008AC' |
| MQRC_Q_MGR_ACTIVE | 2222 | X'000008AE' |
| MQRC_Q_MGR_NOT_ACTIVE | 2223 | X'000008AF' |
| MQRC_Q_DEPTH_HIGH | 2224 | X'000008B0' |
| MQRC_Q_DEPTH_LOW | 2225 | X'000008B1' |
| MQRC_Q_SERVICE_INTERVAL_HIGH | 2226 | X'000008B2' |
| MQRC_Q_SERVICE_INTERVAL_OK | 2227 | X'000008B3' |
| MQRC_RFH_HEADER_FIELD_ERROR | 2228 | X'000008B4' |
| MQRC_RAS_PROPERTY_ERROR | 2229 | X'000008B5' |
| MQRC_UNIT_OF_WORK_NOT_STARTED | 2232 | X'000008B8' |
| MQRC_CHANNEL_AUTO_DEF_OK | 2233 | X'000008B9' |
| MQRC_CHANNEL_AUTO_DEF_ERROR | 2234 | X'000008BA' |
| MQRC_CFH_ERROR | 2235 | X'000008BB' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_CFIL_ERROR | 2236 | X'000008BC' |
| MQRC_CFIN_ERROR | 2237 | X'000008BD' |
| MQRC_CFSL_ERROR | 2238 | X'000008BE' |
| MQRC_CFST_ERROR | 2239 | X'000008BF' |
| MQRC_INCOMPLETE_GROUP | 2241 | X'000008C1' |
| MQRC_INCOMPLETE_MSG | 2242 | X'000008C2' |
| MQRC_INCONSISTENT_CCSIDS | 2243 | X'000008C3' |
| MQRC_INCONSISTENT_ENCODINGS | 2244 | X'000008C4' |
| MQRC_INCONSISTENT_UOW | 2245 | X'000008C5' |
| MQRC_INVALID_MSG_UNDER_CURSOR | 2246 | X'000008C6' |
| MQRC_MATCH_OPTIONS_ERROR | 2247 | X'000008C7' |
| MQRC_MDE_ERROR | 2248 | X'000008C8' |
| MQRC_MSG_FLAGS_ERROR | 2249 | X'000008C9' |
| MQRC_MSG_SEQ_NUMBER_ERROR | 2250 | X'000008CA' |
| MQRC_OFFSET_ERROR | 2251 | X'000008CB' |
| MQRC_ORIGINAL_LENGTH_ERROR | 2252 | X'000008CC' |
| MQRC_SEGMENT_LENGTH_ZERO | 2253 | X'000008CD' |
| MQRC_UOW_NOT_AVAILABLE | 2255 | X'000008CF' |
| MQRC_WRONG_GMO_VERSION | 2256 | X'000008D0' |
| MQRC_WRONG_MD_VERSION | 2257 | X'000008D1' |
| MQRC_GROUP_ID_ERROR | 2258 | X'000008D2' |
| MQRC_INCONSISTENT_BROWSE | 2259 | X'000008D3' |
| MQRC_XQH_ERROR | 2260 | X'000008D4' |
| MQRC_SRC_ENV_ERROR | 2261 | X'000008D5' |
| MQRC_SRC_NAME_ERROR | 2262 | X'000008D6' |
| MQRC_DEST_ENV_ERROR | 2263 | X'000008D7' |
| MQRC_DEST_NAME_ERROR | 2264 | X'000008D8' |
| MQRC_TM_ERROR | 2265 | X'000008D9' |
| MQRC_CLUSTER_EXIT_ERROR | 2266 | X'000008DA' |
| MQRC_CLUSTER_EXIT_LOAD_ERROR | 2267 | X'000008DB' |
| MQRC_CLUSTER_PUT_INHIBITED | 2268 | X'000008DC' |
| MQRC_CLUSTER_RESOURCE_ERROR | 2269 | X'000008DD' |
| MQRC_NO_DESTINATIONS_AVAILABLE | 2270 | X'000008DE' |
| MQRC_CONN_TAG_IN_USE | 2271 | X'000008DF' |
| MQRC_PARTIALLY_CONVERTED | 2272 | X'000008E0' |
| MQRC_CONNECTION_ERROR | 2273 | X'000008E1' |
| MQRC_OPTION_ENVIRONMENT_ERROR | 2274 | X'000008E2' |
| MQRC_CD_ERROR | 2277 | X'000008E5' |
| MQRC_CLIENT_CONN_ERROR | 2278 | X'000008E6' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_CHANNEL_STOPPED_BY_USER | 2279 | X'000008E7' |
| MQRC_HCONFIG_ERROR | 2280 | X'000008E8' |
| MQRC_FUNCTION_ERROR | 2281 | X'000008E9' |
| MQRC_CHANNEL_STARTED | 2282 | X'000008EA' |
| MQRC_CHANNEL_STOPPED | 2283 | X'000008EB' |
| MQRC_CHANNEL_CONV_ERROR | 2284 | X'000008EC' |
| MQRC_SERVICE_NOT_AVAILABLE | 2285 | X'000008ED' |
| MQRC_INITIALIZATION_FAILED | 2286 | X'000008EE' |
| MQRC_TERMINATION_FAILED | 2287 | X'000008EF' |
| MQRC_UNKNOWN_Q_NAME | 2288 | X'000008F0' |
| MQRC_SERVICE_ERROR | 2289 | X'000008F1' |
| MQRC_Q_ALREADY_EXISTS | 2290 | X'000008F2' |
| MQRC_USER_ID_NOT_AVAILABLE | 2291 | X'000008F3' |
| MQRC_UNKNOWN_ENTITY | 2292 | X'000008F4' |
| MQRC_UNKNOWN_AUTH_ENTITY | 2293 | X'000008F5' |
| MQRC_UNKNOWN_REF_OBJECT | 2294 | X'000008F6' |
| MQRC_CHANNEL_ACTIVATED | 2295 | X'000008F7' |
| MQRC_CHANNEL_NOT_ACTIVATED | 2296 | X'000008F8' |
| MQRC_UOW_CANCELED | 2297 | X'000008F9' |
| MQRC_FUNCTION_NOT_SUPPORTED | 2298 | X'000008FA' |
| MQRC_SELECTOR_TYPE_ERROR | 2299 | X'000008FB' |
| MQRC_COMMAND_TYPE_ERROR | 2300 | X'000008FC' |
| MQRC_MULTIPLE_INSTANCE_ERROR | 2301 | X'000008FD' |
| MQRC_SYSTEM_ITEM_NOT_ALTERABLE | 2302 | X'000008FE' |
| MQRC_BAG_CONVERSION_ERROR | 2303 | X'000008FF' |
| MQRC_SELECTOR_OUT_OF_RANGE | 2304 | X'00000900' |
| MQRC_SELECTOR_NOT_UNIQUE | 2305 | X'00000901' |
| MQRC_INDEX_NOT_PRESENT | 2306 | X'00000902' |
| MQRC_STRING_ERROR | 2307 | X'00000903' |
| MQRC_ENCODING_NOT_SUPPORTED | 2308 | X'00000904' |
| MQRC_SELECTOR_NOT_PRESENT | 2309 | X'00000905' |
| MQRC_OUT_SELECTOR_ERROR | 2310 | X'00000906' |
| MQRC_STRING_TRUNCATED | 2311 | X'00000907' |
| MQRC_SELECTOR_WRONG_TYPE | 2312 | X'00000908' |
| MQRC_INCONSISTENT_ITEM_TYPE | 2313 | X'00000909' |
| MQRC_INDEX_ERROR | 2314 | X'0000090A' |
| MQRC_SYSTEM_BAG_NOT_ALTERABLE | 2315 | X'0000090B' |
| MQRC_ITEM_COUNT_ERROR | 2316 | X'0000090C' |
| MQRC_FORMAT_NOT_SUPPORTED | 2317 | X'0000090D' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_SELECTOR_NOT_SUPPORTED | 2318 | X'0000090E' |
| MQRC_ITEM_VALUE_ERROR | 2319 | X'0000090F' |
| MQRC_HBAG_ERROR | 2320 | X'00000910' |
| MQRC_PARAMETER_MISSING | 2321 | X'00000911' |
| MQRC_CMD_SERVER_NOT_AVAILABLE | 2322 | X'00000912' |
| MQRC_STRING_LENGTH_ERROR | 2323 | X'00000913' |
| MQRC_INQUIRY_COMMAND_ERROR | 2324 | X'00000914' |
| MQRC_NESTED_BAG_NOT_SUPPORTED | 2325 | X'00000915' |
| MQRC_BAG_WRONG_TYPE | 2326 | X'00000916' |
| MQRC_ITEM_TYPE_ERROR | 2327 | X'00000917' |
| MQRC_SYSTEM_BAG_NOT_DELETABLE | 2328 | X'00000918' |
| MQRC_SYSTEM_ITEM_NOT_DELETABLE | 2329 | X'00000919' |
| MQRC_CODED_CHAR_SET_ID_ERROR | 2330 | X'0000091A' |
| MQRC_MSG_TOKEN_ERROR | 2331 | X'0000091B' |
| MQRC_MISSING_WIH | 2332 | X'0000091C' |
| MQRC_WIH_ERROR | 2333 | X'0000091D' |
| MQRC_RFH_ERROR | 2334 | X'0000091E' |
| MQRC_RFH_STRING_ERROR | 2335 | X'0000091F' |
| MQRC_RFH_COMMAND_ERROR | 2336 | X'00000920' |
| MQRC_RFH_PARM_ERROR | 2337 | X'00000921' |
| MQRC_RFH_DUPLICATE_PARM | 2338 | X'00000922' |
| MQRC_RFH_PARM_MISSING | 2339 | X'00000923' |
| MQRC_CHAR_CONVERSION_ERROR | 2340 | X'00000924' |
| MQRC_UCS2_CONVERSION_ERROR | 2341 | X'00000925' |
| MQRC_DB2_NOT_AVAILABLE | 2342 | X'00000926' |
| MQRC_OBJECT_NOT_UNIQUE | 2343 | X'00000927' |
| MQRC_CONN_TAG_NOT_RELEASED | 2344 | X'00000928' |
| MQRC_CF_NOT_AVAILABLE | 2345 | X'00000929' |
| MQRC_CF_STRUC_IN_USE | 2346 | X'0000092A' |
| MQRC_CF_STRUC_LIST_HDR_IN_USE | 2347 | X'0000092B' |
| MQRC_CF_STRUC_AUTH_FAILED | 2348 | X'0000092C' |
| MQRC_CF_STRUC_ERROR | 2349 | X'0000092D' |
| MQRC_CONN_TAG_NOT_USABLE | 2350 | X'0000092E' |
| MQRC_GLOBAL_UOW_CONFLICT | 2351 | X'0000092F' |
| MQRC_LOCAL_UOW_CONFLICT | 2352 | X'00000930' |
| MQRC_HANDLE_IN_USE_FOR_UOW | 2353 | X'00000931' |
| MQRC_UOW_ENLISTMENT_ERROR | 2354 | X'00000932' |
| MQRC_UOW_MIX_NOT_SUPPORTED | 2355 | X'00000933' |
| MQRC_WXP_ERROR | 2356 | X'00000934' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_CURRENT_RECORD_ERROR | 2357 | X'00000935' |
| MQRC_NEXT_OFFSET_ERROR | 2358 | X'00000936' |
| MQRC_NO_RECORD_AVAILABLE | 2359 | X'00000937' |
| MQRC_OBJECT_LEVEL_INCOMPATIBLE | 2360 | X'00000938' |
| MQRC_NEXT_RECORD_ERROR | 2361 | X'00000939' |
| MQRC_BACKOUT_THRESHOLD_REACHED | 2362 | X'0000093A' |
| MQRC_MSG_NOT_MATCHED | 2363 | X'0000093B' |
| MQRC_JMS_FORMAT_ERROR | 2364 | X'0000093C' |
| MQRC_SEGMENTS_NOT_SUPPORTED | 2365 | X'0000093D' |
| MQRC_WRONG_CF_LEVEL | 2366 | X'0000093E' |
| MQRC_CONFIG_CREATE_OBJECT | 2367 | X'0000093F' |
| MQRC_CONFIG_CHANGE_OBJECT | 2368 | X'00000940' |
| MQRC_CONFIG_DELETE_OBJECT | 2369 | X'00000941' |
| MQRC_CONFIG_REFRESH_OBJECT | 2370 | X'00000942' |
| MQRC_CHANNEL_SSL_ERROR | 2371 | X'00000943' |
| MQRC_PARTICIPANT_NOT_DEFINED | 2372 | X'00000944' |
| MQRC_CF_STRUC_FAILED | 2373 | X'00000945' |
| MQRC_API_EXIT_ERROR | 2374 | X'00000946' |
| MQRC_API_EXIT_INIT_ERROR | 2375 | X'00000947' |
| MQRC_API_EXIT_TERM_ERROR | 2376 | X'00000948' |
| MQRC_EXIT_REASON_ERROR | 2377 | X'00000949' |
| MQRC_RESERVED_VALUE_ERROR | 2378 | X'0000094A' |
| MQRC_NO_DATA_AVAILABLE | 2379 | X'0000094B' |
| MQRC_SCO_ERROR | 2380 | X'0000094C' |
| MQRC_KEY_REPOSITORY_ERROR | 2381 | X'0000094D' |
| MQRC_CRYPTO_HARDWARE_ERROR | 2382 | X'0000094E' |
| MQRC_AUTH_INFO_REC_COUNT_ERROR | 2383 | X'0000094F' |
| MQRC_AUTH_INFO_REC_ERROR | 2384 | X'00000950' |
| MQRC_AIR_ERROR | 2385 | X'00000951' |
| MQRC_AUTH_INFO_TYPE_ERROR | 2386 | X'00000952' |
| MQRC_AUTH_INFO_CONN_NAME_ERROR | 2387 | X'00000953' |
| MQRC_LDAP_USER_NAME_ERROR | 2388 | X'00000954' |
| MQRC_LDAP_USER_NAME_LENGTH_ERR | 2389 | X'00000955' |
| MQRC_LDAP_PASSWORD_ERROR | 2390 | X'00000956' |
| MQRC_SSL_ALREADY_INITIALIZED | 2391 | X'00000957' |
| MQRC_SSL_CONFIG_ERROR | 2392 | X'00000958' |
| MQRC_SSL_INITIALIZATION_ERROR | 2393 | X'00000959' |
| MQRC_Q_INDEX_TYPE_ERROR | 2394 | X'0000095A' |
| MQRC_CFBS_ERROR | 2395 | X'0000095B' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_SSL_NOT_ALLOWED | 2396 | X'0000095C' |
| MQRC_JSSE_ERROR | 2397 | X'0000095D' |
| MQRC_SSL_PEER_NAME_MISMATCH | 2398 | X'0000095E' |
| MQRC_SSL_PEER_NAME_ERROR | 2399 | X'0000095F' |
| MQRC_UNSUPPORTED_CIPHER_SUITE | 2400 | X'00000960' |
| MQRC_SSL_CERTIFICATE_REVOKED | 2401 | X'00000961' |
| MQRC_SSL_CERT_STORE_ERROR | 2402 | X'00000962' |
| MQRC_CLIENT_EXIT_LOAD_ERROR | 2406 | X'00000966' |
| MQRC_CLIENT_EXIT_ERROR | 2407 | X'00000967' |
| MQRC_UOW_COMMITTED | 2408 | X'00000968' |
| MQRC_SSL_KEY_RESET_ERROR | 2409 | X'00000969' |
| MQRC_UNKNOWN_COMPONENT_NAME | 2410 | X'0000096A' |
| MQRC_LOGGER_STATUS | 2411 | X'0000096B' |
| MQRC_COMMAND_MQSC | 2412 | X'0000096C' |
| MQRC_COMMAND_PCF | 2413 | X'0000096D' |
| MQRC_CFIF_ERROR | 2414 | X'0000096E' |
| MQRC_CFSF_ERROR | 2415 | X'0000096F' |
| MQRC_CFGR_ERROR | 2416 | X'00000970' |
| MQRC_MSG_NOT_ALLOWED_IN_GROUP | 2417 | X'00000971' |
| MQRC_FILTER_OPERATOR_ERROR | 2418 | X'00000972' |
| MQRC_NESTED_SELECTOR_ERROR | 2419 | X'00000973' |
| MQRC_EPH_ERROR | 2420 | X'00000974' |
| MQRC_RFH_FORMAT_ERROR | 2421 | X'00000975' |
| MQRC_CFBF_ERROR | 2422 | X'00000976' |
| MQRC_CLIENT_CHANNEL_CONFLICT | 2423 | X'00000977' |
| MQRC_SD_ERROR | 2424 | X'00000978' |
| MQRC_TOPIC_STRING_ERROR | 2425 | X'00000979' |
| MQRC_STS_ERROR | 2426 | X'0000097A' |
| MQRC_NO_SUBSCRIPTION | 2428 | X'0000097C' |
| MQRC_SUBSCRIPTION_IN_USE | 2429 | X'0000097D' |
| MQRC_STAT_TYPE_ERROR | 2430 | X'0000097E' |
| MQRC_SUB_USER_DATA_ERROR | 2431 | X'0000097F' |
| MQRC_SUB_ALREADY_EXISTS | 2432 | X'00000980' |
| MQRC_IDENTITY_MISMATCH | 2434 | X'00000982' |
| MQRC_ALTER_SUB_ERROR | 2435 | X'00000983' |
| MQRC_DURABILITY_NOT_ALLOWED | 2436 | X'00000984' |
| MQRC_NO_RETAINED_MSG | 2437 | X'00000985' |
| MQRC_SRO_ERROR | 2438 | X'00000986' |
| MQRC_SUB_NAME_ERROR | 2440 | X'00000988' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_OBJECT_STRING_ERROR | 2441 | X'00000989' |
| MQRC_PROPERTY_NAME_ERROR | 2442 | X'0000098A' |
| MQRC_SEGMENTATION_NOT_ALLOWED | 2443 | X'0000098B' |
| MQRC_CBD_ERROR | 2444 | X'0000098C' |
| MQRC_CTLO_ERROR | 2445 | X'0000098D' |
| MQRC_NO_CALLBACKS_ACTIVE | 2446 | X'0000098E' |
| MQRC_CALLBACK_NOT_REGISTERED | 2448 | X'00000990' |
| MQRC_OPTIONS_CHANGED | 2457 | X'00000999' |
| MQRC_READ_AHEAD_MSGS | 2458 | X'0000099A' |
| MQRC_SELECTOR_SYNTAX_ERROR | 2459 | X'0000099B' |
| MQRC_HMSG_ERROR | 2460 | X'0000099C' |
| MQRC_CMHO_ERROR | 2461 | X'0000099D' |
| MQRC_DMHO_ERROR | 2462 | X'0000099E' |
| MQRC_SMPO_ERROR | 2463 | X'0000099F' |
| MQRC_IMPO_ERROR | 2464 | X'000009A0' |
| MQRC_PROPERTY_NAME_TOO_BIG | 2465 | X'000009A1' |
| MQRC_PROP_VALUE_NOT_CONVERTED | 2466 | X'000009A2' |
| MQRC_PROP_TYPE_NOT_SUPPORTED | 2467 | X'000009A3' |
| MQRC_PROPERTY_VALUE_TOO_BIG | 2469 | X'000009A5' |
| MQRC_PROP_CONV_NOT_SUPPORTED | 2470 | X'000009A6' |
| MQRC_PROPERTY_NOT_AVAILABLE | 2471 | X'000009A7' |
| MQRC_PROP_NUMBER_FORMAT_ERROR | 2472 | X'000009A8' |
| MQRC_PROPERTY_TYPE_ERROR | 2473 | X'000009A9' |
| MQRC_PROPERTIES_TOO_BIG | 2478 | X'000009AE' |
| MQRC_PUT_NOT_RETAINED | 2479 | X'000009AF' |
| MQRC_ALIAS_TARGTYPE_CHANGED | 2480 | X'000009B0' |
| MQRC_DMPO_ERROR | 2481 | X'000009B1' |
| MQRC_PD_ERROR | 2482 | X'000009B2' |
| MQRC_CALLBACK_TYPE_ERROR | 2483 | X'000009B3' |
| MQRC_CBD_OPTIONS_ERROR | 2484 | X'000009B4' |
| MQRC_MAX_MSG_LENGTH_ERROR | 2485 | X'000009B5' |
| MQRC_CALLBACK_ROUTINE_ERROR | 2486 | X'000009B6' |
| MQRC_CALLBACK_LINK_ERROR | 2487 | X'000009B7' |
| MQRC_OPERATION_ERROR | 2488 | X'000009B8' |
| MQRC_BMHO_ERROR | 2489 | X'000009B9' |
| MQRC_UNSUPPORTED_PROPERTY | 2490 | X'000009BA' |
| MQRC_PROP_NAME_NOT_CONVERTED | 2492 | X'000009BC' |
| MQRC_GET_ENABLED | 2494 | X'000009BE' |
| MQRC_MODULE_NOT_FOUND | 2495 | X'000009BF' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_MODULE_INVALID | 2496 | X'000009C0' |
| MQRC_MODULE_ENTRY_NOT_FOUND | 2497 | X'000009C1' |
| MQRC_MIXED_CONTENT_NOT_ALLOWED | 2498 | X'000009C2' |
| MQRC_MSG_HANDLE_IN_USE | 2499 | X'000009C3' |
| MQRC_HCONN_ASYNC_ACTIVE | 2500 | X'000009C4' |
| MQRC_MHBO_ERROR | 2501 | X'000009C5' |
| MQRC_PUBLICATION_FAILURE | 2502 | X'000009C6' |
| MQRC_SUB_INHIBITED | 2503 | X'000009C7' |
| MQRC_SELECTOR_ALWAYS_FALSE | 2504 | X'000009C8' |
| MQRC_XEPO_ERROR | 2507 | X'000009CB' |
| MQRC_DURABILITY_NOT_ALTERABLE | 2509 | X'000009CD' |
| MQRC_TOPIC_NOT_ALTERABLE | 2510 | X'000009CE' |
| MQRC_SUBLEVEL_NOT_ALTERABLE | 2512 | X'000009D0' |
| MQRC_PROPERTY_NAME_LENGTH_ERR | 2513 | X'000009D1' |
| MQRC_DUPLICATE_GROUP_SUB | 2514 | X'000009D2' |
| MQRC_GROUPING_NOT_ALTERABLE | 2515 | X'000009D3' |
| MQRC_SELECTOR_INVALID_FOR_TYPE | 2516 | X'000009D4' |
| MQRC_HOBJ_QUIESCED | 2517 | X'000009D5' |
| MQRC_HOBJ_QUIESCED_NO_MSGS | 2518 | X'000009D6' |
| MQRC_SELECTION_STRING_ERROR | 2519 | X'000009D7' |
| MQRC_RES_OBJECT_STRING_ERROR | 2520 | X'000009D8' |
| MQRC_CONNECTION_SUSPENDED | 2521 | X'000009D9' |
| MQRC_INVALID_DESTINATION | 2522 | X'000009DA' |
| MQRC_INVALID_SUBSCRIPTION | 2523 | X'000009DB' |
| MQRC_SELECTOR_NOT_ALTERABLE | 2524 | X'000009DC' |
| MQRC_RETAINED_MSG_Q_ERROR | 2525 | X'000009DD' |
| MQRC_RETAINED_NOT_DELIVERED | 2526 | X'000009DE' |
| MQRC_RFH_RESTRICTED_FORMAT_ERR | 2527 | X'000009DF' |
| MQRC_CONNECTION_STOPPED | 2528 | X'000009E0' |
| MQRC_ASYNC_UOW_CONFLICT | 2529 | X'000009E1' |
| MQRC_ASYNC_XA_CONFLICT | 2530 | X'000009E2' |
| MQRC_PUBSUB_INHIBITED | 2531 | X'000009E3' |
| MQRC_MSG_HANDLE_COPY_FAILURE | 2532 | X'000009E4' |
| MQRC_DEST_CLASS_NOT_ALTERABLE | 2533 | X'000009E5' |
| MQRC_OPERATION_NOT_ALLOWED | 2534 | X'000009E6' |
| MQRC_ACTION_ERROR | 2535 | X'000009E7' |
| MQRC_CHANNEL_NOT_AVAILABLE | 2537 | X'000009E9' |
| MQRC_HOST_NOT_AVAILABLE | 2538 | X'000009EA' |
| MQRC_CHANNEL_CONFIG_ERROR | 2539 | X'000009EB' |

*Table 305. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRC_UNKNOWN_CHANNEL_NAME | 2540 | X'000009EC' |
| MQRC_LOOPING_PUBLICATION | 2541 | X'000009ED' |
| MQRC_ALREADY_JOINED | 2542 | X'000009EE' |
| MQRC_CHANNEL_SSL_WARNING | 2552 | X'000009F8' |
| MQRC_OCSP_URL_ERROR | 2553 | X'000009F9' |
| MQRC_CIPHER_SPEC_NOT_SUITE_B | 2591 | X'00000A1F' |
| MQRC_SUITE_B_ERROR | 2592 | X'00000A20' |
| MQRC_PASSWORD_PROTECTION_ERROR | 2594 | X'00000A22' |
| MQRC_REOPEN_EXCL_INPUT_ERROR | 6100 | X'000017D4' |
| MQRC_REOPEN_INQUIRE_ERROR | 6101 | X'000017D5' |
| MQRC_REOPEN_SAVED_CONTEXT_ERR | 6102 | X'000017D6' |
| MQRC_REOPEN_TEMPORARY_Q_ERROR | 6103 | X'000017D7' |
| MQRC_ATTRIBUTE_LOCKED | 6104 | X'000017D8' |
| MQRC_CURSOR_NOT_VALID | 6105 | X'000017D9' |
| MQRC_ENCODING_ERROR | 6106 | X'000017DA' |
| MQRC_STRUC_ID_ERROR | 6107 | X'000017DB' |
| MQRC_NULL_POINTER | 6108 | X'000017DC' |
| MQRC_NO_CONNECTION_REFERENCE | 6109 | X'000017DD' |
| MQRC_NO_BUFFER | 6110 | X'000017DE' |
| MQRC_BINARY_DATA_LENGTH_ERROR | 6111 | X'000017DF' |
| MQRC_BUFFER_NOT_AUTOMATIC | 6112 | X'000017E0' |
| MQRC_INSUFFICIENT_BUFFER | 6113 | X'000017E1' |
| MQRC_INSUFFICIENT_DATA | 6114 | X'000017E2' |
| MQRC_DATA_TRUNCATED | 6115 | X'000017E3' |
| MQRC_ZERO_LENGTH | 6116 | X'000017E4' |
| MQRC_NEGATIVE_LENGTH | 6117 | X'000017E5' |
| MQRC_NEGATIVE_OFFSET | 6118 | X'000017E6' |
| MQRC_INCONSISTENT_FORMAT | 6119 | X'000017E7' |
| MQRC_INCONSISTENT_OBJECT_STATE | 6120 | X'000017E8' |
| MQRC_CONTEXT_OBJECT_NOT_VALID | 6121 | X'000017E9' |
| MQRC_CONTEXT_OPEN_ERROR | 6122 | X'000017EA' |
| MQRC_STRUC_LENGTH_ERROR | 6123 | X'000017EB' |
| MQRC_NOT_CONNECTED | 6124 | X'000017EC' |
| MQRC_NOT_OPEN | 6125 | X'000017ED' |
| MQRC_DISTRIBUTION_LIST_EMPTY | 6126 | X'000017EE' |
| MQRC_INCONSISTENT_OPEN_OPTIONS | 6127 | X'000017EF' |
| MQRC_WRONG_VERSION | 6128 | X'000017F0' |
| MQRC_REFERENCE_ERROR | 6129 | X'000017F1' |

## MQRCCF_* (Command format header Reason Codes)

See PCF reason codes for more information on the programmer response.

*Table 306. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_CFH_TYPE_ERROR | 3001 | X'00000BB9' |
| MQRCCF_CFH_LENGTH_ERROR | 3002 | X'00000BBA' |
| MQRCCF_CFH_VERSION_ERROR | 3003 | X'00000BBB' |
| MQRCCF_CFH_MSG_SEQ_NUMBER_ERR | 3004 | X'00000BBC' |
| MQRCCF_CFH_CONTROL_ERROR | 3005 | X'00000BBD' |
| MQRCCF_CFH_PARM_COUNT_ERROR | 3006 | X'00000BBE' |
| MQRCCF_CFH_COMMAND_ERROR | 3007 | X'00000BBF' |
| MQRCCF_COMMAND_FAILED | 3008 | X'00000BC0' |
| MQRCCF_CFIN_LENGTH_ERROR | 3009 | X'00000BC1' |
| MQRCCF_CFST_LENGTH_ERROR | 3010 | X'00000BC2' |
| MQRCCF_CFST_STRING_LENGTH_ERR | 3011 | X'00000BC3' |
| MQRCCF_FORCE_VALUE_ERROR | 3012 | X'00000BC4' |
| MQRCCF_STRUCTURE_TYPE_ERROR | 3013 | X'00000BC5' |
| MQRCCF_CFIN_PARM_ID_ERROR | 3014 | X'00000BC6' |
| MQRCCF_CFST_PARM_ID_ERROR | 3015 | X'00000BC7' |
| MQRCCF_MSG_LENGTH_ERROR | 3016 | X'00000BC8' |
| MQRCCF_CFIN_DUPLICATE_PARM | 3017 | X'00000BC9' |
| MQRCCF_CFST_DUPLICATE_PARM | 3018 | X'00000BCA' |
| MQRCCF_PARM_COUNT_TOO_SMALL | 3019 | X'00000BCB' |
| MQRCCF_PARM_COUNT_TOO_BIG | 3020 | X'00000BCC' |
| MQRCCF_Q_ALREADY_IN_CELL | 3021 | X'00000BCD' |
| MQRCCF_Q_TYPE_ERROR | 3022 | X'00000BCE' |
| MQRCCF_MD_FORMAT_ERROR | 3023 | X'00000BCF' |
| MQRCCF_CFSL_LENGTH_ERROR | 3024 | X'00000BD0' |
| MQRCCF_REPLACE_VALUE_ERROR | 3025 | X'00000BD1' |
| MQRCCF_CFIL_DUPLICATE_VALUE | 3026 | X'00000BD2' |
| MQRCCF_CFIL_COUNT_ERROR | 3027 | X'00000BD3' |
| MQRCCF_CFIL_LENGTH_ERROR | 3028 | X'00000BD4' |
| MQRCCF_QUIESCE_VALUE_ERROR | 3029 | X'00000BD5' |
| MQRCCF_MODE_VALUE_ERROR | 3029 | X'00000BD5' |
| MQRCCF_MSG_SEQ_NUMBER_ERROR | 3030 | X'00000BD6' |
| MQRCCF_PING_DATA_COUNT_ERROR | 3031 | X'00000BD7' |
| MQRCCF_PING_DATA_COMPARE_ERROR | 3032 | X'00000BD8' |
| MQRCCF_CFSL_PARM_ID_ERROR | 3033 | X'00000BD9' |
| MQRCCF_CHANNEL_TYPE_ERROR | 3034 | X'00000BDA' |
| MQRCCF_PARM_SEQUENCE_ERROR | 3035 | X'00000BDB' |
| MQRCCF_XMIT_PROTOCOL_TYPE_ERR | 3036 | X'00000BDC' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_BATCH_SIZE_ERROR | 3037 | X'00000BDD' |
| MQRCCF_DISC_INT_ERROR | 3038 | X'00000BDE' |
| MQRCCF_SHORT_RETRY_ERROR | 3039 | X'00000BDF' |
| MQRCCF_SHORT_TIMER_ERROR | 3040 | X'00000BE0' |
| MQRCCF_LONG_RETRY_ERROR | 3041 | X'00000BE1' |
| MQRCCF_LONG_TIMER_ERROR | 3042 | X'00000BE2' |
| MQRCCF_SEQ_NUMBER_WRAP_ERROR | 3043 | X'00000BE3' |
| MQRCCF_MAX_MSG_LENGTH_ERROR | 3044 | X'00000BE4' |
| MQRCCF_PUT_AUTH_ERROR | 3045 | X'00000BE5' |
| MQRCCF_PURGE_VALUE_ERROR | 3046 | X'00000BE6' |
| MQRCCF_CFIL_PARM_ID_ERROR | 3047 | X'00000BE7' |
| MQRCCF_MSG_TRUNCATED | 3048 | X'00000BE8' |
| MQRCCF_CCSID_ERROR | 3049 | X'00000BE9' |
| MQRCCF_ENCODING_ERROR | 3050 | X'00000BEA' |
| MQRCCF_QUEUES_VALUE_ERROR | 3051 | X'00000BEB' |
| MQRCCF_DATA_CONV_VALUE_ERROR | 3052 | X'00000BEC' |
| MQRCCF_INDOUBT_VALUE_ERROR | 3053 | X'00000BED' |
| MQRCCF_ESCAPE_TYPE_ERROR | 3054 | X'00000BEE' |
| MQRCCF_REPOS_VALUE_ERROR | 3055 | X'00000BEF' |
| MQRCCF_CHANNEL_TABLE_ERROR | 3062 | X'00000BF6' |
| MQRCCF_MCA_TYPE_ERROR | 3063 | X'00000BF7' |
| MQRCCF_CHL_INST_TYPE_ERROR | 3064 | X'00000BF8' |
| MQRCCF_CHL_STATUS_NOT_FOUND | 3065 | X'00000BF9' |
| MQRCCF_CFSL_DUPLICATE_PARM | 3066 | X'00000BFA' |
| MQRCCF_CFSL_TOTAL_LENGTH_ERROR | 3067 | X'00000BFB' |
| MQRCCF_CFSL_COUNT_ERROR | 3068 | X'00000BFC' |
| MQRCCF_CFSL_STRING_LENGTH_ERR | 3069 | X'00000BFD' |
| MQRCCF_BROKER_DELETED | 3070 | X'00000BFE' |
| MQRCCF_STREAM_ERROR | 3071 | X'00000BFF' |
| MQRCCF_TOPIC_ERROR | 3072 | X'00000C00' |
| MQRCCF_NOT_REGISTERED | 3073 | X'00000C01' |
| MQRCCF_Q_MGR_NAME_ERROR | 3074 | X'00000C02' |
| MQRCCF_INCORRECT_STREAM | 3075 | X'00000C03' |
| MQRCCF_Q_NAME_ERROR | 3076 | X'00000C04' |
| MQRCCF_NO_RETAINED_MSG | 3077 | X'00000C05' |
| MQRCCF_DUPLICATE_IDENTITY | 3078 | X'00000C06' |
| MQRCCF_INCORRECT_Q | 3079 | X'00000C07' |
| MQRCCF_CORREL_ID_ERROR | 3080 | X'00000C08' |
| MQRCCF_NOT_AUTHORIZED | 3081 | X'00000C09' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_UNKNOWN_STREAM | 3082 | X'00000C0A' |
| MQRCCF_REG_OPTIONS_ERROR | 3083 | X'00000C0B' |
| MQRCCF_PUB_OPTIONS_ERROR | 3084 | X'00000C0C' |
| MQRCCF_UNKNOWN_BROKER | 3085 | X'00000C0D' |
| MQRCCF_Q_MGR_CCSID_ERROR | 3086 | X'00000C0E' |
| MQRCCF_DEL_OPTIONS_ERROR | 3087 | X'00000C0F' |
| MQRCCF_CLUSTER_NAME_CONFLICT | 3088 | X'00000C10' |
| MQRCCF_REPOS_NAME_CONFLICT | 3089 | X'00000C11' |
| MQRCCF_CLUSTER_Q_USAGE_ERROR | 3090 | X'00000C12' |
| MQRCCF_ACTION_VALUE_ERROR | 3091 | X'00000C13' |
| MQRCCF_COMMS_LIBRARY_ERROR | 3092 | X'00000C14' |
| MQRCCF_NETBIOS_NAME_ERROR | 3093 | X'00000C15' |
| MQRCCF_BROKER_COMMAND_FAILED | 3094 | X'00000C16' |
| MQRCCF_CFST_CONFLICTING_PARM | 3095 | X'00000C17' |
| MQRCCF_PATH_NOT_VALID | 3096 | X'00000C18' |
| MQRCCF_PARM_SYNTAX_ERROR | 3097 | X'00000C19' |
| MQRCCF_PWD_LENGTH_ERROR | 3098 | X'00000C1A' |
| MQRCCF_FILTER_ERROR | 3150 | X'00000C4E' |
| MQRCCF_WRONG_USER | 3151 | X'00000C4F' |
| MQRCCF_DUPLICATE_SUBSCRIPTION | 3152 | X'00000C50' |
| MQRCCF_SUB_NAME_ERROR | 3153 | X'00000C51' |
| MQRCCF_SUB_IDENTITY_ERROR | 3154 | X'00000C52' |
| MQRCCF_SUBSCRIPTION_IN_USE | 3155 | X'00000C53' |
| MQRCCF_SUBSCRIPTION_LOCKED | 3156 | X'00000C54' |
| MQRCCF_ALREADY_JOINED | 3157 | X'00000C55' |
| MQRCCF_OBJECT_IN_USE | 3160 | X'00000C58' |
| MQRCCF_UNKNOWN_FILE_NAME | 3161 | X'00000C59' |
| MQRCCF_FILE_NOT_AVAILABLE | 3162 | X'00000C5A' |
| MQRCCF_DISC_RETRY_ERROR | 3163 | X'00000C5B' |
| MQRCCF_ALLOC_RETRY_ERROR | 3164 | X'00000C5C' |
| MQRCCF_ALLOC_SLOW_TIMER_ERROR | 3165 | X'00000C5D' |
| MQRCCF_ALLOC_FAST_TIMER_ERROR | 3166 | X'00000C5E' |
| MQRCCF_PORT_NUMBER_ERROR | 3167 | X'00000C5F' |
| MQRCCF_CHL_SYSTEM_NOT_ACTIVE | 3168 | X'00000C60' |
| MQRCCF_ENTITY_NAME_MISSING | 3169 | X'00000C61' |
| MQRCCF_PROFILE_NAME_ERROR | 3170 | X'00000C62' |
| MQRCCF_AUTH_VALUE_ERROR | 3171 | X'00000C63' |
| MQRCCF_AUTH_VALUE_MISSING | 3172 | X'00000C64' |
| MQRCCF_OBJECT_TYPE_MISSING | 3173 | X'00000C65' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_CONNECTION_ID_ERROR | 3174 | X'00000C66' |
| MQRCCF_LOG_TYPE_ERROR | 3175 | X'00000C67' |
| MQRCCF_PROGRAM_NOT_AVAILABLE | 3176 | X'00000C68' |
| MQRCCF_PROGRAM_AUTH_FAILED | 3177 | X'00000C69' |
| MQRCCF_NONE_FOUND | 3200 | X'00000C80' |
| MQRCCF_SECURITY_SWITCH_OFF | 3201 | X'00000C81' |
| MQRCCF_SECURITY_REFRESH_FAILED | 3202 | X'00000C82' |
| MQRCCF_PARM_CONFLICT | 3203 | X'00000C83' |
| MQRCCF_COMMAND_INHIBITED | 3204 | X'00000C84' |
| MQRCCF_OBJECT_BEING_DELETED | 3205 | X'00000C85' |
| MQRCCF_STORAGE_CLASS_IN_USE | 3207 | X'00000C87' |
| MQRCCF_OBJECT_NAME_RESTRICTED | 3208 | X'00000C88' |
| MQRCCF_OBJECT_LIMIT_EXCEEDED | 3209 | X'00000C89' |
| MQRCCF_OBJECT_OPEN_FORCE | 3210 | X'00000C8A' |
| MQRCCF_DISPOSITION_CONFLICT | 3211 | X'00000C8B' |
| MQRCCF_Q_MGR_NOT_IN_QSG | 3212 | X'00000C8C' |
| MQRCCF_ATTR_VALUE_FIXED | 3213 | X'00000C8D' |
| MQRCCF_NAMELIST_ERROR | 3215 | X'00000C8F' |
| MQRCCF_NO_CHANNEL_INITIATOR | 3217 | X'00000C91' |
| MQRCCF_CHANNEL_INITIATOR_ERROR | 3218 | X'00000C92' |
| MQRCCF_COMMAND_LEVEL_CONFLICT | 3222 | X'00000C96' |
| MQRCCF_Q_ATTR_CONFLICT | 3223 | X'00000C97' |
| MQRCCF_EVENTS_DISABLED | 3224 | X'00000C98' |
| MQRCCF_COMMAND_SCOPE_ERROR | 3225 | X'00000C99' |
| MQRCCF_COMMAND_REPLY_ERROR | 3226 | X'00000C9A' |
| MQRCCF_FUNCTION_RESTRICTED | 3227 | X'00000C9B' |
| MQRCCF_PARM_MISSING | 3228 | X'00000C9C' |
| MQRCCF_PARM_VALUE_ERROR | 3229 | X'00000C9D' |
| MQRCCF_COMMAND_LENGTH_ERROR | 3230 | X'00000C9E' |
| MQRCCF_COMMAND_ORIGIN_ERROR | 3231 | X'00000C9F' |
| MQRCCF_LISTENER_CONFLICT | 3232 | X'00000CA0' |
| MQRCCF_LISTENER_STARTED | 3233 | X'00000CA1' |
| MQRCCF_LISTENER_STOPPED | 3234 | X'00000CA2' |
| MQRCCF_CHANNEL_ERROR | 3235 | X'00000CA3' |
| MQRCCF_CF_STRUC_ERROR | 3236 | X'00000CA4' |
| MQRCCF_UNKNOWN_USER_ID | 3237 | X'00000CA5' |
| MQRCCF_UNEXPECTED_ERROR | 3238 | X'00000CA6' |
| MQRCCF_NO_XCF_PARTNER | 3239 | X'00000CA7' |
| MQRCCF_CFGR_PARM_ID_ERROR | 3240 | X'00000CA8' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_CFIF_LENGTH_ERROR | 3241 | X'00000CA9' |
| MQRCCF_CFIF_OPERATOR_ERROR | 3242 | X'00000CAA' |
| MQRCCF_CFIF_PARM_ID_ERROR | 3243 | X'00000CAB' |
| MQRCCF_CFSF_FILTER_VAL_LEN_ERR | 3244 | X'00000CAC' |
| MQRCCF_CFSF_LENGTH_ERROR | 3245 | X'00000CAD' |
| MQRCCF_CFSF_OPERATOR_ERROR | 3246 | X'00000CAE' |
| MQRCCF_CFSF_PARM_ID_ERROR | 3247 | X'00000CAF' |
| MQRCCF_TOO_MANY_FILTERS | 3248 | X'00000CB0' |
| MQRCCF_LISTENER_RUNNING | 3249 | X'00000CB1' |
| MQRCCF_LSTR_STATUS_NOT_FOUND | 3250 | X'00000CB2' |
| MQRCCF_SERVICE_RUNNING | 3251 | X'00000CB3' |
| MQRCCF_SERV_STATUS_NOT_FOUND | 3252 | X'00000CB4' |
| MQRCCF_SERVICE_STOPPED | 3253 | X'00000CB5' |
| MQRCCF_CFBS_DUPLICATE_PARM | 3254 | X'00000CB6' |
| MQRCCF_CFBS_LENGTH_ERROR | 3255 | X'00000CB7' |
| MQRCCF_CFBS_PARM_ID_ERROR | 3256 | X'00000CB8' |
| MQRCCF_CFBS_STRING_LENGTH_ERR | 3257 | X'00000CB9' |
| MQRCCF_CFGR_LENGTH_ERROR | 3258 | X'00000CBA' |
| MQRCCF_CFGR_PARM_COUNT_ERROR | 3259 | X'00000CBB' |
| MQRCCF_CONN_NOT_STOPPED | 3260 | X'00000CBC' |
| MQRCCF_SERVICE_REQUEST_PENDING | 3261 | X'00000CBD' |
| MQRCCF_NO_START_CMD | 3262 | X'00000CBE' |
| MQRCCF_NO_STOP_CMD | 3263 | X'00000CBF' |
| MQRCCF_CFBF_LENGTH_ERROR | 3264 | X'00000CC0' |
| MQRCCF_CFBF_PARM_ID_ERROR | 3265 | X'00000CC1' |
| MQRCCF_CFBF_OPERATOR_ERROR | 3266 | X'00000CC2' |
| MQRCCF_CFBF_FILTER_VAL_LEN_ERR | 3267 | X'00000CC3' |
| MQRCCF_LISTENER_STILL_ACTIVE | 3268 | X'00000CC4' |
| MQRCCF_DEF_XMIT_Q_CLUS_ERROR | 3269 | X'0000CC5' |
| MQRCCF_TOPICSTR_ALREADY_EXISTS | 3300 | X'00000CE4' |
| MQRCCF_SHARING_CONVS_ERROR | 3301 | X'00000CE5' |
| MQRCCF_SHARING_CONVS_TYPE | 3302 | X'00000CE6' |
| MQRCCF_SECURITY_CASE_CONFLICT | 3303 | X'00000CE7' |
| MQRCCF_TOPIC_TYPE_ERROR | 3305 | X'00000CE9' |
| MQRCCF_MAX_INSTANCES_ERROR | 3306 | X'00000CEA' |
| MQRCCF_MAX_INSTS_PER_CLNT_ERR | 3307 | X'00000CEB' |
| MQRCCF_TOPIC_STRING_NOT_FOUND | 3308 | X'00000CEC' |
| MQRCCF_SUBSCRIPTION_POINT_ERR | 3309 | X'00000CED' |
| MQRCCF_SUB_ALREADY_EXISTS | 3311 | X'00000CEF' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_UNKNOWN_OBJECT_NAME | 3312 | X'00000CF0' |
| MQRCCF_REMOTE_Q_NAME_ERROR | 3313 | X'00000CF1' |
| MQRCCF_DURABILITY_NOT_ALLOWED | 3314 | X'00000CF2' |
| MQRCCF_HOBJ_ERROR | 3315 | X'00000CF3' |
| MQRCCF_DEST_NAME_ERROR | 3316 | X'00000CF4' |
| MQRCCF_INVALID_DESTINATION | 3317 | X'00000CF5' |
| MQRCCF_PUBSUB_INHIBITED | 3318 | X'00000CF6' |
| MQRCCF_CHLAUTH_TYPE_ERROR | 3326 | X'00000CFE' |
| MQRCCF_CHLAUTH_ACTION_ERROR | 3327 | X'00000CFF' |
| MQRCCF_CHLAUTH_USERSRC_ERROR | 3335 | X'00000D07' |
| MQRCCF_WRONG_CHLAUTH_TYPE | 3336 | X'00000D08' |
| MQRCCF_CHLAUTH_ALREADY_EXISTS | 3337 | X'00000D09' |
| MQRCCF_CHLAUTH_NOT_FOUND | 3338 | X'00000D0A' |
| MQRCCF_WRONG_CHLAUTH_ACTION | 3339 | X'00000D0B' |
| MQRCCF_WRONG_CHLAUTH_USERSRC | 3340 | X'00000D0C' |
| MQRCCF_CHLAUTH_WARN_ERROR | 3341 | X'00000D0D' |
| MQRCCF_WRONG_CHLAUTH_MATCH | 3342 | X'00000D0E' |
| MQRCCF_IPADDR_RANGE_CONFLICT | 3343 | X'00000D0F' |
| MQRCCF_CHLAUTH_MAX_EXCEEDED | 3344 | X'00000D10' |
| MQRCCF_IPADDR_ERROR | 3345 | X'00000D11' |
| MQRCCF_IPADDR_RANGE_ERROR | 3346 | X'00000D12' |
| MQRCCF_PROFILE_NAME_MISSING | 3347 | X'00000D13' |
| MQRCCF_CHLAUTH_CLNTUSER_ERROR | 3348 | X'00000D14' |
| MQRCCF_CHLAUTH_NAME_ERROR | 3349 | X'00000D15' |
| MQRCCF_SUITE_B_ERROR | 3353 | X'00000D19' |
| MQRCCF_PSCLUS_DISABLED_TOPDEF | 3359 | X'00000D1F' |
| MQRCCF_PSCLUS_TOPIC_EXISTS | 3360 | X'00000D20' |
| MQRCCF_INVALID_PROTOCOL | 3365 | X'00000D25' |
| MQRCCF_OBJECT_ALREADY_EXISTS | 4001 | X'00000FA1' |
| MQRCCF_OBJECT_WRONG_TYPE | 4002 | X'00000FA2' |
| MQRCCF_LIKE_OBJECT_WRONG_TYPE | 4003 | X'00000FA3' |
| MQRCCF_OBJECT_OPEN | 4004 | X'00000FA4' |
| MQRCCF_ATTR_VALUE_ERROR | 4005 | X'00000FA5' |
| MQRCCF_UNKNOWN_Q_MGR | 4006 | X'00000FA6' |
| MQRCCF_Q_WRONG_TYPE | 4007 | X'00000FA7' |
| MQRCCF_OBJECT_NAME_ERROR | 4008 | X'00000FA8' |
| MQRCCF_ALLOCATE_FAILED | 4009 | X'00000FA9' |
| MQRCCF_HOST_NOT_AVAILABLE | 4010 | X'00000FAA' |
| MQRCCF_CONFIGURATION_ERROR | 4011 | X'00000FAB' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_CONNECTION_REFUSED | 4012 | X'00000FAC' |
| MQRCCF_ENTRY_ERROR | 4013 | X'00000FAD' |
| MQRCCF_SEND_FAILED | 4014 | X'00000FAE' |
| MQRCCF_RECEIVED_DATA_ERROR | 4015 | X'00000FAF' |
| MQRCCF_RECEIVE_FAILED | 4016 | X'00000FB0' |
| MQRCCF_CONNECTION_CLOSED | 4017 | X'00000FB1' |
| MQRCCF_NO_STORAGE | 4018 | X'00000FB2' |
| MQRCCF_NO_COMMS_MANAGER | 4019 | X'00000FB3' |
| MQRCCF_LISTENER_NOT_STARTED | 4020 | X'00000FB4' |
| MQRCCF_BIND_FAILED | 4024 | X'00000FB8' |
| MQRCCF_CHANNEL_INDOUBT | 4025 | X'00000FB9' |
| MQRCCF_MQCONN_FAILED | 4026 | X'00000FBA' |
| MQRCCF_MQOPEN_FAILED | 4027 | X'00000FBB' |
| MQRCCF_MQGET_FAILED | 4028 | X'00000FBC' |
| MQRCCF_MQPUT_FAILED | 4029 | X'00000FBD' |
| MQRCCF_PING_ERROR | 4030 | X'00000FBE' |
| MQRCCF_CHANNEL_IN_USE | 4031 | X'00000FBF' |
| MQRCCF_CHANNEL_NOT_FOUND | 4032 | X'00000FC0' |
| MQRCCF_UNKNOWN_REMOTE_CHANNEL | 4033 | X'00000FC1' |
| MQRCCF_REMOTE_QM_UNAVAILABLE | 4034 | X'00000FC2' |
| MQRCCF_REMOTE_QM_TERMINATING | 4035 | X'00000FC3' |
| MQRCCF_MQINQ_FAILED | 4036 | X'00000FC4' |
| MQRCCF_NOT_XMIT_Q | 4037 | X'00000FC5' |
| MQRCCF_CHANNEL_DISABLED | 4038 | X'00000FC6' |
| MQRCCF_USER_EXIT_NOT_AVAILABLE | 4039 | X'00000FC7' |
| MQRCCF_COMMIT_FAILED | 4040 | X'00000FC8' |
| MQRCCF_WRONG_CHANNEL_TYPE | 4041 | X'00000FC9' |
| MQRCCF_CHANNEL_ALREADY_EXISTS | 4042 | X'00000FCA' |
| MQRCCF_DATA_TOO_LARGE | 4043 | X'00000FCB' |
| MQRCCF_CHANNEL_NAME_ERROR | 4044 | X'00000FCC' |
| MQRCCF_XMIT_Q_NAME_ERROR | 4045 | X'00000FCD' |
| MQRCCF_MCA_NAME_ERROR | 4047 | X'00000FCF' |
| MQRCCF_SEND_EXIT_NAME_ERROR | 4048 | X'00000FD0' |
| MQRCCF_SEC_EXIT_NAME_ERROR | 4049 | X'00000FD1' |
| MQRCCF_MSG_EXIT_NAME_ERROR | 4050 | X'00000FD2' |
| MQRCCF_RCV_EXIT_NAME_ERROR | 4051 | X'00000FD3' |
| MQRCCF_XMIT_Q_NAME_WRONG_TYPE | 4052 | X'00000FD4' |
| MQRCCF_MCA_NAME_WRONG_TYPE | 4053 | X'00000FD5' |
| MQRCCF_DISC_INT_WRONG_TYPE | 4054 | X'00000FD6' |

*Table 306. Values of constants (continued)*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRCCF_SHORT_RETRY_WRONG_TYPE | 4055 | X'00000FD7' |
| MQRCCF_SHORT_TIMER_WRONG_TYPE | 4056 | X'00000FD8' |
| MQRCCF_LONG_RETRY_WRONG_TYPE | 4057 | X'00000FD9' |
| MQRCCF_LONG_TIMER_WRONG_TYPE | 4058 | X'00000FDA' |
| MQRCCF_PUT_AUTH_WRONG_TYPE | 4059 | X'00000FDB' |
| MQRCCF_KEEP_ALIVE_INT_ERROR | 4060 | X'00000FDC' |
| MQRCCF_MISSING_CONN_NAME | 4061 | X'00000FDD' |
| MQRCCF_CONN_NAME_ERROR | 4062 | X'00000FDE' |
| MQRCCF_MQSET_FAILED | 4063 | X'00000FDF' |
| MQRCCF_CHANNEL_NOT_ACTIVE | 4064 | X'00000FE0' |
| MQRCCF_TERMINATED_BY_SEC_EXIT | 4065 | X'00000FE1' |
| MQRCCF_DYNAMIC_Q_SCOPE_ERROR | 4067 | X'00000FE3' |
| MQRCCF_CELL_DIR_NOT_AVAILABLE | 4068 | X'00000FE4' |
| MQRCCF_MR_COUNT_ERROR | 4069 | X'00000FE5' |
| MQRCCF_MR_COUNT_WRONG_TYPE | 4070 | X'00000FE6' |
| MQRCCF_MR_EXIT_NAME_ERROR | 4071 | X'00000FE7' |
| MQRCCF_MR_EXIT_NAME_WRONG_TYPE | 4072 | X'00000FE8' |
| MQRCCF_MR_INTERVAL_ERROR | 4073 | X'00000FE9' |
| MQRCCF_MR_INTERVAL_WRONG_TYPE | 4074 | X'00000FEA' |
| MQRCCF_NPM_SPEED_ERROR | 4075 | X'00000FEB' |
| MQRCCF_NPM_SPEED_WRONG_TYPE | 4076 | X'00000FEC' |
| MQRCCF_HB_INTERVAL_ERROR | 4077 | X'00000FED' |
| MQRCCF_HB_INTERVAL_WRONG_TYPE | 4078 | X'00000FEE' |
| MQRCCF_CHAD_ERROR | 4079 | X'00000FEF' |
| MQRCCF_CHAD_WRONG_TYPE | 4080 | X'00000FF0' |
| MQRCCF_CHAD_EVENT_ERROR | 4081 | X'00000FF1' |
| MQRCCF_CHAD_EVENT_WRONG_TYPE | 4082 | X'00000FF2' |
| MQRCCF_CHAD_EXIT_ERROR | 4083 | X'00000FF3' |
| MQRCCF_CHAD_EXIT_WRONG_TYPE | 4084 | X'00000FF4' |
| MQRCCF_SUPPRESSED_BY_EXIT | 4085 | X'00000FF5' |
| MQRCCF_BATCH_INT_ERROR | 4086 | X'00000FF6' |
| MQRCCF_BATCH_INT_WRONG_TYPE | 4087 | X'00000FF7' |
| MQRCCF_NET_PRIORITY_ERROR | 4088 | X'00000FF8' |
| MQRCCF_NET_PRIORITY_WRONG_TYPE | 4089 | X'00000FF9' |
| MQRCCF_CHANNEL_CLOSED | 4090 | X'00000FFA' |
| MQRCCF_Q_STATUS_NOT_FOUND | 4091 | X'00000FFB' |
| MQRCCF_SSL_CIPHER_SPEC_ERROR | 4092 | X'00000FFC' |
| MQRCCF_SSL_PEER_NAME_ERROR | 4093 | X'00000FFD' |
| MQRCCF_SSL_CLIENT_AUTH_ERROR | 4094 | X'00000FFE' |

| Table 306. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRCCF_RETAINED_NOT_SUPPORTED | 4095 | X'00000FFF' |

## MQRCN_* (Client reconnect Constants)

| Table 307. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRCN_NO | 0 | X'00000000' |
| MQRCN_YES | 1 | X'00000001' |
| MQRCN_Q_MGR | 2 | X'00000002' |
| MQRCN_DISABLED | 3 | X'00000003' |

## MQRCVTIME_* (Receive Timeout Types)

| Table 308. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRCVTIME_MULTIPLY | 0 | X'00000000' |
| MQRCVTIME_ADD | 1 | X'00000001' |
| MQRCVTIME_EQUAL | 2 | X'00000002' |

## MQREADA_* (Read Ahead Values)

| Table 309. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQREADA_NO | 0 | X'00000000' |
| MQREADA_YES | 1 | X'00000001' |
| MQREADA_DISABLED | 2 | X'00000002' |
| MQREADA_INHIBITED | 3 | X'00000003' |
| MQREADA_BACKLOG | 4 | X'00000004' |

## MQRECORDING_* (Recording Options)

| Table 310. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRECORDING_DISABLED | 0 | X'00000000' |
| MQRECORDING_Q | 1 | X'00000001' |
| MQRECORDING_MSG | 2 | X'00000002' |

## MQREGO_* (Publish/Subscribe Registration Options)

| Table 311. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQREGO_NONE | 0 | X'00000000' |
| MQREGO_CORREL_ID_AS_IDENTITY | 1 | X'00000001' |
| MQREGO_ANONYMOUS | 2 | X'00000002' |
| MQREGO_LOCAL | 4 | X'00000004' |

| Table 311. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQREGO_DIRECT_REQUESTS | 8 | X'00000008' |
| MQREGO_NEW_PUBLICATIONS_ONLY | 16 | X'00000010' |
| MQREGO_PUBLISH_ON_REQUEST_ONLY | 32 | X'00000020' |
| MQREGO_DEREGISTER_ALL | 64 | X'00000040' |
| MQREGO_INCLUDE_STREAM_NAME | 128 | X'00000080' |
| MQREGO_INFORM_IF_RETAINED | 256 | X'00000100' |
| MQREGO_DUPLICATES_OK | 512 | X'00000200' |
| MQREGO_NON_PERSISTENT | 1024 | X'00000400' |
| MQREGO_PERSISTENT | 2048 | X'00000800' |
| MQREGO_PERSISTENT_AS_PUBLISH | 4096 | X'00001000' |
| MQREGO_PERSISTENT_AS_Q | 8192 | X'00002000' |
| MQREGO_ADD_NAME | 16384 | X'00004000' |
| MQREGO_NO_ALTERATION | 32768 | X'00008000' |
| MQREGO_FULL_RESPONSE | 65536 | X'00010000' |
| MQREGO_JOIN_SHARED | 131072 | X'00020000' |
| MQREGO_JOIN_EXCLUSIVE | 262144 | X'00040000' |
| MQREGO_LEAVE_ONLY | 524288 | X'00080000' |
| MQREGO_VARIABLE_USER_ID | 1048576 | X'00100000' |
| MQREGO_LOCKED | 2097152 | X'00200000' |

# MQRFH_* (Rules and formatting header structure and Flags)

## Rules and formatting header structure

| Table 312. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQRFH_STRUC_ID | "RFH¬" |
| MQRFH_STRUC_ID_ARRAY | 'R','F','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 313. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRFH_VERSION_1 | 1 | X'00000001' |
| MQRFH_VERSION_2 | 2 | X'00000002' |
| MQRFH_STRUC_LENGTH_FIXED | 32 | X'00000020' |
| MQRFH_STRUC_LENGTH_FIXED_2 | 36 | X'00000024' |

## Rules and formatting header Flags

| Table 314. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRFH_NONE | 0 | X'00000000' |

| Table 314. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRFH_NO_FLAGS | 0 | X'00000000' |

## MQRFH2_* (Publish/Subscribe Options Tag RFH2 Top-level folder Tags)

| Table 315. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRFH2_NAME_VALUE_VERSION | 1 | X'00000001' |

## MQRFH2_* (Publish/Subscribe Options Tag Tag names)

| | |
|---|---|
| MQRFH2_PUBSUB_CMD_FOLDER | "psc" |
| MQRFH2_PUBSUB_RESP_FOLDER | "pscr" |
| MQRFH2_MSG_CONTENT_FOLDER | "mcd" |
| MQRFH2_USER_FOLDER | "usr" |

## MQRFH2_* (Publish/Subscribe Options Tag XML tag names)

| | |
|---|---|
| MQRFH2_PUBSUB_CMD_FOLDER_B | "<psc>" |
| MQRFH2_PUBSUB_CMD_FOLDER_E | "</psc>" |
| MQRFH2_PUBSUB_RESP_FOLDER_B | "<pscr>" |
| MQRFH2_PUBSUB_RESP_FOLDER_E | "</pscr>" |
| MQRFH2_MSG_CONTENT_FOLDER_B | "<mcd>" |
| MQRFH2_MSG_CONTENT_FOLDER_E | "</mcd>" |
| MQRFH2_USER_FOLDER_B | "<usr>" |
| MQRFH2_USER_FOLDER_E | "</usr>" |

## MQRL_* (Returned Length)

| Table 316. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRL_UNDEFINED | -1 | X'FFFFFFFF' |

## MQRMH_* (Reference message header structure)

| Table 317. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQRMH_STRUC_ID | "RMH¬" |
| MQRMH_STRUC_ID_ARRAY | 'R','M','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 318. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRMH_VERSION_1 | 1 | X'00000001' |

| Table 318. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRMH_CURRENT_VERSION | 1 | X'00000001' |

## MQRMHF_* (Reference message header Flags)

| Table 319. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRMHF_LAST | 1 | X'00000001' |
| MQRMHF_NOT_LAST | 0 | X'00000000' |

## MQRO_* (Report Options)

| Table 320. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRO_EXCEPTION | 16777216 | X'01000000' |
| MQRO_EXCEPTION_WITH_DATA | 50331648 | X'03000000' |
| MQRO_EXCEPTION_WITH_FULL_DATA | 117440512 | X'07000000' |
| MQRO_EXPIRATION | 2097152 | X'00200000' |
| MQRO_EXPIRATION_WITH_DATA | 6291456 | X'00600000' |
| MQRO_EXPIRATION_WITH_FULL_DATA | 14680064 | X'00E00000' |
| MQRO_COA | 256 | X'00000100' |
| MQRO_COA_WITH_DATA | 768 | X'00000300' |
| MQRO_COA_WITH_FULL_DATA | 1792 | X'00000700' |
| MQRO_COD | 2048 | X'00000800' |
| MQRO_COD_WITH_DATA | 6144 | X'00001800' |
| MQRO_COD_WITH_FULL_DATA | 14336 | X'00003800' |
| MQRO_PAN | 1 | X'00000001' |
| MQRO_NAN | 2 | X'00000002' |
| MQRO_ACTIVITY | 4 | X'00000004' |
| MQRO_NEW_MSG_ID | 0 | X'00000000' |
| MQRO_PASS_MSG_ID | 128 | X'00000080' |
| MQRO_COPY_MSG_ID_TO_CORREL_ID | 0 | X'00000000' |
| MQRO_PASS_CORREL_ID | 64 | X'00000040' |
| MQRO_DEAD_LETTER_Q | 0 | X'00000000' |
| MQRO_DISCARD_MSG | 134217728 | X'08000000' |
| MQRO_PASS_DISCARD_AND_EXPIRY | 16384 | X'00004000' |
| MQRO_NONE | 0 | X'00000000' |

## MQRO_* (Report Options Masks)

| Table 321. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRO_REJECT_UNSUP_MASK | 270270464 | X'101C0000' |

| Table 321. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQRO_ACCEPT_UNSUP_MASK | -270532353 | X'EFE000FF' |
| MQRO_ACCEPT_UNSUP_IF_XMIT_MASK | 261888 | X'0003FF00' |

## MQROUTE_* (Trace-route)

### Trace-route Max Activities (MQIACF_MAX_ACTIVITIES)

| Table 322. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQROUTE_UNLIMITED_ACTIVITIES | 0 | X'00000000' |

### Trace-route Detail (MQIACF_ROUTE_DETAIL)

| Table 323. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQROUTE_DETAIL_LOW | 2 | X'00000002' |
| MQROUTE_DETAIL_MEDIUM | 8 | X'00000008' |
| MQROUTE_DETAIL_HIGH | 32 | X'00000020' |

### Trace-route Forwarding (MQIACF_ROUTE_FORWARDING)

| Table 324. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQROUTE_FORWARD_ALL | 256 | X'00000100' |
| MQROUTE_FORWARD_IF_SUPPORTED | 512 | X'00000200' |
| MQROUTE_FORWARD_REJ_UNSUP_MASK | -65536 | X'FFFF0000' |

### Trace-route Delivery (MQIACF_ROUTE_DELIVERY)

| Table 325. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQROUTE_DELIVER_YES | 4096 | X'00001000' |
| MQROUTE_DELIVER_NO | 8192 | X'00002000' |
| MQROUTE_DELIVER_REJ_UNSUP_MASK | -65536 | X'FFFF0000' |

### Trace-route Accumulation (MQIACF_ROUTE_ACCUMULATION)

| Table 326. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQROUTE_ACCUMULATE_NONE | 65539 | X'00010003' |
| MQROUTE_ACCUMULATE_IN_MSG | 65540 | X'00010004' |
| MQROUTE_ACCUMULATE_AND_REPLY | 65541 | X'00010005' |

## MQRP_* (Command format Replace Options)

*Table 327. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRP_YES | 1 | X'00000001' |
| MQRP_NO | 0 | X'00000000' |

## MQRQ_* (Command format Reason Qualifiers)

*Table 328. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRQ_CONN_NOT_AUTHORIZED | 1 | X'00000001' |
| MQRQ_OPEN_NOT_AUTHORIZED | 2 | X'00000002' |
| MQRQ_CLOSE_NOT_AUTHORIZED | 3 | X'00000003' |
| MQRQ_CMD_NOT_AUTHORIZED | 4 | X'00000004' |
| MQRQ_Q_MGR_STOPPING | 5 | X'00000005' |
| MQRQ_Q_MGR_QUIESCING | 6 | X'00000006' |
| MQRQ_CHANNEL_STOPPED_OK | 7 | X'00000007' |
| MQRQ_CHANNEL_STOPPED_ERROR | 8 | X'00000008' |
| MQRQ_CHANNEL_STOPPED_RETRY | 9 | X'00000009' |
| MQRQ_CHANNEL_STOPPED_DISABLED | 10 | X'0000000A' |
| MQRQ_BRIDGE_STOPPED_OK | 11 | X'0000000B' |
| MQRQ_BRIDGE_STOPPED_ERROR | 12 | X'0000000C' |
| MQRQ_SSL_HANDSHAKE_ERROR | 13 | X'0000000D' |
| MQRQ_SSL_CIPHER_SPEC_ERROR | 14 | X'0000000E' |
| MQRQ_SSL_CLIENT_AUTH_ERROR | 15 | X'0000000F' |
| MQRQ_SSL_PEER_NAME_ERROR | 16 | X'00000010' |
| MQRQ_SUB_NOT_AUTHORIZED | 17 | X'00000011' |
| MQRQ_SUB_DEST_NOT_AUTHORIZED | 18 | X'00000012' |
| MQRQ_SSL_UNKNOWN_REVOCATION | 19 | X'00000013' |
| MQRQ_SYS_CONN_NOT_AUTHORIZED | 20 | X'00000014' |
| MQRQ_CHANNEL_BLOCKED_ADDRESS | 21 | X'00000015' |
| MQRQ_CHANNEL_BLOCKED_USERID | 22 | X'00000016' |
| MQRQ_CHANNEL_BLOCKED_NOACCESS | 23 | X'00000017' |
| MQRQ_MAX_ACTIVE_CHANNELS | 24 | X'00000018' |
| MQRQ_MAX_CHANNELS | 25 | X'00000019' |
| MQRQ_SVRCONN_INST_LIMIT | 26 | X'0000001A' |
| MQRQ_CLIENT_INST_LIMIT! | 27 | X'0000001B' |
| MQRQ_CAF_NOT_INSTALLED | 28 | X'0000001C' |

## MQRT_* (Command format Refresh Types)

*Table 329. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRT_CONFIGURATION | 1 | X'00000001' |
| MQRT_EXPIRY | 2 | X'00000002' |
| MQRT_NSPROC | 3 | X'00000003' |
| MQRT_PROXYSUB | 4 | X'00000004' |

## MQRU_* (Request Only)

*Table 330. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQRU_PUBLISH_ON_REQUEST | 1 | X'00000001' |
| MQRU_PUBLISH_ALL | 2 | X'00000002' |

## MQSCA_* (SSL Client Authentication)

*Table 331. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCA_REQUIRED | 0 | X'00000000' |
| MQSCA_OPTIONAL | 1 | X'00000001' |

## MQSCO_* (SSL configuration options)

### SSL configuration options structure

*Table 332. Structures of constants*

| Name | Structure |
|---|---|
| MQSCO_STRUC_ID | "SCO¬" |
| MQSCO_STRUC_ID_ARRAY | 'S','C','O','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 333. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCO_VERSION_1 | 1 | X'00000001' |
| MQSCO_VERSION_2 | 2 | X'00000002' |
| MQSCO_VERSION_3 | 3 | X'00000003' |
| MQSCO_VERSION_4 | 4 | X'00000004' |
| MQSCO_CURRENT_VERSION | 4 | X'00000004' |

**Note:** The symbol ¬ represents a single blank character.

### SSL configuration options Key Reset Count

*Table 334. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCO_RESET_COUNT_DEFAULT | 0 | X'00000000' |

### Command format Queue Definition Scope

*Table 335. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCO_Q_MGR | 1 | X'00000001' |
| MQSCO_CELL | 2 | X'00000002' |

## MQSCOPE_* (Publish scope)

*Table 336. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCOPE_ALL | 0 | X'00000000' |
| MQSCOPE_AS_PARENT | 1 | X'00000001' |
| MQSCOPE_QMGR | 4 | X'00000004' |

## MQSCYC_* (Security Case)

*Table 337. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSCYC_UPPER | 0 | X'00000000' |
| MQSCYC_MIXED | 1 | X'00000001' |

## MQSD_* (Object descriptor structure)

*Table 338. Constant names and structures*

| Name | Structure |
|---|---|
| MQSD_STRUC_ID | "SD¬¬" |
| MQSD_STRUC_ID_ARRAY | 'S','D','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 339. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSD_VERSION_1 | 1 | X'00000001' |
| MQSD_CURRENT_VERSION | 1 | X'00000001' |

## MQSECITEM_* (Command format Security Items)

*Table 340. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSECITEM_ALL | 0 | X'00000000' |
| MQSECITEM_MQADMIN | 1 | X'00000001' |
| MQSECITEM_MQNLIST | 2 | X'00000002' |

| Table 340. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSECITEM_MQPROC | 3 | X'00000003' |
| MQSECITEM_MQQUEUE | 4 | X'00000004' |
| MQSECITEM_MQCONN | 5 | X'00000005' |
| MQSECITEM_MQCMDS | 6 | X'00000006' |
| MQSECITEM_MXADMIN | 7 | X'00000007' |
| MQSECITEM_MXNLIST | 8 | X'00000008' |
| MQSECITEM_MXPROC | 9 | X'00000009' |
| MQSECITEM_MXQUEUE | 10 | X'0000000A' |
| MQSECITEM_MXTOPIC | 11 | X'0000000B' |

## MQSECSW_* (Command format Security Switches and Switch States)

### Command format Security Switches

| Table 341. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSECSW_PROCESS | 1 | X'00000001' |
| MQSECSW_NAMELIST | 2 | X'00000002' |
| MQSECSW_Q | 3 | X'00000003' |
| MQSECSW_TOPIC | 4 | X'00000004' |
| MQSECSW_CONTEXT | 6 | X'00000006' |
| MQSECSW_ALTERNATE_USER | 7 | X'00000007' |
| MQSECSW_COMMAND | 8 | X'00000008' |
| MQSECSW_CONNECTION | 9 | X'00000009' |
| MQSECSW_SUBSYSTEM | 10 | X'0000000A' |
| MQSECSW_COMMAND_RESOURCES | 11 | X'0000000B' |
| MQSECSW_Q_MGR | 15 | X'0000000F' |
| MQSECSW_QSG | 16 | X'00000010' |

### Command format Security Switch States

| Table 342. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSECSW_OFF_FOUND | 21 | X'00000015' |
| MQSECSW_ON_FOUND | 22 | X'00000016' |
| MQSECSW_OFF_NOT_FOUND | 23 | X'00000017' |
| MQSECSW_ON_NOT_FOUND | 24 | X'00000018' |
| MQSECSW_OFF_ERROR | 25 | X'00000019' |
| MQSECSW_ON_OVERRIDDEN | 26 | X'0000001A' |

## MQSECTYPE_* (Command format Security Types)

*Table 343. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSECTYPE_AUTHSERV | 1 | X'00000001' |
| MQSECTYPE_SSL | 2 | X'00000002' |
| MQSECTYPE_CLASSES | 3 | X'00000003' |

## MQSEG_* (Segmentation)

*Table 344. Constant names and values*

| Name | Value |
|---|---|
| MQSEG_INHIBITED | '¬' |
| MQSEG_ALLOWED | 'A' |

**Note:** The symbol ¬ represents a single blank character.

## MQSEL_* (Special Selector Values)

*Table 345. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSEL_ANY_SELECTOR | -30001 | X'FFFF8ACF' |
| MQSEL_ANY_USER_SELECTOR | -30002 | X'FFFF8ACE' |
| MQSEL_ANY_SYSTEM_SELECTOR | -30003 | X'FFFF8ACD' |
| MQSEL_ALL_SELECTORS | -30001 | X'FFFF8ACF' |
| MQSEL_ALL_USER_SELECTORS | -30002 | X'FFFF8ACE' |
| MQSEL_ALL_SYSTEM_SELECTORS | -30003 | X'FFFF8ACD' |

## MQSELTYPE_* (Selector Types)

*Table 346. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSELTYPE_NONE | 0 | X'00000000' |
| MQSELTYPE_STANDARD | 1 | X'00000001' |
| MQSELTYPE_EXTENDED | 2 | X'00000002' |

## MQSID_* (Security Identifier)

*Table 347. Constant names and values*

| Name | Value |
|---|---|
| MQSID_NONE | X'00...00' (40 nulls) |
| MQSID_NONE_ARRAY | '\0','\0',... (40 nulls) |

## MQSIDT_* (Security Identifier Types)

*Table 348. Constant names and values*

| Name | Hexadecimal value |
|---|---|
| MQSIDT_NONE | X'00' |

| Table 348. Constant names and values (continued) | |
|---|---|
| **Name** | **Hexadecimal value** |
| MQSIDT_NT_SECURITY_ID | X'01' |
| MQSIDT_WAS_SECURITY_ID | X'02' |

| | |
|---|---|
| MQSIDT_NONE | X'00' |
| MQSIDT_NT_SECURITY_ID | X'01' |
| MQSIDT_WAS_SECURITY_ID | X'02' |

## MQSMPO_* (Set message property options and structure)

### Set message property options structure

| Table 349. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQSMPO_STRUC_ID | "SMPO" |
| MQSMPO_STRUC_ID_ARRAY | 'S','M','P','O' |

**Note:** The symbol ¬ represents a single blank character.

| Table 350. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSMPO_VERSION_1 | 1 | X'00000001' |
| MQSMPO_CURRENT_VERSION | 1 | X'00000001' |

### Set Message Property Options

| Table 351. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSMPO_SET_FIRST | 0 | X'00000000' |
| MQSMPO_SET_PROP_UNDER_CURSOR | 1 | X'00000001' |
| MQSMPO_SET_PROP_AFTER_CURSOR | 2 | X'00000002' |
| MQSMPO_APPEND_PROPERTY | 4 | X'00000004' |
| MQSMPO_SET_PROP_BEFORE_CURSOR | 8 | X'00000008' |
| MQSMPO_NONE | 0 | X'00000000' |

## MQSO_* (Subscribe Options)

| Table 352. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSO_NONE | 0 | X'00000000' |
| MQSO_NON_DURABLE | 0 | X'00000000' |
| MQSO_READ_AHEAD_AS_Q_DEF | 0 | X'00000000' |
| MQSO_ALTER | 1 | X'00000001' |
| MQSO_CREATE | 2 | X'00000002' |
| MQSO_RESUME | 4 | X'00000004' |

| Table 352. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSO_DURABLE | 8 | X'00000008' |
| MQSO_GROUP_SUB | 16 | X'00000010' |
| MQSO_MANAGED | 32 | X'00000020' |
| MQSO_SET_IDENTITY_CONTEXT | 64 | X'00000040' |
| MQSO_FIXED_USERID | 256 | X'00000100' |
| MQSO_ANY_USERID | 512 | X'00000200' |
| MQSO_PUBLICATIONS_ON_REQUEST | 2048 | X'00000800' |
| MQSO_NEW_PUBLICATIONS_ONLY | 4096 | X'00001000' |
| MQSO_FAIL_IF_QUIESCING | 8192 | X'00002000' |
| MQSO_ALTERNATE_USER_AUTHORITY | 262144 | X'00040000' |
| MQSO_WILDCARD_CHAR | 1048576 | X'00100000' |
| MQSO_WILDCARD_TOPIC | 2097152 | X'00200000' |
| MQSO_SET_CORREL_ID | 4194304 | X'00400000' |
| MQSO_SCOPE_QMGR | 67108864 | X'04000000' |
| MQSO_NO_READ_AHEAD | 134217728 | X'08000000' |
| MQSO_READ_AHEAD | 268435456 | X'10000000' |

## MQSP_* (Sync point Availability)

| Table 353. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSP_AVAILABLE | 1 | X'00000001' |
| MQSP_NOT_AVAILABLE | 0 | X'00000000' |

## MQSQQM_* (Shared Queue Queue Manager Name)

| Table 354. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSQQM_USE | 0 | X'00000000' |
| MQSQQM_IGNORE | 1 | X'00000001' |

## MQSR_* (Action)

| Table 355. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSR_ACTION_PUBLICATION | 1 | X'00000001' |

## MQSRO_* (Subscription request options structure)

| Table 356. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQSRO_STRUC_ID | "SRO¬" |
| MQSRO_STRUC_ID_ARRAY | 'S','R','O','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 357. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSRO_VERSION_1 | 1 | X'00000001' |
| MQSRO_CURRENT_VERSION | 1 | X'00000001' |
| MQSRO_NONE | 0 | X'00000000' |
| MQSRO_FAIL_IF_QUIESCING | 8192 | X'00002000' |

## MQSS_* (Segment Status)

*Table 358. Constant names and structures*

| Name | Structure |
|---|---|
| MQSS_NOT_A_SEGMENT | '¬' |
| MQSS_SEGMENT | 'S' |
| MQSS_LAST_SEGMENT | 'L' |

**Note:** The symbol ¬ represents a single blank character.

## MQSSL_* (SSL FIPS Requirements)

*Table 359. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSSL_FIPS_NO | 0 | X'00000000' |
| MQSSL_FIPS_YES | 1 | X'00000001' |

## MQSTAT_* (Stat Options)

*Table 360. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSTAT_TYPE_ASYNC_ERROR | 0 | X'00000000' |
| MQSTAT_TYPE_RECONNECTION | 0 | X'00000000' |
| MQSTAT_TYPE_RECONNECTION_ERROR | 0 | X'00000000' |

## MQSTS_* (Status reporting structure structure)

*Table 361. Structures of constants*

| Name | Structure |
|---|---|
| MQSTS_STRUC_ID | "STAT" |
| MQSTS_STRUC_ID_ARRAY | 'S','T','A','T' |

**Note:** The symbol ¬ represents a single blank character.

*Table 362. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSTS_VERSION_1 | 1 | X'00000001' |
| MQSTS_CURRENT_VERSION | 1 | X'00000001' |

## MQSUB_* (Durable subscriptions)

### Durable subscriptions

*Table 363. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSUB_DURABLE_AS_PARENT | 0 | X'00000000' |
| MQSUB_DURABLE_ALLOWED | 1 | X'00000001' |
| MQSUB_DURABLE_INHIBITED | 2 | X'00000002' |

### Durable Subscriptions

*Table 364. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSUB_DURABLE_ALL | -1 | X'FFFFFFFF' |
| MQSUB_DURABLE_YES | 1 | X'00000001' |
| MQSUB_DURABLE_NO | 2 | X'00000002' |

## MQSUBTYPE_* (Command format Subscription Types)

*Table 365. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSUBTYPE_API | 1 | X'00000001' |
| MQSUBTYPE_ADMIN | 2 | X'00000002' |
| MQSUBTYPE_PROXY | 3 | X'00000003' |
| MQSUBTYPE_ALL | -1 | X'FFFFFFFF' |
| MQSUBTYPE_USER | -2 | X'FFFFFFFE' |

## MQSUS_* (Command format Suspend Status)

*Table 366. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSUS_YES | 1 | X'00000001' |
| MQSUS_NO | 0 | X'00000000' |

## MQSVC_* (Service)

### Service Types

*Table 367. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSVC_TYPE_COMMAND | 0 | X'00000000' |
| MQSVC_TYPE_SERVER | 1 | X'00000001' |

### Service Controls

*Table 368. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSVC_CONTROL_Q_MGR | 0 | X'00000000' |
| MQSVC_CONTROL_Q_MGR_START | 1 | X'00000001' |
| MQSVC_CONTROL_MANUAL | 2 | X'00000002' |

### Service Status

*Table 369. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSVC_STATUS_STOPPED | 0 | X'00000000' |
| MQSVC_STATUS_STARTING | 1 | X'00000001' |
| MQSVC_STATUS_RUNNING | 2 | X'00000002' |
| MQSVC_STATUS_STOPPING | 3 | X'00000003' |
| MQSVC_STATUS_RETRYING | 4 | X'00000004' |

## MQSYNCPOINT_* (Command format Syncpoint values for Pub/Sub migration)

*Table 370. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSYNCPOINT_YES | 0 | X'00000000' |
| MQSYNCPOINT_IFPER | 1 | X'00000001' |

## MQSYSP_* (Command format System Parameter Values)

*Table 371. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQSYSP_NO | 0 | X'00000000' |
| MQSYSP_YES | 1 | X'00000001' |
| MQSYSP_EXTENDED | 2 | X'00000002' |
| MQSYSP_TYPE_INITIAL | 10 | X'0000000A' |
| MQSYSP_TYPE_SET | 11 | X'0000000B' |
| MQSYSP_TYPE_LOG_COPY | 12 | X'0000000C' |
| MQSYSP_TYPE_LOG_STATUS | 13 | X'0000000D' |
| MQSYSP_TYPE_ARCHIVE_TAPE | 14 | X'0000000E' |
| MQSYSP_ALLOC_BLK | 20 | X'00000014' |
| MQSYSP_ALLOC_TRK | 21 | X'00000015' |
| MQSYSP_ALLOC_CYL | 22 | X'00000016' |
| MQSYSP_STATUS_BUSY | 30 | X'0000001E' |
| MQSYSP_STATUS_PREMOUNT | 31 | X'0000001F' |
| MQSYSP_STATUS_AVAILABLE | 32 | X'00000020' |
| MQSYSP_STATUS_UNKNOWN | 33 | X'00000021' |
| MQSYSP_STATUS_ALLOC_ARCHIVE | 34 | X'00000022' |

| Table 371. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQSYSP_STATUS_COPYING_BSDS | 35 | X'00000023' |
| MQSYSP_STATUS_COPYING_LOG | 36 | X'00000024' |

## MQTA_* (Topic attributes)

### Wildcards

| Table 372. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTA_BLOCK | 1 | X'00000001' |
| MQTA_PASSTHRU | 2 | X'00000002' |

### Subscriptions Allowed

| Table 373. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTA_SUB_AS_PARENT | 0 | X'00000000' |
| MQTA_SUB_INHIBITED | 1 | X'00000001' |
| MQTA_SUB_ALLOWED | 2 | X'00000002' |

### Proxy Sub Propagation

| Table 374. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTA_PROXY_SUB_FORCE | 1 | X'00000001' |
| MQTA_PROXY_SUB_FIRSTUSE | 2 | X'00000002' |

### Publications Allowed

| Table 375. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTA_PUB_AS_PARENT | 0 | X'00000000' |
| MQTA_PUB_INHIBITED | 1 | X'00000001' |
| MQTA_PUB_ALLOWED | 2 | X'00000002' |

## MQTC_* (Trigger Controls)

| Table 376. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTC_OFF | 0 | X'00000000' |
| MQTC_ON | 1 | X'00000001' |

## MQTCPKEEP_* (TCP Keepalive)

*Table 377. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTCPKEEP_NO | 0 | X'00000000' |
| MQTCPKEEP_YES | 1 | X'00000001' |

## MQTCPSTACK_* (TCP Stack Types)

*Table 378. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTCPSTACK_SINGLE | 0 | X'00000000' |
| MQTCPSTACK_MULTIPLE | 1 | X'00000001' |

## MQTIME_* (Command format Time units)

*Table 379. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTIME_UNIT_MINS | 0 | X'00000000' |
| MQTIME_UNIT_SECS | 1 | X'00000001' |

## MQTM_* (Trigger message structure)

*Table 380. Structures of constants*

| Name | Structure |
|---|---|
| MQTM_STRUC_ID | "TM¬¬" |
| MQTM_STRUC_ID_ARRAY | 'T','M','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 381. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTM_VERSION_1 | 1 | X'00000001' |
| MQTM_CURRENT_VERSION | 1 | X'00000001' |

## MQTMC_* (Trigger message character format structure)

*Table 382. Structures of constants*

| Name | Structure |
|---|---|
| MQTMC_STRUC_ID | "TMC¬" |
| MQTMC_STRUC_ID_ARRAY | 'T','M','C','¬' |
| MQTMC_VERSION_1 | "¬¬¬1" |
| MQTMC_VERSION_2 | "¬¬¬2" |
| MQTMC_CURRENT_VERSION | "¬¬¬2" |
| MQTMC_VERSION_1_ARRAY | '¬','¬','¬','1' |
| MQTMC_VERSION_2_ARRAY | '¬','¬','¬','2' |
| MQTMC_CURRENT_VERSION_ARRAY | '¬','¬','¬','2' |

## MQTOPT_* (Topic Type)

*Table 383. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTOPT_LOCAL | 0 | X'00000000' |
| MQTOPT_CLUSTER | 1 | X'00000001' |
| MQTOPT_ALL | 2 | X'00000002' |

## MQTRAXSTR_* (Channel Initiator Trace Autostart)

*Table 384. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTRAXSTR_NO | 0 | X'00000000' |
| MQTRAXSTR_YES | 1 | X'00000001' |

## MQTSCOPE_* (Subscription Scope)

*Table 385. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTSCOPE_QMGR | 1 | X'00000001' |
| MQTSCOPE_ALL | 2 | X'00000002' |

## MQTT_* (Trigger Types)

*Table 386. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTT_NONE | 0 | X'00000000' |
| MQTT_FIRST | 1 | X'00000001' |
| MQTT_EVERY | 2 | X'00000002' |
| MQTT_DEPTH | 3 | X'00000003' |

## MQTYPE_* (Property data types)

*Table 387. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQTYPE_AS_SET | 0 | X'00000000' |
| MQTYPE_NULL | 2 | X'00000002' |
| MQTYPE_BOOLEAN | 4 | X'00000004' |
| MQTYPE_BYTE_STRING | 8 | X'00000008' |
| MQTYPE_INT8 | 16 | X'00000010' |
| MQTYPE_INT16 | 32 | X'00000020' |
| MQTYPE_INT32 | 64 | X'00000040' |
| MQTYPE_LONG | 64 | X'00000040' |
| MQTYPE_INT64 | 128 | X'00000080' |
| MQTYPE_FLOAT32 | 256 | X'00000100' |
| MQTYPE_FLOAT64 | 512 | X'00000200' |

| Table 387. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQTYPE_STRING | 1024 | X'00000400' |

## MQUA_* (Publish/Subscribe User Attribute Selectors)

| Table 388. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQUA_FIRST | 65536 | X'00010000' |
| MQUA_LAST | 999999999 | X'3B9AC9FF' |

## MQUIDSUPP_* (Command format User ID Support)

| Table 389. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQUIDSUPP_NO | 0 | X'00000000' |
| MQUIDSUPP_YES | 1 | X'00000001' |

## MQUNDELIVERED_* (Command format Undelivered values for Pub/Sub migration)

| Table 390. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQUNDELIVERED_NORMAL | 0 | X'00000000' |
| MQUNDELIVERED_SAFE | 1 | X'00000001' |
| MQUNDELIVERED_DISCARD | 2 | X'00000002' |
| MQUNDELIVERED_KEEP | 3 | X'00000003' |

## MQUOWST_* (Command format UOW States)

| Table 391. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQUOWST_NONE | 0 | X'00000000' |
| MQUOWST_ACTIVE | 1 | X'00000001' |
| MQUOWST_PREPARED | 2 | X'00000002' |
| MQUOWST_UNRESOLVED | 3 | X'00000003' |

## MQUOWT_* (Command format UOW Types)

| Table 392. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQUOWT_Q_MGR | 0 | X'00000000' |
| MQUOWT_CICS | 1 | X'00000001' |
| MQUOWT_RRS | 2 | X'00000002' |
| MQUOWT_IMS | 3 | X'00000003' |
| MQUOWT_XA | 4 | X'00000004' |

## MQUS_* (Queue Usages)

*Table 393. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQUS_NORMAL | 0 | X'00000000' |
| MQUS_TRANSMISSION | 1 | X'00000001' |

## MQUSAGE_* (Command format Page Set Usage Values and Data Set Usage Values)

### Command format Page Set Usage Values

*Table 394. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQUSAGE_PS_AVAILABLE | 0 | X'00000000' |
| MQUSAGE_PS_DEFINED | 1 | X'00000001' |
| MQUSAGE_PS_OFFLINE | 2 | X'00000002' |
| MQUSAGE_PS_NOT_DEFINED | 3 | X'00000003' |
| MQUSAGE_PS_SUSPENDED | 4 | X'00000004' |
| MQUSAGE_EXPAND_USER | 1 | X'00000001' |
| MQUSAGE_EXPAND_SYSTEM | 2 | X'00000002' |
| MQUSAGE_EXPAND_NONE | 3 | X'00000003' |

### Command format Data Set Usage Values

*Table 395. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQUSAGE_DS_OLDEST_ACTIVE_UOW | 10 | X'0000000A' |
| MQUSAGE_DS_OLDEST_PS_RECOVERY | 11 | X'0000000B' |
| MQUSAGE_DS_OLDEST_CF_RECOVERY | 12 | X'0000000C' |

## MQVL_* (Value Length)

*Table 396. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQVL_NULL_TERMINATED | -1 | X'FFFFFFFF' |
| MQVL_EMPTY_STRING | 0 | X'00000000' |

## MQVU_* (Variable User ID)

*Table 397. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQVU_FIXED_USER | 1 | X'00000001' |
| MQVU_ANY_USER | 2 | X'00000002' |

## MQWDR_* (Cluster workload exit destination record structure)

| *Table 398. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQWDR_STRUC_ID | "WDR¬" |
| MQWDR_STRUC_ID_ARRAY | 'W','D','R','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 399. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQWDR_VERSION_1 | 1 | X'00000001' |
| MQWDR_VERSION_2 | 2 | X'00000002' |
| MQWDR_CURRENT_VERSION | 2 | X'00000002' |
| MQWDR_LENGTH_1 | 124 | X'0000007C' |
| MQWDR_LENGTH_2 | 136 | X'00000088' |
| MQWDR_CURRENT_LENGTH | 136 | X'00000088' |

## MQWI_* (Wait Interval)

| *Table 400. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQWI_UNLIMITED | -1 | X'FFFFFFFF' |

## MQWIH_* (Workload information header structure and Flags)

### Workload information header structure

| *Table 401. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQWIH_STRUC_ID | "WIH¬" |
| MQWIH_STRUC_ID_ARRAY | 'W','I','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 402. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQWIH_VERSION_1 | 1 | X'00000001' |
| MQWIH_CURRENT_VERSION | 1 | X'00000001' |
| MQWIH_LENGTH_1 | 120 | X'00000078' |
| MQWIH_CURRENT_LENGTH | 120 | X'00000078' |

### Workload information header Flags

| *Table 403. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQWIH_NONE | 0 | X'00000000' |

## MQWQR_* (Cluster workload exit queue record structure)

*Table 404. Structures of constants*

| Name | Structure |
|---|---|
| MQWQR_STRUC_ID | "WQR¬" |
| MQWQR_STRUC_ID_ARRAY | 'W','Q','R','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 405. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQWQR_VERSION_1 | 1 | X'00000001' |
| MQWQR_VERSION_2 | 2 | X'00000002' |
| MQWQR_VERSION_3 | 3 | X'00000003' |
| MQWQR_CURRENT_VERSION | 3 | X'00000003' |
| MQWQR_LENGTH_1 | 200 | X'000000C8' |
| MQWQR_LENGTH_2 | 208 | X'000000D0' |
| MQWQR_LENGTH_3 | 212 | X'000000D4' |
| MQWQR_CURRENT_LENGTH | 212 | X'000000D4' |

## MQWS_* (Wildcard Schema)

*Table 406. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQWS_DEFAULT | 0 | X'00000000' |
| MQWS_CHAR | 1 | X'00000001' |
| MQWS_TOPIC | 2 | X'00000002' |

## MQWXP_* (Cluster workload exit parameter structure)

## MQWXP_* (Cluster workload exit parameter structure)

*Table 407. Structures of constants*

| Name | Structure |
|---|---|
| MQWXP_STRUC_ID | "WXP¬" |
| MQWXP_STRUC_ID_ARRAY | 'W','X','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 408. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQWXP_VERSION_1 | 1 | X'00000001' |
| MQWXP_VERSION_2 | 2 | X'00000002' |
| MQWXP_VERSION_3 | 3 | X'00000003' |
| MQWXP_VERSION_4 | 4 | X'00000004' |
| MQWXP_CURRENT_VERSION | 4 | X'00000004' |

## MQWXP_* (Cluster Workload Flags)

*Table 409. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQWXP_PUT_BY_CLUSTER_CHL | 2 | X'00000002' |

**Related reference**

“Fields in MQWXP - Cluster workload exit parameter structure” on page 1562
Description of the fields in the MQWXP - Cluster workload exit parameter structure

## MQXACT_* (API Caller Types)

*Table 410. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXACT_EXTERNAL | 1 | X'00000001' |
| MQXACT_INTERNAL | 2 | X'00000002' |

## MQXC_* (Exit Commands)

*Table 411. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXC_MQOPEN | 1 | X'00000001' |
| MQXC_MQCLOSE | 2 | X'00000002' |
| MQXC_MQGET | 3 | X'00000003' |
| MQXC_MQPUT | 4 | X'00000004' |
| MQXC_MQPUT1 | 5 | X'00000005' |
| MQXC_MQINQ | 6 | X'00000006' |
| MQXC_MQSET | 8 | X'00000008' |
| MQXC_MQBACK | 9 | X'00000009' |
| MQXC_MQCMIT | 10 | X'0000000A' |

## MQXCC_* (Exit Responses)

*Table 412. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXCC_OK | 0 | X'00000000' |
| MQXCC_SUPPRESS_FUNCTION | -1 | X'FFFFFFFF' |
| MQXCC_SKIP_FUNCTION | -2 | X'FFFFFFFE' |
| MQXCC_SEND_AND_REQUEST_SEC_MSG | -3 | X'FFFFFFFD' |
| MQXCC_SEND_SEC_MSG | -4 | X'FFFFFFFC' |
| MQXCC_SUPPRESS_EXIT | -5 | X'FFFFFFFB' |
| MQXCC_CLOSE_CHANNEL | -6 | X'FFFFFFFA' |
| MQXCC_REQUEST_ACK | -7 | X'FFFFFFF9' |
| MQXCC_FAILED | -8 | X'FFFFFFF8' |

## MQXDR_* (Exit Response)

*Table 413. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXDR_OK | 0 | X'00000000' |
| MQXDR_CONVERSION_FAILED | 1 | X'00000001' |

## MQXE_* (Environments)

*Table 414. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXE_OTHER | 0 | X'00000000' |
| MQXE_MCA | 1 | X'00000001' |
| MQXE_MCA_SVRCONN | 2 | X'00000002' |
| MQXE_COMMAND_SERVER | 3 | X'00000003' |
| MQXE_MQSC | 4 | X'00000004' |

## MQXEPO_* (Register Entry Point Options structure and Exit Options)

### Register Entry Point Options structure

*Table 415. Structures of constants*

| Name | Structure |
|---|---|
| MQXEPO_STRUC_ID | "XEPO" |
| MQXEPO_STRUC_ID_ARRAY | 'X','E','P','O' |

**Note:** The symbol ¬ represents a single blank character.

*Table 416. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXEPO_VERSION_1 | 1 | X'00000001' |
| MQXEPO_CURRENT_VERSION | 1 | X'00000001' |

### Exit Options

*Table 417. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXEPO_NONE | 0 | X'00000000' |

## MQXF_* (API Function Identifiers)

*Table 418. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXF_INIT | 1 | X'00000001' |
| MQXF_TERM | 2 | X'00000002' |
| MQXF_CONN | 3 | X'00000003' |
| MQXF_CONNX | 4 | X'00000004' |
| MQXF_DISC | 5 | X'00000005' |

| Table 418. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXF_OPEN | 6 | X'00000006' |
| MQXF_CLOSE | 7 | X'00000007' |
| MQXF_PUT1 | 8 | X'00000008' |
| MQXF_PUT | 9 | X'00000009' |
| MQXF_GET | 10 | X'0000000A' |
| MQXF_DATA_CONV_ON_GET | 11 | X'0000000B' |
| MQXF_INQ | 12 | X'0000000C' |
| MQXF_SET | 13 | X'0000000D' |
| MQXF_BEGIN | 14 | X'0000000E' |
| MQXF_CMIT | 15 | X'0000000F' |
| MQXF_BACK | 16 | X'00000010' |
| MQXF_STAT | 18 | X'00000012' |
| MQXF_CB | 19 | X'00000013' |
| MQXF_CTL | 20 | X'00000014' |
| MQXF_CALLBACK | 21 | X'00000015' |
| MQXF_SUB | 22 | X'00000016' |
| MQXF_SUBRQ | 23 | X'00000017' |
| MQXF_XACLOSE | 24 | X'00000018' |
| MQXF_XACOMMIT | 25 | X'00000019' |
| MQXF_XACOMPLETE | 26 | X'0000001A' |
| MQXF_XAEND | 27 | X'0000001B' |
| MQXF_XAFORGET | 28 | X'0000001C' |
| MQXF_XAOPEN | 29 | X'0000001D' |
| MQXF_XAPREPARE | 30 | X'0000001E' |
| MQXF_XARECOVER | 31 | X'0000001F' |
| MQXF_XAROLLBACK | 32 | X'00000020' |
| MQXF_XASTART | 33 | X'00000021' |
| MQXF_AXREG | 34 | X'00000022' |
| MQXF_AXUNREG | 35 | X'00000023' |

## MQXP_* (API crossing exit parameter structure)

| Table 419. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQXP_STRUC_ID | "XP¬¬" |
| MQXP_STRUC_ID_ARRAY | 'X','P','¬','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 420. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXP_VERSION_1 | 1 | X'00000001' |

## MQXPDA_* (Problem Determination Area)

*Table 421. Constant names and values*

| Name | Value |
|---|---|
| MQXPDA_NONE | X'00...00' (48 nulls) |
| MQXPDA_NONE_ARRAY | '\0','\0',... (48 nulls) |

## MQXPT_* (Transport Types)

*Table 422. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXPT_ALL | -1 | X'FFFFFFFF' |
| MQXPT_LOCAL | 0 | X'00000000' |
| MQXPT_LU62 | 1 | X'00000001' |
| MQXPT_TCP | 2 | X'00000002' |
| MQXPT_NETBIOS | 3 | X'00000003' |
| MQXPT_SPX | 4 | X'00000004' |
| MQXPT_DECNET | 5 | X'00000005' |
| MQXPT_UDP | 6 | X'00000006' |

## MQXQH_* (Transmission queue header structure)

*Table 423. Structures of constants*

| Name | Structure |
|---|---|
| MQXQH_STRUC_ID | "XQH¬" |
| MQXQH_STRUC_ID_ARRAY | 'X','Q','H','¬' |

**Note:** The symbol ¬ represents a single blank character.

*Table 424. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXQH_VERSION_1 | 1 | X'00000001' |
| MQXQH_CURRENT_VERSION | 1 | X'00000001' |

## MQXR_* (Exit Reasons)

*Table 425. Values of constants*

| Name | Decimal value | Hexadecimal value |
|---|---|---|
| MQXR_BEFORE | 1 | X'00000001' |
| MQXR_AFTER | 2 | X'00000002' |
| MQXR_CONNECTION | 3 | X'00000003' |
| MQXR_INIT | 11 | X'0000000B' |
| MQXR_TERM | 12 | X'0000000C' |
| MQXR_MSG | 13 | X'0000000D' |
| MQXR_XMIT | 14 | X'0000000E' |
| MQXR_SEC_MSG | 15 | X'0000000F' |
| MQXR_INIT_SEC | 16 | X'00000010' |

| Table 425. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXR_RETRY | 17 | X'00000011' |
| MQXR_AUTO_CLUSSDR | 18 | X'00000012' |
| MQXR_AUTO_RECEIVER | 19 | X'00000013' |
| MQXR_CLWL_OPEN | 20 | X'00000014' |
| MQXR_CLWL_PUT | 21 | X'00000015' |
| MQXR_CLWL_MOVE | 22 | X'00000016' |
| MQXR_CLWL_REPOS | 23 | X'00000017' |
| MQXR_CLWL_REPOS_MOVE | 24 | X'00000018' |
| MQXR_END_BATCH | 25 | X'00000019' |
| MQXR_ACK_RECEIVED | 26 | X'0000001A' |
| MQXR_AUTO_SVRCONN | 27 | X'0000001B' |
| MQXR_AUTO_CLUSRCVR | 28 | X'0000001C' |
| MQXR_SEC_PARMS | 29 | X'0000001D' |

## MQXR2_* (Exit Response 2)

| Table 426. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXR2_PUT_WITH_DEF_ACTION | 0 | X'00000000' |
| MQXR2_PUT_WITH_DEF_USERID | 1 | X'00000001' |
| MQXR2_PUT_WITH_MSG_USERID | 2 | X'00000002' |
| MQXR2_USE_AGENT_BUFFER | 0 | X'00000000' |
| MQXR2_USE_EXIT_BUFFER | 4 | X'00000004' |
| MQXR2_DEFAULT_CONTINUATION | 0 | X'00000000' |
| MQXR2_CONTINUE_CHAIN | 8 | X'00000008' |
| MQXR2_SUPPRESS_CHAIN | 16 | X'00000010' |
| MQXR2_STATIC_CACHE | 0 | X'00000000' |
| MQXR2_DYNAMIC_CACHE | 32 | X'00000020' |

## MQXT_* (Exit Identifiers)

| Table 427. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXT_API_CROSSING_EXIT | 1 | X'00000001' |
| MQXT_API_EXIT | 2 | X'00000002' |
| MQXT_CHANNEL_SEC_EXIT | 11 | X'0000000B' |
| MQXT_CHANNEL_MSG_EXIT | 12 | X'0000000C' |
| MQXT_CHANNEL_SEND_EXIT | 13 | X'0000000D' |
| MQXT_CHANNEL_RCV_EXIT | 14 | X'0000000E' |
| MQXT_CHANNEL_MSG_RETRY_EXIT | 15 | X'0000000F' |
| MQXT_CHANNEL_AUTO_DEF_EXIT | 16 | X'00000010' |
| MQXT_CLUSTER_WORKLOAD_EXIT | 20 | X'00000014' |

| Table 427. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXT_PUBSUB_ROUTING_EXIT | 21 | X'00000015' |

## MQXUA_* (Exit User Area Value)

| Table 428. Constant names and values | |
|---|---|
| **Name** | **Value** |
| MQXUA_NONE | X'00...00' (16 nulls) |
| MQXUA_NONE_ARRAY | '\0','\0',... (16 nulls) |

## MQXWD_* (Exit wait descriptor structure)

| Table 429. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQXWD_STRUC_ID | "XWD¬" |
| MQXWD_STRUC_ID_ARRAY | 'X','W','D','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 430. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQXWD_VERSION_1 | 1 | X'00000001' |

## MQZAC_* (Application context structure)

| Table 431. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQZAC_STRUC_ID | "ZAC¬" |
| MQZAC_STRUC_ID_ARRAY | 'Z','A','C','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 432. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAC_VERSION_1 | 1 | X'00000001' |
| MQZAC_CURRENT_VERSION | 1 | X'00000001' |

## MQZAD_* (Authority data structure)

| Table 433. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQZAD_STRUC_ID | "ZAD¬" |
| MQZAD_STRUC_ID_ARRAY | 'Z','A','D','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 434. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAD_VERSION_1 | 1 | X'00000001' |
| MQZAD_VERSION_2 | 2 | X'00000002' |
| MQZAD_CURRENT_VERSION | 2 | X'00000002' |

## MQZAET_* (Installable Services Entity Types)

| Table 435. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAET_NONE | 0 | X'00000000' |
| MQZAET_PRINCIPAL | 1 | X'00000001' |
| MQZAET_GROUP | 2 | X'00000002' |
| MQZAET_UNKNOWN | 3 | X'00000003' |

## MQZAO_* (Installable Services Authorizations)

| Table 436. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAO_CONNECT | 1 | X'00000001' |
| MQZAO_BROWSE | 2 | X'00000002' |
| MQZAO_INPUT | 4 | X'00000004' |
| MQZAO_OUTPUT | 8 | X'00000008' |
| MQZAO_INQUIRE | 16 | X'00000010' |
| MQZAO_SET | 32 | X'00000020' |
| MQZAO_PASS_IDENTITY_CONTEXT | 64 | X'00000040' |
| MQZAO_PASS_ALL_CONTEXT | 128 | X'00000080' |
| MQZAO_SET_IDENTITY_CONTEXT | 256 | X'00000100' |
| MQZAO_SET_ALL_CONTEXT | 512 | X'00000200' |
| MQZAO_ALTERNATE_USER_AUTHORITY | 1024 | X'00000400' |
| MQZAO_PUBLISH | 2048 | X'00000800' |
| MQZAO_SUBSCRIBE | 4096 | X'00001000' |
| MQZAO_RESUME | 8192 | X'00002000' |
| MQZAO_ALL_MQI | 16383 | X'00003FFF' |
| MQZAO_CREATE | 65536 | X'00010000' |
| MQZAO_DELETE | 131072 | X'00020000' |
| MQZAO_DISPLAY | 262144 | X'00040000' |
| MQZAO_CHANGE | 524288 | X'00080000' |
| MQZAO_CLEAR | 1048576 | X'00100000' |
| MQZAO_CONTROL | 2097152 | X'00200000' |
| MQZAO_CONTROL_EXTENDED | 4194304 | X'00400000' |
| MQZAO_AUTHORIZE | 8388608 | X'00800000' |
| MQZAO_ALL_ADMIN | 16646144 | X'00FE0000' |
| MQZAO_ALL | 16662527 | X'00FE3FFF' |

| Table 436. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAO_REMOVE | 16777216 | X'01000000' |
| MQZAO_NONE | 0 | X'00000000' |

## MQZAS_* (Installable Services Service Interface Version)

| Table 437. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAS_VERSION_1 | 1 | X'00000001' |
| MQZAS_VERSION_2 | 2 | X'00000002' |
| MQZAS_VERSION_3 | 3 | X'00000003' |
| MQZAS_VERSION_4 | 4 | X'00000004' |
| MQZAS_VERSION_5 | 5 | X'00000005' |
| MQZAS_VERSION_6 | 6 | X'00000006' |

## MQZAT_* (Authentication Types)

| Table 438. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZAT_INITIAL_CONTEXT | 0 | X'00000000' |
| MQZAT_CHANGE_CONTEXT | 1 | X'00000001' |

## MQZCI_* (Installable Services Continuation Indicator)

| Table 439. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZCI_DEFAULT | 0 | X'00000000' |
| MQZCI_CONTINUE | 0 | X'00000000' |
| MQZCI_STOP | 1 | X'00000001' |

## MQZED_* (Entity data structure)

| Table 440. Structures of constants | |
|---|---|
| **Name** | **Structure** |
| MQZED_STRUC_ID | "ZED¬" |
| MQZED_STRUC_ID_ARRAY | 'Z','E','D','¬' |

**Note:** The symbol ¬ represents a single blank character.

| Table 441. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZED_VERSION_1 | 1 | X'00000001' |
| MQZED_VERSION_2 | 2 | X'00000002' |
| MQZED_CURRENT_VERSION | 2 | X'00000002' |

## MQZFP_* (Free parameters structure)

| *Table 442. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQZFP_STRUC_ID | "ZFP¬" |
| MQZFP_STRUC_ID_ARRAY | 'Z','F','P','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 443. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZFP_VERSION_1 | 1 | X'00000001' |
| MQZFP_CURRENT_VERSION | 1 | X'00000001' |

## MQZIC_* (Identity context structure)

| *Table 444. Structures of constants* | |
|---|---|
| **Name** | **Structure** |
| MQZIC_STRUC_ID | "ZIC¬" |
| MQZIC_STRUC_ID_ARRAY | 'Z','I','C','¬' |

**Note:** The symbol ¬ represents a single blank character.

| *Table 445. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZIC_VERSION_1 | 1 | X'00000001' |
| MQZIC_CURRENT_VERSION | 1 | X'00000001' |

## MQZID_* (Function ids for services)

### Function ids common to all services

| *Table 446. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZID_INIT | 0 | X'00000000' |
| MQZID_TERM | 1 | X'00000001' |

### Function ids for Authority service

| *Table 447. Values of constants* | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZID_INIT_AUTHORITY | 0 | X'00000000' |
| MQZID_TERM_AUTHORITY | 1 | X'00000001' |
| MQZID_CHECK_AUTHORITY | 2 | X'00000002' |
| MQZID_COPY_ALL_AUTHORITY | 3 | X'00000003' |
| MQZID_DELETE_AUTHORITY | 4 | X'00000004' |
| MQZID_SET_AUTHORITY | 5 | X'00000005' |
| MQZID_GET_AUTHORITY | 6 | X'00000006' |

| Table 447. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZID_GET_EXPLICIT_AUTHORITY | 7 | X'00000007' |
| MQZID_REFRESH_CACHE | 8 | X'00000008' |
| MQZID_ENUMERATE_AUTHORITY_DATA | 9 | X'00000009' |
| MQZID_AUTHENTICATE_USER | 10 | X'0000000A' |
| MQZID_FREE_USER | 11 | X'0000000B' |
| MQZID_INQUIRE | 12 | X'0000000C' |
| MQZID_CHECK_PRIVILEGED | 13 | X'0000000D' |

### Function ids for Name service

| Table 448. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZID_INIT_NAME | 0 | X'00000000' |
| MQZID_TERM_NAME | 1 | X'00000001' |
| MQZID_LOOKUP_NAME | 2 | X'00000002' |
| MQZID_INSERT_NAME | 3 | X'00000003' |
| MQZID_DELETE_NAME | 4 | X'00000004' |

### Function ids for Userid service

| Table 449. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZID_INIT_USERID | 0 | X'00000000' |
| MQZID_TERM_USERID | 1 | X'00000001' |
| MQZID_FIND_USERID | 2 | X'00000002' |

## MQZIO_* (Installable Services Initialization Options)

| Table 450. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZIO_PRIMARY | 0 | X'00000000' |
| MQZIO_SECONDARY | 1 | X'00000001' |

## MQZNS_* (Name Service Interface Version)

| Table 451. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZNS_VERSION_1 | 1 | X'00000001' |

## MQZSE_* (Installable Services Start-Enumeration Indicator)

| Table 452. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZSE_START | 1 | X'00000001' |

| Table 452. Values of constants (continued) | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZSE_CONTINUE | 0 | X'00000000' |

### MQZSL_* (Installable Services Selector Indicator)

| Table 453. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZSL_NOT_RETURNED | 0 | X'00000000' |
| MQZSL_RETURNED | 1 | X'00000001' |

### MQZTO_* (Installable Services Termination Options)

| Table 454. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZTO_PRIMARY | 0 | X'00000000' |
| MQZTO_SECONDARY | 1 | X'00000001' |

### MQZUS_* (Userid Service Interface Version)

| Table 455. Values of constants | | |
|---|---|---|
| **Name** | **Decimal value** | **Hexadecimal value** |
| MQZUS_VERSION_1 | 1 | X'00000001' |

## Data types used in the MQI

Information on the data types that can be used in the Message Queue Interface (MQI). Descriptions, fields, and language declarations for relevant languages with each data type.

### Introducing data types used in the MQI

This section introduces the data types used in the MQI, and gives you some guidance on using them in the supported programming languages.

#### *Elementary data types*

This section contains information about data types used in the MQI (or in exit functions). These are described in detail, followed by examples showing how to declare the elementary data types in the supported programming languages in the following topics.

The data types used in the MQI (or in exit functions) are either:

- Elementary data types, or
- Aggregates of elementary data types (arrays or structures)

The following elementary data types are used in the MQI (or in exit functions):

| Elementary data type name | Data type | Description |
|---|---|---|
| MQBOOL | Boolean | The MQBOOL data type represents a boolean value. The value 0 represents false. Any other value represents true. An MQBOOL must be aligned as for the MQLONG data type. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQBYTE | Byte | The MQBYTE data type represents a single byte of data. No particular interpretation is placed on the byte; it is treated as a string of bits, and not as a binary number or character. No special alignment is required.<br><br>When MQBYTE data is sent between queue managers that use different character sets or encodings, the MQBYTE data is *not* converted in any way. The *MsgId* and *CorrelId* fields in the MQMD structure are like this.<br><br>An array of MQBYTE is sometimes used to represent an area of main storage that is not known to the queue manager. For example, the area might contain application message data or a structure. The boundary alignment of this area must be compatible with the nature of the data contained within it.<br><br>In the C programming language, any data type can be used for function parameters that are shown as arrays of MQBYTE. This is because such parameters are always passed by address, and in C the function parameter is declared as a pointer-to-void. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQBYTEn | String of *n* bytes | Each MQBYTEn data type represents a string of *n* bytes, where *n* can take any of the following values: 8, 16, 24, 32, 40, or 128. Each byte is described by the MQBYTE data type. No special alignment is required.<br><br>If the data in the byte string is shorter than the defined length of the string, the data must be padded with nulls to fill the string.<br><br>When the queue manager returns byte strings to the application (for example, on the MQGET call), the queue manager pads with nulls to the defined length of the string.<br><br>Named constants are available to define the lengths of byte string fields. These are listed in "Constants" on page 61 |
| MQCHAR | Character | The MQCHAR data type represents a single-byte character, or one byte of a double-byte or multi-byte character. No special alignment is required.<br><br>When MQCHAR data is sent between queue managers that use different character sets or encodings, the MQCHAR data usually requires conversion in order for the data to be interpreted correctly. The queue manager does this automatically for MQCHAR data in the MQMD structure. Conversion of MQCHAR data in the application message data is controlled by the MQGMO_CONVERT option specified on the MQGET call; see the description of this option in "MQGMO - Get-message options" on page 355 for further details. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQCHARn | String of *n* characters | Each MQCHARn data type represents a string of *n* characters, where *n* can take any of the following values: 4, 8, 12, 20, 28, 32, 48, 64, 128, or 256. Each character is described by the MQCHAR data type. No special alignment is required.<br><br>If the data in the string is shorter than the defined length of the string, the data must be padded with blanks to fill the string. In some cases a null character can be used to end the string prematurely, instead of padding with blanks; the null character and characters following it are treated as blanks, up to the defined length of the string. The places where a null can be used are identified in the call and data type descriptions.<br><br>When the queue manager returns character strings to the application (for example, on the MQGET call), the queue manager always pads with blanks to the defined length of the string; the queue manager does not use the null character to delimit the string.<br><br>Named constants are available that define the lengths of character string fields and are listed in "Constants" on page 61. |
| MQFLOAT32 | 32-bit floating point number | The MQFLOAT32 data type is a 32-bit floating-point number represented using the standard IEEE floating-point format. An MQFLOAT32 must be aligned on a 4-byte boundary.<br><br>The use of MQFLOAT32 in C on z/OS requires the use of the FLOAT(IEEE) compiler flag.<br><br>The use of MQFLOAT32 in COBOL is limited to compilers that support floating-point numbers in IEEE format. This might require the use of the FLOAT(NATIVE) compiler flag. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQFLOAT64 | 64-bit floating point number | The MQFLOAT64 data type is a 64-bit floating-point number represented using the standard IEEE floating-point format. An MQFLOAT64 must be aligned on an 8-byte boundary.<br>The use of MQFLOAT64 in C on z/OS requires the use of the FLOAT(IEEE) compiler flag.<br>The use of MQFLOAT64 in COBOL is limited to compilers that support floating-point numbers in IEEE format. This might require the use of the FLOAT(NATIVE) compiler flag. |
| MQHCONFIG | Configuration handle | The MQHCONFIG data type represents a configuration handle, that is, the component that is being configured for a particular installable service. A configuration handle must be aligned on its natural boundary.<br>Applications must not rely on the format of the data stored inside this handle. If valid, its value is intended to be usable in further MQI calls, but is not intended to have any meaning besides that purpose. |
| MQHCONN | Connection handle | The MQHCONN data type represents a connection handle, that is, the connection to a particular queue manager. A connection handle must be aligned on a 4-byte boundary.<br>Applications must not rely on the format of the data stored inside this handle. If valid, its value is intended to be usable in further MQI calls, but is not intended to have any meaning besides that purpose. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQHMSG | Message handle | The MQHMSG data type represents a message handle that gives access to a message. A message handle must be aligned on an 8-byte boundary.<br><br>Applications must not rely on the format of the data stored inside this handle. If valid, its value is intended to be usable in further MQI calls, but is not intended to have any meaning besides that purpose. |
| MQHOBJ | Object handle | The MQHOBJ data type represents an object handle that gives access to an object. An object handle must be aligned on a 4-byte boundary.<br><br>Applications must not rely on the format of the data stored inside this handle. If valid, its value is intended to be usable in further MQI calls, but is not intended to have any meaning besides that purpose. |
| MQINT8 | 8-bit signed integer | The MQINT8 data type is an 8-bit signed integer that can take any value in the range -128 to +127, unless otherwise restricted by the context. |
| MQINT16 | 16-bit signed integer | The MQINT16 data type is a 16-bit signed integer that can take any value in the range -32 768 to +32 767, unless otherwise restricted by the context. An MQINT16 must be aligned on a 2-byte boundary. |
| MQINT32 | 32-bit signed integer | The MQINT32 data type is a 32-bit signed binary integer that can take any value in the range -2 147 483 648 through +2 147 483 647, unless otherwise restricted by the context.<br><br>See the definition of MQLONG. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQINT64 | 64-bit signed integer | The MQINT64 data type is a 64-bit signed integer that can take any value in the range -9 223 372 036 854 775 808 through +9 223 372 036 854 775 807, unless otherwise restricted by the context.<br>For COBOL, the valid range is limited to -999 999 999 999 999 999 through +999 999 999 999 999 999. A 64-bit integer must be aligned on an 8-byte boundary. |
| MQLONG | 32-bit signed integer | The MQLONG data type is a 32-bit signed binary integer that can take any value in the range -2 147 483 648 through +2 147 483 647, unless otherwise restricted by the context.<br>For COBOL, the valid range is limited to -999 999 999 through +999 999 999. An MQLONG must be aligned on a 4-byte boundary. |
| MQPID | Process identifier | The IBM MQ process identifier.<br>This is the same identifier used in MQ trace and FFST™ dumps, but might be different from the operating system process identifier. |
| MQPTR | Pointer | The MQPTR data type is the address of data of any type. A pointer must be aligned on its natural boundary; this is a 16-byte boundary on IBM i, and an 8-byte boundary on other platforms.<br>Some programming languages support typed pointers; the MQI also uses these in a few cases (for example, PMQCHAR and PMQLONG in the C programming language). |
| MQTID | Thread identifier | The IBM MQ thread identifier.<br>This is the same identifier used in MQ trace and FFST™ dumps, but might be different from the operating system thread identifier. |

| Elementary data type name | Data type | Description |
|---|---|---|
| MQUINT8 | 8-bit unsigned integer | The MQUINT8 data type is an 8-bit unsigned integer that can take any value in the range 0 to +255, unless otherwise restricted by the context. |
| MQUINT16 | 16-bit unsigned integer | The MQUINT16 data type is a 16-bit unsigned integer that can take any value in the range 0 through +65 535, unless otherwise restricted by the context. An MQUINT16 must be aligned on a 2-byte boundary. |
| MQUINT32 | 32-bit unsigned integer | The MQUINT32 data type is a 32-bit unsigned binary integer.<br>See the definition of MQULONG. |
| MQUINT64 | 64-bit unsigned integer | The MQINT64 data type is a 64-bit unsigned integer that can take any value in the range 0 through +18 446 744 073 709 551 615, unless otherwise restricted by the context.<br>For COBOL, the valid range is limited to 0 through +999 999 999 999 999 999. A 64-bit integer must be aligned on an 8-byte boundary. |
| MQULONG | 32-bit unsigned integer | The MQULONG data type is a 32-bit unsigned binary integer that can take any value in the range 0 through +4 294 967 294, unless otherwise restricted by the context.<br>For COBOL, the valid range is limited to 0 through +999 999 999. An MQULONG must be aligned on a 4-byte boundary. |
| PMQACH | Pointer | Pointer to a data structure of type MQACH |
| PMQAIR | Pointer | Pointer to a data structure of type MQAIR |
| PMQAXC | Pointer | Pointer to a data structure of type MQAXC |
| PMQAXP | Pointer | Pointer to a data structure of type MQAXP |
| PMQBMHO | Pointer | Pointer to a data structure of type MQBMHO |

| Elementary data type name | Data type | Description |
|---|---|---|
| PMQBO | Pointer | Pointer to a data structure of type MQBO |
| PMQBOOL | Pointer | Pointer to data of type MQBOOL |
| PMQBYTE | Pointer | Pointer to data of type MQBYTE |
| PMQBYTEn | Pointer | Pointer to data of type MQBYTEn, where n can be 8, 16, 24, 32, 40, 128 |
| PMQCBC | Pointer | Pointer to a data structure of type MQCBC |
| PMQCBD | Pointer | Pointer to a data structure of type MQCBD |
| PMQCHAR | Pointer | Pointer to data of type MQCHAR |
| PMQCHARN | Pointer | Pointer to a data type of MQCHARN, where n can be 4, 8, 12, 20, 28, 32, 48, 64, 128, 256, 264 |
| PMQCHARV | Pointer | Pointer to a data structure of type MQCHARV |
| PMQCIH | Pointer | Pointer to a data structure of type MQCIH |
| PMQCMHO | Pointer | Pointer to a data structure of type MQCMHO |
| PMQCNO | Pointer | Pointer to a data structure of type MQCNO |
| PMQCSP | Pointer | Pointer to a data structure of type MQCSP |
| PMQCTLO | Pointer | Pointer to a data structure of type MQCTLO |
| PMQDH | Pointer | Pointer to a data structure of type MQDH |
| PMQDHO | Pointer | Pointer to a data structure of type MQDHO |
| PMQDLH | Pointer | Pointer to a data structure of type MQDLH |
| PMQDMHO | Pointer | Pointer to a data structure of type MQDMHO |
| PMQDMPO | Pointer | Pointer to a data structure of type MQDMPO |
| PMQEPH | Pointer | Pointer to a data structure of type MQEPH |
| PMQFLOAT32 | Pointer | Pointer to a data structure of type MQFLOAT32 |

| Elementary data type name | Data type | Description |
|---|---|---|
| PMQFLOAT64 | Pointer | Pointer to a data structure of type MQFLOAT64 |
| PMQFUNC | Pointer | Pointer to a function |
| PMQGMO | Pointer | Pointer to a data structure of type MQGMO |
| PMQHCONFIG | Pointer | Pointer to data of type MQHCONFIG |
| PMQHCONN | Pointer | Pointer to data of type MQHCONN |
| PMQHMSG | Pointer | Pointer to data of type MQHMSG |
| PMQHOBJ | Pointer | Pointer to data of type MQHOBJ |
| PMQIIH | Pointer | Pointer to a data structure of type MQIIH |
| PMQIMPO | Pointer | Pointer to a data structure of type MQIMPO |
| PMQINT8 | Pointer | Pointer to data of type MQINT8 |
| PMQINT16 | Pointer | Pointer to data of type MQINT16 |
| PMQINT32 | Pointer | Pointer to data of type MQINT32 |
| PMQINT64 | Pointer | Pointer to data of type MQINT64 |
| PMQLONG | Pointer | Pointer to data of type MQLONG |
| PMQMD | Pointer | Pointer to structure of type MQMD |
| PMQMDE | Pointer | Pointer to a data structure of type MQMDE |
| PMQMD1 | Pointer | Pointer to a data structure of type MQMD1 |
| PMQMD2 | Pointer | Pointer to a data structure of type MQMD2 |
| PMQMHBO | Pointer | Pointer to a data structure of type MQMHBO |
| PMQOD | Pointer | Pointer to a data structure of type MQOD |
| PMQOR | Pointer | Pointer to a data structure of type MQOR |
| PMQPD | Pointer | Pointer to a data structure of type MQPD |
| PMQPID | Pointer | Pointer to a process identifier |
| PMQMD | Pointer | Pointer to a data structure of type MQMD |
| PMQPMO | Pointer | Pointer to a data structure of type MQPMO |

| Elementary data type name | Data type | Description |
|---|---|---|
| PMQPTR | Pointer | Pointer to data of type MQPTR |
| PMQRFH | Pointer | Pointer to a data structure of type MQRFH |
| PMQRFH2 | Pointer | Pointer to a data structure of type MQRFH2 |
| PMQRMH | Pointer | Pointer to a data structure of type MQRMH |
| PMQRR | Pointer | Pointer to a data structure of type MQRR |
| PMQSCO | Pointer | Pointer to a data structure of type MQSCO |
| PMQSD | Pointer | Pointer to a data structure of type MQSD |
| PMQSMPO | Pointer | Pointer to a data structure of type MQSMPO |
| PMQSRO | Pointer | Pointer to a data structure of type MQSRO |
| PMSSTS | Pointer | Pointer to a data structure of type MQSTS |
| PMQTID | Pointer | Pointer to a thread ID |
| PMQTM | Pointer | Pointer to a data structure of type MQTM |
| PMQTMC2 | Pointer | Pointer to a data structure of type MQTMC2 |
| PMQUINT8 | Pointer | Pointer to a data type of MQUINT8 |
| PMQUINT16 | Pointer | Pointer to a data type of MQUINT16 |
| PMQUINT32 | Pointer | Pointer to a data type of MQUINT32 |
| PMQUINT64 | Pointer | Pointer to a data type of MQUINT64 |
| PMQULONG | Pointer | Pointer to a data type of MQULONG |
| PMQVOID | Pointer | |
| PMQWIH | Pointer | Pointer to a data structure of type MQWIH |
| PMQXQH | Pointer | Pointer to a data structure of type MQXQH |

*C declarations*

| Data type | Representation |
|---|---|
| MQBOOL | `typedef MQLONG MQBOOL;` |
| MQBYTE | `typedef unsigned char MQBYTE;` |
| MQBYTE8 | `typedef MQBYTE MQBYTE8[8];` |
| MQBYTE16 | `typedef MQBYTE MQBYTE16[16];` |
| MQBYTE24 | `typedef MQBYTE MQBYTE24[24];` |
| MQBYTE32 | `typedef MQBYTE MQBYTE32[32];` |
| MQBYTE40 | `typedef MQBYTE MQBYTE40[40];` |
| MQCHAR | `typedef char MQCHAR;` |
| MQCHAR4 | `typedef MQCHAR MQCHAR4[4];` |
| MQCHAR8 | `typedef MQCHAR MQCHAR8[8];` |
| MQCHAR12 | `typedef MQCHAR MQCHAR12[12];` |
| MQCHAR20 | `typedef MQCHAR MQCHAR20[20];` |
| MQCHAR28 | `typedef MQCHAR MQCHAR28[28];` |
| MQCHAR32 | `typedef MQCHAR MQCHAR32[32];` |
| MQCHAR48 | `typedef MQCHAR MQCHAR48[48];` |
| MQCHAR64 | `typedef MQCHAR MQCHAR64[64];` |

| Data type | Representation |
| --- | --- |
| MQCHAR128 | `typedef MQCHAR MQCHAR128[128];` |
| MQCHAR256 | `typedef MQCHAR MQCHAR256[256];` |
| MQFLOAT32 | `typedef float MQFLOAT32;` |
| MQFLOAT64 | `typedef double MQFLOAT64;` |
| MQHCONFIG | `typedef void MQPOINTER MQHCONFIG;` |
| MQHCONN | `typedef MQLONG MQHCONN;` |
| MQHOBJ | `typedef MQLONG MQHOBJ;` |
| MQINT8 | `typedef signed char MQINT8;` |
| MQINT16 | `typedef short MQINT16;` |
| MQINT64 | On 64-bit UNIX systems:<br>`typedef long;`<br>On 32-bit AIX, Solaris, and HP-UX:<br>`typedef int64_t;`<br>On IBM i, Linux, and z/OS:<br>`typedef long long;`<br>On Windows:<br>`typedef _int64;` |

| Data type | Representation |
| --- | --- |
| MQLONG | On IBM i:<br>`typedef long MQLONG;`<br>other platforms:<br>`if defined(MQ_64_BIT)`<br>`    typedef int MQLONG;`<br>`else`<br>`    typedef long MQLONG;` |
| MQPID | `typedef MQLONG MQPID;` |
| MQPTR | `typedef void MQPOINTER MQPTR;` |
| MQTID | `typedef MQLONG MQTID;` |
| MQUINT8 | `typedef unsigned char MQUINT8;` |
| MQUINT16 | `typedef unsigned short MQUINT16;` |
| MQUINT64 | On 64-bit UNIX systems:<br>`typedef unsigned long;`<br>On 32-bit AIX, Solaris, and HP-UX:<br>`typedef uint64_t;`<br>On IBM i, Linux, and z/OS:<br>`typedef unsigned long long;`<br>On Windows:<br>`typedef unsigned _int64;` |
| MQULONG | On IBM i:<br>`typedef unsigned long MQULONG;`<br>other platforms:<br>`if defined(MQ_64_BIT)`<br>`    typedef unsigned int MQULONG;`<br>`else`<br>`    typedef unsigned long MQULONG;` |

| Data type | Representation |
| --- | --- |
| PMQBO | `typedef MQBO MQPOINTER PMQBO;` |
| PMQBOOL | `typedef MQBOOL MQPOINTER PMQBOOL;` |
| PMQBYTE | `typedef MQBYTE MQPOINTER PMQBYTE;` |
| PMQBYTE8 | `typedef MQBYTE8[8] MQPOINTER PMQBYTE8[8];` |
| PMQBYTE16 | `typedef MQBYTE16[16] MQPOINTER PMQBYTE16[16];` |
| PMQBYTE24 | `typedef MQBYTE24[24] MQPOINTER PMQBYTE24[24];` |
| PMQBYTE32 | `typedef MQBYTE32[32] MQPOINTER PMQBYTE32[32];` |
| PMQBYTE40 | `typedef MQBYTE40[40] MQPOINTER PMQBYTE40[40];` |
| PMQBYTE128 | `typedef MQBYTE128[128] MQPOINTER PMQBYTE128[128];` |
| PMQCHAR | `typedef MQCHAR MQPOINTER PMQCHAR;` |
| PMQCHAR4 | `typedef MQCHAR4[4] MQPOINTER PMQCHAR4[4];` |
| PMQCHAR8 | `typedef MQCHAR8[8] MQPOINTER PMQCHAR8[8];` |
| PMQCHAR12 | `typedef MQCHAR12[12] MQPOINTER PMQCHAR12[12];` |
| PMQCHAR20 | `typedef MQCHAR20[20] MQPOINTER PMQCHAR20[20];` |
| PMQCHAR28 | `typedef MQCHAR28[28] MQPOINTER PMQCHAR28[28];` |
| PMQCHAR32 | `typedef MQCHAR32[32] MQPOINTER PMQCHAR32[32];` |
| PMQCHAR48 | `typedef MQCHAR48[48] MQPOINTER PMQCHAR48[48];` |

| Data type | Representation |
| --- | --- |
| PMQCHAR64 | `typedef MQCHAR64[64] MQPOINTER PMQCHAR64[64];` |
| PMQCHAR128 | `typedef MQCHAR128[128] MQPOINTER PMQCHAR128[128];` |
| PMQCHAR256 | `typedef MQCHAR256[256] MQPOINTER PMQCHAR256[256];` |
| PMQCHAR264 | `typedef MQCHAR264[264] MQPOINTER PMQCHAR264[264];` |
| PMQCIH | `typedef MQCIH MQPOINTER PMQCIH;` |
| PMQCNO | `typedef MQCNO MQPOINTER PMQCNO;` |
| PMQDLH | `typedef MQDLH MQPOINTER PMQDLH;` |
| PMQFUNC | `typedef void MQPOINTER PMQFUNC;` |
| PMQFLOAT32 | `typedef MQFLOAT32 MQPOINTER PMQFLOAT32;` |
| PMQFLOAT64 | `typedef MQFLOAT64 MQPOINTER PMQFLOAT64;` |
| PMQGMO | `typedef MQGMO MQPOINTER PMQGMO;` |
| PMQHCONFIG | `typedef MQHCONFIG MQPOINTER PMQHCONFIG;` |
| PMQHCONN | `typedef MQHCONN MQPOINTER PMQHCONN;` |
| PMQHOBJ | `typedef MQHOBJ MQPOINTER PMQHOBJ;` |
| PMQIIH | `typedef MQIIH MQPOINTER PMQIIH;` |
| PMQINT8 | `typedef MQINT8 MQPOINTER PMQINT8;` |
| PMQINT16 | `typedef MQINT16 MQPOINTER PMQINT16;` |

| Data type | Representation |
| --- | --- |
| PMQLONG | `typedef MQLONG MQPOINTER PMQLONG;` |
| PMQMD | `typedef MQMD MQPOINTER PMQMD;` |
| PMQMD1 | `typedef MQMD1[1] MQPOINTER PMQMD1[1];` |
| PMQMDE | `typedef MQMDE MQPOINTER PMQMDE;` |
| PMQOD | `typedef MQOD MQPOINTER PMQOD;` |
| PMQPMO | `typedef MQPMO MQPOINTER PMQPMO;` |
| PMQPTR | `typedef MQPTR MQPOINTER PMQPTR;` |
| PMQRFH | `typedef MQRFH MQPOINTER PMQRFH;` |
| PMQRFH2 | `typedef MQRFH2[2] MQPOINTER PMQRFH2[2];` |
| PMQRMH | `typedef MQRMH MQPOINTER PMQRMH;` |
| PMQTM | `typedef MQTM MQPOINTER PMQTM;` |
| PMQTMC2 | `typedef MQTMC2[2] MQPOINTER PMQTMC2[2];` |
| PMQUINT8 | `typedef MQUINT8 MQPOINTER PMQUINT8;` |
| PMQUINT16 | `typedef MQUINT16 MQPOINTER PMQUINT16;` |
| PMQULONG | `typedef MQULONG MQPOINTER PMQULONG;` |
| PMQVOID | `typedef void MQPOINTER PMQVOID;` |
| PMQWIH | `typedef MQWIH MQPOINTER PMQWIH;` |

| Data type | Representation |
|---|---|
| PMQXQH | `typedef MQXQH MQPOINTER PMQXQH;` |
| PPMQBO | `typedef PMQBO MQPOINTER PPMQBO;` |
| PPMQBYTE | `typedef PMQBYTE MQPOINTER PPMQBYTE;` |
| PPMQCHAR | `typedef PMQCHAR MQPOINTER PPMQCHAR;` |
| PPMQCNO | `typedef PMQCNO MQPOINTER PPMQCNO;` |
| PPMQGMO | `typedef PMQGMO MQPOINTER PPMQGMO;` |
| PPMQHCONN | `typedef PMQHCONN MQPOINTER PPMQHCONN;` |
| PPMQHOBJ | `typedef PMQHOBJ MQPOINTER PPMQHOBJ;` |
| PPMQLONG | `typedef PMQLONG MQPOINTER PPMQLONG;` |
| PPMQMD | `typedef PMQMD MQPOINTER PPMQMD;` |
| PPMQOD | `typedef PMQOD MQPOINTER PPMQOD;` |
| PPMQPMO | `typedef PMQPMO MQPOINTER PPMQPMO;` |
| PPMQULONG | `typedef PMQULONG MQPOINTER PPMQULONG;` |
| PPMQVOID | `typedef PMQVOID MQPOINTER PPMQVOID;` |
| Where `defined(MQ_64_BIT)` means a 64 bit platform. | |

See “Data types” on page 259 for a description of the MQPOINTER macro variable.

*COBOL declarations*

| Data type | Representation |
|---|---|
| MQBOOL | `PIC S9(9) BINARY` |
| MQBYTE | `PIC X` |
| MQBYTE8 | `PIC X(8)` |
| MQBYTE16 | `PIC X(16)` |
| MQBYTE24 | `PIC X(24)` |
| MQBYTE32 | `PIC X(32)` |
| MQBYTE40 | `PIC X(40)` |
| MQCHAR | `PIC X` |
| MQCHAR4 | `PIC X(4)` |
| MQCHAR8 | `PIC X(8)` |
| MQCHAR12 | `PIC X(12)` |
| MQCHAR20 | `PIC X(20)` |
| MQCHAR28 | `PIC X(28)` |
| MQCHAR32 | `PIC X(32)` |
| MQCHAR48 | `PIC X(48)` |
| MQCHAR64 | `PIC X(64)` |

| Data type | Representation |
| --- | --- |
| MQCHAR128 | `PIC X(128)` |
| MQCHAR256 | `PIC X(256)` |
| MQFLOAT32 | `USAGE COMP-1` |
| MQFLOAT64 | `USAGE COMP-2` |
| MQHCONN | `PIC S9(9) BINARY` |
| MQHOBJ | `PIC S9(9) BINARY` |
| MQINT8 | `PIC S9(2) BINARY` |
| MQINT16 | `PIC S9(4) BINARY` |
| MQINT64 | `PIC S9(18) BINARY` |
| MQLONG | `PIC S9(9) BINARY` |
| MQPTR | `POINTER` |
| MQUINT8 | `PIC 9(2) BINARY` |
| MQUINT16 | `PIC 9(4) BINARY` |
| MQUINT64 | `PIC 9(18) BINARY` |
| MQULONG | `PIC 9(9) BINARY` |

*PL/I declarations*
PL/I is supported on z/OS.

| Data type | Representation |
| --- | --- |
| MQBOOL | `fixed bin(31)` |
| MQBYTE | `char(1)` |
| MQBYTE8 | `char(8)` |
| MQBYTE16 | `char(16)` |
| MQBYTE24 | `char(24)` |
| MQBYTE32 | `char(32)` |
| MQBYTE40 | `char(40)` |
| MQCHAR | `char(1)` |
| MQCHAR4 | `char(4)` |
| MQCHAR8 | `char(8)` |
| MQCHAR12 | `char(12)` |
| MQCHAR20 | `char(20)` |
| MQCHAR28 | `char(28)` |
| MQCHAR32 | `char(32)` |
| MQCHAR48 | `char(48)` |
| MQCHAR64 | `char(64)` |
| MQCHAR128 | `char(128)` |

| Data type | Representation |
|---|---|
| MQCHAR256 | `char(256)` |
| MQFLOAT32 | `binary float(21) ieee` |
| MQFLOAT64 | `binary float(52) ieee` |
| MQHCONN | `fixed bin(31)` |
| MQHOBJ | `fixed bin(31)` |
| MQINT8 | `fixed bin(7)` |
| MQINT16 | `fixed bin(15)` |
| MQINT64 | `fixed bin(63)` |
| MQLONG | `fixed bin(31)` |
| MQPTR | `pointer` |
| MQUINT8 | `fixed bin(8)` |
| MQUINT16 | `fixed bin(16)` |
| MQUINT64 | `fixed bin(64)` |
| MQULONG | `fixed bin(32)` |

*System/390 assembler declarations*
System/390 assembler is supported on z/OS only.

| Data type | Representation |
|---|---|
| MQBOOL | `DS  F` |

| Data type | Representation |
| --- | --- |
| MQBYTE | `DS XL1` |
| MQBYTE8 | `DS XL8` |
| MQBYTE16 | `DS XL16` |
| MQBYTE24 | `DS XL24` |
| MQBYTE32 | `DS XL32` |
| MQBYTE40 | `DS XL40` |
| MQCHAR | `DS CL1` |
| MQCHAR4 | `DS CL4` |
| MQCHAR8 | `DS CL8` |
| MQCHAR12 | `DS CL12` |
| MQCHAR20 | `DS CL20` |
| MQCHAR28 | `DS CL28` |
| MQCHAR32 | `DS CL32` |
| MQCHAR48 | `DS CL48` |
| MQCHAR64 | `DS CL64` |
| MQCHAR128 | `DS CL128` |
| MQCHAR256 | `DS CL256` |

| Data type | Representation |
|---|---|
| MQFLOAT32 | `DS EB` |
| MQFLOAT64 | `DS DB` |
| MQHCONN | `DS F` |
| MQHOBJ | `DS F` |
| MQINT8 | `DS XL1` |
| MQINT16 | `DS H` |
| MQINT64 | `DS D` |
| MQLONG | `DS F` |
| MQPTR | `DS F` |
| MQUINT8 | `DS XL1` |
| MQUINT16 | `DS H` |
| MQUINT64 | `DS D` |
| MQULONG | `DS F` |

## *Structure data types - introduction*

This section introduces the structure data types used in the MQI. The structure data types themselves are described in subsequent sections.

*Summary*

The following tables summarize the structure data types used in the MQI.

*Table 456. Structure data types used on MQI calls (or exit functions):*

| Structure | Description | Calls where used |
|---|---|---|
| MQACH | API exit chain header | |

| *Table 456. Structure data types used on MQI calls (or exit functions): (continued)* | | |
|---|---|---|
| **Structure** | **Description** | **Calls where used** |
| MQAIR | Authentication information record | MQCONNX |
| MQAXC | API exit context | |
| MQAXP | API exit parameter | |
| MQBMHO | Buffer to message handle options | MQBUFMH |
| MQBO | Begin options | MQBEGIN |
| MQCBD | Callback descriptor | MQCB |
| MQCBO | Create-bag options | mqCreateBag |
| MQCHARV | Variable length string | MQINQMP |
| MQCNO | Connect options | MQCONNX |
| MQCSP | Security parameters | MQCONNX |
| MQCTLO | Callback options | MQCTL |
| MQDMPO | Delete message property options | MQDLTMP |
| MQGMO | Get-message options | MQGET |
| MQIMPO | Inquire message property options | MQINQMP |
| MQMD | Message descriptor | MQBUFMH, MQMHBUF, MQCB, MQGET, MQPUT, MQPUT1 |
| MQMHBO | Message handle to buffer options | MQMHBUF |
| MQOD | Object descriptor | MQOPEN, MQPUT1 |
| MQOR | Object record | MQOPEN, MQPUT1 |
| MQPD | Property descriptor | MQSETMP |
| MQPMO | Put-message options | MQPUT, MQPUT1 |
| MQPMR | Put-message record | MQPUT, MQPUT1 |
| MQRR | Response record | MQOPEN, MQPUT, MQPUT1 |
| MQSCO | SSL configuration options | MQCONNX |
| MQSD | Subscription descriptor | MQSUB |
| MQSMPO | Set message property option | MQSETMP |
| MQSRO | Subscription request options | MQSUBRQ |
| MQSTS | Status reporting structure | MQSTAT |

| *Table 457. Structure data types used in message data:* | |
|---|---|
| **Structure** | **Description** |
| MQCIH | CICS information header |

| Table 457. Structure data types used in message data: (continued) | |
|---|---|
| **Structure** | **Description** |
| MQCFH | PCF header |
| MQEPH | Embedded PCF header |
| MQDH | Distribution header |
| MQDLH | Dead letter (undelivered message) header |
| MQIIH | IMS information header |
| MQMDE | Message descriptor extension |
| MQRFH | Rules and formatting header |
| MQRFH2 | Rules and formatting header 2 |
| MQRMH | Reference message header |
| MQTM | Trigger message |
| MQTMC2 | Trigger message (character format 2) |
| MQWIH | Work information header |
| MQXQH | Transmission queue header |

**Note:** The MQDXP structure (data conversion exit parameter) is described in "Data-conversion exit" on page 879, together with the associated data conversion calls.

*Rules for structure data types*

Programming languages vary in their level of support for structures, and certain rules and conventions are adopted to map the MQI structures consistently in each programming language:

1. Structures must be aligned on their natural boundaries.
   - Most MQI structures require 4-byte alignment.
   - On IBM i, structures containing pointers require 16-byte alignment; these are: MQCNO, MQOD, MQPMO.
2. Each field in a structure must be aligned on its natural boundary.
   - Fields with data types that equate to MQLONG must be aligned on 4-byte boundaries.
   - Fields with data types that equate to MQPTR must be aligned on 16-byte boundaries on IBM i, and 4-byte boundaries in other environments.
   - Other fields are aligned on 1-byte boundaries.
3. The length of a structure must be a multiple of its boundary alignment.
   - Most MQI structures have lengths that are multiples of 4 bytes.
   - On IBM i, structures containing pointers have lengths that are multiples of 16 bytes.
4. Where necessary, padding bytes or fields must be added to ensure compliance with the preceding rules.

*Conventions used in the descriptions*

The description of each structure data type includes:

- An overview of the purpose and use of the structure
- Descriptions of the fields in the structure, in a form that is independent of the programming language
- Examples of how the structure is declared in each of the supported programming languages

The description of each structure data type contains the following sections:

**Structure name**
The name of the structure, followed by a summary of the fields in the structure.

**Overview**
A brief description of the purpose and use of the structure.

**Fields**
Descriptions of the fields. For each field, the name of the field is followed by its elementary data type in parentheses ( ). In text, field names are shown using an italic typeface; for example *Version*.

There is also a description of the purpose of the field, together with a list of any values that the field can take. Names of constants are shown in uppercase; for example MQGMO_STRUC_ID. A set of constants having the same prefix is shown using the * character, for example: MQIA_*.

In the descriptions of the fields, the following terms are used:

**input**
You supply information in the field when you make a call.

**output**
The queue manager returns information in the field when the call completes or fails.

**input/output**
You supply information in the field when you make a call, and the queue manager changes the information when the call completes or fails.

**Initial values**
A table showing the initial values for each field in the data definition files supplied with the MQI.

**C declaration**
Typical declaration of the structure in C.

**COBOL declaration**
Typical declaration of the structure in COBOL.

**PL/I declaration**
Typical declaration of the structure in PL/I.

**System/390 assembler declaration**
Typical declaration of the structure in System/390 assembler language.

**Visual Basic declaration**
Typical declaration of the structure in Visual Basic.

## *C programming*

This section contains information to help you use the MQI from the C programming language.

*Header files*

Header files are provided to help you write C application programs that use the MQI.

These header files are summarized in Table 458 on page 258.

*Table 458. C header files*

| File | Contents |
|---|---|
| CMQC | Function prototypes, data types, and named constants for the main MQI |
| CMQXC | Function prototypes, data types, and named constants for the data conversion exit |
| CMQEC | Function prototypes, data types, and named constants for the main MQI, data conversion exit and Interface Entry Points structure (CMQEC includes CMQXC and CMQC.) |

| Table 458. C header files (continued) | |
|---|---|
| **File** | **Contents** |
| CMQSTRC | Functions that convert MQI constant definitions to the text equivalent.<br> **Attention:** z/OS Not applicable to z/OS. |

To improve the portability of applications, code the name of the header file in lowercase on the `#include` preprocessor directive:

```
#include "cmqec.h"
```

*Functions*
You do not need to specify all parameters that are passed by address every time you invoke a function.

- Pass parameters that are *input-only* and of type MQHCONN, MQHOBJ, or MQLONG by value.
- Pass all other parameters by address.

Where a particular parameter is not required, use a null pointer as the parameter on the function invocation, in place of the address of the parameter data. Parameters for which this is possible are identified in the call descriptions.

No parameter is returned as the value of the function; in C terminology, this means that all functions return `void` .

The attributes of the function are defined by the MQENTRY macro variable; the value of this macro variable depends on the environment.

*Parameters with undefined data type*

The *`Buffer`* parameter on the MQGET, MQPUT, and MQPUT1 functions has an undefined data type. This parameter is used to send and receive the application's message data.

Parameters of this sort are shown in the C examples as arrays of MQBYTE. You can declare the parameters in this way, but it is usually more convenient to declare them as the particular structure that describes the layout of the data in the message. Declare the actual function parameter as a pointer-to-void, and specify the address of any sort of data as the parameter on the function invocation.

*Data types*

Define all data types using the C `typedef` statement. For each data type, also define the corresponding pointer data type. The name of the pointer data type is the name of the elementary or structure data type prefixed with the letter P to denote a pointer. Define the attributes of the pointer using the MQPOINTER macro variable; the value of this macro variable depends on the environment. The following illustrates how to declare pointer data types:

```
#define MQPOINTER *               /* depends on environment */
...
typedef MQLONG MQPOINTER PMQLONG;  /* pointer to MQLONG */
typedef MQMD   MQPOINTER PMQMD;    /* pointer to MQMD */
```

*Manipulating binary strings*
Declare strings of binary data as one of the MQBYTEn data types.

Whenever you copy, compare, or set fields of this type, use the C functions `memcpy` , `memcmp` , or `memset` ; for example:

```
#include <string.h>
#include "cmqc.h"
```

```
MQMD MyMsgDesc;

memcpy(MyMsgDesc.MsgId,           /* set "MsgId" field to nulls    */
       MQMI_NONE,                 /* ...using named constant      */
       sizeof(MyMsgDesc.MsgId));

memset(MyMsgDesc.CorrelId,        /* set "CorrelId" field to nulls */
       0x00,                      /* ...using a different method   */
       sizeof(MQBYTE24));
```

Do not use the string functions `strcpy` , `strcmp` , `strncpy` , or `strncmp` , because these do not work correctly for data declared with the MQBYTEn data types.

*Manipulating character strings*
When the queue manager returns character data to the application, the queue manager always pads the character data with blanks to the defined length of the field; the queue manager *does not* return null-terminated strings.

Therefore, when copying, comparing, or concatenating such strings, use the string functions `strncpy` , `strncmp` , or `strncat` .

Do not use the string functions that require the string to be terminated by a null ( `strcpy` , `strcmp` , `strcat` ). Also, do not use the function `strlen` to determine the length of the string; use instead the `sizeof` function to determine the length of the field.

*Initial values for structures*
The header files define various macro variables that you can use to provide initial values for the MQ structures when you declare instances of those structures.

These macro variables have names of the form MQxxx_DEFAULT, where MQxxx represents the name of the structure. They are used in the following way:

```
MQMD   MyMsgDesc = {MQMD_DEFAULT};
MQPMO  MyPutOpts = {MQPMO_DEFAULT};
```

For some character fields (for example, the *StrucId* fields that occur in most structures, or the *Format* field that occurs in MQMD), the MQI defines particular values that are valid. For each of the valid values, *two* macro variables are provided:

- One macro variable defines the value as a string with a length, excluding the implied null matches, exactly the defined length of the field. For example, for the *Format* field in MQMD the following macro variable is provided ( ¬ represents a blank character):

  ```
  #define MQFMT_STRING "MQSTR¬¬¬"
  ```

  Use this form with the `memcpy` and `memcmp` functions.
- The other macro variable defines the value as an array of characters; the name of this macro variable is the name of the string form suffixed with _ARRAY. For example:

  ```
  #define MQFMT_STRING_ARRAY 'M','Q','S','T','R','¬','¬','¬'
  ```

  Use this form to initialize the field when you declare an instance of the structure with values different from those provided by the MQMD_DEFAULT macro variable. (This is not always necessary; in some environments you can use the string form of the value in both situations. However, you can use the array form for declarations, because this is required for compatibility with the C++ programming language.)

*Initial values for dynamic structures*

When a variable number of instances of a structure is required, the instances are typically created in main storage obtained dynamically using the `calloc` or `malloc` functions. To initialize the fields in such structures, consider the following technique:

1. Declare an instance of the structure using the appropriate MQxxx_DEFAULT macro variable to initialize the structure. This instance becomes the model for other instances:

```
MQMD Model = {MQMD_DEFAULT}; /* declare model instance */
```

   The `static` or `auto` keywords can be coded on the declaration in order to give the model instance static or dynamic lifetime, as required.
2. Use the `calloc` or `malloc` functions to obtain storage for a dynamic instance of the structure:

```
PMQMD Instance;
Instance = malloc(sizeof(MQMD)); /* get storage for dynamic instance */
```

3. Use the `memcpy` function to copy the model instance to the dynamic instance:

```
memcpy(Instance,&Model,sizeof(MQMD)); /* initialize dynamic instance */
```

*Use from C++*

For the C++ programming language, the header files contain the following additional statements that are included only when you use a C++ compiler:

```
#ifdef __cplusplus
  extern "C" {
#endif

/* rest of header file */

#ifdef __cplusplus
  }
#endif
```

*Notational conventions*
This information shows how to invoke the functions and declare parameters.

In some cases, the parameters are arrays with a size that is not fixed. For these, a lowercase n is used to represent a numeric constant. When you code the declaration for that parameter, replace the n with the numeric value required.

## *COBOL programming*

This section contains information to help you use the MQI from the COBOL programming language.

*COPY files*
Various COPY files are provided to help you write COBOL application programs that use the MQI. There are two files containing named constants, and two files for each of the structures.

Each structure is provided in two forms: a form with initial values, and a form without:

- Use the structures with initial values in the WORKING-STORAGE SECTION of a COBOL program; they are contained in COPY files with names suffixed with the letter V (for Values).
- Use the structures without initial values in the `LINKAGE SECTION` of a COBOL program; they are contained in COPY files with names suffixed with the letter L (for Linkage).

The COPY files are summarized in Table 459 on page 261. Not all the files listed are available in all environments.

*Table 459. COBOL COPY files*

| File (with initial values) | File (without initial values) | Contents |
|---|---|---|
| CMQAIRV | CMQAIRL | Authentication information record |

| *Table 459. COBOL COPY files (continued)* | | |
|---|---|---|
| **File (with initial values)** | **File (without initial values)** | **Contents** |
| CMQBOV | CMQBOL | Begin options structure |
| CMQCIHV | CMQCIHL | CICS information header structure |
| CMQCNOV | CMQCNOL | Connect options structure |
| CMQDHV | CMQDHL | Distribution header structure |
| CMQDLHV | CMQDLHL | Dead letter header structure |
| CMQDXPV | CMQDXPL | Data conversion exit parameter structure |
| CMQGMOV | CMQGMOL | Get message options structure |
| CMQIIHV | CMQIIHL | IMS information header structure |
| CMQMDV | CMQMDL | Message descriptor structure |
| CMQMDEV | CMQMDEL | Message descriptor extension structure |
| CMQMD1V | CMQMD1L | Message descriptor structure version 1 |
| CMQODV | CMQODL | Object descriptor structure |
| CMQORV | CMQORL | Object record structure |
| CMQPMOV | CMQPMOL | Put message options structure |
| CMQRFHV | CMQRFHL | Rules and formatting header structure |
| CMQRFH2V | CMQRFH2L | Rules and formatting header structure version 2 |
| CMQRMHV | CMQRMHL | Reference message header structure |
| CMQRRV | CMQRRL | Response record structure |
| CMQSCOV | CMQSCOL | SSL configuration options |
| CMQTMV | CMQTML | Trigger message structure |
| CMQTMCV | CMQTMCL | Trigger message structure (character format) |
| CMQTMC2V | CMQTMC2L | Trigger message structure (character format) version 2 |
| CMQWIHV | CMQWIHL | Work information header structure |
| CMQXQHV | CMQXQHL | Transmission queue header structure |
| CMQV | - | Named constants for main MQI |
| CMQXV | - | Named constants for data conversion exit |
| CMQMD2V | CMQMD2L | Message descriptor structure version 2 |

*Structures*

In the COPY file, each structure declaration begins with a level-10 item; this enables you to declare several instances of the structure by coding the level-01 declaration and then using the COPY statement to copy in the remainder of the structure declaration. To refer to the appropriate instance, use the IN keyword:

```
* Declare two instances of MQMD
 01  MY-MQMD.
     COPY CMQMDV.
 01  MY-OTHER-MQMD.
```

```
     COPY CMQMDV.
*
* Set MSGTYPE field in MY-OTHER-MQMD
     MOVE MQMT-REQUEST TO MQMD-MSGTYPE IN MY-OTHER-MQMD.
```

Align the structures on appropriate boundaries. If you use the COPY statement to include a structure following an item that is not the level-01 item, ensure that the structure begins at the appropriate offset from the start of the level-01 item. Most MQI structures require 4-byte alignment; the exceptions to this are MQCNO, MQOD, and MQPMO, which require 16-byte alignment on IBM i.

In this section, the names of fields in structures are shown without a prefix. In COBOL, the field names are prefixed with the name of the structure followed by a hyphen. However, if the structure name ends with a numeric digit, indicating that the structure is a second or later version of the original structure, the numeric digit is omitted from the prefix. Field names in COBOL are shown in uppercase (although lowercase or mixed case can be used if required). For example, the field *MsgType* described in "MQMD - Message descriptor" on page 402 becomes MQMD-MSGTYPE in COBOL.

The V-suffix structures are declared with initial values for all the fields; you need to set only those fields where you want a value that is different from the supplied initial value.

*Pointers*

Some structures need to address optional data that might be discontiguous with the structure, such as the MQOR and MQRR records addressed by the MQOD structure.

To address this optional data, the structures contain fields that are declared with the pointer data type. However, COBOL does not support the pointer data type in all environments. Because of this, the optional data can also be addressed using fields that contain the offset of the data from the start of the structure.

If you want to port an application between environments, ascertain whether the pointer data type is available in all the intended environments. If it is not, the application must address the optional data using the offset fields instead of the pointer fields.

In those environments where pointers are not supported, declare the pointer fields as byte strings of the appropriate length, with the initial value being the all-null byte string. Do not alter this initial value if you are using the offset fields.

*Named constants*

In this section, the names of constants are shown containing the underscore character (_) as part of the name. In COBOL, use the hyphen character (-) in place of the underscore.

Constants that have character-string values use the single quotation mark as the string delimiter ('). In some environments, you might have to specify an appropriate compiler option to cause the compiler to accept the single quotation mark as the string delimiter in place of the double quotation mark.

The named constants are declared in the COPY files as level-10 items. To use the constants, declare the level-01 item explicitly, and then use the COPY statement to copy in the declarations of the constants:

```
* Declare a structure to hold the constants
 01  MY-MQ-CONSTANTS.
     COPY CMQV.
```

The preceding method causes the constants to occupy storage in the program even if they are not referenced. If you include the constants in many separate programs within the same run unit, multiple copies of the constants exist, consuming main storage unnecessarily. Avoid this effect by using one of the following techniques:

- Add the GLOBAL clause to the level-01 declaration:

```
* Declare a global structure to hold the constants
 01  MY-MQ-CONSTANTS GLOBAL.
     COPY CMQV.
```

This causes allocates storage for only one set of constants within the run unit. The constants, however, can be referenced by any program within the run unit, not just the program that contains the level-01 declaration.

**Note:** The GLOBAL clause is not supported in all environments.

- Manually copy into each program only those constants that are referenced by that program. Do not use the COPY statement to copy all the constants into the program.

*Notational conventions*

The latter topics in this section show how to invoke the calls and declare parameters. In some cases, the parameters are tables or character strings the size of which is not fixed. For these, a lowercase n is used to represent a numeric constant. When you code the declaration for that parameter, replace the n with the numeric value required.

## *System/390 assembler programming*

This section contains information to help to you use the MQI from the System/390 Assembler programming language.

*Macros*

Various macros are provided to help you to write assembler application programs that use the MQI.

There are two macros for named constants, and one macro for each of the structures. These files are summarized in Table 460 on page 264.

*Table 460. Assembler macros*

| File | Contents |
|---|---|
| CMQA | Named constants (equates) for main MQI |
| CMQCIHA | CICS information header structure |
| CMQCNOA | Connect options structure |
| CMQDLHA | Dead letter header structure |
| CMQDXPA | Data conversion exit parameter structure |
| CMQGMOA | Get message options structure |
| CMQIIHA | IMS information header structure |
| CMQMDA | Message descriptor structure |
| CMQMDEA | Message descriptor extension structure |
| CMQODA | Object descriptor structure |
| CMQPMOA | Put message options structure |
| CMQRFHA | Rules and formatting header structure |
| CMQRFH2A | Rules and formatting header structure version 2 |
| CMQRMHA | Reference message header structure |
| CMQTMA | Trigger message structure |
| CMQTMC2A | Trigger message structure (character format) version 2 |
| CMQVERA | Structure version control |
| CMQWIHA | Work information header structure |
| CMQXA | Named constants for data conversion exit |
| CMQXPA | API crossing exit parameter structure |

| *Table 460. Assembler macros (continued)* | |
|---|---|
| **File** | **Contents** |
| CMQXQHA | Transmission queue header structure |

*Structures*
The structures are generated by macros that have various parameters to control the action of the macro. These parameters are described in the following sections.

From time to time new versions of the MQ structures are introduced. The additional fields in a new version can cause a structure that previously was smaller than 256 bytes to become larger than 256 bytes. Because of this, write assembler instructions that are intended to copy an MQ structure, or to set an MQ structure to nulls, to work correctly with structures that might be larger than 256 bytes. Alternatively, use the DCLVER macro parameter or CMQVERA macro with the VERSION parameter to declare a specific version of the structure.

*Specifying the name of the structure*
To declare more than one instance of a structure, the macro prefixes the name of each field in the structure with a user-specifiable string and an underscore.

The string used is the label specified on the invocation of the macro. If no label is specified, the name of the structure is used to construct the prefix:

```
* Declare two object descriptors
         CMQODA  ,        Prefix used="MQOD_" (the default)
MY_MQOD  CMQODA  ,        Prefix used="MY_MQOD_"
```

The structure declarations shown in this section use the default prefix.

*Specifying the form of the structure*

Structure declarations can be generated by the macro in one of two forms, controlled by the DSECT parameter:

**DSECT=YES**
An assembler DSECT instruction is used to start a new data section; the structure definition immediately follows the DSECT statement. The label on the macro invocation is used as the name of the data section; if no label is specified, the name of the structure is used.

**DSECT=NO**
Assembler DC instructions are used to define the structure at the current position in the routine. The fields are initialized with values, which can be specified by coding the relevant parameters on the macro invocation. Fields for which no values are specified on the macro invocation are initialized with default values.

The value specified must be uppercase. If the DSECT parameter is not specified, DSECT=NO is assumed.

*Controlling the version of the structure*
By default, the macros always declare the most recent version of each structure.

Although you can use the VERSION macro parameter to specify a value for the *Version* field in the structure, that parameter defines the initial value for the *Version* field, and does not control the version of the structure actually declared. To control the version of the structure that is declared, use the DCLVER parameter:

**DCLVER=CURRENT**
The version declared is the current (most recent) version.

**DCLVER=SPECIFIED**
The version declared is the version specified by the VERSION parameter. If you omit the VERSION parameter, the default is version 1.

If you specify the VERSION parameter, the value must be a self-defining numeric constant, or the named constant for the version required (for example, MQCNO_VERSION_3). If you specify some other value, the structure is declared as if DCLVER=CURRENT had been specified, even if the value of VERSION resolves to a valid value.

The value specified must be uppercase. If you omit the DCLVER parameter, the value used is taken from the MQDCLVER global macro variable. You can set this variable using the CMQVERA macro.

*Declaring one structure embedded within another*

To declare one structure as a component of another structure, use the NESTED parameter:

**NESTED=YES**
The structure declaration is nested within another.

**NESTED=NO**
The structure declaration is not nested within another.

The value specified must be uppercase. If you omit the NESTED parameter, NESTED=NO is assumed.

*Specifying initial values for fields*
Specify the value to be used to initialize a field in a structure by coding the name of that field (without the prefix) as a parameter on the macro invocation, accompanied by the value required.

For example, to declare a message-descriptor structure with the *MsgType* field initialized with MQMT_REQUEST, and the *ReplyToQ* field initialized with the string "MY_REPLY_TO_QUEUE", use the following:

```
MY_MQMD  CMQMDA  MSGTYPE=MQMT_REQUEST,                              X
               REPLYTOQ=MY_REPLY_TO_QUEUE
```

If you specify a named constant (equate) as a value on the macro invocation, use the CMQA macro to define the named constant. Do not enclose character string values in single quotation marks.

*Controlling the listing*

Control the appearance of the structure declaration in the assembler listing using the LIST parameter:

**LIST=YES**
The structure declaration appears in the assembler listing.

**LIST=NO**
The structure declaration does not appear in the assembler listing.

The value specified must be uppercase. If you omit the LIST parameter, LIST=NO is assumed.

*CMQVERA macro*

This macro allows you to set the default value to be used for the DCLVER parameter on the structure macros. The value specified by CMQVERA is used by the structure macro only if you omit the DCLVER parameter from the invocation of the structure macro. The default value is set by coding the CMQVERA macro with the DCLVER parameter:

**DCLVER=CURRENT**
The default version is set to the current (most recent) version.

**DCLVER=SPECIFIED**
The default version is set to the version specified by the VERSION parameter.

You must specify the DCLVER parameter, and the value must be uppercase. The value set by CMQVERA remains the default value until the next invocation of CMQVERA, or the end of the assembly. If you omit CMQVERA, the default is DCLVER=CURRENT .

*Notational conventions*

Later sections show how to invoke the calls and declare parameters. In some cases, the parameters are arrays or character strings with a size that is not fixed for which, a lowercase n is used to represent a

numeric constant. When you code the declaration for that parameter, replace the n with the numeric value required.

## MQAIR - Authentication information record

The MQAIR structure represents the authentication information record.

The following table summarizes the fields in the structure.

| *Table 461. Fields in MQAIR* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| StrucId | Structure identifier | StrucId |
| Version | Structure version number | Version |
| AuthInfoType | Type of authentication information | AuthInfoType |
| AuthInfoConnName | Connection name of LDAP CRL server | AuthInfoConnName |
| LDAPUserNamePtr | Address of LDAP user name | LDAPUserNamePtr |
| LDAPUserNameOffset | Offset of LDAP user name from start of MQSCO | LDAPUserNameOffset |
| LDAPUserNameLength | Length of LDAP user name | LDAPUserNameLength |
| LDAPPassword | Password to access LDAP server | LDAPPassword |
| **Note:** The remaining fields are ignored if *Version* is less than MQAIR_VERSION_2. | | |
| OCSPResponderURL | URL at which the OCSP responder can be contacted | OCSPResponderURL |

### *Overview for MQAIR*

The MQAIR structure allows an application running as an IBM MQ MQI client to specify information about an authenticator that is to be used for the client connection. The structure is an input parameter on the MQCONNX call.

**Availability**: AIX, HP-UX, Solaris, Linux and Windows clients.

**Character set and encoding**: Data in MQAIR must be in the character set and encoding of the local queue manager; these are given by the **CodedCharSetId** queue manager attribute and MQENC_NATIVE.

### *Fields for MQAIR*

The MQAIR structure contains the following fields; the fields are described in **alphabetical order**:

*AuthInfoConnName (MQCHAR264)*
This is either the host name or the network address of a host on which the LDAP server is running. This can be followed by an optional port number, enclosed in parentheses. The default port number is 389.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. If the value is not valid, the call fails with reason code MQRC_AUTH_INFO_CONN_NAME_ERROR.

This is an input field. The length of this field is given by MQ_AUTH_INFO_CONN_NAME_LENGTH. The initial value of this field is the null string in C, and blank characters in other programming languages.

*AuthInfoType (MQLONG)*
This is the type of authentication information contained in the record.

The value can be one of the two following parameters:

**MQAIT_CRL_LDAP**
Certificate revocation checking using LDAP server.

**MQAIT_OCSP**
Certificate revocation checking using OCSP.

If the value is not valid, the call fails with reason code MQRC_AUTH_INFO_TYPE_ERROR.

This is an input field. The initial value of this field is MQAIT_CRL_LDAP.

*LDAPPassword (MQCHAR32)*
This is the password needed to access the LDAP CRL server. If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field.

If the LDAP server does not require a password, or you omit the LDAP user name, *LDAPPassword* must be null or blank. If you omit the LDAP user name and *LDAPPassword* is not null or blank, the call fails with reason code MQRC_LDAP_PASSWORD_ERROR.

This is an input field. The length of this field is given by MQ_LDAP_PASSWORD_LENGTH. The initial value of this field is the null string in C, and blank characters in other programming languages.

*LDAPUserNameLength (MQLONG)*

This is the length in bytes of the LDAP user name addressed by the *LDAPUserNamePtr* or *LDAPUserNameOffset* field. The value must be in the range zero through MQ_DISTINGUISHED_NAME_LENGTH. If the value is not valid, the call fails with reason code MQRC_LDAP_USER_NAME_LENGTH_ERR.

If the LDAP server involved does not require a user name, set this field to zero.

This is an input field. The initial value of this field is 0.

*LDAPUserNameOffset (MQLONG)*
This is the offset in bytes of the LDAP user name from the start of the MQAIR structure.

The offset can be positive or negative. The field is ignored if *LDAPUserNameLength* is zero.

You can use either *LDAPUserNamePtr* or *LDAPUserNameOffset* to specify the LDAP user name, but not both; see the description of the *LDAPUserNamePtr* field for details.

This is an input field. The initial value of this field is 0.

*LDAPUserNamePtr (PMQCHAR)*
This is the LDAP user name.

It consists of the Distinguished Name of the user who is attempting to access the LDAP CRL server. If the value is shorter than the length specified by *LDAPUserNameLength*, terminate the value with a null character, or pad it with blanks to the length *LDAPUserNameLength*. The field is ignored if *LDAPUserNameLength* is zero.

You can supply the LDAP user name in one of two ways:

- By using the pointer field *LDAPUserNamePtr*

  In this case, the application can declare a string that is separate from the MQAIR structure, and set *LDAPUserNamePtr* to the address of the string.

  Consider using *LDAPUserNamePtr* for programming languages that support the pointer data type in a fashion that is portable to different environments (for example, the C programming language).
- By using the offset field *LDAPUserNameOffset*

  In this case, the application must declare a compound structure containing the MQSCO structure followed by the array of MQAIR records followed by the LDAP user name strings, and set *LDAPUserNameOffset* to the offset of the appropriate name string from the start of the MQAIR structure. Ensure that this value is correct, and has a value that can be accommodated within

an MQLONG (the most restrictive programming language is COBOL, for which the valid range is -999 999 999 through +999 999 999).

Consider using *LDAPUserNameOffset* for programming languages that do not support the pointer data type, or that implement the pointer data type in a fashion that might not be portable to different environments (for example, the COBOL programming language).

Whichever technique is chosen, use only one of *LDAPUserNamePtr* and *LDAPUserNameOffset* ; the call fails with reason code MQRC_LDAP_USER_NAME_ERROR if both are nonzero.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

*OCSPResponderURL (MQCHAR256)*
For an MQAIR structure that represents connection details for an OCSP responder, this field contains the URL at which the responder can be contacted.

The value of this field is an HTTP URL. This field takes priority over a URL in an AuthorityInfoAccess (AIA) certificate extension.

The value is ignored unless both the following statements are true:

- The MQAIR structure is Version 2 or later (the Version field is set to MQAIR_VERSION_2 or greater).
- The AuthInfoType field is set to MQAIT_OCSP.

If the field does not contain an HTTP URL in the correct format (and is not being ignored), the MQCONNX call fails with reason code MQRC_OCSP_URL_ERROR.

This field is case-sensitive. It must start with the string http:// in lowercase. The rest of the URL might be case-sensitive, depending on the OCSP server implementation.

This field is not subject to data conversion.

*StrucId (MQCHAR4)*

The value must be:

**MQAIR_STRUC_ID**
Identifier for the authentication information record.

For the C programming language, the constant MQAIR_STRUC_ID_ARRAY is also defined; this has the same value as MQAIR_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQAIR_STRUC_ID.

*Version (MQLONG)*
The version number of the MQAIR structure.

The value must be one of the following:

**MQAIR_VERSION_1**
Version-1 authentication information record.

**MQAIR_VERSION_2**
Version-2 authentication information record.

The following constant specifies the version number of the current version:

**MQAIR_CURRENT_VERSION**
Current version of authentication information record.

This is always an input field. The initial value of this field is MQAIR_VERSION_1.

### *Initial values and language declarations for MQAIR*

*Table 462. Initial values of fields in MQAIR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| StrucId | MQAIR_STRUC_ID | 'AIR¬' |
| Version | MQAIR_VERSION_1 | 1 |
| AuthInfoType | MQAIT_CRL_LDAP | 1 |
| AuthInfoConnName | None | Null string or blanks |
| LDAPUserNamePtr | None | Null pointer or null bytes |
| LDAPUserNameOffset | None | 0 |
| LDAPUserNameLength | None | 0 |
| LDAPPassword | None | Null string or blanks |
| OCSPResponderURL | None | Null string or blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQAIR_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQAIR MyAIR = {MQAIR_DEFAULT};
```

*C declaration*

```
typedef struct tagMQAIR MQAIR;
struct tagMQAIR {
  MQCHAR4    StrucId;             /* Structure identifier */
  MQLONG     Version;             /* Structure version number */
  MQLONG     AuthInfoType;        /* Type of authentication
                                     information */
  MQCHAR264  AuthInfoConnName;    /* Connection name of CRL LDAP
                                     server */
  PMQCHAR    LDAPUserNamePtr;     /* Address of LDAP user name */
  MQLONG     LDAPUserNameOffset;  /* Offset of LDAP user name from start
                                     of MQAIR structure */
  MQLONG     LDAPUserNameLength;  /* Length of LDAP user name */
  MQCHAR32   LDAPPassword;        /* Password to access LDAP server */
  MQCHAR256  OCSPResponderURL;    /* URL of OCSP responder */

};
```

*COBOL declaration*

```
**   MQAIR structure
  10 MQAIR.
**    Structure identifier
   15 MQAIR-STRUCID            PIC X(4).
**    Structure version number
   15 MQAIR-VERSION            PIC S9(9) BINARY.
**    Type of authentication information
   15 MQAIR-AUTHINFOTYPE       PIC S9(9) BINARY.
**    Connection name of CRL LDAP server
   15 MQAIR-AUTHINFOCONNNAME   PIC X(264).
**    Address of LDAP user name
   15 MQAIR-LDAPUSERNAMEPTR    POINTER.
**    Offset of LDAP user name from start of MQAIR structure
   15 MQAIR-LDAPUSERNAMEOFFSET PIC S9(9) BINARY.
**    Length of LDAP user name
   15 MQAIR-LDAPUSERNAMELENGTH PIC S9(9) BINARY.
```

```
**    Password to access LDAP server
   15 MQAIR-LDAPPASSWORD       PIC X(32).
**    URL of OCSP responder
   15 MQAIR-OCSPRESPONDERURL   PIC X(256).
```

*Visual Basic declaration*

```
Type MQAIR
  StrucId            As String*4   'Structure identifier'
  Version            As Long       'Structure version number'
  AuthInfoType       As Long       'Type of authentication information'
  AuthInfoConnName   As String*264 'Connection name of CRL LDAP server'
  LDAPUserNamePtr    As MQPTR      'Address of LDAP user name'
  LDAPUserNameOffset As Long       'Offset of LDAP user name from start'
                                   'of MQAIR structure'
  LDAPUserNameLength As Long       'Length of LDAP user name'
  LDAPPassword       As String*32  'Password to access LDAP server'
End Type
```

## MQBMHO - Buffer to message handle options

The following table summarizes the fields in the structure. MQBMHO structure - buffer to message handle options

*Table 463. Fields in MQBMHO*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options controlling the action of MQBMHO | Options |

### *Overview for MQBMHO*

**Availability**: All. Buffer to message handle options structure - overview

**Purpose**: The MQBMHO structure allows applications to specify options that control how message handles are produced from buffers. The structure is an input parameter on the MQBUFMH call.

**Character set and encoding**: Data in MQBMHO must be in the character set of the application and encoding of the application (MQENC_NATIVE).

### *Fields for MQBMHO*

Buffer to message handle options structure - fields

The MQBMHO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*
Buffer to message handle structure - Options field

The value can be:

**MQBMHO_DELETE_PROPERTIES**
Properties that are added to the message handle are deleted from the buffer. If the call fails no properties are deleted.

Default options: If you do not need the option described, use the following option:

**MQBMHO_NONE**
No options specified.

This is always an input field. The initial value of this field is MQBMHO_DELETE_PROPERTIES.

*StrucId (MQCHAR4)*
Buffer to message handle structure - StrucId field

This is the structure identifier. The value must be:

**MQBMHO_STRUC_ID**
Identifier for buffer to message handle structure.

For the C programming language, the constant MQBMHO_STRUC_ID_ARRAY is also defined; this has the same value as MQBMHO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQBMHO_STRUC_ID.

*Version (MQLONG)*
Buffer to message handle structure - Version field

This is the structure version number. The value must be:

**MQBMHO_VERSION_1**
Version number for buffer to message handle structure.

The following constant specifies the version number of the current version:

**MQBMHO_CURRENT_VERSION**
Current version of buffer to message handle structure.

This is always an input field. The initial value of this field is MQBMHO_VERSION_1.

## *Initial values and language declarations for MQBMHO*

Buffer to message handle structure - Initial values

*Table 464. Initial values of fields in MQBMHO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQBMHO_STRUC_ID | 'BMHO' |
| *Version* | MQBMHO_VERSION_1 | 1 |
| *Options* | MQBMHO_NONE | 0 |

**Notes:**

1. In the C programming language, the macro variable MQBMHO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQBMHO MyBMHO = {MQBMHO_DEFAULT};
```

*C declaration*
Buffer to message handle structure - C language declaration

```
typedef struct tagMQBMHO MQBMHO;
struct tagMQBMHO {
  MQCHAR4  StrucId;        /* Structure identifier */
  MQLONG   Version;        /* Structure version number */
  MQLONG   Options;        /* Options that control the action of
                              MQBUFMH */
};
```

*COBOL declaration*
Buffer to message handle structure - COBOL language declaration

```
**   MQBMHO structure
  10 MQBMHO.
```

```
**    Structure identifier
   15 MQBMHO-STRUCID               PIC X(4).
**    Structure version number
   15 MQBMHO-VERSION               PIC S9(9) BINARY.
**    Options that control the action of MQBUFMH
   15 MQBMHO-OPTIONS               PIC S9(9) BINARY.
```

*PL/I declaration*
Buffer to message handle structure - PL/I language declaration

```
Dcl
 1 MQBMHO based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 Options        fixed bin(31), /* Options that control the action
                                     of MQBUFMH */
```

*High Level Assembler declaration*
Buffer to message handle structure - Assembler language declaration

```
MQBMHO                      DSECT
MQBMHO_STRUCID              DS   CL4  Structure identifier
MQBMHO_VERSION              DS   F    Structure version number
MQBMHO_OPTIONS              DS   F    Options that control the
*                                     action of MQBUFMH
MQBMHO_LENGTH               EQU  *-MQBMHO
MQBMHO_AREA                 DS   CL(MQBMHO_LENGTH)
```

## MQBO - Begin options

The following table summarizes the fields in the structure.

| *Table 465. Fields in MQBO* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options that control the action of MQBEGIN | Options |

### *Overview for MQBO*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows ; not available for IBM MQ MQI clients.

**Purpose**: The MQBO structure allows the application to specify options relating to the creation of a unit of work. The structure is an input/output parameter on the MQBEGIN call.

**Character set and encoding**: Data in MQBO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

### *Fields for MQBO*

The MQBO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*
This field is always an input field. Its initial value is MQBO_NONE.

The value must be:

**MQBO_NONE**
No options specified.

*StrucId (MQCHAR4)*
This field is always an input field. Its initial value is MQBO_STRUC_ID.

The value must be:

**MQBO_STRUC_ID**
Identifier for begin-options structure.

For the C programming language, the constant MQBO_STRUC_ID_ARRAY is also defined; this has the same value as MQBO_STRUC_ID, but is an array of characters instead of a string.

*Version (MQLONG)*
This field is always an input field. Its initial value is MQBO_VERSION_1.

The value must be:

**MQBO_VERSION_1**
Version number for begin-options structure.

The following constant specifies the version number of the current version:

**MQBO_CURRENT_VERSION**
Current version of begin-options structure.

## *Initial values and language declarations for MQBO*

*Table 466. Initial values of fields in MQBO for MQBO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQBO_STRUC_ID | 'BO¬¬' |
| *Version* | MQBO_VERSION_1 | 1 |
| *Options* | MQBO_NONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQBO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQBO MyBO = {MQBO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQBO MQBO;
struct tagMQBO {
  MQCHAR4  StrucId;  /* Structure identifier */
  MQLONG   Version;  /* Structure version number */
  MQLONG   Options;  /* Options that control the action of MQBEGIN */
};
```

*COBOL declaration*

```
**   MQBO structure
  10 MQBO.
**    Structure identifier
   15 MQBO-STRUCID PIC X(4).
**    Structure version number
   15 MQBO-VERSION PIC S9(9) BINARY.
**    Options that control the action of MQBEGIN
   15 MQBO-OPTIONS PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQBO based,
  3 StrucId char(4),       /* Structure identifier */
  3 Version fixed bin(31), /* Structure version number */
  3 Options fixed bin(31); /* Options that control the action of
                              MQBEGIN */
```

*Visual Basic declaration*

```
Type MQBO
  StrucId As String*4 'Structure identifier'
  Version As Long     'Structure version number'
  Options As Long     'Options that control the action of MQBEGIN'
End Type
```

## MQCBC - Callback context

The following table summarizes the fields in the structure. Structure describing the callback routine.

*Table 467. Fields in MQCBC*

| Field | Description | Topic |
|---|---|---|
| *StrucID* | Structure identifier | StrucID |
| *Version* | Structure version number | Version |
| *CallType* | Why function has been called | CallType |
| *Hobj* | Object handle | Hobj |
| *CallbackArea* | Field for callback function to use | CallbackArea |
| *ConnectionArea* | Field for callback function to use | ConnectionArea |
| *CompCode* | Completion code | CompCode |
| *Reason* | Reason code | Reason |
| *State* | Indication of the state of the current consumer | State |
| *DataLength* | Message length | DataLength |
| *BufferLength* | Length of message buffer in bytes | BufferLength |
| *Flags* | General flags | Flags |
| **Note:** The remaining field is ignored if Version is less than MQCBC_VERSION_2 | | |
| *ReconnectDelay* | Number of milliseconds before reconnection attempt | ReconnectDelay |

### *Overview for MQCBC*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQCBC structure is used to specify context information that is passed to a callback function.

The structure is an input/output parameter on the call to a message consumer routine.

**Version**: The current version of MQCBC is MQCBC_VERSION_2.

**Character set and encoding**: Data in MQCBC must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure will be in the character set and encoding of the client.

## *Fields for MQCBC*

Alphabetic list of fields for the MQCBC structure.

The MQCBC structure contains the following fields; the fields are described in alphabetical order:

*BufferLength (MQLONG)*
This field is the length in bytes of the message buffer that has been passed to this function.

The buffer can be larger than both the MaxMsgLength value defined for the consumer and the ReturnedLength value in the MQGMO.

The actual message length is supplied in DataLength field.

The application can use the entire buffer for its own purposes for the duration of the callback function.

This is an input field to the message consumer function; it is not relevant to an exception handler function.

*CallbackArea (MQPTR)*
This field is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the CallbackArea field in the MQCBD structure, which is a parameter on the MQCB call used to define the callback function.

Changes to the *CallbackArea* are preserved across the invocations of the callback function for an *HObj*. This field is not shared with callback functions for other handles.

This is an input/output field to the callback function. The initial value of this field is a null pointer or null bytes.

*CallType (MQLONG)*
Field containing information about why this function has been called; the following are defined.

Message delivery call types: These call types contain information about a message. The *DataLength* and *BufferLength* parameters are valid for these call types.

**MQCBCT_MSG_REMOVED**
The message consumer function has been invoked with a message that has been destructively removed from the object handle.

If the value of *CompCode* is MQCC_WARNING, the value of the *Reason* field is MQRC_TRUNCATED_MSG_ACCEPTED or one of the codes indicating a data conversion problem.

**MQCBCT_MSG_NOT_REMOVED**
The message consumer function has been invoked with a message that has not yet been destructively removed from the object handle. The message can be destructively removed from the object handle using the *MsgToken*.

The message might not have been removed because:

- The MQGMO options requested a browse operation, MQGMO_BROWSE_*
- The message is larger than the available buffer and the MQGMO options do not specify MQGMO_ACCEPT_TRUNCATED_MSG

If the value of *CompCode* is MQCC_WARNING, the value of the *Reason* field is MQRC_TRUNCATED_MSG_FAILED or one of the codes indicating a data conversion problem.

Callback control call types: These call types contain information about the control of the callback and do not contain details about a message. These call types are requested using Options in the MQCBD structure.

The *DataLength* and *BufferLength* parameters are not valid for these call types.

**MQCBCT_REGISTER_CALL**
The purpose of this call type is to allow the callback function to perform some initial setup.

The callback function is invoked is immediately after the callback is registered, that is, upon return from an MQCB call using a value for the *Operation* field of MQOP_REGISTER.

This call type is used both for message consumers and event handlers.

If requested, this is the first invocation of the callback function.

The value of the *Reason* field is MQRC_NONE.

**MQCBCT_START_CALL**
The purpose of this call type is to allow the callback function to perform some setup when it is started, for example, reinstating resources that were cleaned up when it was previously stopped.

The callback function is invoked when the connection is started using either MQOP_START or MQOP_START_WAIT.

If a callback function is registered within another callback function, this call type is invoked when the callback returns.

This call type is used for message consumers only.

The value of the *Reason* field is MQRC_NONE.

**MQCBCT_STOP_CALL**
The purpose of this call type is to allow the callback function to perform some cleanup when it is stopped for a while, for example, cleaning up additional resources that have been acquired during the consuming of messages.

The callback function is invoked when an MQCTL call is issued using a value for the *Operation* field of MQOP_STOP.

This call type is used for message consumers only.

The value of the *Reason* field is set to indicate the reason for stopping.

**MQCBCT_DEREGISTER_CALL**
The purpose of this call type is to allow the callback function to perform final cleanup at the end of the consume process. The callback function is invoked when the:

- Callback function is deregistered using an MQCB call with MQOP_DEREGISTER.
- Queue is closed, causing an implicit deregister. In this instance the callback function is passed MQHO_UNUSABLE_HOBJ as the object handle.
- MQDISC call completes - causing an implicit close and, therefore, a deregister. In this case the connection is not disconnected immediately, and any ongoing transaction is not yet committed.

If any of these actions are taken inside the callback function itself, the action is invoked once the callback returns.

This call type is used both for message consumers and event handlers.

If requested, this is the last invocation of the callback function.

The value of the *Reason* field is set to indicate the reason for stopping.

**MQCBCT_EVENT_CALL**
**Event handler function**

The event handler function has been invoked without a message when the queue manager or connection stops or quiesces.

This call can be used to take appropriate action for all callback functions.

**Message consumer function**

The message consumer function has been invoked without a message when an error (*CompCode* = MQCC_FAILED) has been detected that is specific to the object handle; for example *Reason* code = MQRC_GET_INHIBITED.

The value of the *Reason* field is set to indicate the reason for the call.

**MQCBCT_MC_EVENT_CALL**

The event handler function has been invoked for multicast events; The event handler is sent IBM MQ Multicast events instead of 'normal' IBM MQ events.

For more information about MQCBCT_MC_EVENT_CALL, see Multicast exception reporting.

*CompCode (MQLONG)*
This field is the completion code. It indicates whether there were any problems consuming the message.

The value is one of the following:

**MQCC_OK**
Successful completion

**MQCC_WARNING**
Warning (partial completion)

**MQCC_FAILED**
Call failed

This is an input field. The initial value of this field is MQCC_OK.

*ConnectionArea (MQPTR)*
This field is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the ConnectionArea field in the MQCTLO structure, which is a parameter on the MQCTL call used to control the callback function.

Any changes made to this field by the callback functions are preserved across the invocations of the callback function. This area can be used to pass information that is to be shared by all callback functions. Unlike *CallbackArea*, this area is common across all callbacks for a connection handle.

This is an input and output field. The initial value of this field is a null pointer or null bytes.

*DataLength (MQLONG)*
This is the length in bytes of the application data in the message. If the value is zero, it means that the message contains no application data.

The DataLength field contains the length of the message but not necessarily the length of the message data passed to the consumer. It could be that the message was truncated. Use the ReturnedLength field in the MQGMO to determine how much data has actually been passed to the consumer.

If the reason code indicates the message has been truncated, you can use the DataLength field to determine how large the actual message is. This allows you to determine the size of the buffer required to accommodate the message data, and then issue an MQCB call to update the MaxMsgLength with an appropriate value.

If the MQGMO_CONVERT option is specified, the converted message could be larger than the value returned for DataLength. In such cases, the application probably needs to issue an MQCB call to update the MaxMsgLength to to be greater than the value returned by the queue manager for DataLength.

To avoid message truncation problems, specify MaxMsgLength as MQCBD_FULL_MSG_LENGTH. This causes the queue manager to allocate a buffer for the full message length after data conversion. Be aware, however, that even if this option is specified, it is still possible that sufficient storage is not

available to correctly process the request. Applications should always check the returned reason code. For example, if it is not possible to allocate sufficient storage to convert the message, the messages is returned to the application unconverted.

This is an input field to the message consumer function; it is not relevant to an event handler function.

*Flags (MQLONG)*
Flags containing information about this consumer.

The following option is defined:

**MQCBCF_READA_BUFFER_EMPTY**
This flag can be returned if a previous MQCLOSE call using the MQCO_QUIESCE option failed with a reason code of MQRC_READ_AHEAD_MSGS.

This code indicated that the last read ahead message is being returned and that the buffer is now empty. If the application issues another MQCLOSE call using the MQCO_QUIESCE) option, it succeeds.

Note, that an application is not guaranteed to be given a message with this flag set, as there might still be messages in the read-ahead buffer that do not match the current selection criteria. In this instance, the consumer function is invoked with the reason code MQRC_HOBJ_QUIESCED.

If the read ahead buffer is completely empty, the consumer is invoked with the MQCBCF_READA_BUFFER_EMPTY flag and the reason code MQRC_HOBJ_QUIESCED_NO_MSGS.

This is an input field to the message consumer function; it is not relevant to an event handler function.

*Hobj (MQHOBJ)*
This is the object handle for calls to the message consumer.

For an event handler, this value is MQHO_NONE

The application can use this handle and the message token in the Get Message Options block to get the message if a message has not been removed from the queue.

This is always an input field. The initial value of this field is MQHO_UNUSABLE_HOBJ

*Reason (MQLONG)*
This is the reason code qualifying the *CompCode*.

This is an input field. The initial value of this field is MQRC_NONE.

*State (MQLONG)*
An indication as to the state of the current consumer. This field is of most value to an application when a nonzero reason code is passed to the consumer function.

You can use this field to simplify application programming because you do not need to code behavior for each reason code.

This is an input field. The initial value of this field is MQCS_NONE

| **State** | **Queue manager action** | **Value of constant** |
|---|---|---|
| *MQCS_NONE*<br>This reason code represents a normal call with no additional reason information | None; this is the normal operation. | 0 |

| State | Queue manager action | Value of constant |
|---|---|---|
| *MQCS_SUSPENDED_TEMPORARY*<br>These reason codes represent temporary conditions. | The callback routine is called to report the condition and then suspended. After a period of time the system might attempt the operation again, which can lead to the same condition being raised again. | 1 |
| *MQCS_SUSPENDED_USER_ACTION*<br>These reason codes represent conditions where the callback needs to take action to resolve the condition. | The consumer is suspended and the callback routine is called to report the condition. The callback routine should resolve the condition if possible and either RESUME or close down the connection. | 2 |
| *MQCS_SUSPENDED*<br>These reason codes represent failures that prevent further message callbacks. | The queue manager automatically suspends the callback function. If the callback function is resumed it is likely to receive the same reason code again. | 3 |
| *MQCS_STOPPED*<br>These reason codes represent the end of message consumption. | Delivered to the exception handler and to callbacks that specified MQCBDO_STOP_CALL. No further messages can be consumed. | 4 |

*StrucId (MQCHAR4)*
The value in this field is the structure identifier.

The value must be:

**MQCBC_STRUC_ID**
Identifier for callback context structure.

For the C programming language, the constant MQCBC_STRUC_ID_ARRAY is also defined; this has the same value as MQCBC_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQCBC_STRUC_ID.

*Version (MQLONG)*
The value in this field is the structure version number.

The value must be:

**MQCBC_VERSION_1**
Version-1 callback context structure.

The following constant specifies the version number of the current version:

**MQCBC_CURRENT_VERSION**
Current version of the callback context structure.

This is always an input field. The initial value of this field is MQCBC_VERSION_1.

The callback function is always passed the latest version of the structure.

*ReconnectDelay (MQLONG)*
ReconnectDelay indicates how long the queue manager will wait before trying to reconnect. The field can be modified by an event handler to change the delay or stop reconnection altogether.

Use the `ReconnectDelay` field only if the value of the `Reason` field in the Callback Context is `MQRC_RECONNECTING`.

On entry to the event handler the value of `ReconnectDelay` is the number of milliseconds the queue manager is going to wait before making a reconnection attempt. Table 468 on page 281 lists the values that you can set to modify the behavior of the queue manager on return from the event handler.

| *Table 468. ReconnectDelay values* | | |
|---|---|---|
| **Name** | **Value** | **Description** |
| MQRD_NO_RECONNECT | -1 | Make no more reconnection attempts. An error is returned to the application. |
| MQRD_NO_DELAY | 0 | Try to reconnect immediately. |
| *Milliseconds* | >0 | Wait for this many milliseconds before retrying the connection. |

## *Initial values and language declarations for MQCBC*

Callback context structure - initial values

There are no initial values for the **MQCBC** structure. The structure is passed as a parameter to a callback routine. The queue manager initializes the structure; applications never initialize it.

*C declaration*

Callback context structure - C language declaration

```
typedef struct tagMQCBC MQCBC;
struct tagMQCBC {
   MQCHAR4   StrucId;                /* Structure identifier */
   MQLONG    Version;                /* Structure version number */
   MQLONG    CallType;               /* Why Function was called */
   MQHOBJ    Hobj;                   /* Object Handle */
   MQPTR     CallbackArea;           /* Callback data passed to the function */
   MQPTR     ConnectionArea;         /* MQCTL data area passed to the function */
   MQLONG    CompCode;               /* Completion Code */
   MQLONG    Reason;                 /* Reason Code */
   MQLONG    State;                  /* Consumer State */
   MQLONG    DataLength;             /* Message Data Length */
   MQLONG    BufferLength;           /* Buffer Length */
   MQLONG    Flags;                  /* Flags containing information about
                                        this consumer */
  /* Ver:1 */
   MQLONG    ReconnectDelay;         /* Number of milliseconds before */
  /* Ver:2 */  };                    /* reconnect attempt */
```

*COBOL declaration*

```
** MQCBC structure
 10  MQCBC.
** Structure Identifier
 15  MQCBC-STRUCID                    PIC X(4).
** Structure Version
 15  MQCBC-VERSION                    PIC S9(9) BINARY.
 ** Call Type
 15  MQCBC-CALLTYPE                   PIC S9(9) BINARY.
** Object Handle
 15  MQCBC-HOBJ                       PIC S9(9) BINARY.
** Callback User Area
 15  MQCBC-CALLBACKAREA               POINTER
** Connection Area
 15  MQCBC-CONNECTIONAREA             POINTER
** Completion Code
 15  MQCBC-COMPCODE                   PIC S9(9) BINARY.
** Reason Code
 15  MQCBC-REASON                     PIC S9(9) BINARY.
** Consumer State
 15  MQCBC-STATE                      PIC S9(9) BINARY.
** Data Length
 15  MQCBC-DATALENGTH                 PIC S9(9) BINARY.
** Buffer Length
 15  MQCBC-BUFFERLENGTH               PIC S9(9) BINARY.
** Flags
 15  MQCBC-FLAGS                      PIC S9(9) BINARY.
** Ver:1 **
** Number of milliseconds before reconnect attempt
 15  MQCBC-RECONNECTDELAY PIC S9(9) BINARY.
** Ver:2 **
```

*PL/I declaration*

```
dcl
 1 MQCBC based,
  3 StrucId             char(4),       /* Structure identifier */
  3 Version             fixed bin(31), /* Structure version */
  3 CallType            fixed bin(31), /* Callback type */
  3 Hobj                fixed bin(31), /* Object Handle */
  3 CallbackArea        pointer,       /* User area passed to the function */
  3 ConnectionArea      pointer,       /* Connection User Area */
  3 CompCode            fixed bin(31); /* Completion Code */
  3 Reason              fixed bin(31); /* Reason Code */
  3 State               fixed bin(31); /* Consumer State */
  3 DataLength          fixed bin(31); /* Message Data Length */
  3 BufferLength        fixed bin(31); /* Message Buffer length */
  3 Flags               fixed bin(31); /* Consumer Flags */
/* Ver:1 */
  3 ReconnectDelay      fixed bin(31); /* Number of milliseconds before */
/* Ver:2 */                           /* reconnect attempt */
```

*High Level Assembler declaration*

```
    MQCBC                 DSECT
    MQCBC                 DS  0F    Force fullword alignment
    MQCBC_STRUCID         DS  CL4   Structure identifier
    MQCBC_VERSION         DS  F     Structure version number
    MQCBC_CALLTYPE        DS  F     Why Function was called
    MQCBC_HOBJ            DS  F     Object Handle
    MQCBC_CALLBACKAREA    DS  A     Callback data passed to the function
    MQCBC_CONNECTIONAREA  DS  A     MQCTL Data area passed to the function
    MQCBC_COMPCODE        DS  F     Completion Code
    MQCBC_REASON          DS  F     Reason Code
    MQCBC_STATE           DS  F     Consumer State
    MQCBC_DATALENGTH      DS  F     Message Data Length
    MQCBC_BUFFERLENGTH    DS  F     Buffer Length
    MQCBC_FLAGS           DS  F     Flags containing information about this consumer
    MQCBC_RECONNECTDELAY  DS  F     Number of milliseconds before reconnect
    MQCBC_LENGTH          EQU *-MQCBC
                          ORG       MQCBC
    MQCBC_AREA            DS  CL(MQCBC_LENGTH)
```

## MQCBD - Callback descriptor

The following table summarizes the fields in the structure. Structure specifying the callback function.

*Table 469. Fields in MQCBD*

| Field | Description | Topic |
|---|---|---|
| *StrucID* | Structure identifier | StrucID |
| *Version* | Structure version number | Version |
| *CallbackType* | Type of callback function | CallbackType |
| *Options* | Options controlling message consumption | Options |
| *Callback Area* | Field for callback function to use | CallbackArea |
| *CallbackFunction* | Whether the function is invoked as an API call | CallbackFunction |
| *CallbackName* | Whether the function is invoked as a dynamically-linked program | CallbackName |
| *MaxMsgLength* | Length of longest message that can be read | MaxMsgLength |

### *Overview for MQCBD*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS, and IBM MQ MQI clients connected to these systems.

**Purpose**: The MQCBD structure is used to specify a callback function and the options controlling its use by the queue manager.

The structure is an input parameter on the MQCB call.

**Version**: The current version of MQCBD is MQCBD_VERSION_1.

**Character set and encoding**: Data in MQCBD must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

## *Fields for MQCBD*

Alphabetic list of fields for the MQCBD structure.

The MQCBD structure contains the following fields; the fields are described in alphabetical order:

*CallbackArea (MQPTR)*
Callback descriptor structure - CallbackArea field

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the CallbackArea field in the MQCBC structure, which is a parameter on the callback function declaration.

The value is used only on an *Operation* having a value MQOP_REGISTER, with no currently defined callback, it does not replace a previous definition.

This is an input and output field to the callback function. The initial value of this field is a null pointer or null bytes.

*CallbackFunction (MQPTR)*
Callback descriptor structure - CallbackFunction field

The callback function is invoked as a function call.

Use this field to specify a pointer to the callback function.

You *must* specify either *CallbackFunction* or *CallbackName*. If you specify both, the reason code MQRC_CALLBACK_ROUTINE_ERROR is returned.

If neither *CallbackName* nor *CallbackFunction* is set, the call fails with the reason code MQRC_CALLBACK_ROUTINE_ERROR.

This option is not supported in the following environment: Programming languages and compilers that do not support function-pointer references. In such situations, the call fails with the reason code MQRC_CALLBACK_ROUTINE_ERROR.

On z/OS the function must expect to be called with OS linkage conventions. For example, in the C programming language, specify:

```
#pragma linkage(MQCB_FUNCTION,OS)
```

This is an input field. The initial value of this field is a null pointer or null bytes.

**Note:** When using CICS with IBM MQ V7.0.1, asynchronous consumption is supported if:

- Apar PK66866 is applied to CICS TS 3.2
- Apar PK89844 is applied to CICS TS 4.1

*CallbackName (MQCHAR128)*
Callback descriptor structure - CallbackName field

The callback function is invoked as a dynamically linked program.

You *must* specify either *CallbackFunction* or *CallbackName*. If you specify both, the reason code MQRC_CALLBACK_ROUTINE_ERROR is returned.

If neither *CallbackName* nor *CallbackFunction* is not set, the call fails with the reason code MQRC_CALLBACK_ROUTINE_ERROR.

The module is loaded when the first callback routine to use is registered, and unloaded when the last callback routine to use it deregisters.

Except where noted in the following text, the name is left-justified within the field, with no embedded blanks; the name itself is padded with blanks to the length of the field. In the descriptions that follow, square brackets ([ ]) denote optional information:

**IBM i**
The callback name can be one of the following formats:

- Library "/" Program
- Library "/" ServiceProgram "("FunctionName")"

For example, `MyLibrary/MyProgram(MyFunction)`.

The library name can be *LIBL. Both the library and program names are limited to a maximum of 10 characters.

**UNIX systems**
The callback name is the name of a dynamically-loadable module or library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path:

```
[path]library(function)
```

If the path is not specified the system search path is used.

The name is limited to a maximum of 128 characters.

**Windows**
The callback name is the name of a dynamic-link library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses .The library name can optionally be prefixed with a directory path and drive:

```
[d:][path]library(function)
```

If the drive and path are not specified the system search path is used.

The name is limited to a maximum of 128 characters.

**z/OS**
The callback name is the name of a load module that is valid for specification on the EP parameter of the LINK or LOAD macro.

The name is limited to a maximum of 8 characters.

**z/OS CICS**
The callback name is the name of a load module that is valid for specification on the PROGRAM parameter of the EXEC CICS LINK command macro.

The name is limited to a maximum of 8 characters.

The program can be defined as remote using the REMOTESYTEM option of the installed PROGRAM definition or by the dynamic routing program.

The remote CICS region must be connected to IBM MQ if the program is to use IBM MQ API calls. Note, however, that the Hobj field in the MQCBC structure is not valid in a remote system.

If a failure occurs trying to load *CallbackName*, one of the following error codes is returned to the application:

- MQRC_MODULE_NOT_FOUND
- MQRC_MODULE_INVALID
- MQRC_MODULE_ENTRY_NOT_FOUND

A message is also written to the error log containing the name of the module for which the load was attempted, and the failing reason code from the operating system.

This is an input field. The initial value of this field is a null string or blanks.

*CallbackType (MQLONG)*
Callback descriptor structure - CallbackType field

This is the type of the callback function. The value must be one of:

**MQCBT_MESSAGE_CONSUMER**
Defines this callback as a message consumer function.

A message consumer callback function is called when a message, meeting the selection criteria specified, is available on an object handle and the connection is started.

**MQCBT_EVENT_HANDLER**
Defines this callback as the asynchronous event routine; it is not driven to consume messages for a handle.

*Hobj* is not required on the MQCB call defining the event handler and is ignored if specified.

The event handler is called for conditions that affect the whole message consumer environment. The consumer function is invoked without a message when an event, for example, a queue manager or connection stopping, or quiescing, occurs. It is not called for conditions that are specific to a single message consumer, for example, MQRC_GET_INHIBITED.

Events are delivered to the application, regardless of whether the connection is started or stopped, except in the following environments:

- CICS on z/OS environment
- nonthreaded applications

If the caller does not pass one of these values, the call fails with a *Reason* code of MQRC_CALLBACK_TYPE_ERROR

This is always an input field. The initial value of this field is MQCBT_MESSAGE_CONSUMER.

*MaxMsgLength (MQLONG)*
This is the length in bytes of the longest message that can be read from the handle and given to the callback routine. Callback descriptor structure - MaxMsgLength field

If a message has a longer length, the callback routine receives *MaxMsgLength* bytes of the message, and reason code:

- MQRC_TRUNCATED_MSG_FAILED or
- MQRC_TRUNCATED_MSG_ACCEPTED if you specified MQGMO_ACCEPT_TRUNCATED_MSG.

The actual message length is supplied in the DataLength field of the MQCBC structure.

The following special value is defined:

**MQCBD_FULL_MSG_LENGTH**
The buffer length is adjusted by the system to return messages without truncation.

If insufficient memory is available to allocate a buffer to receive the message, the system calls the callback function with an MQRC_STORAGE_NOT_AVAILABLE reason code.

If, for example, you request data conversion, and there is insufficient memory available to convert the message data, the unconverted message is passed to the callback function.

This is an input field. The initial value of the *MaxMsgLength* field is MQCBD_FULL_MSG_LENGTH.

*Options (MQLONG)*
Callback descriptor structure - Options field

You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**MQCBDO_FAIL_IF_QUIESCING**
The MQCB call fails if the queue manager is in the quiescing state.

On z/OS, this option also forces the MQCB call to fail if the connection (for a CICS or IMS application) is in the quiescing state.

Specify MQGMO_FAIL_IF_QUIESCING, in the MQGMO options passed on the MQCB call, to cause notification to message consumers when they are quiescing.

**Control options**: The following options control whether the callback function is called, without a message, when the state of the consumer changes:

**MQCBDO_REGISTER_CALL**
The callback function is invoked with call type MQCBCT_REGISTER_CALL.

**MQCBDO_START_CALL**
The callback function is invoked with call type MQCBCT_START_CALL.

**MQCBDO_STOP_CALL**
The callback function is invoked with call type MQCBCT_STOP_CALL.

**MQCBDO_DEREGISTER_CALL**
The callback function is invoked with call type MQCBCT_DEREGISTER_CALL.

**MQCBDO_EVENT_CALL**
The callback function is invoked with call type MQCBCT_EVENT_CALL.

**MQCBDO_MC_EVENT_CALL**
The callback function is invoked with call type MQCBCT__MC_EVENT_CALL.

See CallType for further details about these call types.

**Default option**: If you do not need any of the options described, use the following option:

**MQCBDO_NONE**
Use this value to indicate that no other options have been specified; all options assume their default values.

MQCBDO_NONE is defined to aid program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of the *Options* field is MQCBDO_NONE.

*StrucId (MQCHAR4)*
Callback descriptor structure - StrucId field

This is the structure identifier; the value must be:

**MQCBD_STRUC_ID**
Identifier for callback descriptor structure.

For the C programming language, the constant MQCBD_STRUC_ID_ARRAY is also defined; this has the same value as MQCBD_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQCBD_STRUC_ID.

*Version (MQLONG)*
Callback descriptor structure - Version field

This is the structure version number; the value must be:

**MQCBD_VERSION_1**
Version-1 callback descriptor structure.

The following constant specifies the version number of the current version:

**MQCBD_CURRENT_VERSION**
Current version of callback descriptor structure.

This is always an input field. The initial value of this field is MQCBD_VERSION_1.

## *Initial values and language declarations for MQCBD*

Callback descriptor structure - Initial values

*Table 470. Initial values of fields in MQCBD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCBD_STRUC_ID | 'CBD¬' |
| *Version* | MQCBD_VERSION_1 | 1 |
| *CallBackType* | MQCBT_MESSAGE_CONSUMER | 1 |
| *Options* | MQCBDO_NONE | 0 |
| *CallbackArea* | None | Null pointer or null blanks |
| *CallbackFunction* | None | Null pointer or null blanks |
| *CallbackName* | None | Null string or blanks |
| *MaxMsgLength* | MQCBD_FULL_MSG_LENGTH | -1 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null sting in the C programming language, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQCBD_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQCBD MyCBD = {MQCBD_DEFAULT};
```

*C declaration*
Callback descriptor structure - C language declaration

```
typedef struct tagMQCBD MQCBD;
 struct tagMQCBD {
   MQCHAR4    StrucId;                /* Structure identifier */
   MQLONG     Version;                /* Structure version number */
   MQLONG     CallBackType;           /* Callback function type */
   MQLONG     Options;                /* Options controlling message
                                         consumption */
   MQPTR      CallbackArea;           /* User data passed to the function */
   MQPTR      CallbackFunction;       /* Callback function pointer */
   MQCHAR128  CallbackName;           /* Callback name */
   MQLONG     MaxMsgLength;           /* Maximum message length */
 };
```

*COBOL declaration*

```
** MQCBCD structure
 10  MQCBD.
** Structure Identifier
 15  MQCBD-STRUCID                    PIC X(4).
** Structure Version
```

```
 15  MQCBD-VERSION                      PIC S9(9) BINARY.
 ** Callback Type
 15  MQCBD-CALLBACKTYPE                PIC S9(9) BINARY.
** Options
 15  MQCBD-OPTIONS                     PIC S9(9) BINARY.
** Callback User Area
 15  MQCBD-CALLBACKAREA                POINTER
** Callback Function Pointer
 15  MQCBD-CALLBACKFUNCTION            FUNCTION-POINTER
** Callback Program Name
 15  MQCBD-CALLBACKNAME                PIC X(128)
** Maximum Message Length
 15  MQCDB-MAXMSGLENGTH                PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQCBD based,
  3 StrucId             char(4),       /* Structure identifier*/
  3 Version             fixed bin(31), /* Structure version*/
  3 CallbackType        fixed bin(31), /* Callback function type */
  3 Options             fixed bin(31), /* Options */
  3 CallbackArea        pointer,       /* User area passed to the function */
  3 CallbackFunction    pointer,       /* Callback Function Pointer */
  3 CallbackName        char(128),     /* Callback Program Name */
  3 MaxMsgLength        fixed bin(31); /* Maximum Message Length */
```

## MQCHARV - Variable Length String

The following table summarizes the fields in the structure.

| Field | Description | Topic |
|---|---|---|
| *VSPtr* | Pointer to the variable length string | VSPtr |
| *VSOffset* | Offset in bytes of the variable length string from the start of the structure that contains this MQCHARV structure | VSOffset |
| *VSLength* | The length in bytes of the variable length string addressed by the VSPtr or VSOffset field. | VSLength |
| *VSBufSize* | The size in bytes of the buffer addressed by the VSPtr or VSOffset field. | VSBufSize |
| *VSCCSID* | The character set identifier of the variable length string addressed by the VSPtr or VSOffset field. | VSCCSID |

### *Overview for MQCHARV*

**Availability**: AIX, HP-UX, Solaris, Linux, IBM i, Windows, plus IBM MQ MQI clients connected to these systems.

**Purpose**: Use the MQCHARV structure to describe a variable length string.

**Character set and encoding**: Data in the MQCHARV must be in the encoding of the local queue manager that is given by MQENC_NATIVE and the character set of the VSCCSID field within the structure. If the application is running as an MQ client, the structure must be in the encoding of the client. Some character sets have a representation that depends on the encoding. If VSCCSID is one of these character sets, the encoding used is the same encoding as that of the other fields in the MQCHARV. The character set identified by VSCCSID can be a double-byte character set (DBCS).

**Usage**: The MQCHARV structure addresses data that might be discontiguous with the structure containing it. To address this data, fields declared with the pointer data type can be used. Be aware that COBOL does not support the pointer data type in all environments. Because of this, the data can also be addressed using fields that contain the offset of the data from the start of the structure containing the MQCHARV.

## COBOL programming

If you want to port an application between environments, you must ascertain whether the pointer data type is available in all the intended environments. If not, the application must address the data using the offset fields instead of the pointer fields.

In those environments where pointers are not supported, you can declare the pointer fields as byte strings of the appropriate length, with the initial value being the all-null byte string. Do not alter this initial value if you are using the offset fields. One way to do this without changing the supplied copy books is to use the following:

```
COPY CMQCHRVV REPLACING POINTER BY ==BINARY PIC S9(9)==.
```

where CMQCHRVV can be exchanged for the copy book to be used.

### *Fields for MQCHARV*

The MQCHARV structure contains the following fields; the fields are described in **alphabetical order**:

*VSBufSize (MQLONG)*
This is the size in bytes of the buffer addressed by the VSPtr or VSOffset field.

When the MQCHARV structure is used as an output field on a function call, this field must be initialised with the length of the buffer provided. If the value of VSLength is greater than VSBufSize then only VSBufSize bytes of data are returned to the caller in the buffer.

This value must be a value greater than or equal to zero, or the following special value which is recognized:

**MQVS_USE_VSLENGTH**
When specified, the length of the buffer is taken from the VSLength field in the MQCHARV structure. Do not use this value when using the structure as an output field and a buffer is provided.

This is the initial value of this field.

*VSCCSID (MQLONG)*
This is the character set identifier of the variable length string addressed by the **VSPtr** or **VSOffset** field.

The initial value of this field is *MQCCSI_APPL*, which is defined by MQ to indicate that it should be changed to the true character set identifier of the current process. As a result, the value of constant *MQCCSI_APPL* is never associated with a variable length string.

The initial value of this field can be changed by defining a different value for the constant *MQCCSI_APPL* for your compile unit. How you do this depends on your application's programming language.

z/OS On z/OS systems, the default application CCSID used by *MQCCSI_APPL* is defined as follows:

- For batch LE applications using the DLL interface, the default is the CODESET associated with the current locale at the time **MQCONN** is issued (default value is 1047).
- For batch LE applications bound with one of the batch MQ stubs, the default is the CODESET associated with the current locale at the time of the first MQI call issued after **MQCONN** (default value is 1047).
- For batch non-LE applications running on a USS thread, the default is the value of THLICCSID at the time of the first MQI call issued after **MQCONN** (default value is 1047).
- For other batch applications, the default is the CCSID of the queue manager.

*VSLength (MQLONG)*
The length in bytes of the variable length string addressed by the VSPtr or VSOffset field.

The initial value of this field is 0. The value must be either greater than or equal to zero or the following special value which is recognized:

**MQVS_NULL_TERMINATED**

If MQVS_NULL_TERMINATED is not specified, VSLength bytes are included as part of the string. If null characters are present they do not delimit the string.

If MQVS_NULL_TERMINATED is specified, the string is delimited by the first null encountered in the string. The null itself is not included as part of that string.

**Note:** The null character used to terminate a string if MQVS_NULL_TERMINATED is specified is a null from the codeset specified by VSCCSID.

For example, in UTF-16 (UCS-2 CCSIDs 1200 and 13488), this is the two byte Unicode encoding where a null is represented by a 16-bit number of all zeros. In UTF-16 it is common to find single bytes set to all zero which are part of characters (7-bit ASCII characters for instance), but the strings will only be null terminated when two 'zero' bytes are found on an even byte boundary. It is possible to get two 'zero' bytes on an odd boundary when they are each part of valid characters. For example x'01' x'00 x'00' x'30' represents two valid Unicode characters and does not null terminate the string.

*VSOffset (MQLONG)*
The offset can be positive or negative. You can use either the VSPtr or VSOffset field to specify the variable length string, but not both. The offset in bytes of the variable length string from the start of the MQCHARV, or the structure containing it.

When the MQCHARV structure is embedded within another structure, this value is the offset in bytes of the variable length string from the start of the structure that contains this MQCHARV structure. When the MQCHARV structure is not embedded within another structure, for example, if it is specified as a parameter on a function call, the offset is relative to the start of the MQCHARV structure.

The initial value of this field is 0.

*VSPtr (MQPTR)*
This is a pointer to the variable length string.

You can use either the VSPtr or VSOffset field to specify the variable length string, but not both.

The initial value of this field is a null pointer or null bytes.

## *Initial values and language declarations for MQCHARV*

### Initial values of fields in MQCHARV

| Field name | Name of constant | Value of constant |
|---|---|---|
| *VSPtr* | None | Null pointer or null bytes. |
| *VSOffset* | None | 0 |
| *VSBufSize* | MQVS_USE_VSLENGTH | 0 |
| *VSLength* | None | 0 |
| *VSCCSID* | MQCCSI_APPL | -3 |

**Note:** In the C programming language, the macro variable MQCHARV_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQCHARV MyVarStr = {MQCHARV_DEFAULT};
```

*C declaration*

```
typedef struct tagMQCHARV MQCHARV;
struct tagMQCHARV {
  MQPTR     VSPtr;              /* Address of variable length string */
  MQLONG    VSOffset;           /* Offset of variable length string */
  MQLONG    VSBufSize;          /* Size of buffer */
  MQLONG    VSLength;           /* Length of variable length string */
  MQLONG    VSCCSID;            /* CCSID of variable length string */
};
```

*COBOL declaration for MQCHARV*

```
** MQCHARV structure
 10  MQCHARV.
** Address of variable length string
 15  MQCHARV-VSPTR        POINTER.
** Offset of variable length string
 15  MQCHARV-VSOFFSET     PIC S9(9) BINARY.
** Size of buffer
 15  MQCHARV-VSBUFSIZE    PIC S9(9) BINARY.
** Length of variable length string
 15  MQCHARV-VSLENGTH     PIC S9(9) BINARY.
** CCSID of variable length string
 15  MQCHARV-VSCCSID      PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQCHARV based,
   3 VSPtr       pointer,       /* Address of variable length string */
   3 VSOffset    fixed bin(31), /* Offset of variable length string */
   3 VSBufSize   fixed bin(31), /* Size of buffer */
   3 VSLength    fixed bin(31), /* Length of variable length string */
   3 VSCCSID     fixed bin(31); /* CCSID of variable length string */
```

*High Level Assembler declaration*

```
MQCHARV             DSECT
MQCHARV_VSPTR       DS   F     Address of variable length string
MQCHARV_VSOFFSET    DS   F     Offset of variable length string
MQCHARV_VSBUFSIZE   DS   F     Size of buffer
MQCHARV_VSLENGTH    DS   F     Length of variable length string
MQCHARV_VSCCSID     DS   F     CCSID of variable length string
*
MQCHARV_LENGTH      EQU  *-MQCHARV
                    ORG  MQCHARV
MQCHARV_AREA        DS   CL(MQCHARV_LENGTH)
```

### *Redefinition of MQCCSI_APPL*

The following examples show how you can override the value of MQCCSI_APPL in various programming languages. You can change the value of MQCCSI_APPL, removing the need to set the VSCCSID for each variable length string separately.

In these examples the CCSID is set to 1208; change this to the value you require. This becomes the default value, which you can override by setting the VSCCSID in any specific instance of MQCHARV.

## C usage

```
#define MQCCSI_APPL 1208
#include <cmqc.h>
```

### COBOL usage

```
COPY CMQXYZV REPLACING -3 BY 1208.
```

### PL/I usage

```
%MQCCSI_APPL = '1208';
%include syslib(cmqp);
```

### System/390 assembler usage

```
MQCCSI_APPL EQU 1208
CMQA LIST=NO
```

## MQCIH - CICS bridge header

The following table summarizes the fields in the structure.

*Table 471. Fields in MQCIH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQCIH structure | StrucLength |
| *Encoding* | Reserved | Encoding |
| *CodedCharSetId* | Reserved | CodedCharSetId |
| *Format* | MQ format name of data that follows MQCIH | Format |
| *Flags* | Flags | Flags |
| *ReturnCode* | Return code from bridge | ReturnCode |
| *CompCode* | MQ completion code or CICS EIBRESP | CompCode |
| *Reason* | MQ reason or feedback code, or CICS EIBRESP2 | Reason |
| *UOWControl* | Unit-of-work control | UOWControl |
| *GetWaitInterval* | Wait interval for MQGET call issued by bridge task | GetWaitInterval |
| *LinkType* | Link type | LinkType |
| *OutputDataLength* | Output COMMAREA data length | OutputDataLength |
| *FacilityKeepTime* | Bridge facility release time | FacilityKeepTime |
| *ADSDescriptor* | Send/receive ADS descriptor | ADSDescriptor |
| *ConversationalTask* | Whether task can be conversational | ConversationalTask |
| *TaskEndStatus* | Status at end of task | TaskEndStatus |
| *Facility* | Bridge facility token | Facility |
| *Function* | MQ call name or CICS EIBFN function | Function |

| Table 471. Fields in MQCIH (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *AbendCode* | Abend code | AbendCode |
| *Authenticator* | Password or passticket | Authenticator |
| *Reserved1* | Reserved | Reserved1 |
| *ReplyToFormat* | MQ format name of reply message | ReplyToFormat |
| *RemoteSysId* | Remote CICS system Id to use | RemoteSysId |
| *RemoteTransId* | CICS RTRANSID to use | RemoteTransId |
| *TransactionId* | Transaction to attach | TransactionId |
| *FacilityLike* | Terminal emulated attributes | FacilityLike |
| *AttentionId* | AID key | AttentionId |
| *StartCode* | Transaction start code | StartCode |
| *CancelCode* | Abend transaction code | CancelCode |
| *NextTransactionId* | Next transaction to attach | NextTransactionId |
| *Reserved2* | Reserved | Reserved2 |
| *Reserved3* | Reserved | Reserved3 |
| **Note:** The remaining fields are not present if *Version* is less than MQCIH_VERSION_2. | | |
| *CursorPosition* | Cursor position | CursorPosition |
| *ErrorOffset* | Offset of error in message | ErrorOffset |
| *InputItem* | Reserved | InputItem |
| *Reserved4* | Reserved | Reserved4 |

### *Overview for MQCIH*

The MQCIH structure describes the header information for a message sent to CICS across the CICS bridge. For any IBM MQ supported platform you can create and transmit a message that includes the MQCIH structure, but only an IBM MQ for z/OS queue manager can use the CICS bridge. Therefore, for the message to get to CICS from a non-z/OS queue manager, your queue manager network must include at least one z/OS queue manager through which the message can be routed.

**Availability**: AIX, HP-UX, z/OS, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQCIH structure describes the information that can be present at the start of a message sent to the CICS bridge through IBM MQ for z/OS.

**Format name**: MQFMT_CICS.

**Version**: The current version of MQCIH is MQCIH_VERSION_2. Fields that exist only in the more-recent version of the structure are identified as such in the descriptions that follow.

The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQCIH, with the initial value of the *Version* field set to MQCIH_VERSION_2.

**Character set and encoding**: Special conditions apply to the character set and encoding used for the MQCIH structure and application message data:

- Applications that connect to the queue manager that owns the CICS bridge queue must provide an MQCIH structure that is in the character set and encoding of the queue manager. This is because data conversion of the MQCIH structure is not performed in this case.
- Applications that connect to other queue managers can provide an MQCIH structure that is in any of the supported character sets and encodings; the receiving message channel agent connected to the queue manager that owns the CICS bridge queue converts the MQCIH structure.
- The application message data following the MQCIH structure must be in the same character set and encoding as the MQCIH structure. You cannot use the *CodedCharSetId* and *Encoding* fields in the MQCIH structure to specify the character set and encoding of the application message data.

  You must provide a data-conversion exit to convert the application message data if the data is not one of the built-in formats supported by the queue manager.

**Usage**: If the application requires values that are the same as the initial values shown in Table 473 on page 303, and the bridge is running with AUTH=LOCAL or AUTH=IDENTIFY, you can omit the MQCIH structure from the message. In all other cases, the structure must be present.

The bridge accepts either a version-1 or a version-2 MQCIH structure, but for 3270 transactions, you must use a version-2 structure.

The application must ensure that fields documented as request fields have appropriate values in the message sent to the bridge; these fields are input to the bridge.

Fields documented as response fields are set by the CICS bridge in the reply message that the bridge sends to the application. Error information is returned in the *ReturnCode*, *Function*, *CompCode*, *Reason*, and *AbendCode* fields, but not all of them are set in all cases. Table 472 on page 294 shows which fields are set for different values of *ReturnCode*.

*Table 472. Contents of error information fields in MQCIH structure for MQCIH*

| ***ReturnCode*** | ***Function*** | ***CompCode*** | ***Reason*** | ***AbendCode*** |
|---|---|---|---|---|
| MQCRC_OK | - | - | - | - |
| MQCRC_BRIDGE_ERROR | - | - | MQFB_CICS_* | - |
| MQCRC_MQ_API_ERROR<br>MQCRC_BRIDGE_TIMEOUT | MQ call name | MQ *CompCode* | MQ *Reason* | - |
| MQCRC_CICS_EXEC_ERROR<br>MQCRC_SECURITY_ERROR<br>MQCRC_PROGRAM_NOT_AVAILABLE<br>MQCRC_TRANSID_NOT_AVAILABLE | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | - |
| MQCRC_BRIDGE_ABEND<br>MQCRC_APPLICATION_ABEND | - | - | - | CICS ABCODE |

## *Fields for MQCIH*

The MQCIH structure contains the following fields; the fields are described in **alphabetical order**:

*AbendCode (MQCHAR4)*
AbendCode is a response field. The length of this field is given by MQ_ABEND_CODE_LENGTH. The initial value of this field is 4 blank characters.

The value returned in this field is significant only if the *ReturnCode* field has the value MQCRC_APPLICATION_ABEND or MQCRC_BRIDGE_ABEND. If it does, *AbendCode* contains the CICS ABCODE value.

*ADSDescriptor (MQLONG)*
This field is an indicator specifying whether to send ADS descriptors on SEND and RECEIVE BMS requests.

The following values are defined:

**MQCADSD_NONE**
Do not send or receive ADS descriptors.

**MQCADSD_SEND**
Send ADS descriptors.

**MQCADSD_RECV**
Receive ADS descriptors.

**MQCADSD_MSGFORMAT**
Use message format for the ADS descriptors.

This sends or receives the ADS descriptors using the long form of the ADS descriptor. The long form has fields that are aligned on 4-byte boundaries.

Set the *ADSDescriptor* field as follows:

- If you are not using ADS descriptors, set the field to MQCADSD_NONE.
- If you are using ADS descriptors with the *same* CCSID in each environment, set the field to the sum of MQCADSD_SEND and MQCADSD_RECV.
- If you are using ADS descriptors with *different* CCSIDs in each environment, set the field to the sum of MQCADSD_SEND, MQCADSD_RECV, and MQCADSD_MSGFORMAT.

This is a request field used only for 3270 transactions. The initial value of this field is MQCADSD_NONE.

*AttentionId (MQCHAR4)*
The value in this field determines the initial value of the AID key when the transaction is started. It is a 1 byte value, left-aligned.

AttentionId is a request field used only for 3270 transactions. The length of this field is given by MQ_ATTENTION_ID_LENGTH. The initial value of this field is four blanks.

*Authenticator (MQCHAR8)*
The value of this field is the password or passticket.

If user-identifier authentication is active for the CICS bridge, *Authenticator* is used with the user identifier in the MQMD identity context to authenticate the sender of the message.

This is a request field. The length of this field is given by MQ_AUTHENTICATOR_LENGTH. The initial value of this field is 8 blanks.

*CancelCode (MQCHAR4)*
The value in this field is the abend code to be used to terminate the transaction (normally a conversational transaction that is requesting more data). Otherwise this field is set to blanks.

This field is a request field used only for 3270 transactions. The length of this field is given by MQ_CANCEL_CODE_LENGTH. The initial value of this field is four blanks.

*CodedCharSetId (MQLONG)*
CodedCharSetId is a reserved field; its value is not significant. The initial value of this field is 0.

The Character Set ID for supported structures which follow an MQCIH structure is the same as the Character Set ID of the MQCIH structure itself and is taken from any preceding IBM MQ header.

*CompCode (MQLONG)*
This field is a response field. Its initial value is MQCC_OK

The value returned in this field depends on *ReturnCode* ; see Table 472 on page 294.

*ConversationalTask (MQLONG)*
This field is an indicator specifying whether to allow the task to issue requests for more information, or to stop the task and issue an abend message.

The value must be one of the following options:

**MQCCT_YES**
The task is conversational.

**MQCCT_NO**
The task is not conversational.

This field is a request field used only for 3270 transactions. The initial value of this field is MQCCT_NO.

*CursorPosition (MQLONG)*
The value in this field shows the initial cursor position when the transaction is started. For conversational transactions, the cursor position is in the RECEIVE vector.

This field is a request field used only for 3270 transactions. The initial value of this field is 0. This field is not present if *Version* is less than MQCIH_VERSION_2.

*Encoding (MQLONG)*
This field is a reserved field; its value is not significant. Its initial value is 0.

The Encoding for supported structures which follow an MQCIH structure is the same as the Encoding of the MQCIH structure itself and taken from any preceding IBM MQ header.

*ErrorOffset (MQLONG)*
The ErrorOffset field shows the position of invalid data detected by the bridge exit. This field provides the offset from the start of the message to the location of the invalid data.

ErrorOffset is a response field used only for 3270 transactions. The initial value of this field is 0. This field is not present if *Version* is less than MQCIH_VERSION_2.

*Facility (MQBYTE8)*
This field shows the 8-byte bridge facility token.

A bridge facility token enables multiple transactions in a pseudo-conversation to use the same bridge facility (virtual 3270 terminal). In the first, or only, message in a pseudo-conversation, set a value of MQCFAC_NONE. This value tells CICS to allocate a new bridge facility for this message. A bridge facility token is returned in response messages when a nonzero *FacilityKeepTime* is specified on the input message. Subsequent input messages within a pseudo-conversation must then use the same bridge facility token.

The following special value is defined:

**MQCFAC_NONE**
No facility token specified.

For the C programming language, the constant MQCFAC_NONE_ARRAY is also defined, and has the same value as MQCFAC_NONE, but is an array of characters instead of a string.

This field is both a request and a response field used only for 3270 transactions. The length of this field is given by MQ_FACILITY_LENGTH. The initial value of this field is MQCFAC_NONE.

*FacilityKeepTime (MQLONG)*
FacilityKeepTime is the length of time in seconds that the bridge facility is kept after the user transaction ends.

For pseudo-conversational transactions, specify a value that corresponds to the expected duration of a pseudo-conversation; specify zero for the last transaction of a pseudo-conversation, and for other transaction types specify zero.

This field is a request field used only for 3270 transactions. The initial value of this field is 0.

*FacilityLike (MQCHAR4)*
FacilityLike is the name of an installed terminal that is to be used as a model for the bridge facility.

A value of blanks means that *FacilityLike* is taken from the bridge transaction profile definition, or a default value is used.

This field is a request field used only for 3270 transactions. The length of this field is given by MQ_FACILITY_LIKE_LENGTH. The initial value of this field is four blanks.

*Flags (MQLONG)*
This field is a request field. The initial value of this field is MQCIH_NONE.

The value must be:

**MQCIH_NONE**
No flags.

**MQCIH_PASS_EXPIRATION**
The reply message contains:

- The same expiry report options as the request message.
- The remaining expiry time from the request message with no adjustment made for the processing time of the bridge.

If you omit this value, the expiry time is set to *unlimited*.

**MQCIH_REPLY_WITHOUT_NULLS**
The reply message length of a CICS DPL program request is adjusted to exclude trailing nulls (X'00') at the end of the COMMAREA returned by the DPL program. If this value is not set, the nulls might be significant, and the full COMMAREA is returned.

**MQCIH_SYNC_ON_RETURN**
The CICS link for DPL requests uses the SYNCONRETURN option, causing CICS to take a sync point when the program completes if it is shipped to another CICS region. The bridge does not specify to which CICS region to ship the request; that is controlled by the CICS program definition or workload balancing facilities.

*Format (MQCHAR8)*
This field shows the IBM MQ format name of the data that follows the MQCIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as the rules for coding the *Format* field in MQMD.

This format name is also used for the reply message, if the *ReplyToFormat* field has the value MQFMT_NONE.

- For DPL requests, *Format* must be the format name of the COMMAREA.
- For 3270 requests, *Format* must be CSQCBDCI, and the bridge sets the format to CSQCBDC0 for Reply messages.

The data-conversion exits for these formats must be installed on the queue manager where they are to run.

If the request message generates an error reply message, the error reply message has a format name of MQFMT_STRING.

This field is a request field. The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*Function (MQCHAR4)*
This field is a response field. The length of this field is given by MQ_FUNCTION_LENGTH. The initial value of this field is MQCFUNC_NONE.

The value returned in this field depends on *ReturnCode* ; see Table 472 on page 294. The following values are possible when *Function* contains an IBM MQ call name:

**MQCFUNC_MQCONN**
MQCONN call.

**MQCFUNC_MQGET**
MQGET call.

**MQCFUNC_MQINQ**
MQINQ call.

**MQCFUNC_MQOPEN**
MQOPEN call.

**MQCFUNC_MQPUT**
MQPUT call.

**MQCFUNC_MQPUT1**
MQPUT1 call.

**MQCFUNC_NONE**
No call.

In all cases, for the C programming language the constants MQCFUNC_*_ARRAY are also defined; these constants have the same values as the corresponding MQCFUNC_* constants, but are arrays of characters instead of strings.

*GetWaitInterval (MQLONG)*
This field is a request field. Its initial value is MQCGWI_DEFAULT.

This field applies only when *UOWControl* has the value MQCUOWC_FIRST. It enables the sending application to specify the approximate time in milliseconds that the MQGET calls issued by the bridge will wait for second and subsequent request messages for the unit of work started by this message. This facility overrides the default wait interval used by the bridge. You can use the following special values:

**MQCGWI_DEFAULT**
Default wait interval.

This value causes the CICS bridge to wait for the time specified when the bridge was started.

**MQWI_UNLIMITED**
Unlimited wait interval.

*InputItem (MQLONG)*
This field is a reserved field. The value must be 0.

This field is not present if *Version* is less than MQCIH_VERSION_2.

*LinkType (MQLONG)*
This field is a request field. Its initial value is MQCLT_PROGRAM.

This value indicates the type of object that the bridge tries to link. It must be one of the following values:

**MQCLT_PROGRAM**
DPL program.

**MQCLT_TRANSACTION**
3270 transaction.

*NextTransactionId (MQCHAR4)*
This value is the name of the next transaction returned by the user transaction (usually by EXEC CICS RETURN TRANSID). If there is no next transaction, this field is set to blanks.

This field is a response field used only for 3270 transactions. The length of this field is given by MQ_TRANSACTION_ID_LENGTH. The initial value of this field is four blanks.

*OutputDataLength (MQLONG)*
This field is a request field used only for DPL programs. Its initial value is MQCODL_AS_INPUT.

This value is the length of the user data to be returned to the client in a reply message. This length includes the 8-byte program name. The length of the COMMAREA passed to the linked program is the maximum of this field and the length of the user data in the request message, minus 8.

**Note:** The length of the user data in a message is the length of the message excluding the MQCIH structure.

If the length of the user data in the request message is smaller than *OutputDataLength*, the DATALENGTH option of the LINK command is used, enabling the LINK to be function-shipped efficiently to another CICS region.

You can use the following special value:

**MQCODL_AS_INPUT**
Output length is same as input length.

This value might be needed even if no reply is requested, in order to ensure that the COMMAREA passed to the linked program is of sufficient size.

*Reason (MQLONG)*
This field is a response field. Its initial value is MQRC_NONE.

The value returned in this field depends on *ReturnCode* ; see Table 472 on page 294.

*RemoteSysId (MQCHAR4)*
This field shows the CICS system identifier of the CICS system processing the request.

If this field is blank, the CICS system request is processed on the same CICS system as the bridge monitor. The SYSID used is returned in the Reply message.

For a 3270 pseudo-conversation, all subsequent messages in the conversation must specify the remote SYSID returned in the initial reply. If specified, the SYSID must:

- Be active.
- Have access to the IBM MQ Request queue.
- Be accessible by the CICS ISC links from the CICS system of the bridge monitor.

*RemoteTransId (MQCHAR4)*
This field is an optional Request field. The length of this field is given by MQ_TRANSACTION_ID_LENGTH.

If specified, the field is used as the RTRANSID value of CICS START.

*ReplyToFormat (MQCHAR8)*
The value of this field is the IBM MQ format name of the reply message that is sent in response to the current message.

The rules for coding this field are the same as those rules for coding the *Format* field in MQMD.

This field is a request field used only for DPL programs. The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*Reserved1 (MQCHAR8)*
This field is a reserved field. The value must be 8 blanks.

*Reserved2 (MQCHAR8)*
This field is a reserved field. The value must be 8 blanks.

*Reserved3 (MQCHAR8)*
This field is a reserved field. The value must be 8 blanks.

*Reserved4 (MQLONG)*
This field is a reserved field. The value must be 0.

This field is not present if *Version* is less than MQCIH_VERSION_2.

*ReturnCode (MQLONG)*
The value of this field is the return code from the CICS bridge describing the outcome of the processing performed by the bridge. This field is a response field, with an initial value of MQCRC_OK.

The *Function*, *CompCode*, *Reason*, and *AbendCode* fields might contain additional information (see Table 472 on page 294 ). The value is one of the following:

**MQCRC_APPLICATION_ABEND**
(5, X'005') Application ended abnormally.

**MQCRC_BRIDGE_ABEND**
(4, X'004') CICS bridge ended abnormally.

**MQCRC_BRIDGE_ERROR**
(3, X'003') CICS bridge detected an error.

**MQCRC_BRIDGE_TIMEOUT**
(8, X'008') Second or later message within current unit of work not received within specified time.

**MQCRC_CICS_EXEC_ERROR**
(1, X'001') EXEC CICS statement detected an error.

**MQCRC_MQ_API_ERROR**
(2, X'002') MQ call detected an error.

**MQCRC_OK**
(0, X'000') No error.

**MQCRC_PROGRAM_NOT_AVAILABLE**
(7, X'007') Program not available.

**MQCRC_SECURITY_ERROR**
(6, X'006') Security error occurred.

**MQCRC_TRANSID_NOT_AVAILABLE**
(9, X'009') Transaction not available.

*StartCode (MQCHAR4)*
The value of this field is an indicator specifying whether the bridge emulates a terminal transaction or a transaction initiated with START.

The value must be one of the following:

**MQCSC_START**
Start.

**MQCSC_STARTDATA**
Start data.

**MQCSC_TERMINPUT**
Terminal input.

**MQCSC_NONE**
None.

In all cases, for the C programming language the constants MQCSC_*_ARRAY are also defined; these constants have the same values as the corresponding MQCSC_* constants, but are arrays of characters instead of strings.

In the response from the bridge, this field is set to the start code appropriate to the next transaction ID contained in the *NextTransactionId* field. The following start codes are possible in the response:

- MQCSC_START
- MQCSC_STARTDATA
- MQCSC_TERMINPUT

For CICS Transaction Server Version 1.2, this field is a request field only; its value in the response is undefined.

For CICS Transaction Server Version 1.3 and subsequent releases, this field is both a request and a response field.

This field is used only for 3270 transactions. The length of this field is given by MQ_START_CODE_LENGTH. The initial value of this field is MQCSC_NONE.

*StrucId (MQCHAR4)*
This field is a request field, with an initial value of MQCIH_STRUC_ID.

The value must be:

**MQCIH_STRUC_ID**
Identifier for CICS information header structure.

For the C programming language, the constant MQCIH_STRUC_ID_ARRAY is also defined; this has the same value as MQCIH_STRUC_ID, but is an array of characters instead of a string.

*StrucLength (MQLONG)*
This field is a request field, with an initial value of MQCIH_LENGTH_2.

The value must be one of the following:

**MQCIH_LENGTH_1**
Length of version-1 CICS information header structure.

**MQCIH_LENGTH_2**
Length of version-2 CICS information header structure.

The following constant specifies the length of the current version:

**MQCIH_CURRENT_LENGTH**
Length of current version of CICS information header structure.

*TaskEndStatus (MQLONG)*
This field is a response field, showing the status of the user transaction at end of task. The field is used only for 3270 transactions, and its initial value is MQCTES_NOSYNC.

One of the following values is returned:

**MQCTES_NOSYNC**
Not synchronized.

The user transaction has not yet completed and has not syncpointed. The *MsgType* field in MQMD is MQMT_REQUEST in this case.

**MQCTES_COMMIT**
Commit unit of work.

The user transaction has not yet completed, but has syncpointed the first unit of work. The *MsgType* field in MQMD is MQMT_DATAGRAM in this case.

**MQCTES_BACKOUT**
Back out unit of work.

The user transaction has not yet completed. The current unit of work is backed out. The *MsgType* field in MQMD is MQMT_DATAGRAM in this case.

**MQCTES_ENDTASK**
End task.

The user transaction has ended (or abended). The *MsgType* field in MQMD is MQMT_REPLY in this case.

*TransactionId (MQCHAR4)*
This field is a request field. Its length is given by MQ_TRANSACTION_ID_LENGTH. The initial value of this field is four blanks.

If *LinkType* has the value MQCLT_TRANSACTION, *TransactionId* is the transaction identifier of the user transaction to be run; specify a nonblank value in this case.

If *LinkType* has the value MQCLT_PROGRAM, *TransactionId* is the transaction code under which all programs within the unit of work are to be run. If you specify a blank value, the CICS DPL bridge default transaction code (CKBP) is used. If the value is nonblank, you must have defined it to CICS as a local transaction with an initial program that is CSQCBP00. This field applies only when *UOWControl* has the value MQCUOWC_FIRST or MQCUOWC_ONLY.

*UOWControl (MQLONG)*
This field is a request field which controls the unit-of-work processing performed by the CICS bridge. The initial value of this field is MQCUOWC_ONLY.

You can request the bridge to run a single transaction, or one or more programs within a unit of work. The field indicates whether the CICS bridge starts a unit of work, performs the requested function within the current unit of work, or ends the unit of work by committing it or backing it out. Various combinations are supported, to optimize the data transmission flows.

The value must be one of the following:

**MQCUOWC_ONLY**
Start unit of work, perform function, then commit the unit of work.

**MQCUOWC_CONTINUE**
Additional data for the current unit of work (3270 only).

**MQCUOWC_FIRST**
Start unit of work and perform function.

**MQCUOWC_MIDDLE**
Perform function within current unit of work

**MQCUOWC_LAST**
Perform function, then commit the unit of work.

**MQCUOWC_COMMIT**
Commit the unit of work (DPL only).

**MQCUOWC_BACKOUT**
Back out the unit of work (DPL only).

*Version (MQLONG)*
This field is a request field. Its initial value is MQCIH_VERSION_2.

The value must be one of the following:

**MQCIH_VERSION_1**
Version-1 CICS information header structure.

**MQCIH_VERSION_2**
Version-2 CICS information header structure.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQCIH_CURRENT_VERSION**
Current version of CICS information header structure.

### *Initial values and language declarations for MQCIH*

*Table 473. Initial values of fields in MQCIH for MQCIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCIH_STRUC_ID | 'CIH¬' |
| *Version* | MQCIH_VERSION_2 | 2 |
| *StrucLength* | MQCIH_LENGTH_2 | 180 |
| *Encoding* | None | 0 |
| *CodedCharSetId* | None | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQCIH_NONE | 0 |
| *ReturnCode* | MQCRC_OK | 0 |
| *CompCode* | MQCC_OK | 0 |
| *Reason* | MQRC_NONE | 0 |
| *UOWControl* | MQCUOWC_ONLY | 273 |
| *GetWaitInterval* | MQCGWI_DEFAULT | -2 |
| *LinkType* | MQCLT_PROGRAM | 1 |
| *OutputDataLength* | MQCODL_AS_INPUT | -1 |
| *FacilityKeepTime* | None | 0 |
| *ADSDescriptor* | MQCADSD_NONE | 0 |
| *ConversationalTask* | MQCCT_NO | 0 |
| *TaskEndStatus* | MQCTES_NOSYNC | 0 |
| *Facility* | MQCFAC_NONE | Nulls |
| *Function* | MQCFUNC_NONE | Blanks |
| *AbendCode* | None | Blanks |
| *Authenticator* | None | Blanks |
| *Reserved1* | None | Blanks |
| *ReplyToFormat* | MQFMT_NONE | Blanks |
| *RemoteSysId* | None | Blanks |
| *RemoteTransId* | None | Blanks |
| *TransactionId* | None | Blanks |
| *FacilityLike* | None | Blanks |
| *AttentionId* | None | Blanks |
| *StartCode* | MQCSC_NONE | Blanks |
| *CancelCode* | None | Blanks |
| *NextTransactionId* | None | Blanks |
| *Reserved2* | None | Blanks |

| *Table 473. Initial values of fields in MQCIH for MQCIH (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *Reserved3* | None | Blanks |
| *CursorPosition* | None | 0 |
| *ErrorOffset* | None | 0 |
| *InputItem* | None | 0 |
| *Reserved4* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQCIH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQCIH MyCIH = {MQCIH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQCIH MQCIH;
struct tagMQCIH {
  MQCHAR4  StrucId;             /* Structure identifier */
  MQLONG   Version;             /* Structure version number */
  MQLONG   StrucLength;         /* Length of MQCIH structure */
  MQLONG   Encoding;            /* Reserved */
  MQLONG   CodedCharSetId;      /* Reserved */
  MQCHAR8  Format;              /* MQ format name of data that follows
                                   MQCIH */
  MQLONG   Flags;               /* Flags */
  MQLONG   ReturnCode;          /* Return code from bridge */
  MQLONG   CompCode;            /* MQ completion code or CICS EIBRESP */
  MQLONG   Reason;              /* MQ reason or feedback code, or CICS
                                   EIBRESP2 */
  MQLONG   UOWControl;          /* Unit-of-work control */
  MQLONG   GetWaitInterval;     /* Wait interval for MQGET call issued
                                   by bridge task */
  MQLONG   LinkType;            /* Link type */
  MQLONG   OutputDataLength;    /* Output COMMAREA data length */
  MQLONG   FacilityKeepTime;    /* Bridge facility release time */
  MQLONG   ADSDescriptor;       /* Send/receive ADS descriptor */
  MQLONG   ConversationalTask;  /* Whether task can be conversational */
  MQLONG   TaskEndStatus;       /* Status at end of task */
  MQBYTE8  Facility;            /* Bridge facility token */
  MQCHAR4  Function;            /* MQ call name or CICS EIBFN
                                   function */
  MQCHAR4  AbendCode;           /* Abend code */
  MQCHAR8  Authenticator;       /* Password or passticket */
  MQCHAR8  Reserved1;           /* Reserved */
  MQCHAR8  ReplyToFormat;       /* MQ format name of reply message */
  MQCHAR4  RemoteSysId;         /* Reserved */
  MQCHAR4  RemoteTransId;       /* Reserved */
  MQCHAR4  TransactionId;       /* Transaction to attach */
  MQCHAR4  FacilityLike;        /* Terminal emulated attributes */
  MQCHAR4  AttentionId;         /* AID key */
  MQCHAR4  StartCode;           /* Transaction start code */
  MQCHAR4  CancelCode;          /* Abend transaction code */
  MQCHAR4  NextTransactionId;   /* Next transaction to attach */
  MQCHAR8  Reserved2;           /* Reserved */
  MQCHAR8  Reserved3;           /* Reserved */
  MQLONG   CursorPosition;      /* Cursor position */
  MQLONG   ErrorOffset;         /* Offset of error in message */
  MQLONG   InputItem;           /* Reserved */
  MQLONG   Reserved4;           /* Reserved */
};
```

*COBOL declaration*

```
**   MQCIH structure
  10 MQCIH.
**    Structure identifier
   15 MQCIH-STRUCID            PIC X(4).
**    Structure version number
   15 MQCIH-VERSION            PIC S9(9) BINARY.
**    Length of MQCIH structure
   15 MQCIH-STRUCLENGTH        PIC S9(9) BINARY.
**    Reserved
   15 MQCIH-ENCODING           PIC S9(9) BINARY.
**    Reserved
   15 MQCIH-CODEDCHARSETID     PIC S9(9) BINARY.
**    MQ format name of data that follows MQCIH
   15 MQCIH-FORMAT             PIC X(8).
**    Flags
   15 MQCIH-FLAGS              PIC S9(9) BINARY.
**    Return code from bridge
   15 MQCIH-RETURNCODE         PIC S9(9) BINARY.
**    MQ completion code or CICS EIBRESP
   15 MQCIH-COMPCODE           PIC S9(9) BINARY.
**    MQ reason or feedback code, or CICS EIBRESP2
   15 MQCIH-REASON             PIC S9(9) BINARY.
**    Unit-of-work control
   15 MQCIH-UOWCONTROL         PIC S9(9) BINARY.
**    Wait interval for MQGET call issued by bridge task
   15 MQCIH-GETWAITINTERVAL    PIC S9(9) BINARY.
**    Link type
   15 MQCIH-LINKTYPE           PIC S9(9) BINARY.
**    Output COMMAREA data length
   15 MQCIH-OUTPUTDATALENGTH   PIC S9(9) BINARY.
**    Bridge facility release time
   15 MQCIH-FACILITYKEEPTIME   PIC S9(9) BINARY.
**    Send/receive ADS descriptor
   15 MQCIH-ADSDESCRIPTOR      PIC S9(9) BINARY.
**    Whether task can be conversational
   15 MQCIH-CONVERSATIONALTASK PIC S9(9) BINARY.
**    Status at end of task
   15 MQCIH-TASKENDSTATUS      PIC S9(9) BINARY.
**    Bridge facility token
   15 MQCIH-FACILITY           PIC X(8).
**    MQ call name or CICS EIBFN function
   15 MQCIH-FUNCTION           PIC X(4).
**    Abend code
   15 MQCIH-ABENDCODE          PIC X(4).
**    Password or passticket
   15 MQCIH-AUTHENTICATOR      PIC X(8).
**    Reserved
   15 MQCIH-RESERVED1          PIC X(8).
**    MQ format name of reply message
   15 MQCIH-REPLYTOFORMAT      PIC X(8).
**    Reserved
   15 MQCIH-REMOTESYSID        PIC X(4).
**    Reserved
   15 MQCIH-REMOTETRANSID      PIC X(4).
**    Transaction to attach
   15 MQCIH-TRANSACTIONID      PIC X(4).
**    Terminal emulated attributes
   15 MQCIH-FACILITYLIKE       PIC X(4).
**    AID key
   15 MQCIH-ATTENTIONID        PIC X(4).
**    Transaction start code
   15 MQCIH-STARTCODE          PIC X(4).
**    Abend transaction code
   15 MQCIH-CANCELCODE         PIC X(4).
**    Next transaction to attach
   15 MQCIH-NEXTTRANSACTIONID  PIC X(4).
**    Reserved
   15 MQCIH-RESERVED2          PIC X(8).
**    Reserved
   15 MQCIH-RESERVED3          PIC X(8).
**    Cursor position
   15 MQCIH-CURSORPOSITION     PIC S9(9) BINARY.
**    Offset of error in message
   15 MQCIH-ERROROFFSET        PIC S9(9) BINARY.
**    Reserved
   15 MQCIH-INPUTITEM          PIC S9(9) BINARY.
```

```
**    Reserved
   15 MQCIH-RESERVED4          PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQCIH based,
  3 StrucId             char(4),       /* Structure identifier */
  3 Version             fixed bin(31), /* Structure version number */
  3 StrucLength         fixed bin(31), /* Length of MQCIH structure */
  3 Encoding            fixed bin(31), /* Reserved */
  3 CodedCharSetId      fixed bin(31), /* Reserved */
  3 Format              char(8),       /* MQ format name of data that
                                          follows MQCIH */
  3 Flags               fixed bin(31), /* Flags */
  3 ReturnCode          fixed bin(31), /* Return code from bridge */
  3 CompCode            fixed bin(31), /* MQ completion code or CICS
                                          EIBRESP */
  3 Reason              fixed bin(31), /* MQ reason or feedback code, or
                                          CICS EIBRESP2 */
  3 UOWControl          fixed bin(31), /* Unit-of-work control */
  3 GetWaitInterval     fixed bin(31), /* Wait interval for MQGET call
                                          issued by bridge task */
  3 LinkType            fixed bin(31), /* Link type */
  3 OutputDataLength    fixed bin(31), /* Output COMMAREA data length */
  3 FacilityKeepTime    fixed bin(31), /* Bridge facility release time */
  3 ADSDescriptor       fixed bin(31), /* Send/receive ADS descriptor */
  3 ConversationalTask fixed bin(31), /* Whether task can be
                                          conversational */
  3 TaskEndStatus       fixed bin(31), /* Status at end of task */
  3 Facility            char(8),       /* Bridge facility token */
  3 Function            char(4),       /* MQ call name or CICS EIBFN
                                          function */
  3 AbendCode           char(4),       /* Abend code */
  3 Authenticator       char(8),       /* Password or passticket */
  3 Reserved1           char(8),       /* Reserved */
  3 ReplyToFormat       char(8),       /* MQ format name of reply
                                          message */
  3 RemoteSysId         char(4),       /* Reserved */
  3 RemoteTransId       char(4),       /* Reserved */
  3 TransactionId       char(4),       /* Transaction to attach */
  3 FacilityLike        char(4),       /* Terminal emulated attributes */
  3 AttentionId         char(4),       /* AID key */
  3 StartCode           char(4),       /* Transaction start code */
  3 CancelCode          char(4),       /* Abend transaction code */
  3 NextTransactionId   char(4),       /* Next transaction to attach */
  3 Reserved2           char(8),       /* Reserved */
  3 Reserved3           char(8),       /* Reserved */
  3 CursorPosition      fixed bin(31), /* Cursor position */
  3 ErrorOffset         fixed bin(31), /* Offset of error in message */
  3 InputItem           fixed bin(31), /* Reserved */
  3 Reserved4           fixed bin(31); /* Reserved */
```

*High Level Assembler declaration*

```
MQCIH                   DSECT
MQCIH_STRUCID           DS   CL4  Structure identifier
MQCIH_VERSION           DS   F    Structure version number
MQCIH_STRUCLENGTH       DS   F    Length of MQCIH structure
MQCIH_ENCODING          DS   F    Reserved
MQCIH_CODEDCHARSETID    DS   F    Reserved
MQCIH_FORMAT            DS   CL8  MQ format name of data that follows
*                                 MQCIH
MQCIH_FLAGS             DS   F    Flags
MQCIH_RETURNCODE        DS   F    Return code from bridge
MQCIH_COMPCODE          DS   F    MQ completion code or CICS EIBRESP
MQCIH_REASON            DS   F    MQ reason or feedback code, or CICS
*                                 EIBRESP2
MQCIH_UOWCONTROL        DS   F    Unit-of-work control
MQCIH_GETWAITINTERVAL   DS   F    Wait interval for MQGET call issued
*                                 by bridge task
MQCIH_LINKTYPE          DS   F    Link type
MQCIH_OUTPUTDATALENGTH  DS   F    Output COMMAREA data length
MQCIH_FACILITYKEEPTIME  DS   F    Bridge facility release time
MQCIH_ADSDESCRIPTOR     DS   F    Send/receive ADS descriptor
MQCIH_CONVERSATIONALTASK DS  F    Whether task can be conversational
```

```
MQCIH_TASKENDSTATUS       DS   F    Status at end of task
MQCIH_FACILITY            DS   XL8  Bridge facility token
MQCIH_FUNCTION            DS   CL4  MQ call name or CICS EIBFN function
MQCIH_ABENDCODE           DS   CL4  Abend code
MQCIH_AUTHENTICATOR       DS   CL8  Password or passticket
MQCIH_RESERVED1           DS   CL8  Reserved
MQCIH_REPLYTOFORMAT       DS   CL8  MQ format name of reply message
MQCIH_REMOTESYSID         DS   CL4  Reserved
MQCIH_REMOTETRANSID       DS   CL4  Reserved
MQCIH_TRANSACTIONID       DS   CL4  Transaction to attach
MQCIH_FACILITYLIKE        DS   CL4  Terminal emulated attributes
MQCIH_ATTENTIONID         DS   CL4  AID key
MQCIH_STARTCODE           DS   CL4  Transaction start code
MQCIH_CANCELCODE          DS   CL4  Abend transaction code
MQCIH_NEXTTRANSACTIONID   DS   CL4  Next transaction to attach
MQCIH_RESERVED2           DS   CL8  Reserved
MQCIH_RESERVED3           DS   CL8  Reserved
MQCIH_CURSORPOSITION      DS   F    Cursor position
MQCIH_ERROROFFSET         DS   F    Offset of error in message
MQCIH_INPUTITEM           DS   F    Reserved
MQCIH_RESERVED4           DS   F    Reserved
*
MQCIH_LENGTH              EQU  *-MQCIH
                          ORG  MQCIH
MQCIH_AREA                DS   CL(MQCIH_LENGTH)
```

*Visual Basic declaration*

```
Type MQCIH
  StrucId            As String*4 'Structure identifier'
  Version            As Long     'Structure version number'
  StrucLength        As Long     'Length of MQCIH structure'
  Encoding           As Long     'Reserved'
  CodedCharSetId     As Long     'Reserved'
  Format             As String*8 'MQ format name of data that follows'
                                 'MQCIH'
  Flags              As Long     'Flags'
  ReturnCode         As Long     'Return code from bridge'
  CompCode           As Long     'MQ completion code or CICS EIBRESP'
  Reason             As Long     'MQ reason or feedback code, or CICS'
                                 'EIBRESP2'
  UOWControl         As Long     'Unit-of-work control'
  GetWaitInterval    As Long     'Wait interval for MQGET call issued'
                                 'by bridge task'
  LinkType           As Long     'Link type'
  OutputDataLength   As Long     'Output COMMAREA data length'
  FacilityKeepTime   As Long     'Bridge facility release time'
  ADSDescriptor      As Long     'Send/receive ADS descriptor'
  ConversationalTask As Long     'Whether task can be conversational'
  TaskEndStatus      As Long     'Status at end of task'
  Facility           As MQBYTE8  'Bridge facility token'
  Function           As String*4 'MQ call name or CICS EIBFN function'
  AbendCode          As String*4 'Abend code'
  Authenticator      As String*8 'Password or passticket'
  Reserved1          As String*8 'Reserved'
  ReplyToFormat      As String*8 'MQ format name of reply message'
  RemoteSysId        As String*4 'Reserved'
  RemoteTransId      As String*4 'Reserved'
  TransactionId      As String*4 'Transaction to attach'
  FacilityLike       As String*4 'Terminal emulated attributes'
  AttentionId        As String*4 'AID key'
  StartCode          As String*4 'Transaction start code'
  CancelCode         As String*4 'Abend transaction code'
  NextTransactionId  As String*4 'Next transaction to attach'
  Reserved2          As String*8 'Reserved'
  Reserved3          As String*8 'Reserved'
  CursorPosition     As Long     'Cursor position'
  ErrorOffset        As Long     'Offset of error in message'
  InputItem          As Long     'Reserved'
  Reserved4          As Long     'Reserved'
End Type
```

## MQCMHO - Create message handle options

The following table summarizes the fields in the structure.

| Table 474. Fields in MQCMHO | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |

## *Overview for MQCMHO*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS and IBM MQ clients.

**Purpose**: The **MQCMHO** structure allows applications to specify options that control how message handles are created. The structure is an input parameter on the **MQCRTMH** call.

**Character set and encoding**: Data in **MQCMHO** must be in the character set of the application and encoding of the application ( **MQENC_NATIVE** ).

## *Fields for MQCMHO*

The MQCMHO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*
This field is always an input field. Its initial value is MQCMHO_DEFAULT_VALIDATION.

One of the following options can be specified:

**MQCMHO_VALIDATE**

When **MQSETMP** is called to set a property in this message handle, the property name is validated to ensure that it:

- contains no invalid characters.
- does not begin JMS or usr.JMS except for the following:
  - JMSCorrelationID
  - JMSReplyTo
  - JMSType
  - JMSXGroupID
  - JMSXGroupSeq

  These names are reserved for JMS properties.
- is not one of the following keywords, in any mixture of uppercase or lowercase:
  - AND
  - BETWEEN
  - ESCAPE
  - FALSE
  - IN
  - IS
  - LIKE
  - NOT
  - NULL
  - OR
  - TRUE

- does not begin Body. or Root. (except for Root.MQMD.).

If the property is MQ-defined (mq.*) and the name is recognized, the property descriptor fields are set to the correct values for the property. If the property is not recognized, the *Support* field of the property descriptor is set to **MQPD_OPTIONAL**.

**MQCMHO_DEFAULT_VALIDATION**

This value specifies that the default level of validation of property names occur.

The default level of validation is equivalent to the level specified by **MQCMHO_VALIDATE**.

This value is the default value.

**MQCMHO_NO_VALIDATION**

No validation on the property name occurs. See the description of **MQCMHO_VALIDATE**.

**Default option:** If none of the preceding options described is required, the following option can be used:

**MQCMHO_NONE**

All options assume their default values. Use this value to indicate that no other options have been specified. **MQCMHO_NONE** aids program documentation; it is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

*StrucId (MQCHAR4)*
This field is always an input field. Its initial value is MQCMHO_STRUC_ID.

This is the structure identifier; the value must be:

**MQCMHO_STRUC_ID**
Identifier for create message handle options structure.

For the C programming language, the constant **MQCMHO_STRUC_ID_ARRAY** is also defined; this has the same value as **MQCMHO_STRUC_ID**, but is an array of characters instead of a string.

*Version (MQLONG)*
This field is always an input field. Its initial value is MQCMHO_VERSION_1.

This is the structure version number; the value must be:

**MQCMHO_VERSION_1**
Version-1 create message handle options structure.

The following constant specifies the version number of the current version:

**MQCMHO_CURRENT_VERSION**
Current version of create message handle options structure.

## *Initial values and language declarations for MQCMHO*

*Table 475. Initial values of fields in MQCMHO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCMHO_STRUC_ID | 'CMHO' |
| *Version* | MQCMHO_VERSION_1 | 1 |
| *Options* | MQCMHO_DEFAULT_VALIDATION | 0 |

| Table 475. Initial values of fields in MQCMHO (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |

**Notes:**

1. In the C programming language, the macro variable MQCMHO_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQCMHO MyCMHO = {MQCMHO_DEFAULT};
```

*C declaration*

```
struct tagMQCMHO {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    Options;         /* Options that control the action of MQCRTMH */
};
```

*COBOL declaration*

```
**   MQCMHO structure
  10 MQCMHO.
**    Structure identifier
   15 MQCMHO-STRUCID        PIC X(4).
**    Structure version number
   15 MQCMHO-VERSION        PIC S9(9) BINARY.
**    Options that control the action of MQCRTMH
   15 MQCMHO-OPTIONS        PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQCMHO based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 Options        fixed bin(31), /* Options that control the action of MQCRTMH */
```

*High Level Assembler declaration*

```
MQCMHO                DSECT
MQCMHO_STRUCID        DS   CL4   Structure identifier
MQCMHO_VERSION        DS   F     Structure version number
MQCMHO_OPTIONS        DS   F     Options that control the action of
*                                MQCRTMH
MQCMHO_LENGTH         EQU  *-MQCMHO
MQCMHO_AREA           DS   CL(MQCMHO_LENGTH)
```

## MQCNO - Connect options

The following table summarizes the fields in the structure.

| Table 476. Fields in MQCNO | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options that control the action of MQCONNX | Options |

| Table 476. Fields in MQCNO (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| **Note:** The remaining fields are ignored if *Version* is less than MQCNO_VERSION_2. | | |
| *ClientConnOffset* | Offset of MQCD structure for client connection | ClientConnOffset |
| *ClientConnPtr* | Address of MQCD structure for client connection | ClientConnPtr |
| **Note:** The remaining fields are ignored if *Version* is less than MQCNO_VERSION_3. | | |
| *ConnTag* | Queue-manager connection tag | ConnTag |
| **Note:** The remaining fields are ignored if *Version* is less than MQCNO_VERSION_4. | | |
| *SSLConfigPtr* | Address of MQSCO structure for client connection | SSLConfigPtr |
| *SSLConfigOffset* | Offset of MQSCO structure for client connection | SSLConfigOffset |
| **Note:** The remaining fields are ignored if *Version* is less than MQCNO_VERSION_5. | | |
| *ConnectionId* | Unique connection ID | ConnectionId |
| *SecurityParmsOffset* | Security parameters | SecurityParmsOffset |
| *SecurityParmsPtr* | Security parameters | SecurityParmsPtr |

**Related tasks**
Using MQCONNX

## *Overview for MQCNO*

**Availability**: All versions except MQCNO_VERSION_4: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQCNO structure allows the application to specify options relating to the connection to the local queue manager. The structure is an input/output parameter on the MQCONNX call. For more information about using shared handles, and the MQCONNX call, see Shared (thread independent) connections with MQCONNX .

**Version**: The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQCNO, but with the initial value of the *Version* field set to MQCNO_VERSION_1. To use fields that are not present in the version-1 structure, the application must set the *Version* field to the version number of the version required.

**Character set and encoding**: Data in MQCNO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an IBM MQ MQI client, the structure must be in the character set and encoding of the client.

## *Fields for MQCNO*

The MQCNO structure contains the following fields; the fields are described in **alphabetical order**:

*ClientConnOffset (MQLONG)*
ClientConnOffset is the offset in bytes of an MQCD channel definition structure from the start of the MQCNO structure. The offset can be positive or negative. This field is an input field with an initial value of 0.

Use *ClientConnOffset* only when the application issuing the MQCONNX call is running as an IBM MQ MQI client. For information about how to use this field, see the description of the *ClientConnPtr* field.

This field is ignored if *Version* is less than MQCNO_VERSION_2.

*ClientConnPtr (MQPTR)*
ClientConnPtr is an input field. Its initial value is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

Use *ClientConnOffset* and *ClientConnPtr* only when the application issuing the MQCONNX call is running as an IBM MQ MQI client. By specifying one or other of these fields, the application can control the definition of the client connection channel by providing an MQCD channel definition structure that contains the values required.

If the application is running as an IBM MQ MQI client, but does not provide an MQCD structure, the MQSERVER environment variable is used to select the channel definition. If MQSERVER is not set, the client channel table is used.

If the application is not running as an IBM MQ MQI client, *ClientConnOffset* and *ClientConnPtr* are ignored.

If the application provides an MQCD structure, set the fields listed to the values required; other fields in MQCD are ignored. You can pad character strings with blanks to the length of the field, or terminated them with a null character. See "Fields" on page 1502 for more information about the fields in the MQCD structure.

| Field in MQCD | Value |
|---|---|
| *ChannelName* | Channel name. |
| *Version* | Structure version number. Must not be less than MQCD_VERSION_7. |
| *TransportType* | Any supported transport type. |
| *ModeName* | LU 6.2 mode name. |
| *TpName* | LU 6.2 transaction program name. |
| *SecurityExit* | Name of channel security exit. |
| *SendExit* | Name of channel send exit. |
| *ReceiveExit* | Name of channel receive exit. |
| *MaxMsgLength* | Maximum length in bytes of messages that can be sent over the client connection channel. |
| *SecurityUserData* | User data for security exit. |
| *SendUserData* | User data for send exit. |
| *ReceiveUserData* | User data for receive exit. |
| *UserIdentifier* | User identifier to be used to establish an LU 6.2 session. |
| *Password* | Password to be used to establish an LU 6.2 session. |
| *ConnectionName* | Connection name. |
| *HeartbeatInterval* | Time in seconds between heartbeat flows. |
| *StrucLength* | Length of the MQCD structure. |

| Field in MQCD | Value |
|---|---|
| *ExitNameLength* | Length of exit names addressed by *SendExitPtr* and *ReceiveExitPtr*. Must be greater than zero if *SendExitPtr* or *ReceiveExitPtr* is set to a value that is not the null pointer. |
| *ExitDataLength* | Length of exit data addressed by *SendUserDataPtr* and *ReceiveUserDataPtr*. Must be greater than zero if *SendUserDataPtr* or *ReceiveUserDataPtr* is set to a value that is not the null pointer. |
| *SendExitsDefined* | Number of send exits addressed by *SendExitPtr*. If zero, *SendExit* and *SendUserData* provide the exit name and data. If greater than zero, *SendExitPtr* and *SendUserDataPtr* provide the exit names and data, and *SendExit* and *SendUserData* must be blank. |
| *ReceiveExitsDefined* | Number of receive exits addressed by *ReceiveExitPtr*. If zero, *ReceiveExit* and *ReceiveUserData* provide the exit name and data. If greater than zero, *ReceiveExitPtr* and *ReceiveUserDataPtr* provide the exit names and data, and *ReceiveExit* and *ReceiveUserData* must be blank. |
| *SendExitPtr* | Address of name of first send exit. |
| *SendUserDataPtr* | Address of data for first send exit. |
| *ReceiveExitPtr* | Address of name of first receive exit. |
| *ReceiveUserDataPtr* | Address of data for first receive exit. |
| *LongRemoteUserIdLength* | Length of long remote user identifier. |
| *LongRemoteUserIdPtr* | Address of long remote user identifier. |
| *RemoteSecurityId* | Remote security identifier. |
| *SSLCipherSpec* | SSL CipherSpec. |
| *SSLPeerNamePtr* | Address of SSL peer name. |
| *SSLPeerNameLength* | Length of SSL peer name. |
| *KeepAliveInterval* | Value passed to the communications stack for keepalive timing for the channel |
| *LocalAddress* | The local communications address, including the IP address of the local network adapter to use, and a range of ports to use for outgoing connections. |

Provide the channel definition structure in one of two ways:

- By using the offset field *ClientConnOffset*

  In this case, the application must declare a compound structure containing an MQCNO followed by the channel definition structure MQCD, and set *ClientConnOffset* to the offset of the channel definition structure from the start of the MQCNO. Ensure that this offset is correct. *ClientConnPtr* must be set to the null pointer or null bytes.

  Use *ClientConnOffset* for programming languages that do not support the pointer data type, or that implement the pointer data type in a way that is not portable to different environments (for example, the COBOL programming language).

  For the Visual Basic programming language, a compound structure called MQCNOCD is provided in the header file CMQXB.BAS; this structure contains an MQCNO structure followed by an MQCD structure. Initialize MQCNOCD by invoking the MQCNOCD_DEFAULTS subroutine. MQCNOCD is used with the

MQCONNXAny variant of the MQCONNX call; see the description of the MQCONNX call for further details.

- By using the pointer field *ClientConnPtr*

  In this case, the application can declare the channel definition structure separately from the MQCNO structure, and set *ClientConnPtr* to the address of the channel definition structure. Set *ClientConnOffset* to zero.

  Use *ClientConnPtr* for programming languages that support the pointer data type in a way that is portable to different environments (for example, the C programming language).

  In the C programming language, you can use the macro variable MQCD_CLIENT_CONN_DEFAULT to provide initial values for the structure that are more suitable for use on the MQCONNX call than the initial values provided by MQCD_DEFAULT.

Whichever technique you choose, you can use only one of *ClientConnOffset* and *ClientConnPtr* ; the call fails with reason code MQRC_CLIENT_CONN_ERROR if both are nonzero.

When the MQCONNX call has completed, the MQCD structure is not referenced again.

This field is ignored if *Version* is less than MQCNO_VERSION_2.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length, with the initial value being the all-null byte string.

*ConnectionId (MQBYTE24)*
ConnectionId is a unique 24-byte identifier that allows IBM MQ to reliably identify an application. An application can use this identifier for correlation in PUT and GET calls. This output parameter has an initial value of 24 null bytes in all programming languages.

The queue manager assigns a unique ID to all connections, however they are established. If an MQCONNX establishes the connection with a version 5 MQCNO, the application can determine the ConnectionId from the returned MQCNO. The assigned identifier is guaranteed to be unique among all other identifiers that IBM MQ generates, such as CorrelId, MsgID, and GroupId.

Use the ConnectionId to identify long running units of work using the PCF command Inquire Connection or the MQSC command DISPLAY CONN. The ConnectionId used by MQSC commands (CONN) is derived from the ConnectionId returned here. The PCF Inquire and Stop Connection commands can use the ConnectionId returned here without modification.

You can use the ConnectionId to force the end of a long running unit of work, by specifying the ConnectionId using the PCF command Stop Connection or the MQSC command STOP CONN. See Stop Connection and STOP CONN for more information about using these commands.

This field is not returned if Version is less than MQCNO_VERSION_5.

The length of this field is given by MQ_CONNECTION_ID_LENGTH.

*ConnTag (MQBYTE128)*
ConnTag is a tag that the queue manager associates with the resources that are affected by the application during this connection. Each application or application instance must use a different value for the tag, so that the queue manager can correctly serialize access to the affected resources. This field is an input field, and its initial value is MQCT_NONE.

See the descriptions of the MQCNO_*_CONN_TAG_* options for further details about values to be used by different applications. The tag ceases to be valid when the application terminates or issues the MQDISC call.

**Note:** Connection tag values beginning with MQ in upper, lower, or mixed case in either ASCII or EBCDIC are reserved for use by IBM products. Do not use connection tag values beginning with these letters.

Use the following special value if you require no tag:

**MQCT_NONE**
The value is binary zero for the length of the field.

For the C programming language, the constant MQCT_NONE_ARRAY is also defined; this constant has the same value as MQCT_NONE, but is an array of characters instead of a string.

This field is used when connecting to a z/OS queue manager. In other environments, specify the value MQCT_NONE.

The length of this field is given by MQ_CONN_TAG_LENGTH. This field is ignored if *Version* is less than MQCNO_VERSION_3.

*Options (MQLONG)*
Options that control the action of MQCONNX.

## Accounting options

The following options control the type of accounting if the *AccountingConnOverride* queue manager attribute is set to MQMON_ENABLED:

**MQCNO_ACCOUNTING_MQI_ENABLED**
When monitoring data collection is switched off in the queue manager definition by setting the *MQIAccounting* attribute to MQMON_OFF, setting this flag enables MQI accounting data collection.

**MQCNO_ACCOUNTING_MQI_DISABLED**
When monitoring data collection is switched off in the queue manager definition by setting the *MQIAccounting* attribute to MQMON_OFF, setting this flag stops MQI accounting data collection.

**MQCNO_ACCOUNTING_Q_ENABLED**
When queue-accounting data collection is switched off in the queue manager definition by setting the *MQIAccounting* attribute to MQMON_OFF, setting this flag enables accounting data collection for those queues that specify a queue manager in the *MQIAccounting* field of their queue definition.

**MQCNO_ACCOUNTING_Q_DISABLED**
When queue-accounting data collection is switched off in the queue manager definition by setting the *MQIAccounting* attribute to MQMON_OFF, setting this flag switches off accounting data collection for those queues that specify a queue manager in the *MQIAccounting* field of their queue definition.

If none of these flags are defined, the accounting for the connection is as defined in the Queue Manager attributes.

## Binding options

The following options control the type of IBM MQ binding to use. Specify only one of these options:

**MQCNO_STANDARD_BINDING**
The application and the local queue manager agent (the component that manages queuing operations) run in separate units of execution (typically, in separate processes). This arrangement maintains the integrity of the queue manager; that is, it protects the queue manager from errant programs.

If the queue manager supports multiple binding types, and you set MQCNO_STANDARD_BINDING, the queue manager uses the *DefaultBindType* attribute in the *Connection* stanza in the `qm.ini` file to select the actual type of binding. If this stanza is not defined, or the value cannot be used or is not appropriate for the application, the queue manager selects an appropriate binding type. The queue manager sets the actual binding type used in the connect options.

Use MQCNO_STANDARD_BINDING in situations where the application might not have been fully tested, or might be unreliable or untrustworthy. MQCNO_STANDARD_BINDING is the default.

This option is supported in all environments.

If you are linking to the mqm library, then a standard server connection using the default bind type is attempted first. If the underlying server library failed to load, a client connection is attempted instead.

- If the MQ_CONNECT_TYPE environment variable is specified, one of the following options can be supplied to change the behavior of MQCONN or MQCONNX if MQCNO_STANDARD_BINDING is specified. (The exception to this is if MQCNO_FASTPATH_BINDING is specified with MQ_CONNECT_TYPE set to LOCAL or STANDARD to allow fastpath connections to be downgraded by the administrator without a related change to the application:

| Value | Meaning |
|---|---|
| CLIENT | A client connection only is attempted. |
| FASTPATH | This value was supported in previous releases, but is now ignored if specified. |
| LOCAL | A server connection only is attempted. Fastpath connections are downgraded to a standard server connection. |
| STANDARD | Supported for compatibility with previous releases. This value is now treated as LOCAL. |

- If the MQ_CONNECT_TYPE environment variable is not set when MQCONNX is called, a standard server connection using the default bind type is attempted. If the server library fails to load, a client connection is attempted.

**MQCNO_FASTPATH_BINDING**

The application and the local queue manager agent are part of the same unit of execution. This is in contrast to the typical method of binding, where the application and the local queue manager agent run in separate units of execution.

MQCNO_FASTPATH_BINDING is ignored if the queue manager does not support this type of binding; processing continues as though the option had not been specified.

MQCNO_FASTPATH_BINDING can be of advantage in situations where multiple processes consume more resources than the overall resource used by the application. An application that uses the fastpath binding is known as a *trusted application*.

Consider the following important points when deciding whether to use the fastpath binding:

- Using the MQCNO_FASTPATH_BINDING option does not prevent an application altering or corrupting messages and other data areas belonging to the queue manager. Use this option only in situations where you have fully evaluated these issues.
- The application must not use asynchronous signals or timer interrupts (such as `sigkill`) with MQCNO_FASTPATH_BINDING. There are also restrictions on the use of shared memory segments.
- The application must use the MQDISC call to disconnect from the queue manager.
- The application must finish before you end the queue manager with the `endmqm` command.
- On IBM i, the job must run under a user profile that belongs to the `QMQMADM` group. Also, the program must not stop abnormally, otherwise unpredictable results can occur.
- On UNIX systems, the `mqm` user identifier must be the effective user identifier, and the `mqm` group identifier must be the effective group identifier. To make the application run in this way, configure the program so that it is owned by the `mqm` user identifier and `mqm` group identifier, and then set the `setuid` and `setgid` permission bits on the program.

  The IBM MQ Object Authority Manager (OAM) still uses the real user ID for authority checking.
- On Windows, the program must be a member of the `mqm` group. Fastpath binding is not supported for 64 bit applications.

The MQCNO_FASTPATH_BINDING option is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, and Windows.

z/OS On z/OS, the option is accepted but ignored.

For more information about the implications of using trusted applications, see Restrictions for trusted applications.

**MQCNO_SHARED_BINDING**

With MQCNO_SHARED_BINDING, the application and the local-queue-manager agent share some resources. MQCNO_SHARED_BINDING is ignored if the queue manager does not support this type of binding. Processing continues as though the option had not been specified.

**MQCNO_ISOLATED_BINDING**

In this case, the application process and the local queue manager agent are isolated from each other in that they do not share resources. MQCNO_ISOLATED_BINDING is ignored if the queue manager does not support this type of binding. Processing continues as though the option had not been specified.

**MQCNO_CLIENT_BINDING**

Specify this option to make the application attempt a client connection only. This option has the following limitations:

- z/OS MQCNO_CLIENT_BINDING is ignored on z/OS.
- MQCNO_CLIENT_BINDING is rejected with MQRC_OPTIONS_ERROR if it is specified with any MQCNO binding option other than MQCNO_STANDARD_BINDING.
- MQCNO_CLIENT_BINDING is not available for Java or .NET as they have their own mechanisms for choosing the bind type.

**MQCNO_LOCAL_BINDING**

Specify this option to make the application attempt a server connection. If either MQCNO_FASTPATH_BINDING, MQCNO_ISOLATED_BINDING, or MQCNO_SHARED_BINDING is also specified, then the connection is of that type instead, and is documented in this section. Otherwise a standard server connection is attempted using the default bind type. MQCNO_LOCAL_BINDING has the following limitations:

- z/OS MQCNO_LOCAL_BINDING is ignored on z/OS.
- MQCNO_LOCAL_BINDING is rejected with MQRC_OPTIONS_ERROR if it is specified with any MQCNO reconnect option other than MQCNO_RECONNECT_AS_DEF.
- MQCNO_LOCAL_BINDING is not available for Java or .NET as they have their own mechanisms for choosing the bind type.

On AIX, HP-UX, Solaris, Linux, and Windows, you can use the environment variable MQ_CONNECT_TYPE with the bind type specified by the *Options* field, to control the type of binding used. If you specify this environment variable, it must have the value FASTPATH or STANDARD ; if it has a different value, it is ignored. The value of the environment variable is case sensitive; see MQCONNX environment variable for more information.

The environment variable and *Options* field interact as follows:

- If you omit the environment variable, or give it a value that is not supported, use of the fastpath binding is determined solely by the *Options* field.
- If you give the environment variable a supported value, the fastpath binding is used only if *both* the environment variable and *Options* field specify the fastpath binding.

## Connection-tag options

z/OS

These options are supported only when connecting to a z/OS queue manager and they control the use of the connection tag *ConnTag* . You can specify only one of these options:

**MQCNO_SERIALIZE_CONN_TAG_Q_MGR**

This option requests exclusive use of the connection tag within the local queue manager. If the connection tag is already in use in the local queue manager, the MQCONNX call fails with reason code MQRC_CONN_TAG_IN_USE. The outcome of the call is not affected by using the connection tag elsewhere in the queue-sharing group to which the local queue manager belongs.

**MQCNO_SERIALIZE_CONN_TAG_QSG**

This option requests exclusive use of the connection tag within the queue-sharing group to which the local queue manager belongs. If the connection tag is already in use in the queue-sharing group, the MQCONNX call fails with reason code MQRC_CONN_TAG_IN_USE.

**MQCNO_RESTRICT_CONN_TAG_Q_MGR**

This option requests shared use of the connection tag within the local queue manager. If the connection tag is already in use in the local queue manager, the MQCONNX call can succeed if the requesting application is running in the same processing scope as the existing user of the tag. If this condition is not satisfied, the MQCONNX call fails with reason code MQRC_CONN_TAG_IN_USE. The outcome of the call is not affected by use of the connection tag elsewhere in the queue-sharing group to which the local queue manager belongs.

- Applications must run within the same MVS address space to share the connection tag. If the application using the connection tag is a client application, MQCNO_RESTRICT_CONN_TAG_Q_MGR is not allowed.

**MQCNO_RESTRICT_CONN_TAG_QSG**

This option requests shared use of the connection tag within the queue-sharing group to which the local queue manager belongs. If the connection tag is already in use in the queue-sharing group, the MQCONNX call can succeed provided the requesting application is running in the same processing scope and is connected to the same queue manager, as the existing user of the tag.

If these conditions are not satisfied, the MQCONNX call fails with reason code MQRC_CONN_TAG_IN_USE.

- Applications must run within the same MVS address space to share the connection tag. If the application using the connection tag is a client application, MQCNO_RESTRICT_CONN_TAG_QSG is not allowed.

If none of these options are specified, *ConnTag* is not used. These options are not valid if *Version* is less than MQCNO_VERSION_3.

## Handle-sharing options

These options are supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, and Windows. They control the sharing of handles between different threads (units of parallel processing) within the same process. You can specify only one of these options:

**MQCNO_HANDLE_SHARE_NONE**

This option indicates that connection and object handles can be used only by the thread that caused the handle to be allocated (that is, the thread that issued the MQCONN, MQCONNX , or MQOPEN call). The handles cannot be used by other threads belonging to the same process.

**MQCNO_HANDLE_SHARE_BLOCK**

This option indicates that connection and object handles allocated by one thread of a process can be used by other threads belonging to the same process. However, only one thread at a time can use any particular handle; that is, only serial use of a handle is permitted. If a thread tries to use a handle that is already in use by another thread, the call blocks (waits) until the handle becomes available.

**MQCNO_HANDLE_SHARE_NO_BLOCK**

This is the same as MQCNO_HANDLE_SHARE_BLOCK, except that if the handle is in use by another thread, the call completes immediately with MQCC_FAILED and MQRC_CALL_IN_PROGRESS instead of blocking until the handle becomes available.

A thread can have zero or one non-shared handles:

- Each MQCONN or MQCONNX call that specifies MQCNO_HANDLE_SHARE_NONE returns a new nonshared handle on the first call, and the same non-shared handle on the second and later calls (assuming no intervening MQDISC call). The reason code is MQRC_ALREADY_CONNECTED for the second and later calls.
- Each MQCONNX call that specifies MQCNO_HANDLE_SHARE_BLOCK or MQCNO_HANDLE_SHARE_NO_BLOCK returns a new shared handle on each call.

Object handles inherit the same sharing properties as the connection handle specified on the MQOPEN call that created the object handle. Also, units of work inherit the same sharing properties as the connection handle used to start the unit of work; if the unit of work is started in one thread using a shared handle, the unit of work can be updated in another thread using the same handle.

If you do not specify a handle-sharing option, the default is determined by the environment:

- In the Microsoft Transaction Server (MTS) environment, the default is the same as MQCNO_HANDLE_SHARE_BLOCK.
- In other environments, the default is the same as MQCNO_HANDLE_SHARE_NONE.

## Reconnection options

Reconnection options determine if a connection is reconnectable. Only client connections are reconnectable.

**MQCNO_RECONNECT_AS_DEF**

The reconnection option is resolved to its default value. If no default is set, the value of this option resolves to DISABLED. The value of the option is passed to the server, and can be queried by PCF and MQSC.

**MQCNO_RECONNECT**

The application can be reconnected to any queue manager consistent with the value of the `QmgrName` parameter of `MQCONNX`. Use the MQCNO_RECONNECT option only if there is no affinity between the client application and the queue manager with which it initially established a connection. The value of the option is passed to the server, and can be queried by PCF and MQSC.

**MQCNO_RECONNECT_DISABLED**

The application cannot be reconnected. The value of the option is not passed to the server.

**MQCNO_RECONNECT_Q_MGR**

The application can be reconnected only to the queue manager with which it originally connected. Use this value if a client can be reconnected, but there is an affinity between the client application and the queue manager with which it originally established a connection. Choose this value if you want a client to automatically reconnect to the standby instance of a highly available queue manager. The value of the option is passed to the server, and can be queried by PCF and MQSC.

Use the options MQCNO_RECONNECT, MQCNO_RECONNECT_DISABLED and MQCNO_RECONNECT_Q_MGR only for client connections. If the options are used for a binding connection, `MQCONNX` fails with completion code `MQCC_FAILED` and reason code `MQRC_OPTIONS_ERROR`. Automatic client reconnect is not supported by IBM MQ classes for Java

## Conversation-sharing options

The following options apply only to TCP/IP client connections. For SNA, SPX and NetBios channels, these values are ignored and the channel runs as in previous versions of the product

**MQCNO_NO_CONV_SHARING**

This option does not permit conversation sharing.

You might use MQCNO_NO_CONV_SHARING in situations where conversations are heavily loaded and, therefore, where contention is a possibility on the server-connection end of the channel instance on which the sharing conversations exist. MQCNO_NO_CNV_SHARING behaves like sharecnv(1) when connected to a channel that supports conversation sharing, and sharecnv(0) when connected to a channel that does not support conversation sharing.

**MQCNO_ALL_CONVS_SHARE**

This option permits conversation sharing; the application does not place any limit on the number of connections on the channel instance. This option is the default value.

If the application indicates that the channel instance can share, but the *SharingConversations* (SHARECNV) definition on the server-connection end of the channel is set to one, no sharing occurs and no warning is given to the application.

Similarly, if the application indicates that sharing is permitted but the server-connection *SharingConversations* definition is set to zero, no warning is given, and the application exhibits the same behavior as a client in versions of the product earlier than Version 7.0; the application setting relating to sharing conversations is ignored.

MQCNO_NO_CONV_SHARING and MQCNO_ALL_CONVS_SHARE are mutually exclusive. If both options are specified on a particular connection, the connection is rejected with a reason code of MQRC_OPTIONS_ERROR.

## Channel definition options

The following options control the use of the channel definition structure passed in the MQCNO:

**MQCNO_CD_FOR_OUTPUT_ONLY**

This option permits channel definition structure in the MQCNO to be used only to return the channel name used on a successful MQCONNX call.

If a valid channel definition structure is not provided, the call fails with the reason code MQRC_CD_ERROR.

If the application is not running as a client, the option is ignored.

The returned channel name can be used on a subsequent MQCONNX call using the MQCNO_USE_CD_SELECTION option to reconnect using the same channel definition. This can be useful when there are multiple applicable channel definitions in the client channel table.

**MQCNO_USE_CD_SELECTION**

This option permits MQCONNX call to connect using the channel name contained in the channel definition structure passed in the MQCNO.

If the MQSERVER environment variable is set, the channel definition defined by it is used. If MQSERVER is not set, the client channel table is used.

If a channel definition with matching channel name and queue manager name is not found, the call fails with reason code MQRC_Q_MGR_NAME_ERROR.

If a valid channel definition structure is not provided, the call fails with the reason code MQRC_CD_ERROR.

If the application is not running as a client, the option is ignored.

## Default option

If you require none of the options described above, you can use the following option:

**MQCNO_NONE**

No options are specified.

Use MQCNO_NONE to aid program documentation. It is not intended that this option is used with any other MQCNO_* option, but because its value is zero, such use cannot be detected.

*SecurityParmsOffset (MQLONG)*
SecurityParmsOffset is the offset in bytes of the MQCSP structure from the start of the MQCNO structure. The offset can be positive or negative. This field is an input field, with an initial value of 0.

This field is ignored if *Version* is less than MQCNO_VERSION_5.

The MQCSP structure is defined in "MQCSP - Security parameters" on page 325.

*SecurityParmsPtr (PMQCSP)*
SecurityParmsPtr is the address of the MQCSP structure, used to specify a user ID and password for authentication by the authorization service. This field is an input field, and its initial value is a null pointer or null bytes.

This field is ignored if *Version* is less than MQCNO_VERSION_5.

The MQCSP structure is defined in "MQCSP - Security parameters" on page 325.

*SSLConfigOffset (MQLONG)*
SSLConfigOffset is the offset in bytes of an MQSCO structure from the start of the MQCNO structure. The offset can be positive or negative. This field is an input field, with an initial value of 0.

Use *SSLConfigOffset* only when the application issuing the MQCONNX call is running as an IBM MQ MQI client. For information about how to use this field, see the description of the *SSLConfigPtr* field.

This field is ignored if *Version* is less than MQCNO_VERSION_4.

*SSLConfigPtr (PMQSCO)*
SSLConfigPtr is an input field. Its initial value is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

Use *SSLConfigPtr* and *SSLConfigOffset* only when the application issuing the MQCONNX call is running as an IBM MQ MQI client and the channel protocol is TCP/IP. If the application is not running as an IBM MQ client, or the channel protocol is not TCP/IP, *SSLConfigPtr* and *SSLConfigOffset* are ignored.

By specifying *SSLConfigPtr* or *SSLConfigOffset*, plus either *ClientConnPtr* or *ClientConnOffset*, the application can control the use of SSL for the client connection. When the SSL information is specified in this way, the environment variables MQSSLKEYR and MQSSLCRYP are ignored; any SSL-related information in the client channel definition table (CCDT) is also ignored.

The SSL information can be specified only on:

- The first MQCONNX call of the client process, or
- A subsequent MQCONNX call when all previous SSL/TLS connections to the queue manager have been concluded using MQDISC.

These are the only states in which the process-wide SSL environment can be initialized. If an MQCONNX call is issued specifying SSL information when the SSL environment already exists, the SSL information on the call is ignored and the connection is made using the existing SSL environment; the call returns completion code MQCC_WARNING and reason code MQRC_SSL_ALREADY_INITIALIZED in this case.

You can provide the MQSCO structure in the same way as the MQCD structure, either by specifying an address in *SSLConfigPtr*, or by specifying an offset in *SSLConfigOffset* ; see the description of *ClientConnPtr* for details of how to do this. However, you can use no more than one of *SSLConfigPtr* and *SSLConfigOffset* ; the call fails with reason code MQRC_SSL_CONFIG_ERROR. if both are nonzero.

Once the MQCONNX call has completed, the MQSCO structure is not referenced again.

This field is ignored if *Version* is less than MQCNO_VERSION_4.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

*StrucId (MQCHAR4)*
StrucId is always an input field. Its initial value is MQCNO_STRUC_ID.

The value must be:

**MQCNO_STRUC_ID**
Identifier for connect-options structure.

For the C programming language, the constant MQCNO_STRUC_ID_ARRAY is also defined; this constant has the same value as MQCNO_STRUC_ID, but is an array of characters instead of a string.

*Version (MQLONG)*
Version is always an input field. Its initial value is MQCNO_VERSION_1.

The value must be one of the following:

**MQCNO_VERSION_1**
Version-1 connect-options structure.

**MQCNO_VERSION_2**
Version-2 connect-options structure.

**MQCNO_VERSION_3**
Version-3 connect-options structure.

**MQCNO_VERSION_4**
Version-4 connect-options structure.

**MQCNO_VERSION_5**
Version-5 connect-options structure.

This version of the MQCNO structure extends MQCNO_VERSION_3 on z/OS, and MQCNO_VERSION_4 on all other platforms.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQCNO_CURRENT_VERSION**
Current version of connect-options structure.

## *Initial values and language declarations for MQCNO*

*Table 477. Initial values of fields in MQCNO for MQCNO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCNO_STRUC_ID | 'CNO¬' |
| *Version* | MQCNO_VERSION_1 | 1 |
| *Options* | MQCNO_NONE | 0 |
| *ClientConnOffset* | None | 0 |
| *ClientConnPtr* | None | Null pointer or null bytes |
| *ConnTag* | MQCT_NONE | Nulls |

| *Table 477. Initial values of fields in MQCNO for MQCNO (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *SSLConfigPtr* | None | Null pointer or null bytes |
| *SSLConfigOffset* | None | 0 |
| *ConnectionId* | None | Null pointer or null bytes |
| *SecurityParmsOffset* | None | Null pointer or null bytes |
| *SecurityParmsPtr* | None | Null pointer or null bytes |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQCNO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQCNO MyCNO = {MQCNO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQCNO MQCNO;
struct tagMQCNO {
  MQCHAR4    StrucId;           /* Structure identifier */
  MQLONG     Version;           /* Structure version number */
  MQLONG     Options;           /* Options that control the action of
                                   MQCONNX */
  MQLONG     ClientConnOffset;  /* Offset of MQCD structure for client
                                   connection */
  MQPTR      ClientConnPtr;     /* Address of MQCD structure for client
                                   connection */
  MQBYTE128  ConnTag;           /* Queue-manager connection tag */
  PMQSCO     SSLConfigPtr;      /* Address of MQSCO structure for client
                                   connection */
  MQLONG     SSLConfigOffset;   /* Offset of MQSCO structure for client
                                   connection */
  MQBYTE24   ConnectionId;      /* Unique connection identifier */
  MQLONG     SecurityParmsOffset /* Security fields */
  PMQCSP     SecurityParmsPtr   /* Security parameters */
};
```

*COBOL declaration*

```
**   MQCNO structure
  10 MQCNO.
**    Structure identifier
   15 MQCNO-STRUCID          PIC X(4).
**    Structure version number
   15 MQCNO-VERSION          PIC S9(9) BINARY.
**    Options that control the action of MQCONNX
   15 MQCNO-OPTIONS          PIC S9(9) BINARY.
**    Offset of MQCD structure for client connection
   15 MQCNO-CLIENTCONNOFFSET PIC S9(9) BINARY.
**    Address of MQCD structure for client connection
   15 MQCNO-CLIENTCONNPTR    POINTER.
**    Queue-manager connection tag
   15 MQCNO-CONNTAG          PIC X(128).
**    Address of MQSCO structure for client connection
   15 MQCNO-SSLCONFIGPTR     POINTER.
**    Offset of MQSCO structure for client connection
   15 MQCNO-SSLCONFIGOFFSET  PIC S9(9) BINARY.
**    Unique connection identifier
   15 MQCNO-CONNECTIONID     PIC X(24).
**    Offset of MQCSP structure for security parameters
   15 MQCNO-SECURITYPARMSOFFSET PIC S9(9) BINARY.
```

```
**    Address of MQCSP structure for security parameters
   15 MQCNO-SECURITYPARMSPTR POINTER.
```

*PL/I declaration*

```
dcl
 1 MQCNO based,
  3 StrucId          char(4),       /* Structure identifier */
  3 Version          fixed bin(31), /* Structure version number */
  3 Options          fixed bin(31), /* Options that control the action
                                       of MQCONNX */
  3 ClientConnOffset fixed bin(31), /* Offset of MQCD structure for
                                       client connection */
  3 ClientConnPtr    pointer,       /* Address of MQCD structure for
                                       client connection */
  3 ConnTag          char(128),     /* Queue-manager connection tag */
  3 SSLConfigPtr     pointer,       /* Address of MQSCO structure for
                                       client connection */
  3 SSLConfigOffset  fixed bin(31), /* Offset of MQSCO structure for
                                       client connection */
  3 ConnectionId     char(24),      /* Unique connection identifier
  3 SecurityParmsOffset fixed bin(31); /* Offset of MQCSP structure for
                                       security parameters */
  3 SecurityParmsPtr pointer,       /* Address of MQCSP structure for
                                       security parameters */
```

*High Level Assembler declaration*

```
MQCNO                   DSECT
MQCNO_STRUCID           DS   CL4    Structure identifier
MQCNO_VERSION           DS   F      Structure version number
MQCNO_OPTIONS           DS   F      Options that control the action of
*                                   MQCONNX
MQCNO_CLIENTCONNOFFSET  DS   F      Offset of MQCD structure for client
*                                   connection
MQCNO_CLIENTCONNPTR     DS   F      Address of MQCD structure for client
*                                   connection
MQCNO_CONNTAG           DS   XL128  Queue-manager connection tag
*
MQCNO_CONNECTIONID      DS   XL24   Unique connection identifier
*
MQCNO_SSLCONFIGOFFSET   DS   F      Offset of MQCSP structure for security
*                                   parameters
MQCNO_SSLCONFIGPTR      DS   F      Address of MQCSP structure for security
*                                   parameters
MQCNO_LENGTH            EQU  *-MQCNO
                        ORG  MQCNO
MQCNO_AREA              DS   CL(MQCNO_LENGTH)
```

*Visual Basic declaration*

```
Type MQCNO
  StrucId          As String*4  'Structure identifier'
  Version          As Long      'Structure version number'
  Options          As Long      'Options that control the action of'
                                'MQCONNX'
  ClientConnOffset As Long      'Offset of MQCD structure for client'
                                'connection'
  ClientConnPtr    As MQPTR     'Address of MQCD structure for client'
                                'connection'
  ConnTag          As MQBYTE128 'Queue-manager connection tag'
  SSLConfigPtr     As MQPTR     'Address of MQSCO structure for client'
                                'connection'
  SSLConfigOffset  As Long      'Offset of MQSCO structure for client'
                                'connection'
  ConnectionId     As MQBYTE24  'Unique connection identifier'
  SecurityParmsOffset As Long   'Offset of MQCSP structure for security'
                                'parameters'
  SecurityParmsPtr As MQPTR     'Address of MQCSP structure for security'
                                'parameters'
  End Type
```

## MQCSP - Security parameters

The following table summarizes the fields in the structure.

**Warning:** In some cases, the password in an MQCSP structure for a client application will be sent across a network in plain text. To ensure that client application passwords are protected appropriately, see IBM MQCSP password protection.

*Table 478. Fields in MQCSP*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *AuthenticationType* | Type of authentication | AuthenticationType |
| *Reserved1* | Required for pointer alignment on IBM i | Reserved1 |
| *CSPUserIdPtr* | Address of user ID | CSPUserIdPtr |
| *CSPUserIdOffset* | Offset of user ID | CSPUserIdOffset |
| *CSPUserIdLength* | Length of user ID | CSPUserIdLength |
| *Reserved2* | Required for pointer alignment on IBM i | Reserved2 |
| *CSPPasswordPtr* | Address of password | CSPPasswordPtr |
| *CSPPasswordOffset* | Offset of password | CSPPasswordOffset |
| *CSPPasswordLength* | Length of password | CSPPasswordLength |

### *Overview for MQCSP*

**Availability**: All IBM MQ products.

**Purpose**: The MQCSP structure enables the authorization service to authenticate a user ID and password. You specify the MQCSP connection security parameters structure on an MQCONNX call.

**Warning:** In some cases, the password in an MQCSP structure for a client application will be sent across a network in plain text. To ensure that client application passwords are protected appropriately, see IBM MQCSP password protection.

**Character set and encoding**: Data in MQCSP must be in the character set and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively.

### *Fields for MQCSP*

The MQCSP structure contains the following fields; the fields are described in **alphabetical order**:

*AuthenticationType (MQLONG)*
AuthenticationType is an input field. Its initial value is MQCSP_AUTH_NONE.

This is the type of authentication to perform. Valid values are:

**MQCSP_AUTH_NONE**
Do not use user ID and password fields.

**MQCSP_AUTH_USER_ID_AND_PWD**
Authenticate user ID and password fields.

The default value is MQCSP_AUTH_NONE. With the default setting, no password protection is done.

If you require authentication, you have to set **MQCSP**.**AuthenticationType** to MQCSP_AUTH_USER_ID_AND_PWD.

See MQCSP password protection for more information.

*CSPPasswordLength (MQLONG)*
This field is the length of the password to be used in authentication.

The maximum length of the password is MQ_CSP_PASSWORD_LENGTH. If the length of the password is greater than the maximum length permitted, the authentication request fails with MQRC_NOT_AUTHORIZED.

The value of MQ_CSP_PASSWORD_LENGTH is 256.

This field is an input field. The initial value of this field is 0.

*CSPPasswordOffset (MQLONG)*
This is the offset in bytes of the password to be used in authentication. The offset can be positive or negative.

This is an input field. The initial value of this field is 0.

*CSPPasswordPtr (MQPTR)*
This is the address in bytes of the password to be used in authentication.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQCNO_VERSION_5.

This field can contain an empty password which is rejected by the operating system or LDAP password checking, depending on setup, but is not rejected by IBM MQ before passing it the authentication method.

*CSPUserIdLength (MQLONG)*
This field is the length of the user ID to be used in authentication.

The maximum length of the user ID is dependent on the platform, see User IDs. If the length of the user ID is greater than the maximum length permitted, the authentication request fails with MQRC_NOT_AUTHORIZED.

This field is an input field. The initial value of this field is 0.

*CSPUserIdOffset (MQLONG)*
This is the offset in bytes of the user ID to be used in authentication. The offset can be positive or negative.

This is an input field. The initial value of this field is 0.

*CSPUserIdPtr (MQPTR)*
This is the address in bytes of the user ID to be used in authentication.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQCNO_VERSION_5.

This field can contain an operating system user ID when an **AUTHTYPE** of *IDPWOS* is named in the CONNAUTH field of the queue manager.

On Windows this can be a fully qualified domain user ID.

This field can contain an LDAP User ID when an **AUTHTYPE** of *IDPWLDAP* is named in the CONNAUTH field of the queue manager.

*Reserved1 (MQBYTE4)*
A reserved field, required for pointer alignment on IBM i.

This is an input field. The initial value of this field is all null.

*Reserved2 (MQBYTE8)*
A reserved field, required for pointer alignment on IBM i.

This is an input field. The initial value of this field is all null.

*StrucId (MQCHAR4)*
Structure identifier.

The value must be:

**MQCSP_STRUC_ID**
Identifier for the security parameters structure.

For the C programming language, the constant MQCSP_STRUC_ID_ARRAY is also defined; this has the same value as MQCSP_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQCSPSTRUC_ID.

*Version (MQLONG)*
Structure version number.

The value must be:

**MQCSP_VERSION_1**
Version-1 security parameters structure.

The following constant specifies the version number of the current version:

**MQCSP_CURRENT_VERSION**
Current version of security parameters structure.

This is always an input field. The initial value of this field is MQCSP_VERSION_1.

## *Initial values and language declarations for MQCSP*

*Table 479. Initial values of fields in MQCSP for MQCSP*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCSP_STRUC_ID | 'CSP¬' |
| *Version* | MQCSP_VERSION_1 | 1 |
| *AuthenticationType* | None | MQCSP_AUTH_NONE |
| *Reserved1* | None | Null string or blanks |
| *CSPUserIdPtr* | None | Null pointer or null bytes |
| *CSPUserIdOffset* | None | 0 |
| *CSPUserIdLength* | None | 0 |
| *Reserved2* | None | Null string or blanks |
| *CSPPasswordPtr* | None | Null pointer or null bytes |
| *CSPPasswordOffset* | None | 0 |
| *CSPPasswordLength* | None | 0 |

*Table 479. Initial values of fields in MQCSP for MQCSP (continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQCSP_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQCSP MyCSP = {MQCSP_DEFAULT};
```

*C declaration*

```
typedef struct tagMQCSP MQCSP;
struct tagMQCSP {
  MQCHAR4    StrucId;            /* Structure identifier */
  MQLONG     Version;            /* Structure version number */
  MQLONG     AuthenticationType; /* Type of authentication */
  MQBYTE4    Reserved1;          /* Required for IBM i pointer
                                    alignment */
  MQPTR      CSPUserIdPtr;       /* Address of user ID */
  MQLONG     CSPUserIdOffset;    /* Offset of user ID */
  MQLONG     CSPUserIdLength;    /* Length of user ID */
  MQBYTE8    Reserved2;          /* Required for IBM i pointer
                                    alignment */
                                  alignment */
  MQPTR      CSPPasswordPtr;     /* Address of password */
  MQLONG     CSPPasswordOffset;  /* Offset of password */
  MQLONG     CSPPasswordLength;  /* Length of password */
  };
```

*COBOL declaration*

```
**   MQCSP structure
  10 MQCSP.
**    Structure identifier
   15 MQCSP-STRUCID           PIC X(4).
**    Structure version number
   15 MQCSP-VERSION           PIC S9(9) BINARY.
**    Type of authentication
   15 MQCSP-AUTHENTICATIONTYPE PIC S9(9) BINARY.
**    Required for IBM i pointer alignment
   15 MQCSP-RESERVED1         PIC X(4).
**    Address of user ID
   15 MQCSP-CSPUSERIDPTR      POINTER.
**    Offset of user ID
   15 MQCSP-CSPUSERIDOFFSET   PIC S9(9) BINARY.
**    Length of user ID
   15 MQCSP-CSPUSERIDLENGTH   PIC S9(9) BINARY.
**    Required for IBM i pointer alignment
   15 MQCSP-RESERVED2         PIC X(4).
**    Address of password
   15 MQCSP-CSPPASSWORDPTR    POINTER.
**    Offset of password
   15 MQCSP-CSPPASSWORDOFFSET PIC S9(9) BINARY.
**    Length of password
   15 MQCSP-CSPPASSWORDLENGTH PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQCSP based,
  3 StrucId           char(4),       /* Structure identifier */
  3 Version           fixed bin(31), /* Structure version number */
  3 AuthenticationType fixed bin(31),  /* Type of authentication */
  3 Reserved1         char(4),     /* Required for IBM i pointer
```

```
                                        alignment */
  3 CSPUserIdPtr      pointer,      /* Address of user ID */
  3 CSPUserIdOffset   fixed bin(31), /* Offset of user ID */
  3 CSPUserIdLength   fixed bin(31), /* Length of user ID */
  3 Reserved2         char(8),     /* Required for IBM i pointer
                                        alignment */
  3 CSPPasswordPtr    pointer,      /* Address of password */
  3 CSPPasswordOffset fixed bin(31), /* Offset of user ID */
  3 CSPPasswordLength fixed bin(31); /* Length of user ID */
```

*Visual Basic declaration*

```
Type MQCSP
  StrucId           As String*4   'Structure identifier'
  Version           As Long       'Structure version number'
  AuthenticationType As Long      'Type of authentication'
  Reserved1         As MQBYTE4    'Required for IBM i pointer'
                                  'alignment'
  CSPUserIdPtr      As MQPTR      'Address of user ID'
  CSPUserIdOffset   As Long       'Offset of user ID'
  CSPUserIdLength   As Long       'Length of user ID'
  Reserved2         As MQBYTE8    'Required for IBM i pointer'
                                  'alignment'
  CSPPasswordPtr    As MQPTR      'Address of password'
  CSPPasswordOffset As Long       'Offset of password'
  CSPPasswordLength As Long       'Length of password'
End Type
```

## MQCTLO - Control callback options structure

The following table summarizes the fields in the structure. Structure specifying the control callback function.

*Table 480. Fields in MQCTLO*

| Field | Description | Topic |
|---|---|---|
| *StrucID* | Structure identifier | StrucID |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |
| *Reserved* | Reserved field | Options |
| *ConnectionArea* | Field for callback function to use | ConnectionArea |

### *Overview for MQCTLO*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS, and IBM MQ MQI clients connected to these systems. Overview of the MQCTLO structure.

**Purpose**: The MQCTLO structure is used to specify options relating to a control callbacks function.

The structure is an input and output parameter on the MQCTL call.

**Version**: The current version of MQCTLO is MQCTLO_VERSION_1.

**Character set and encoding**: Data in MQCTLO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

### *Fields for MQCTLO*

Alphabetic list of fields for the MQCTLO structure.

The MQCTLO structure contains the following fields; the fields are described in alphabetical order:

*ConnectionArea (MQPTR)*
Control options structure - ConnectionArea field

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged to the ConnectionArea field in the MQCBC structure, which is an input parameter to the callback.

This field is ignored for all operations other than MQOP_START and MQOP_START_WAIT.

This is an input and output field to the callback function. The initial value of this field is a null pointer or null bytes.

*Options (MQLONG)*
Control options structure - Options field

Options that control the action of MQCTL.

**MQCTLO_FAIL_IF_QUIESCING**
Force the MQCTL call to fail if the queue manager or connection is in the quiescing state.

Specify MQGMO_FAIL_IF_QUIESCING, in the MQGMO options passed on the MQCB call, to cause notification to message consumers when they are quiescing.

**MQCTLO_THREAD_AFFINITY**
This option informs the system that the application requires that all message consumers, for the same connection, are called on the same thread. This thread will be used for all invocations of the consumers until the connection is stopped.

**Default option**: If you do not need any of the options described, use the following option:

**MQCTLO_NONE**
Use this value to indicate that no other options have been specified; all options assume their default values. MQCTLO_NONE is defined to aid program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of the *Options* field is MQCTLO_NONE.

*Reserved (MQLONG)*

This is a reserved field. The value must be zero.

*StrucId (MQCHAR4)*
Control options structure - StrucId field

This is the structure identifier; the value must be:

**MQCTLO_STRUC_ID**
Identifier for Control Options structure.

For the C programming language, the constant MQCTLO_STRUC_ID_ARRAY is also defined; this has the same value as MQCTLO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQCTLO_STRUC_ID.

*Version (MQLONG)*
Control options structure - Version field

This is the structure version number; the value must be:

**MQCTLO_VERSION_1**
Version-1 Control options structure.

The following constant specifies the version number of the current version:

**MQCTLO_CURRENT_VERSION**
Current version of Control options structure.

This is always an input field. The initial value of this field is MQCTLO_VERSION_1.

### *Initial values and language declarations for MQCTLO*

Control options structure - Initial values

*Table 481. Initial values of fields in MQCTLO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQCTLO_STRUC_ID | 'CTLO' |
| *Version* | MQCTLO_VERSION_1 | 1 |
| *Options* | MQCTLO_NONE | Nulls |
| *Reserved* | Reserved field | |
| *ConnectionArea* | None | Null pointer or null bytes |

**Notes:**

1. In the C programming language, the macro variable MQCTLO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQCTLO MyCTLO = {MQCTLO_DEFAULT};
```

*C declaration*

Control Options structure - C language declaration

```
typedef struct tagMQCTLO MQCTLO;
 struct tagMQCTLO {
  MQCHAR4   StrucId;        /* Structure identifier */
  MQLONG    Version;        /* Structure version number */
  MQLONG    Options;        /* Options that control the action of MQCTL */
  MQLONG    Reserved;       /* Reserved field */


MQPTR     ConnectionArea; /* Connection work area passed to the function */
 };
```

*COBOL declaration*

```
** MQCTLO structure
 10  MQCTLO.
** Structure Identifier
 15  MQCTLO-STRUCID                    PIC X(4).
** Structure Version
 15  MQCTLO-VERSION                    PIC S9(9) BINARY.
 ** Options
 15  MQCTLO-OPTIONS                    PIC S9(9) BINARY.
** Reserved
 15  MQCTLO-RESERVED                   PIC S9(9) BINARY.
** ConnectionArea
 15  MQCTLO-CONNECTIONAREA             POINTER
```

*PL/I declaration*

```
dcl
 1 MQCTLO based,
  3 StrucId             char(4),       /* Structure identifier */
  3 Version             fixed bin(31), /* Structure version */
  3 Options             fixed bin(31), /* Options */
  3 Reserved            fixed bin(31),
  3 ConnectionArea      pointer;       /* Connection work area */
```

## MQDH - Distribution header

The following table summarizes the fields in the structure.

| *Table 482. Fields in MQDH* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQDH structure plus following records | StrucLength |
| *Encoding* | Numeric encoding of data that follows array of MQPMR records | Encoding |
| *CodedCharSetId* | Character set identifier of data that follows array of MQPMR records | CodedCharSetId |
| *Format* | Format name of data that follows array of MQPMR records | Format |
| *Flags* | General flags | Flags |
| *PutMsgRecFields* | Flags indicating which MQPMR fields are present | PutMsgRecFields |
| *RecsPresent* | Number of object records present | RecsPresent |
| *ObjectRecOffset* | Offset of first object record from start of MQDH | ObjectRecOffset |
| *PutMsgRecOffset* | Offset of first put-message record from start of MQDH | PutMsgRecOffset |

### *Overview for MQDH*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

**Purpose**: The MQDH structure describes the additional data that is present in a message when that message is a distribution-list message stored on a transmission queue. A distribution-list message is a message that is sent to multiple destination queues. The additional data consists of the MQDH structure followed by an array of MQOR records and an array of MQPMR records.

This structure is used by specialized applications that put messages directly on transmission queues, or that remove messages from transmission queues (for example: message channel agents).

Applications that want to put messages to distribution lists must not use this structure. Instead, they must use the MQOD structure to define the destinations in the distribution list, and the MQPMO structure to specify message properties or receive information about the messages sent to the individual destinations.

**Format name**: MQFMT_DIST_HEADER.

**Character set and encoding**: Data in MQDH must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE.

Set the character set and encoding of the MQDH into the *CodedCharSetId* and *Encoding* fields in:

- The MQMD (if the MQDH structure is at the start of the message data), or
- The header structure that precedes the MQDH structure (all other cases).

**Usage**: When an application puts a message to a distribution list, and some or all of the destinations are remote, the queue manager prefixes the application message data with the MQXQH and MQDH structures, and places the message on the relevant transmission queue. The data therefore occurs in the following sequence when the message is on a transmission queue:

- MQXQH structure
- MQDH structure plus arrays of MQOR and MQPMR records
- Application message data

Depending on the destinations, the queue manager can generate more than one such message, and place it on different transmission queues. In this case, the MQDH structures in those messages identify different subsets of the destinations defined by the distribution list opened by the application.

An application that puts a distribution-list message directly on a transmission queue must conform to the sequence described earlier, and must ensure that the MQDH structure is correct. If the MQDH structure is not valid, the queue manager can fail the MQPUT or MQPUT1 call with reason code MQRC_DH_ERROR.

You can store messages on a queue in distribution-list form only if you have defined the queue as being able to support distribution list messages (see the *DistLists* queue attribute described in "Attributes for queues" on page 810 ). If an application puts a distribution-list message directly on a queue that does not support distribution lists, the queue manager splits the distribution list message into individual messages, and places those on the queue instead.

## *Fields for MQDH*

The MQDH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This is the character set identifier of the data that follows the arrays of MQOR and MQPMR records; it does not apply to character data in the MQDH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. You can use the following special value:

**MQCCSI_INHERIT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the MQGET call does not return the value MQCCSI_INHERIT.

You cannot use MQCCSI_INHERIT if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

This value is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

The initial value of this field is MQCCSI_UNDEFINED.

*Encoding (MQLONG)*

This is the numeric encoding of the data that follows the arrays of MQOR and MQPMR records; it does not apply to numeric data in the MQDH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is 0.

*Flags (MQLONG)*

You can specify the following flag:

**MQDHF_NEW_MSG_IDS**
Generate a new message identifier for each destination in the distribution list. Set this only when there are no put-message records present, or when the records are present but they do not contain the *MsgId* field.

Using this flag defers generation of the message identifiers until the moment when the distribution-list message is finally split into individual messages. This minimizes the amount of control information that must flow with the distribution-list message.

When an application puts a message to a distribution list, the queue manager sets MQDHF_NEW_MSG_IDS in the MQDH that it generates when both of the following are true:

- There are no put-message records provided by the application, or the records provided do not contain the *MsgId* field.
- The *MsgId* field in MQMD is MQMI_NONE, or the *Options* field in MQPMO includes MQPMO_NEW_MSG_ID

If no flags are needed, specify the following:

**MQDHF_NONE**
No flags have been specified. MQDHF_NONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is MQDHF_NONE.

*Format (MQCHAR8)*

This is the format name of the data that follows the arrays of MQOD and MQPMR records (whichever occurs last).

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *Format* field in MQMD.

The initial value of this field is MQFMT_NONE.

*ObjectRecOffset (MQLONG)*

This gives the offset in bytes of the first record in the array of MQOR object records containing the names of the destination queues. There are *RecsPresent* records in this array. These records (plus any bytes skipped between the first object record and the previous field) are included in the length given by the *StrucLength* field.

A distribution list must always contain at least one destination, so *ObjectRecOffset* must always be greater than zero.

The initial value of this field is 0.

*PutMsgRecFields (MQLONG)*

You can specify none or more of the following flags:

**MQPMRF_MSG_ID**
Message-identifier field is present.

**MQPMRF_CORREL_ID**
Correlation-identifier field is present.

**MQPMRF_GROUP_ID**
Group-identifier field is present.

**MQPMRF_FEEDBACK**
Feedback field is present.

**MQPMRF_ACCOUNTING_TOKEN**
Accounting-token field is present.

If no MQPMR fields are present, specify the following:

**MQPMRF_NONE**
No put-message record fields are present. MQPMRF_NONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is MQPMRF_NONE.

*PutMsgRecOffset (MQLONG)*

This gives the offset in bytes of the first record in the array of MQPMR put message records containing the message properties. If present, there are *RecsPresent* records in this array. These records (plus any bytes skipped between the first put message record and the previous field) are included in the length given by the *StrucLength* field.

Put message records are optional; if no records are provided, *PutMsgRecOffset* is zero, and *PutMsgRecFields* has the value MQPMRF_NONE.

The initial value of this field is 0.

*RecsPresent (MQLONG)*

This is the number of destinations. A distribution list must always contain at least one destination, so *RecsPresent* must always be greater than zero.

The initial value of this field is 0.

*StrucId (MQCHAR4)*

The value must be:

**MQDH_STRUC_ID**
Identifier for distribution header structure.

For the C programming language, the constant MQDH_STRUC_ID_ARRAY is also defined; this has the same value as MQDH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQDH_STRUC_ID.

*StrucLength (MQLONG)*

This is the number of bytes from the start of the MQDH structure to the start of the message data following the arrays of MQOR and MQPMR records. The data occurs in the following sequence:

- MQDH structure
- Array of MQOR records
- Array of MQPMR records
- Message data

The arrays of MQOR and MQPMR records are addressed by offsets contained within the MQDH structure. If these offsets result in unused bytes between one or more of the MQDH structure, the arrays of records, and the message data, those unused bytes must be included in the value of *StrucLength*, but the content of those bytes is not preserved by the queue manager. It is valid for the array of MQPMR records to precede the array of MQOR records.

The initial value of this field is 0.

*Version (MQLONG)*

The value must be:

**MQDH_VERSION_1**
Version number for distribution header structure.

The following constant specifies the version number of the current version:

**MQDH_CURRENT_VERSION**
Current version of distribution header structure.

The initial value of this field is MQDH_VERSION_1.

### *Initial values and language declarations for MQDH*

*Table 483. Initial values of fields in MQDH for MQDH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQDH_STRUC_ID | 'DH¬¬' |
| *Version* | MQDH_VERSION_1 | 1 |
| *StrucLength* | None | 0 |
| *Encoding* | None | 0 |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQDHF_NONE | 0 |
| *PutMsgRecFields* | MQPMRF_NONE | 0 |
| *RecsPresent* | None | 0 |
| *ObjectRecOffset* | None | 0 |
| *PutMsgRecOffset* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQDH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQDH MyDH = {MQDH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQDH MQDH;
struct tagMQDH {
  MQCHAR4  StrucId;          /* Structure identifier */
  MQLONG   Version;          /* Structure version number */
  MQLONG   StrucLength;      /* Length of MQDH structure plus following
                                MQOR and MQPMR records */
  MQLONG   Encoding;         /* Numeric encoding of data that follows
                                the MQOR and MQPMR records */
  MQLONG   CodedCharSetId;   /* Character set identifier of data that
                                follows the MQOR and MQPMR records */
  MQCHAR8  Format;           /* Format name of data that follows the
                                MQOR and MQPMR records */
  MQLONG   Flags;            /* General flags */
  MQLONG   PutMsgRecFields;  /* Flags indicating which MQPMR fields are
                                present */
  MQLONG   RecsPresent;      /* Number of MQOR records present */
  MQLONG   ObjectRecOffset;  /* Offset of first MQOR record from start
                                of MQDH */
  MQLONG   PutMsgRecOffset;  /* Offset of first MQPMR record from start
                                of MQDH */
};
```

*COBOL declaration*

```
**   MQDH structure
  10 MQDH.
**    Structure identifier
```

```
   15 MQDH-STRUCID         PIC X(4).
**    Structure version number
   15 MQDH-VERSION         PIC S9(9) BINARY.
**    Length of MQDH structure plus following MQOR and MQPMR records
   15 MQDH-STRUCLENGTH     PIC S9(9) BINARY.
**    Numeric encoding of data that follows the MQOR and MQPMR records
   15 MQDH-ENCODING        PIC S9(9) BINARY.
**    Character set identifier of data that follows the MQOR and MQPMR
**    records
   15 MQDH-CODEDCHARSETID  PIC S9(9) BINARY.
**    Format name of data that follows the MQOR and MQPMR records
   15 MQDH-FORMAT          PIC X(8).
**    General flags
   15 MQDH-FLAGS           PIC S9(9) BINARY.
**    Flags indicating which MQPMR fields are present
   15 MQDH-PUTMSGRECFIELDS PIC S9(9) BINARY.
**    Number of MQOR records present
   15 MQDH-RECSPRESENT     PIC S9(9) BINARY.
**    Offset of first MQOR record from start of MQDH
   15 MQDH-OBJECTRECOFFSET PIC S9(9) BINARY.
**    Offset of first MQPMR record from start of MQDH
   15 MQDH-PUTMSGRECOFFSET PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQDH based,
  3 StrucId         char(4),       /* Structure identifier */
  3 Version         fixed bin(31), /* Structure version number */
  3 StrucLength     fixed bin(31), /* Length of MQDH structure plus
                                      following MQOR and MQPMR
                                      records */
  3 Encoding        fixed bin(31), /* Numeric encoding of data that
                                      follows the MQOR and MQPMR
                                      records */
  3 CodedCharSetId  fixed bin(31), /* Character set identifier of data
                                      that follows the MQOR and MQPMR
                                      records */
  3 Format          char(8),       /* Format name of data that follows
                                      the MQOR and MQPMR records */
  3 Flags           fixed bin(31), /* General flags */
  3 PutMsgRecFields fixed bin(31), /* Flags indicating which MQPMR
                                      fields are present */
  3 RecsPresent     fixed bin(31), /* Number of MQOR records present */
  3 ObjectRecOffset fixed bin(31), /* Offset of first MQOR record from
                                      start of MQDH */
  3 PutMsgRecOffset fixed bin(31); /* Offset of first MQPMR record from
                                      start of MQDH */
```

*Visual Basic declaration*

```
Type MQDH
  StrucId         As String*4 'Structure identifier'
  Version         As Long     'Structure version number'
  StrucLength     As Long     'Length of MQDH structure plus following'
                              'MQOR and MQPMR records'
  Encoding        As Long     'Numeric encoding of data that follows'
                              'the MQOR and MQPMR records'
  CodedCharSetId  As Long     'Character set identifier of data that'
                              'follows the MQOR and MQPMR records'
  Format          As String*8 'Format name of data that follows the'
                              'MQOR and MQPMR records'
  Flags           As Long     'General flags'
  PutMsgRecFields As Long     'Flags indicating which MQPMR fields are'
                              'present'
  RecsPresent     As Long     'Number of MQOR records present'
  ObjectRecOffset As Long     'Offset of first MQOR record from start'
                              'of MQDH'
  PutMsgRecOffset As Long     'Offset of first MQPMR record from start'
                              'of MQDH'
End Type
```

## MQDLH - Dead-letter header

The following table summarizes the fields in the structure.

| *Table 484. Fields in MQDLH* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Reason* | Reason message arrived on dead-letter queue | Reason |
| *DestQName* | Name of original destination queue | DestQName |
| *DestQMgrName* | Name of original destination queue manager | DestQMgrName |
| *Encoding* | Numeric encoding of data that follows MQDLH | Encoding |
| *CodedCharSetId* | Character set identifier of data that follows MQDLH | CodedCharSetId |
| *Format* | Format name of data that follows MQDLH | Format |
| *PutApplType* | Type of application that put message on dead-letter queue | PutApplType |
| *PutApplName* | Name of application that put message on dead-letter queue | PutApplName |
| *PutDate* | Date when message was put on dead-letter queue | PutDate |
| *PutTime* | Time when message was put on dead-letter queue | PutTime |

### *Overview for MQDLH*

**Availability**: All IBM MQ platforms.

**Purpose**: The MQDLH structure describes the information that prefixes the application message data of messages on the dead-letter (undelivered-message) queue. A message can arrive on the dead-letter queue either because the queue manager or message channel agent has redirected it to the queue, or because an application has put the message directly on the queue.

**Format name**: MQFMT_DEAD_LETTER_HEADER.

**Character set and encoding**: The fields in the MQDLH structure are in the character set and encoding given by the *CodedCharSetId* and *Encoding* fields. These are specified in the header structure that precedes the MQDLH, or in the MQMD structure if the MQDLH is at the start of the application message data.

The character set must be one that has single-byte characters for the characters that are valid in queue names.

If you are using the WMQ classes for Java/JMS, and the code page defined in the MQMD is not supported by the Java virtual machine, then the MQDLH is written in the UTF-8 character set.

**Usage**: Applications that put messages directly on the dead-letter queue must prefix the message data with an MQDLH structure, and initialize the fields with appropriate values. However, the queue manager does not require that an MQDLH structure be present, or that valid values have been specified for the fields.

If a message is too long to put on the dead-letter queue, the application must do one of the following:

- Truncate the message data to fit on the dead-letter queue.

- Record the message on auxiliary storage and place an exception report message on the dead-letter queue indicating this.
- Discard the message and return an error to its originator. If the message is (or might be) a critical message, do this only if it is known that the originator still has a copy of the message; for example, a message received by a message channel agent from a communication channel.

Which of the preceding actions is appropriate (if any) depends on the design of the application.

The queue manager performs special processing when a message that is a segment is put with an MQDLH structure at the front; see the description of the MQMDE structure for further details.

**Putting messages on the dead-letter queue**: When a message is put on the dead-letter queue, the MQMD structure used for the MQPUT or MQPUT1 call must be identical to the MQMD associated with the message (usually the MQMD returned by the MQGET call), with the exception of the following:

- Set the *CodedCharSetId* and *Encoding* fields to whatever character set and encoding are used for fields in the MQDLH structure.
- Set the *Format* field to MQFMT_DEAD_LETTER_HEADER to indicate that the data begins with a MQDLH structure.
- Set the context fields (*AccountingToken*, *ApplIdentityData*, *ApplOriginData*, *PutApplName*, *PutApplType*, *PutDate*, *PutTime*, *UserIdentifier*) by using a context option appropriate to the circumstances:
  - An application putting on the dead-letter queue a message that is not related to any preceding message must use the MQPMO_DEFAULT_CONTEXT option; this causes the queue manager to set all of the context fields in the message descriptor to their default values.
  - A server application putting on the dead-letter queue a messagethat it has just received must use the MQPMO_PASS_ALL_CONTEXT option to preserve the original context information.
  - A server application putting on the dead-letter queue a *reply* to a message that it has just received must use the MQPMO_PASS_IDENTITY_CONTEXT option; this preserves the identity information but sets the origin information to be that of the server application.
  - A message channel agent putting on the dead-letter queue a messagethat it received from its communication channel must use the MQPMO_SET_ALL_CONTEXT option to preserve the original context information.

In the MQDLH structure itself, set the fields as follows:

- Set the *CodedCharSetId*, *Encoding*, and *Format* fields to the values that describe the data that follows the MQDLH structure, usually the values from the original message descriptor.
- Set the context fields *PutApplType*, *PutApplName*, *PutDate*, and *PutTime* to values appropriate to the application that is putting the message on the dead-letter queue; these values are not related to the original message.
- Set other fields as appropriate.

Ensure that all fields have valid values, and that character fields are padded with blanks to the defined length of the field; do not end the character data prematurely by using a null character, because the queue manager does not convert the null and subsequent characters to blanks in the MQDLH structure.

**Getting messages from the dead-letter queue**: Applications that get messages from the dead-letter queue must verify that the messages begin with an MQDLH structure. The application can determine whether an MQDLH structure is present by examining the *Format* field in the message descriptor MQMD; if the field has the value MQFMT_DEAD_LETTER_HEADER, the message data begins with an MQDLH structure. Be aware also that messages that applications get from the dead-letter queue might be truncated if they were originally too long for the queue.

## *Fields for MQDLH*

The MQDLH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*
CodedCharSetId is the character set identifier of the data that flows through the MQDLH structure (usually the data from the original message); it does not apply to character data in the MQDLH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**MQCCSI_INHERIT**
Character data in the data following this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

You cannot use MQCCSI_INHERIT if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

This value is supported in the following environments: AIX, HP-UX, z/OS, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

The initial value of this field is MQCCSI_UNDEFINED.

*DestQMgrName (MQCHAR48)*
DestQMgrName is the name of the queue manager that was the original destination for the message.

The length of this field is given by MQ_Q_MGR_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*DestQName (MQCHAR48)*
DestQName is the name of the message queue that was the original destination for the message.

The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*Encoding (MQLONG)*
Encoding is the numeric encoding of the data that follows the MQDLH structure (usually the data from the original message); it does not apply to numeric data in the MQDLH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is `0`.

*Format (MQCHAR8)*
Format is the format name of the data that follows the MQDLH structure (usually the data from the original message).

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those rules for coding the *Format* field in MQMD.

The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*PutApplName (MQCHAR28)*
PutApplName is the name of the application that put the message on the dead-letter (undelivered-message) queue.

The format of the name depends on the *PutApplType* field. The format can vary release to release. See the description of the *PutApplName* field in "MQMD - Message descriptor" on page 402.

If the queue manager redirects the message to the dead-letter queue, *PutApplName* contains the first 28 characters of the queue-manager name, padded with blanks if necessary.

The length of this field is given by MQ_PUT_APPL_NAME_LENGTH. The initial value of this field is the null string in C, and 28 blank characters in other programming languages.

*PutApplType (MQLONG)*
PutApplType is the type of application that put the message on the dead-letter (undelivered-message) queue.

This field has the same meaning as the *PutApplType* field in the message descriptor MQMD (see "MQMD - Message descriptor" on page 402 for details).

If the queue manager redirects the message to the dead-letter queue, *PutApplType* has the value MQAT_QMGR.

The initial value of this field is `0`.

*PutDate (MQCHAR8)*
PutDate is the date when the message was put on the dead-letter (undelivered-message) queue.

The format used for the date when this field is generated by the queue manager is:

- YYYYMMDD

where the characters represent:

**YYYY**
year (four numeric digits)

**MM**
month of year (01 through 12)

**DD**
day of month (01 through 31)

Greenwich Mean Time (GMT) is used for the *PutDate* and *PutTime* fields, subject to the system clock being set accurately to GMT.

The length of this field is given by MQ_PUT_DATE_LENGTH. The initial value of this field is the null string in C, and eight blank characters in other programming languages.

*PutTime (MQCHAR8)*
PutTime is the time when the message was put on the dead-letter (undelivered-message) queue.

The format used for the time when this field is generated by the queue manager is:

- HHMMSSTH

where the characters represent:

**HH**
hours (00 through 23)

**MM**
minutes (00 through 59)

**SS**
seconds (00 through 59; see note)

**T**
tenths of a second (0 through 9)

**H**
hundredths of a second (0 through 9)

**Note:** If the system clock is synchronized to an very accurate time standard, it is possible on rare occasions for 60 or 61 to be returned for the seconds in *PutTime*. This happens when leap seconds are inserted into the global time standard.

Greenwich Mean Time (GMT) is used for the *PutDate* and *PutTime* fields, subject to the system clock being set accurately to GMT.

The length of this field is given by MQ_PUT_TIME_LENGTH. The initial value of this field is the null string in C, and eight blank characters in other programming languages.

*Reason (MQLONG)*
The Reason field identifies the reason why the message was placed on the dead-letter queue instead of on the original destination queue.

This identifies the reason why the message was placed on the dead-letter queue instead of on the original destination queue. It should be one of the MQFB_* or MQRC_* values (for example, MQRC_Q_FULL). See the description of the *Feedback* field in "MQMD - Message descriptor" on page 402 for details of the common MQFB_* values that can occur.

If the value is in the range MQFB_IMS_FIRST through MQFB_IMS_LAST, the actual IMS error code can be determined by subtracting MQFB_IMS_ERROR from the value of the *Reason* field.

Some MQFB_* values occur only in this field. They relate to repository messages, trigger messages, or transmission-queue messages that have been transferred to the dead-letter queue. These are:

**MQFB_APPL_CANNOT_BE_STARTED (X'00000109')**
An application processing a trigger message cannot start the application named in the *ApplId* field of the trigger message (see "MQTM - Trigger message" on page 579 ).

On z/OS, the CKTI CICS transaction is an example of an application that processes trigger messages.

**MQFB_APPL_TYPE_ERROR (X'0000010B')**
An application processing a trigger message cannot start the application because the *ApplType* field of the trigger message is not valid (see "MQTM - Trigger message" on page 579 ).

On z/OS, the CKTI CICS transaction is an example of an application that processes trigger messages.

**MQFB_BIND_OPEN_CLUSRCVR_DEL (X'00000119')**
The message was on the SYSTEM.CLUSTER.TRANSMIT.QUEUE intended for a cluster queue that was opened with the MQOO_BIND_ON_OPEN option, but the remote cluster-receiver channel to be used to transmit the message to the destination queue was deleted before the message could be sent. Because MQOO_BIND_ON_OPEN was specified, only the channel selected when the queue was opened can be used to transmit the message. As this channel is no longer available, the message is placed on the dead-letter queue.

**MQFB_NOT_A_REPOSITORY_MSG (X'00000118')**
The message is not a repository message.

**MQFB_STOPPED_BY_CHAD_EXIT (X'00000115')**
The message was stopped by channel auto-definition exit.

**MQFB_STOPPED_BY_MSG_EXIT (X'0000010D')**
The message was stopped by channel message exit.

**MQFB_TM_ERROR (X'0000010A')**
The *Format* field in MQMD specifies MQFMT_TRIGGER, but the message does not begin with a valid MQTM structure. For example, the *StrucId* mnemonic eye-catcher might not be valid, the *Version* might not be recognized, or the length of the trigger message might be insufficient to contain the MQTM structure.

On z/OS, the CKTI CICS transaction is an example of an application that processes trigger messages and can generate this feedback code.

**MQFB_XMIT_Q_MSG_ERROR (X'0000010F')**
A message channel agent has found that a message on the transmission queue is not in the correct format. The message channel agent puts the message on the dead-letter queue using this feedback code.

One common cause is that a message has been put directly to the transmission queue, so the message does not have the expected XQH header. Messages should be put to a transmission queue through a remote queue, unless the application builds the MQXQH header.

The initial value of this field is MQRC_NONE.

*StrucId (MQCHAR4)*
StrucId is the structure identifier.

The value must be:

**MQDLH_STRUC_ID**
Identifier for dead-letter header structure.

For the C programming language, the constant MQDLH_STRUC_ID_ARRAY is also defined; this has the same value as MQDLH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQDLH_STRUC_ID.

*Version (MQLONG)*
Version is the structure version number.

The value must be:

**MQDLH_VERSION_1**
Version number for dead-letter header structure.

The following constant specifies the version number of the current version:

**MQDLH_CURRENT_VERSION**
Current version of dead-letter header structure.

The initial value of this field is MQDLH_VERSION_1.

## *Initial values and language declarations for MQDLH*

*Table 485. Initial values of fields in MQDLH for MQDLH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQDLH_STRUC_ID | 'DLH¬' |
| *Version* | MQDLH_VERSION_1 | 1 |
| *Reason* | MQRC_NONE | 0 |
| *DestQName* | None | Null string or blanks |
| *DestQMgrName* | None | Null string or blanks |
| *Encoding* | None | 0 |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *PutApplType* | None | 0 |
| *PutApplName* | None | Null string or blanks |
| *PutDate* | None | Null string or blanks |
| *PutTime* | None | Null string or blanks |

*Table 485. Initial values of fields in MQDLH for MQDLH (continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQDLH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQDLH MyDLH = {MQDLH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQDLH MQDLH;
struct tagMQDLH {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    Reason;          /* Reason message arrived on dead-letter
                                (undelivered-message) queue */
  MQCHAR48  DestQName;       /* Name of original destination queue */
  MQCHAR48  DestQMgrName;    /* Name of original destination queue
                                manager */
  MQLONG    Encoding;        /* Numeric encoding of data that follows
                                MQDLH */
  MQLONG    CodedCharSetId;  /* Character set identifier of data that
                                follows MQDLH */
  MQCHAR8   Format;          /* Format name of data that follows
                                MQDLH */
  MQLONG    PutApplType;     /* Type of application that put message on
                                dead-letter (undelivered-message)
                                queue */
  MQCHAR28  PutApplName;     /* Name of application that put message on
                                dead-letter (undelivered-message)
                                queue */
  MQCHAR8   PutDate;         /* Date when message was put on dead-letter
                                (undelivered-message) queue */
  MQCHAR8   PutTime;         /* Time when message was put on the
                                dead-letter (undelivered-message)
                                queue */
};
```

*COBOL declaration*

```
**   MQDLH structure
  10 MQDLH.
**    Structure identifier
   15 MQDLH-STRUCID        PIC X(4).
**    Structure version number
   15 MQDLH-VERSION        PIC S9(9) BINARY.
**    Reason message arrived on dead-letter (undelivered-message) queue
   15 MQDLH-REASON         PIC S9(9) BINARY.
**    Name of original destination queue
   15 MQDLH-DESTQNAME      PIC X(48).
**    Name of original destination queue manager
   15 MQDLH-DESTQMGRNAME   PIC X(48).
**    Numeric encoding of data that follows MQDLH
   15 MQDLH-ENCODING       PIC S9(9) BINARY.
**    Character set identifier of data that follows MQDLH
   15 MQDLH-CODEDCHARSETID PIC S9(9) BINARY.
**    Format name of data that follows MQDLH
   15 MQDLH-FORMAT         PIC X(8).
**    Type of application that put message on dead-letter
**    (undelivered-message) queue
   15 MQDLH-PUTAPPLTYPE    PIC S9(9) BINARY.
**    Name of application that put message on dead-letter
**    (undelivered-message) queue
   15 MQDLH-PUTAPPLNAME    PIC X(28).
```

```
**    Date when message was put on dead-letter (undelivered-message)
**    queue
   15 MQDLH-PUTDATE        PIC X(8).
**    Time when message was put on the dead-letter (undelivered-message)
**    queue
   15 MQDLH-PUTTIME        PIC X(8).
```

*PL/I declaration*

```
dcl
 1 MQDLH based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 Reason         fixed bin(31), /* Reason message arrived on
                                     dead-letter (undelivered-message)
                                     queue */
  3 DestQName      char(48),      /* Name of original destination
                                     queue */
  3 DestQMgrName   char(48),      /* Name of original destination queue
                                     manager */
  3 Encoding       fixed bin(31), /* Numeric encoding of data that
                                     follows MQDLH */
  3 CodedCharSetId fixed bin(31), /* Character set identifier of data
                                     that follows MQDLH */
  3 Format         char(8),       /* Format name of data that follows
                                     MQDLH */
  3 PutApplType    fixed bin(31), /* Type of application that put
                                     message on dead-letter
                                     (undelivered-message) queue */
  3 PutApplName    char(28),      /* Name of application that put
                                     message on dead-letter
                                     (undelivered-message) queue */
  3 PutDate        char(8),       /* Date when message was put on
                                     dead-letter (undelivered-message)
                                     queue */
  3 PutTime        char(8);       /* Time when message was put on the
                                     dead-letter (undelivered-message)
                                     queue */
```

*High Level Assembler declaration*

```
MQDLH                 DSECT
MQDLH_STRUCID         DS   CL4   Structure identifier
MQDLH_VERSION         DS   F     Structure version number
MQDLH_REASON          DS   F     Reason message arrived on dead-letter
*                                (undelivered-message) queue
MQDLH_DESTQNAME       DS   CL48  Name of original destination queue
MQDLH_DESTQMGRNAME    DS   CL48  Name of original destination queue
*                                manager
MQDLH_ENCODING        DS   F     Numeric encoding of data that follows
*                                MQDLH
MQDLH_CODEDCHARSETID  DS   F     Character set identifier of data that
*                                follows MQDLH
MQDLH_FORMAT          DS   CL8   Format name of data that follows MQDLH
MQDLH_PUTAPPLTYPE     DS   F     Type of application that put message on
*                                dead-letter (undelivered-message) queue
MQDLH_PUTAPPLNAME     DS   CL28  Name of application that put message on
*                                dead-letter (undelivered-message) queue
MQDLH_PUTDATE         DS   CL8   Date when message was put on
*                                dead-letter (undelivered-message) queue
MQDLH_PUTTIME         DS   CL8   Time when message was put on the
*                                dead-letter (undelivered-message) queue
*
MQDLH_LENGTH          EQU  *-MQDLH
                      ORG  MQDLH
MQDLH_AREA            DS   CL(MQDLH_LENGTH)
```

*Visual Basic declaration*

```
Type MQDLH
  StrucId        As String*4  'Structure identifier'
  Version        As Long      'Structure version number'
  Reason         As Long      'Reason message arrived on dead-letter'
```

```
                              '(undelivered-message) queue'
   DestQName      As String*48 'Name of original destination queue'
   DestQMgrName   As String*48 'Name of original destination queue'
                              'manager'
   Encoding       As Long      'Numeric encoding of data that follows'
                              'MQDLH'
   CodedCharSetId As Long      'Character set identifier of data that'
                              'follows MQDLH'
   Format         As String*8  'Format name of data that follows MQDLH'
   PutApplType    As Long      'Type of application that put message on'
                              'dead-letter (undelivered-message) queue'
   PutApplName    As String*28 'Name of application that put message on'
                              'dead-letter (undelivered-message) queue'
   PutDate        As String*8  'Date when message was put on dead-letter'
                              '(undelivered-message) queue'
   PutTime        As String*8  'Time when message was put on the'
                              'dead-letter (undelivered-message) queue'
End Type
```

## MQDMHO - Delete message handle options

The following table summarizes the fields in the structure.

| *Table 486. Fields in MQDMHO* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |

### *Overview for MQDMHO*

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The **MQDMHO** structure allows applications to specify options that control how message handles are deleted. The structure is an input parameter on the **MQDLTMH** call.

**Character set and encoding**: Data in **MQDMHO** must be in the character set of the application and encoding of the application ( **MQENC_NATIVE** ).

### *Fields for MQDMHO*

The MQDMHO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*

The value must be:

**MQDMHO_NONE**

No options specified.

This is always an input field. The initial value of this field is **MQDMHO_NONE**.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQDMHO_STRUC_ID**

Identifier for delete message handle options structure.

For the C programming language, the constant **MQDMHO_STRUC_ID_ARRAY** is also defined; this has the same value as **MQDMHO_STRUC_ID**, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is **MQDMHO_STRUC_ID**.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQDMHO_VERSION_1**
Version-1 delete message handle options structure.

The following constant specifies the version number of the current version:

**MQDMHO_CURRENT_VERSION**
Current version of delete message handle options structure.

This is always an input field. The initial value of this field is **MQDMHO_VERSION_1**.

## *Initial values and language declarations for MQDMHO*

*Table 487. Initial values of fields in MQDMHO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQDMHO_STRUC_ID | 'DMHO' |
| *Version* | MQDMHO_VERSION_1 | 1 |
| *Options* | MQDMHO_NONE | 0 |

**Notes:**

1. In the C programming language, the macro variable MQDMHO_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQDMHO MyDMHO = {MQDMHO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQDMHO;
struct tagMQDMHO {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    Options;         /* Options that control the action of MQDLTMH */
};
```

*COBOL declaration*

```
**   MQDMHO structure
  10 MQDMHO.
**    Structure identifier
   15 MQDMHO-STRUCID       PIC X(4).
**    Structure version number
   15 MQDMHO-VERSION       PIC S9(9) BINARY.
**    Options that control the action of MQDLTMH
   15 MQDMHO-OPTIONS       PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQDMHO based,
  3 StrucId        char(4),       /* Structure identifier */
```

```
  3 Version        fixed bin(31), /* Structure version number */
  3 Options        fixed bin(31), /* Options that control the action of MQDLTMH */
```

*High Level Assembler declaration*

```
MQDMHO                DSECT
MQDMHO_STRUCID        DS   CL4   Structure identifier
MQDMHO_VERSION        DS   F     Structure version number
MQDMHO_OPTIONS        DS   F     Options that control the action of
*                                MQDLTMH
MQDMHO_LENGTH         EQU  *-MQDMHO
MQDMHO_AREA           DS   CL(MQDMHO_LENGTH)
```

## MQDMPO - Delete message property options

The following table summarizes the fields in the structure. MQDMPO structure - delete message property options

| *Table 488. Fields in MQDMPO* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options controlling the action of MQDMPO | Options |

### *Overview for MQDMPO*

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The MQDMPO structure allows applications to specify options that control how properties of messages are deleted. The structure is an input parameter on the MQDLTMP call.

**Character set and encoding**: Data in MQDMPO must be in the character set of the application and encoding of the application (MQENC_NATIVE).

### *Fields for MQDMPO*

Delete message property options structure - fields

The MQDMPO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*
Delete message property options structure - Options field

**Location options:** The following options relate to the relative location of the property compared to the property cursor.

**MQDMPO_DEL_FIRST**
Deletes the first property that matches the specified name.

**MQDMPO_DEL_PROP_UNDER_CURSOR**
Deletes the property pointed to by the property cursor; that is the property that was last inquired by using either the MQIMPO_INQ_FIRST or the MQIMPO_INQ_NEXT option.

The property cursor is reset when the message handle is reused. It is also reset when the message handle is specified in the *MsgHandle* field of the MQGMO structure on an MQGET call, or MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established, the call fails with completion code MQCC_FAILED and reason MQRC_PROPERTY_NOT_AVAILABLE. If the property pointed to by the property cursor has already been deleted, the call also fails with completion code MQCC_FAILED and reason MQRC_PROPERTY_NOT_AVAILABLE.

If neither of thees options is required, the following option can be used:

**MQDMPO_NONE**
No options specified.

This field is always an input field. The initial value of this field is MQDMPO_DEL_FIRST.

*StrucId (MQCHAR4)*
Delete message property options structure - StrucId field

This is the structure identifier. The value must be:

**MQDMPO_STRUC_ID**
Identifier for delete message property options structure.

For the C programming language, the constant MQDMPO_STRUC_ID_ARRAY is also defined; this has the same value as MQDMPO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQDMPO_STRUC_ID.

*Version (MQLONG)*
Delete message property options structure - Version field

This is the structure version number. The value must be:

**MQDMPO_VERSION_1**
Version number for delete message property options structure.

The following constant specifies the version number of the current version:

**MQDMPO_CURRENT_VERSION**
Current version of delete message property options structure.

This is always an input field. The initial value of this field is MQDMPO_VERSION_1.

## *Initial values and language declarations for MQDMPO*

Delete message property options structure - Initial values

*Table 489. Initial values of fields in MQDPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQDMPO_STRUC_ID | 'DMPO' |
| *Version* | MQDMPO_VERSION_1 | 1 |
| *Options* | Options that control the action of MQDLTMP | MQDMPO_NONE |

**Notes:**

1. In the C programming language, the macro variable MQDMPO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQDMPO MyDMPO = {MQDMPO_DEFAULT};
```

*C declaration*
Delete message property options structure - C language declaration

```
typedef struct tagMQDMPO MQDMPO;
struct tagMQDMPO {
  MQCHAR4  StrucId;        /* Structure identifier */
  MQLONG   Version;        /* Structure version number */
  MQLONG   Options;        /* Options that control the action of
                              MQDLTMP */
};
```

*COBOL declaration*
Delete message property options structure - COBOL language declaration

```
**   MQDMPO structure
  10 MQDMPO.
**    Structure identifier
   15 MQDMPO-STRUCID               PIC X(4).
**    Structure version number
   15 MQDMPO-VERSION               PIC S9(9) BINARY.
**    Options that control the action of MQDLTMP
   15 MQDMPO-OPTIONS               PIC S9(9) BINARY.
```

*PL/I declaration*
Delete message property options structure - PL/I language declaration

```
Dcl
 1 MQDPMO based,
   3 StrucId        char(4),       /* Structure identifier */
   3 Version        fixed bin(31), /* Structure version number */
   3 Options        fixed bin(31), /* Options that control the action
                                      of MQDLTMP */
```

*High Level Assembler declaration*
Delete message property options structure - Assembler language declaration

```
MQDMPO                   DSECT
MQDMPO_STRUCID           DS   CL4  Structure identifier
MQDMPO_VERSION           DS   F    Structure version number
MQDMPO_OPTIONS           DS   F    Options that control the
*                                  action of MQDLTMP
MQDMPO_LENGTH            EQU  *-MQDMPO
MQDMPO_AREA              DS   CL(MQDMPO_LENGTH)
```

## MQEPH - Embedded PCF header

The following table summarizes the fields in the structure.

*Table 490. Fields in MQEPH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQEPH structure plus the MQCFH and parameter structures that follow it | StrucLength |
| *Encoding* | Numeric encoding of data that follows last PCF parameter structure | Encoding |
| *CodedCharSetId* | Character set identifier of data that follows last PCF parameter structure | CodedCharSetId |
| *Format* | Format name of data that follows last PCF parameter structure | Format |
| *Flags* | Flags | Flags |
| *PCFHeader* | Programmable command format (PCF) header | PCFHeader |

### *Overview for MQEPH*

**Availability**: All IBM MQ platforms.

**Purpose**: The MQEPH structure describes the additional data that is present in a message when that message is a programmable command format (PCF) message. The *PCFHeader* field defines the PCF parameters that follow this structure and this allows you to follow the PCF message data with other headers.

**Format name**: MQFMT_EMBEDDED_PCF

**Character set and encoding**: Data in MQEPH must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE.

Set the character set and encoding of the MQEPH into the *CodedCharSetId* and *Encoding* fields in:

- The MQMD (if the MQEPH structure is at the start of the message data), or
- The header structure that precedes the MQEPH structure (all other cases).

**Usage**: You cannot use MQEPH structures to send commands to the command server or any other queue manager PCF-accepting server.

Similarly, the command server or any other queue manager PCF-accepting server do not generate responses or events containing MQEPH structures.

## *Fields for MQEPH*

The MQEPH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This is the character set identifier of the data that follows the MQEPH structure and the associated PCF parameters; it does not apply to character data in the MQEPH structure itself.

The initial value of this field is MQCCSI_UNDEFINED.

*Encoding (MQLONG)*

This is the numeric encoding of the data that follows the MQEPH structure and the associated PCF parameters; it does not apply to character data in the MQEPH structure itself.

The initial value of this field is 0.

*Flags (MQLONG)*

The following values are available:

**MQEPH_NONE**
No flags have been specified. MQEPH_NONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

**MQEPH_CCSID_EMBEDDED**
The character set of the parameters containing character data is specified individually within the CodedCharSetId field in each structure. The character set of the StrucId and Format fields is defined by the CodedCharSetId field in the header structure that precedes the MQEPH structure, or by the CodedCharSetId field in the MQMD if the MQEPH is at the start of the message.

The initial value of this field is MQEPH_NONE.

*Format (MQCHAR8)*

This is the format name of the data that follows the MQEPH structure and the associated PCF parameters.

The initial value of this field is MQFMT_NONE.

*PCFHeader (MQCFH)*

This is the programmable command format (PCF) header, defining the PCF parameters that follow the MQEPH structure. This enables you to follow the PCF message data with other headers.

The PCF header is initially defined with the following values:

| *Table 491. Initial values of fields in MQCFH* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *Type* | MQCFT_NONE | 0 |
| *StrucLength* | MQCFH_STRUC_LENGTH | 36 |
| *Version* | MQCFH_VERSION_3 | 3 |
| *StrucLength* | None | 0 |
| *Command* | MQCMD_NONE | 0 |
| *MsgSeqNumber* | None | 1 |
| *Control* | MQCFC_LAST | 1 |
| *CompCode* | MQCC_OK | 0 |
| *Reason* | MQRC_NONE | 0 |
| *ParameterCount* | None | 0 |

The application must change the Type from MQCFT_NONE to a valid structure type for the use it is making of the embedded PCF header.

*StrucId (MQCHAR4)*

The value must be:

**MQEPH_STRUC_ID**
Identifier for distribution header structure.

For the C programming language, the constant MQEPH_STRUC_ID_ARRAY is also defined; this has the same value as MQDH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQEPH_STRUC_ID.

*StrucLength (MQLONG)*

This is the amount of data preceding the next header structure. It includes:

- The length of the MQEPH header
- The length of all PCF parameters following the header
- Any blank padding following those parameters

StrucLength must be a multiple of 4.

The fixed length part of the structure is defined by MQEPH_STRUC_LENGTH_FIXED.

The initial value of this field is 68.

*Version (MQLONG)*

The value must be:

**MQEPH_VERSION_1**
Version number for embedded PCF header structure.

The following constant specifies the version number of the current version:

**MQCFH_VERSION_3**
Current version of embedded PCF header structure.

The initial value of this field is MQEPH_VERSION_1.

### *Initial values and language declarations for MQEPH*

*Table 492. Initial values of fields in MQEPH for MQEPH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQEPH_STRUC_ID | 'EPH¬' |
| *Version* | MQEPH_VERSION_1 | 1 |
| *StrucLength* | MQEPH_STRUC_LENGTH_FIXED | 68 |
| *Encoding* | None | 0 |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQEPH_NONE | 0 |
| *PCFHeader* | Names and values as defined in Table 491 on page 352 | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQEPH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQEPH MyEPH = {MQEPH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQEPH MQEPH;
struct tagMQDH {
  MQCHAR4  StrucId;          /* Structure identifier */
  MQLONG   Version;          /* Structure version number */
  MQLONG   StrucLength;      /* Total length of MQEPH including the MQCFH
                                and parameter structures that follow it */
  MQLONG   Encoding;         /* Numeric encoding of data that follows last
                                PCF parameter structure */
  MQLONG   CodedCharSetId;   /* Character set identifier of data that
                                follows last PCF parameter structure */
  MQCHAR8  Format;           /* Format name of data that follows last PCF
                                parameter structure */
  MQLONG   Flags;            /* Flags */
  MQCFH    PCFHeader;        /* Programmable command format header */
 };
```

*COBOL declaration*

```
**   MQEPH structure
  10 MQEPH.
**    Structure identifier
   15 MQEPH-STRUCID         PIC X(4).
**    Structure version number
   15 MQEPH-VERSION         PIC S9(9) BINARY.
**    Total length of MQEPH structure including the MQCFH
**    and parameter structures that follow it
   15 MQEPH-STRUCLENGTH     PIC S9(9) BINARY.
**    Numeric encoding of data that follows last
**    PCF structure
   15 MQEPH-ENCODING        PIC S9(9) BINARY.
**    Character set identifier of data that
**    follows last PCF parameter structure
   15 MQEPH-CODEDCHARSETID  PIC S9(9) BINARY.
**    Format name of data that follows last PCF
**    parameter structure
```

```
   15 MQEPH-FORMAT          PIC X(8).
**    Flags
   15 MQEPH-FLAGS           PIC S9(9) BINARY.
**    Programmable command format header
   15 MQEPH-PCFHEADER.
**      Structure type
     20 MQEPH-PCFHEADER-TYPE           PIC S9(9) BINARY.
**      Structure length
     20 MQEPH-PCFHEADER-STRUCLENGTH    PIC S9(9) BINARY.
**      Structure version number
     20 MQEPH-PCFHEADER-VERSION        PIC S9(9) BINARY.
**      Command identifier
     20 MQEPH-PCFHEADER-COMMAND        PIC S9(9) BINARY.
**      Message sequence number
     20 MQEPH-PCFHEADER-MSGSEQNUMBER   PIC S9(9) BINARY.
**      Control options
     20 MQEPH-PCFHEADER-CONTROL        PIC S9(9) BINARY.
**      Completion code
     20 MQEPH-PCFHEADER-COMPCODE       PIC S9(9) BINARY.
**      Reason code qualifying completion code
     20 MQEPH-PCFHEADER-REASON         PIC S9(9) BINARY.
**      Count of parameter structures
     20 MQEPH-PCFHEADER-PARAMETERCOUNT PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQEPH based,
  3 StrucId         char(4),       /* Structure identifier */
  3 Version         fixed bin(31), /* Structure version number */
  3 StrucLength     fixed bin(31), /* Total Length of MQEPH including the
                                      MQCFH and parameter structures that
                                      follow it
  3 Encoding        fixed bin(31), /* Numeric encoding of data that follows
                                      last PCF parameter structure
  3 CodedCharSetId  fixed bin(31), /* Character set identifier of data that
                                      follows last PCF parameter structure
  3 Format          char(8),       /* Format name of data that follows last
                                      PCF parameter structure */
  3 Flags           fixed bin(31), /* Flags */
  3 PCFHeader,                     /* Programmable command format header
   5 Type           fixed bin(31), /* Structure type */
   5 StrucLength    fixed bin(31), /* Structure length */
   5 Version        fixed bin(31), /* Structure version number */
   5 Command        fixed bin(31), /* Command identifier */
   5 MsgseqNumber   fixed bin(31), /* Message sequence number */
   5 Control        fixed bin(31), /* Control options */
   5 CompCode       fixed bin(31), /* Completion code */
   5 Reason         fixed bin(31), /* Reason code qualifying completion code */
   5 ParameterCount fixed bin(31); /* Count of parameter structures */
```

*High Level Assembler declaration*

```
MQEPH                           DSECT
MQEPH_STRUCID                   DS   CL4   Structure identifier
MQEPH_VERSION                   DS   F     Structure version number
MQEPH_STRUCLENGTH               DS   F     Total length of MQEPH including the
*                                          MQCFH and parameter structures that
                                           follow it
MQEPH_ENCODING                  DS   F     Numeric encoding of data that follows
*                                          last PCF parameter structure
MQEPH_CODEDCHARSETID            DS   F     Character set identifier of data that
*                                          follows last PCF parameter structure
MQEPH_FORMAT                    DS   CL8   Format name of data that follows last
*                                          PCF parameter structure
MQEPH_FLAGS                     DS   F     Flags
MQEPH_PCFHEADER                 DS   0F    Force fullword alignment
MQEPH_PCFHEADER_TYPE            DS   F     Structure type
MQEPH_PCFHEADER_STRUCLENGTH     DS   F     Structure length
MQEPH_PCFHEADER_VERSION         DS   F     Structure version number
MQEPH_PCFHEADER_COMMAND         DS   F     Command identifier
MQEPH_PCFHEADER_MSGSEQNUMBER    DS   F     Structure length
MQEPH_PCFHEADER_CONTROL         DS   F     Control options
MQEPH_PCFHEADER_COMPCODE        DS   F     Completion code
MQEPH_PCFHEADER_REASON          DS   F     Reason code qualifying completion code
MQEPH_PCFHEADER_PARAMETER_COUNT DS   F     Count of parameter structures
```

```
MQEPH_PCFHEADER_LENGTH           EQU  *-MQEPH_PCFHEADER
                                 ORG  MQEPH_PCFHEADER
MQEPH_PCFHEADER_AREA             DS   CL(MQEPH_PCFHEADER_LENGTH)
*
MQEPH_LENGTH                     EQU  *-MQEPH
                                 ORG  MQEPH
MQEPH_AREA                       DS   CL(MQEPH_LENGTH)
```

*Visual Basic declaration*

```
Type MQEPH
  StrucId         As String*4 'Structure identifier'
  Version         As Long     'Structure version number'
  StrucLength     As Long     'Total length of MQEPH structure including the MQCFH'
                              'and parameter structures that follow it'
  Encoding        As Long     'Numeric encoding of data that follows last'
                              'PCF parameter structure'
  CodedCharSetId  As Long     'Character set identifier of data that'
                              'follows last PCF parameter structure'
  Format          As String*8 'Format name of data that follows last PCF'
                              'parameter structure'
  Flags           As Long     'Flags'
  PCFHeader       As MQCFH    'Programmable command format header'
 End Type

Global MQEPH_DEFAULT As MQEPH
```

## MQGMO - Get-message options

The following table summarizes the fields in the structure.

*Table 493. Fields in MQGMO*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options that control the action of MQGET | MQGMO - Options field |
| *WaitInterval* | Wait interval | WaitInterval |
| *Signal1* | Signal | Signal1 |
| *Signal2* | Signal identifier | Signal2 |
| *ResolvedQName* | Resolved name of destination queue | ResolvedQName |
| **Note:** The remaining fields are ignored if *Version* is less than MQGMO_VERSION_2. | | |
| *MatchOptions* | Options controlling selection criteria used for MQGET | MatchOptions |
| *GroupStatus* | Flag indicating whether message retrieved is in a group | GroupStatus |
| *SegmentStatus* | Flag indicating whether message retrieved is a segment of a logical message | SegmentStatus |
| *Segmentation* | Flag indicating whether further segmentation is allowed for the message retrieved | Segmentation |
| *Reserved1* | Reserved | Reserved1 |
| **Note:** The remaining fields are ignored if *Version* is less than MQGMO_VERSION_3. | | |
| *MsgToken* | Message token | MsgToken |

| Table 493. Fields in MQGMO (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *ReturnedLength* | Length of message data returned (bytes) | ReturnedLength |
| **Note:** The remaining fields are ignored if *Version* is less than MQGMO_VERSION_4. | | |
| *Reserved2* | Reserved | Reserved2 |
| *MsgHandle* | The handle to a message that is to be populated with the properties of the message being retrieved from the queue. | MsgHandle |

## *Overview for MQGMO*

**Availability**: All IBM MQ platforms.

**Purpose**: The MQGMO structure allows the application to control how messages are removed from queues. The structure is an input/output parameter on the MQGET call.

**Version**: The current version of MQGMO is MQGMO_VERSION_4. Certain fields are available only in certain versions of MQGMO. If you need to port applications between several environments, you must ensure that the version of MQGMO is consistent across all environments. Fields that exist only in particular versions of the structure are identified as such in "MQGMO - Get-message options" on page 355 and in the field descriptions.

The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQGMO that is supported by the environment, but with the initial value of the *Version* field set to MQGMO_VERSION_1. To use fields that are not present in the version-1 structure, set the *Version* field to the version number of the version required.

**Character set and encoding**: Data in MQGMO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

## *Fields for MQGMO*

The MQGMO structure contains the following fields; the fields are described in **alphabetical order**:

*GroupStatus (MQCHAR)*
This flag indicates whether the message retrieved is in a group.

It has one of the following values:

**MQGS_NOT_IN_GROUP**
Message is not in a group.

**MQGS_MSG_IN_GROUP**
Message is in a group, but is not the last in the group.

**MQGS_LAST_MSG_IN_GROUP**
Message is the last in the group.

This is also the value returned if the group consists of only one message.

This is an output field. The initial value of this field is MQGS_NOT_IN_GROUP. This field is ignored if *Version* is less than MQGMO_VERSION_2.

*MatchOptions (MQLONG)*

These options allow the application to choose which fields in the *MsgDesc* parameter to use to select the message returned by the MQGET call. The application sets the required options in this field, and then sets the corresponding fields in the *MsgDesc* parameter to the values required for those fields. Only messages that have those values in the MQMD for the message are candidates for retrieval using that

*MsgDesc* parameter on the MQGET call. Fields for which the corresponding match option is *not* specified are ignored when selecting the message to be returned. If you specify no selection criteria on the MQGET call (that is, *any* message is acceptable), set *MatchOptions* to MQMO_NONE.

- On z/OS, the selection criteria that can be used might be restricted by the type of index used for the queue. See the *IndexType* queue attribute for further details.

If you specify MQGMO_LOGICAL_ORDER, only certain messages are eligible for return by the next MQGET call:

- If there is no current group or logical message, only messages that have *MsgSeqNumber* equal to 1 and *Offset* equal to 0 are eligible for return. In this situation, you can use one or more of the following match options to select which of the eligible messages is returned:
  - MQMO_MATCH_MSG_ID
  - MQMO_MATCH_CORREL_ID
  - MQMO_MATCH_GROUP_ID
- If there *is* a current group or logical message, only the next message in the group or next segment in the logical message is eligible for return, and this cannot be altered by specifying MQMO_* options.

In both of the preceding cases, you can specify match options that do not apply, but the value of the relevant field in the *MsgDesc* parameter must match the value of the corresponding field in the message to be returned; the call fails with reason code MQRC_MATCH_OPTIONS_ERROR is this condition is not satisfied.

*MatchOptions* is ignored if you specify either MQGMO_MSG_UNDER_CURSOR or MQGMO_BROWSE_MSG_UNDER_CURSOR.

Getting messages based on message property is not done using match options; for more information, see "SelectionString (MQCHARV)" on page 469.

You can specify one or more of the following match options:

**MQMO_MATCH_MSG_ID**
The message to be retrieved must have a message identifier that matches the value of the *MsgId* field in the *MsgDesc* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the correlation identifier).

If you omit this option, the *MsgId* field in the *MsgDesc* parameter is ignored, and any message identifier will match.

**Note:** The message identifier MQMI_NONE is a special value that matches *any* message identifier in the MQMD for the message. Therefore, specifying MQMO_MATCH_MSG_ID with MQMI_NONE is the same as *not* specifying MQMO_MATCH_MSG_ID.

**MQMO_MATCH_CORREL_ID**
The message to be retrieved must have a correlation identifier that matches the value of the *CorrelId* field in the *MsgDesc* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the message identifier).

If you omit this option, the *CorrelId* field in the *MsgDesc* parameter is ignored, and any correlation identifier will match.

**Note:** The correlation identifier MQCI_NONE is a special value that matches *any* correlation identifier in the MQMD for the message. Therefore, specifying MQMO_MATCH_CORREL_ID with MQCI_NONE is the same as *not* specifying MQMO_MATCH_CORREL_ID.

**MQMO_MATCH_GROUP_ID**
The message to be retrieved must have a group identifier that matches the value of the *GroupId* field in the *MsgDesc* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the correlation identifier).

If you omit this option, the *GroupId* field in the *MsgDesc* parameter is ignored, and any group identifier will match.

**Note:** The group identifier MQGI_NONE is a special value that matches *any* group identifier in the MQMD for the message. Therefore, specifying MQMO_MATCH_GROUP_ID with MQGI_NONE is the same as *not* specifying MQMO_MATCH_GROUP_ID.

**MQMO_MATCH_MSG_SEQ_NUMBER**
The message to be retrieved must have a message sequence number that matches the value of the *MsgSeqNumber* field in the *MsgDesc* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the group identifier).

If you omit this option, the *MsgSeqNumber* field in the *MsgDesc* parameter is ignored, and any message sequence number will match.

**MQMO_MATCH_OFFSET**
The message to be retrieved must have an offset that matches the value of the *Offset* field in the *MsgDesc* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the message sequence number).

If you omit this option is not specified, the *Offset* field in the *MsgDesc* parameter is ignored, and any offset will match.

- This option is not supported on z/OS.

**MQMO_MATCH_MSG_TOKEN**
The message to be retrieved must have a message token that matches the value of the *MsgToken* field in the MQGMO structure specified on the MQGET call.

You can specify this option for all local queues. If you specify it for a queue that has an *IndexType* of MQIT_MSG_TOKEN (a WLM-managed queue), you can specify no other match options with MQMO_MATCH_MSG_TOKEN.

You cannot specify MQMO_MATCH_MSG_TOKEN with MQGMO_WAIT or MQGMO_SET_SIGNAL. If the application wants to wait for a message to arrive on a queue that has an *IndexType* of MQIT_MSG_TOKEN, specify MQMO_NONE.

If you omit this option, the *MsgToken* field in MQGMO is ignored, and any message token will match.

If you specify none of the options described, you can use the following option:

**MQMO_NONE**
Use no matches in selecting the message to be returned; all messages on the queue are eligible for retrieval (but subject to control by the MQGMO_ALL_MSGS_AVAILABLE, MQGMO_ALL_SEGMENTS_AVAILABLE, and MQGMO_COMPLETE_MSG options).

MQMO_NONE aids program documentation. It is not intended that this option be used with any other MQMO_* option, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of this field is MQMO_MATCH_MSG_ID with MQMO_MATCH_CORREL_ID. This field is ignored if *Version* is less than MQGMO_VERSION_2.

**Note:** The initial value of the *MatchOptions* field is defined for compatibility with earlier MQSeries® queue managers. However, when reading a series of messages from a queue without using selection criteria, this initial value requires the application to reset the *MsgId* and *CorrelId* fields to MQMI_NONE and MQCI_NONE before each MQGET call. Avoid the need to reset *MsgId* and *CorrelId* by setting *Version* to MQGMO_VERSION_2, and *MatchOptions* to MQMO_NONE.

**Related concepts**
Message selectors in JMS

*MsgHandle (MQHMSG)*

If the MQGMO_PROPERTIES_AS_Q_DEF option is specified and the `PropertyControl` queue attribute is not set to MQPROP_FORCE_MQRFH2 then this is the handle to a message which will be populated with the properties of the message being retrieved from the queue. The handle is created by an MQCRTMH call. Any properties already associated with the handle will be cleared before retrieving a message.

The following value can also be specified:
MQHM_NONE
No message handle supplied.

No message descriptor is required on the MQGET call if a valid message handle is supplied and used on output to contain the message properties, the message descriptor associated with the message handle is used for input fields.

If a message descriptor is specified on the MQGET call, it always takes precedence over the message descriptor associated with a message handle.

If MQGMO_PROPERTIES_FORCE_MQRFH2 is specified, or the MQGMO_PROPERTIES_AS_Q_DEF is specified and the `PropertyControl` queue attribute is MQPROP_FORCE_MQRFH2 then the call fails with reason code MQRC_MD_ERROR when no message descriptor parameter is specified.

On return from the MQGET call, the properties and message descriptor associated with this message handle are updated to reflect the state of the message retrieved (as well as the message descriptor if one was supplied on the MQGET call). The properties of the message can then be inquired using the MQINQMP call.

Except for message descriptor extensions, when present, a property that can be inquired with the MQINQMP call is not contained in the message data; if the message on the queue contained properties in the message data these are removed from the message data before the data is returned to the application.

If no message handle is provided or Version is less than MQGMO_VERSION_4 then you must supply a valid message descriptor on the MQGET call. Any message properties (except those contained in the message descriptor) are returned in the message data subject to the value of the property options in the MQGMO structure and the `PropertyControl` queue attribute.

This is an always an input field. The initial value of this field is MQHM_NONE. This field is ignored if `Version` is less than MQGMO_VERSION_4.

*MsgToken (MQBYTE16)*
MsgToken field - MQGMO structure. This field is used by the queue manager to uniquely identify a message.

This is a byte string that is generated by the queue manager to identify a message uniquely on a queue. The message token is generated when the message is first placed on the queue manager, and remains with the message until the message is permanently removed from the queue manager, unless the queue manager is restarted.

When the message is removed from the queue, the *MsgToken* that identified that instance of the message is no longer valid, and is never reused. If the queue manager is restarted, the *MsgToken* that identified a message on the queue before restart might not be valid after restart. However, the *MsgToken* is never reused to identify a different message instance. The *MsgToken* is generated by the queue manager and is not visible to any external application.

When a message is returned by a call to MQGET where a Version 3 or higher MQGMO is supplied, the *MsgToken* identifying the message on the queue is returned in the MQGMO by the queue manager. There is one exception to this: when the message is being removed from the queue outside syncpoint, the queue manager might not return a *MsgToken* because it is not useful to identify the returned message on a subsequent MQGET call. Applications should only use *MsgToken* to refer to the message on subsequent MQGET calls.

If a *MsgToken* is supplied and the *MatchOption* MQMO_MATCH_MSG_TOKEN is specified and neither MQGMO_MSG_UNDER_CURSOR nor MQGMO_BROWSE_MSG_UNDER_CURSOR is specified, only the message identified by that *MsgToken* can be returned. The option is valid on all local queues regardless of INDXTYPE, and on z/OS you must use INDXTYPE(MSGTOKEN) only on Workload Manager (WLM) queues.

Any other *MatchOptions* specified are checked, and if they do not match, MQRC_NO_MSG_AVAILABLE is returned. If MQGMO_BROWSE_NEXT is coded with MQMO_MATCH_MSG_TOKEN, the message identified by the *MsgToken* is returned only if it is beyond the browse-cursor for the calling handle.

If MQGMO_MSG_UNDER_CURSOR or MQGMO_BROWSE_MSG_UNDER_CURSOR is specified, MQMO_MATCH_MSG_TOKEN is ignored.

MQMO_MATCH_MSG_TOKEN is not valid with the following get message options:

- MQGMO_WAIT
- MQGMO_SET_SIGNAL

For an MQGET call specifying MQMO_MATCH_MSG_TOKEN, an MQGMO of version 3 or later must be supplied to the call, otherwise MQRC_WRONG_GMO_VERSION is returned.

If the *MsgToken* is not valid at this time, MQCC_FAILED with MQRC_NO_MSG_AVAILABLE is returned, unless there is another error.

*Options (MQLONG)*

**MQGMO** options control the action of MQGET. You can specify zero or more of the options. If you need more than one optional value:

- Add the values (do not add the same constant more than once), or
- Combine the values using the bitwise OR operation (if the programming language supports bit operations).

Combinations of options that are not valid are noted; all other combinations are valid.

**Wait options**: The following options relate to waiting for messages to arrive on the queue:

**MQGMO_WAIT**
The application waits until a suitable message arrives. The maximum time that the application waits is specified in *WaitInterval* .

**Important:** There is no wait, or delay, if a suitable message is available immediately.

If MQGET requests are inhibited, or MQGET requests become inhibited while waiting, the wait is canceled. The call completes with MQCC_FAILED and reason code MQRC_GET_INHIBITED, regardless of whether there are suitable messages on the queue.

You can use MQGMO_WAIT with the MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT options.

If several applications are waiting on the same shared queue, the following rules select which application is activated when a suitable message arrives:

*Table 494. Rules for activating MQGET calls on a shared queue.*

| **Number of MQGET calls waiting to be activated** | | **Result** |
|---|---|---|
| **With a BROWSE option** | **Without a BROWSE option** [1] | |
| None | One or more | One MQGET call without a BROWSE option is activated. |
| One or more | None | All MQGET calls with a BROWSE option are activated. |
| One or more | One or more | One MQGET call without a BROWSE option is activated. The number of MQGET calls with a BROWSE option that are activated is unpredictable. |

If more than one MQGET call without a BROWSE option is waiting on the same queue, only one is activated. The queue manager attempts to give priority to waiting calls in the following order:

1. Specific get-wait requests that can be satisfied only by certain messages, for example, ones with a specific *MsgId* or *CorrelId* (or both).
2. General get-wait requests that can be satisfied by any message.

[1] An MQGET call specifying the MQGMO_LOCK option is treated as a nonbrowse call.

**Note:**

- Within the first category, no additional priority is given to more specific get-wait requests. For example, requests that specify both *MsgId* and *CorrelId* .
- Within either category, it cannot be predicted which application is selected. In particular, the application waiting longest is not necessarily the one selected.
- Path length, and priority-scheduling considerations of the operating system, can mean that a waiting application of lower operating system priority than expected retrieves the message.
- It can also happen that an application that is not waiting retrieves the message in preference to one that is.

On z/OS, the following points apply:

- If you want the application to proceed with other work while waiting for the message to arrive, consider using the signal option ( MQGMO_SET_SIGNAL ) instead. However the signal option is environment-specific; applications that you to port between different environments must not use it.
- If there is more than one MQGET call waiting for the same message, with a mixture of wait and signal options, each waiting call is considered equally. It is an error to specify MQGMO_SET_SIGNAL with MQGMO_WAIT . It is also an error to specify this option with a queue handle for which a signal is outstanding.
- If you specify MQGMO_WAIT or MQGMO_SET_SIGNAL for a queue that has an *IndexType* of MQIT_MSG_TOKEN, no selection criteria are permitted. This means that:
  - If you are using a version-1 MQGMO, set the *MsgId* and *CorrelId* fields in the MQMD specified on the MQGET call to MQMI_NONE and MQCI_NONE.
  - If you are using a version-2 or later MQGMO, set the *MatchOptions* field to MQMO_NONE.
- For an MQGET call on a shared queue and the call is a browse request, or a destructive get of a group message, and neither *MsgId* nor *CorrelId* are to be matched, your signal ECB is posted MQEC_MSG_ARRIVED after 200 milliseconds.

  This occurs, even though a suitable message might not have arrived on the queue, until the wait interval has expired, when the queue is posted with MQEC_WAIT_INTERVAL_EXPIRED. When MQEC_MSG_ARRIVED is posted, you must reissue a second MQGET call to retrieve the message, if one is available.

  This technique is used to ensure that you are informed in a timely manner of a message arrival, but can appear as an unexpected processing overhead when compared with a similar call sequence on a nonshared queue.

MQGMO_WAIT is ignored if specified with MQGMO_BROWSE_MSG_UNDER_CURSOR or MQGMO_MSG_UNDER_CURSOR ; no error is raised.

**MQGMO_NO_WAIT**
The application does not wait if no suitable message is available. MQGMO_NO_WAIT is the opposite of the MQGMO_WAIT. MQGMO_NO_WAIT is defined to aid program documentation. It is the default if neither is specified.

**MQGMO_SET_SIGNAL**
Use this option with the *Signal1* and *Signal2* fields. It allows applications to proceed with other work while waiting for a message to arrive. It also allows (if suitable operating system facilities are available) applications to wait for messages arriving on more than one queue.

**Note:** The MQGMO_SET_SIGNAL option is environment-specific; do not use it for applications that you want to port.

In two circumstances, the call completes in the same way as if this option had not been specified:

1. If a currently available message satisfies the criteria specified in the message descriptor.
2. If a parameter error or other synchronous error is detected.

If no message satisfying the criteria specified in the message descriptor is currently available, control returns to the application without waiting for a message to arrive. The *CompCode* and *Reason*

parameters are set to MQCC_WARNING and MQRC_SIGNAL_REQUEST_ACCEPTED. Other output fields in the message descriptor and the output parameters of the MQGET call are not set. When a suitable message arrives later, the signal is delivered by posting the ECB.

The caller must then reissue the MQGET call to retrieve the message. The application can wait for this signal, using functions provided by the operating system.

If the operating system provides a multiple wait mechanism, you can use it to wait for a message arriving on any one of several queues.

If a nonzero *WaitInterval* is specified, the signal is delivered after the wait interval expires. The queue manager can also cancel the wait, in which case the signal is delivered.

More than one MQGET call can set a signal for the same message. The order in which applications are activated is the same as described for MQGMO_WAIT.

If more than one MQGET call is waiting for the same message, each waiting call is considered equally. The calls can include a mixture of wait and signal options.

Under certain conditions the MQGET call can retrieve a message, and a signal resulting from the arrival of the same message can be delivered. When a signal is delivered, an application must be prepared for no message to be available.

A queue handle can have no more than one signal request outstanding.

This option is not valid with any of the following options:

- MQGMO_UNLOCK
- MQGMO_WAIT

For an MQGET call on a shared queue and the call is a browse request, or a destructive get of a group message, and neither *MsgId* or *CorrelId* are to be matched, the user's signal ECB is posted MQEC_MSG_ARRIVED after 200 milliseconds.

This occurs, even though a suitable message might not have arrived on the queue, until the wait interval has expired, when the queue is posted with MQEC_WAIT_INTERVAL_EXPIRED. When MQEC_MSG_ARRIVED is posted, you must reissue a second MQGET call to retrieve the message, if one is available.

This technique is used to ensure that you are informed in a timely manner of a message arrival, but can appear as an unexpected processing overhead when compared with a similar call sequence on a nonshared queue.

This is not an efficient method of message retrieval when messages are added infrequently. To avoid this overhead for the browse case, specify *MsgId* (if non-indexed or indexed by *MsgId*) or *CorrelId* (if indexed by *CorrelId*) matching on the MQGET call.

This option is supported on z/OS only.

**MQGMO_FAIL_IF_QUIESCING**
Force the MQGET call to fail if the queue manager is in the quiescing state.

On z/OS, this option also forces the MQGET call to fail if the connection (for a CICS or IMS application) is in the quiescing state.

If this option is specified with MQGMO_WAIT or MQGMO_SET_SIGNAL, and the wait or signal is outstanding at the time the queue manager enters the quiescing state:

- The wait is canceled and the call returns completion code MQCC_FAILED with reason code MQRC_Q_MGR_QUIESCING or MQRC_CONNECTION_QUIESCING.
- The signal is canceled with an environment-specific signal completion code.

  On z/OS, the signal completes with event completion code MQEC_Q_MGR_QUIESCING or MQEC_CONNECTION_QUIESCING.

If MQGMO_FAIL_IF_QUIESCING is not specified and the queue manager or connection enters the quiescing state, the wait or signal is not canceled.

**Sync point options**: The following options relate to the participation of the MQGET call within a unit of work:

**MQGMO_SYNCPOINT**
The request is to operate within the normal unit-of-work protocols. The message is marked as being unavailable to other applications, but it is deleted from the queue only when the unit of work is committed. The message is made available again if the unit of work is backed out.

You can leave MQGMO_SYNCPOINT and MQGMO_NO_SYNCPOINT unset. In which case, the inclusion of the get request in unit-of-work protocols is determined by the environment running the queue manager. It is not determined by the environment running the application. On z/OS, the get request is within a unit of work. In all other environments, the get request is not within a unit of work.

Because of these differences, an application that you want to port must not allow this option to default; specify MQGMO_SYNCPOINT or MQGMO_NO_SYNCPOINT explicitly.

This option is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT
- MQGMO_LOCK
- MQGMO_NO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

**MQGMO_SYNCPOINT_IF_PERSISTENT**
The request is to operate within the normal unit-of-work protocols, but *only* if the message retrieved is persistent. A persistent message has the value MQPER_PERSISTENT in the *Persistence* field in MQMD.

- If the message is persistent, the queue manager processes the call as though the application had specified MQGMO_SYNCPOINT.
- If the message is not persistent, the queue manager processes the call as though the application had specified MQGMO_NO_SYNCPOINT.

This option is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT
- MQGMO_COMPLETE_MSG
- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_NO_SYNCPOINT
- MQGMO_SYNCPOINT
- MQGMO_UNLOCK

This option is supported in the following environments: AIX, HP-UX, z/OS, IBM i, Solaris, and Linux, plus IBM MQ MQI clients connected to these systems.

**MQGMO_NO_SYNCPOINT**
The request is to operate outside the normal unit-of-work protocols. If you get a message without a browse option, it is deleted from the queue immediately. The message cannot be made available again by backing out the unit of work.

This option is assumed if you specify MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT.

You can leave MQGMO_SYNCPOINT and MQGMO_NO_SYNCPOINT unset. In which case, the inclusion of the get request in unit-of-work protocols is determined by the environment running the queue

manager. It is not determined by the environment running the application. On z/OS, the get request is within a unit of work. In all other environments, the get request is not within a unit of work.

Because of these differences, an application that you want to port must not allow this option to default; specify either MQGMO_SYNCPOINT or MQGMO_NO_SYNCPOINT explicitly.

This option is not valid with any of the following options:

- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT

**MQGMO_MARK_SKIP_BACKOUT**
Back out a unit of work without reinstating on the queue the message that was marked with this option.

This option is supported only on z/OS.

If this option is specified, MQGMO_SYNCPOINT must also be specified. MQGMO_MARK_SKIP_BACKOUT is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT
- MQGMO_LOCK
- MQGMO_NO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

**Note:** On IMS and CICS, you might have to issue an extran IBM MQ call after backing out a unit of work containing a message marked with MQGMO_MARK_SKIP_BACKOUT. You must issue an IBM MQ call before you commit the new unit of work containing the marked message. The call can be any IBM MQ call you like.

1. On IMS, if you have not applied IMS APAR PN60855 and you are running an IMS MPP or BMP application.
2. On CICS, if you are running any application.

In both cases, issue any IBM MQ call before committing the new unit of work containing the backed out message.

**Note:** Within a unit of work, there can be only one get request marked as skipping backout, as well as none or several unmarked get requests.

If an application backs out of a unit of work, a message that was retrieved using MQGMO_MARK_SKIP_BACKOUT is not restored to its previous state. Other resource updates are backed out. The message is treated as if it had been retrieved in a new unit of work started by the backout request. The message is retrieved without the MQGMO_MARK_SKIP_BACKOUT option.

MQGMO_MARK_SKIP_BACKOUT is useful if, after some resources have been changed, it becomes apparent that the unit of work cannot complete successfully. If you omit this option, backing out the unit of work reinstates the message on the queue. The same sequence of events occurs again, when the message is next retrieved.

However, if you specify MQGMO_MARK_SKIP_BACKOUT on the original MQGET call, backing out the unit of work backs out the updates to the other resources. The message is treated as if it had been retrieved under a new unit of work. The application can perform appropriate error handling. It can send a report message to the sender of the original message, or place the original message on the dead-letter queue. It can then commit the new unit of work. Committing the new unit of work removes the message permanently from the original queue.

MQGMO_MARK_SKIP_BACKOUT marks a single physical message. If the message belongs to a message group, the other messages in the group are not marked. Similarly, if the marked message is a segment of a logical message, the other segments in the logical message are not marked.

Any message in a group can be marked, but if messages are retrieved using MQGMO_LOGICAL_ORDER, it is advantageous to mark the first message in the group. If the unit of work is backed out, the first (marked) message is moved to the new unit of work. The second and later messages in the group are reinstated on the queue. The messages left on the queue cannot be retrieved by another application using MQGMO_LOGICAL_ORDER. The first message in the group is no longer on the queue. However, the application that backed the unit of work out can retrieve the second and later messages into the new unit of work using the MQGMO_LOGICAL_ORDER option. The first message has been retrieved already.

Occasionally you might need to back out the new unit of work. For example, because the dead-letter queue is full and the message must not be discarded. Backing out the new unit of work reinstates the message on the original queue, which prevents the message being lost. However, in this situation processing cannot continue. After backing out the new unit of work, the application must inform the operator or administrator that there is an unrecoverable error, and then finish.

MQGMO_MARK_SKIP_BACKOUT only works if the unit of work containing the get request is interrupted by the application backing it out. If the unit of work containing the get request is backed out because the transaction or system fails, MQGMO_MARK_SKIP_BACKOUT is ignored. Any message retrieved using this option is reinstated on the queue in the same way as messages retrieved without this option.

**Browse options**: The following options relate to browsing messages on the queue:

**MQGMO_BROWSE_FIRST**
When a queue is opened with the MQOO_BROWSE option, a browse cursor is established, positioned logically before the first message on the queue. You can then use MQGET calls specifying the MQGMO_BROWSE_FIRST, MQGMO_BROWSE_NEXT, or MQGMO_BROWSE_MSG_UNDER_CURSOR option to retrieve messages from the queue nondestructively. The browse cursor marks the position, within the messages on the queue, from which the next MQGET call with MQGMO_BROWSE_NEXT searches for a suitable message.

MQGMO_BROWSE_FIRST is not valid with any of the following options:

- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT
- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_MSG_UNDER_CURSOR
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

It is also an error if the queue was not opened for browse.

An MQGET call with MQGMO_BROWSE_FIRST ignores the previous position of the browse cursor. The first message on the queue that satisfies the conditions specified in the message descriptor is retrieved. The message remains on the queue, and the browse cursor is positioned on this message.

After this call, the browse cursor is positioned on the message that has been returned. The message might be removed from the queue before the next MQGET call with MQGMO_BROWSE_NEXT is issued. In this case, the browse cursor remains at the position in the queue that the message occupied, even though that position is now empty.

Use the MQGMO_MSG_UNDER_CURSOR option with a non-browse MQGET call, to remove the message from the queue.

The browse cursor is not moved by a non-browse MQGET call, even if using the same *Hobj* handle. Nor is it moved by a browse MQGET call that returns a completion code of MQCC_FAILED, or a reason code of MQRC_TRUNCATED_MSG_FAILED.

Specify the MQGMO_LOCK option with this option, to lock the message that is browsed.

You can specify MQGMO_BROWSE_FIRST with any valid combination of the MQGMO_* and MQMO_* options that control the processing of messages in groups and segments of logical messages.

If you specify MQGMO_LOGICAL_ORDER, the messages are browsed in logical order. If you omit that option, the messages are browsed in physical order. If you specify MQGMO_BROWSE_FIRST, you can switch between logical order and physical order. Subsequent MQGET calls using MQGMO_BROWSE_NEXT browse the queue in the same order as the most recent call that specified MQGMO_BROWSE_FIRST for the queue handle.

The queue manager retains two sets of group and segment information for MQGET calls. The group and segment information for browse calls are retained separately from the information for calls that remove messages from the queue. If you specify MQGMO_BROWSE_FIRST, the queue manager ignores the group and segment information for browsing. It scans the queue as though there were no current group and no current logical message. If the MQGET call is successful, completion code MQCC_OK or MQCC_WARNING, the group and segment information for browsing is set to that of the message returned. If the call fails, the group and segment information remain the same as they were before the call.

**MQGMO_BROWSE_NEXT**
Advance the browse cursor to the next message on the queue that satisfies the selection criteria specified on the MQGET call. The message is returned to the application, but remains on the queue.

MQGMO_BROWSE_NEXT is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_MSG_UNDER_CURSOR
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

It is also an error if the queue was not opened for browse.

MQGMO_BROWSE_NEXT behaves the same way as MQGMO_BROWSE_FIRST, if it is the first call to browse a queue, after the queue has been opened for browse.

The message under cursor might be removed from the queue before the next MQGET call with MQGMO_BROWSE_NEXT is issued. The browse cursor logically remains at the position in the queue that the message occupied, even though that position is now empty.

Messages are stored on the queue in one of two ways:

- FIFO within priority ( MQMDS_PRIORITY), or
- FIFO *regardless* of priority ( MQMDS_FIFO)

The *MsgDeliverySequence* queue attribute indicates which method applies (see “Attributes for queues” on page 810 for details).

A queue might have a *MsgDeliverySequence* of MQMDS_PRIORITY. A message arrives on the queue that is of a higher priority than the one currently pointed to by the browse cursor. In which case, the higher priority message is not found during the current sweep of the queue using MQGMO_BROWSE_NEXT. It can be found only after the browse cursor has been reset with MQGMO_BROWSE_FIRST, or by reopening the queue.

The MQGMO_MSG_UNDER_CURSOR option can be used with a non-browse MQGET call if required, to remove the message from the queue.

The browse cursor is not moved by non-browse MQGET calls using the same *Hobj* handle.

Specify the MQGMO_LOCK option with this option to lock the message that is browsed.

You can specify MQGMO_BROWSE_NEXT with any valid combination of the MQGMO_* and MQMO_* options that control the processing of messages in groups and segments of logical messages.

If you specify MQGMO_LOGICAL_ORDER, the messages are browsed in logical order. If you omit that option, the messages are browsed in physical order. If you specify MQGMO_BROWSE_FIRST, you can switch between logical order and physical order. Subsequent MQGET calls using MQGMO_BROWSE_NEXT browse the queue in the same order as the most recent call that specified MQGMO_BROWSE_FIRST for the queue handle. The call fails with reason code MQRC_INCONSISTENT_BROWSE if this condition is not satisfied.

**Note:** Take special care when using an MQGET call to browse beyond the end of a message group if MQGMO_LOGICAL_ORDER is not specified. For example, suppose that the last message in the group precedes the first message in the group on the queue. Using MQGMO_BROWSE_NEXT to browse beyond the end of the group, specifying MQMO_MATCH_MSG_SEQ_NUMBER with *MsgSeqNumber* set to 1 returns the first message in the group already browsed. This result can happen immediately, or a number of MQGET calls later if there are intervening groups. The same consideration applies for a logical message not in a group.

The group and segment information for browse calls are retained separately from the information for calls that remove messages from the queue.

**MQGMO_BROWSE_MSG_UNDER_CURSOR**
Retrieve the message pointed to by the browse cursor nondestructively, regardless of the MQMO_* options specified in the *MatchOptions* field in MQGMO.

MQGMO_BROWSE_MSG_UNDER_CURSOR is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_NEXT
- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_MSG_UNDER_CURSOR
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

It is also an error if the queue was not opened for browse.

The message pointed to by the browse cursor is the one that was last retrieved using either the MQGMO_BROWSE_FIRST or the MQGMO_BROWSE_NEXT option. The call fails if neither of these calls has been issued for this queue since it was opened. The call also fails if the message that was under the browse cursor has since been retrieved destructively.

The position of the browse cursor is not changed by this call.

The MQGMO_MSG_UNDER_CURSOR option can be used with a non-browse MQGET call, to remove the message from the queue.

The browse cursor is not moved by a non-browse MQGET call, even if using the same *Hobj* handle. Nor is it moved by a browse MQGET call that returns a completion code of MQCC_FAILED, or a reason code of MQRC_TRUNCATED_MSG_FAILED.

If MQGMO_BROWSE_MSG_UNDER_CURSOR is specified with MQGMO_LOCK:

- If there is already a message locked, it must be the one under the cursor, so that is returned without unlocking and locking again. The message remains locked.
- If there is no locked message and there is a message under the browse cursor, it is locked and returned to the application. If there is no message under the browse cursor, the call fails.

If MQGMO_BROWSE_MSG_UNDER_CURSOR is specified without MQGMO_LOCK:

- If there is already a message locked, it must be the one under the cursor. The message is returned to the application and then unlocked. Because the message is now unlocked, there is no guarantee

that it can be browsed again, or retrieved destructively by the same application. It might have been retrieved destructively by another application getting messages from the queue.

- If there is no locked message and there is a message under the browse cursor, it is returned to the application. If there is no message under the browse cursor the call fails.

If MQGMO_COMPLETE_MSG is specified with MQGMO_BROWSE_MSG_UNDER_CURSOR, the browse cursor must identify a message whose *Offset* field in MQMD is zero. If this condition is not satisfied, the call fails with reason code MQRC_INVALID_MSG_UNDER_CURSOR.

The group and segment information for browse calls are retained separately from the information for calls that remove messages from the queue.

**MQGMO_MSG_UNDER_CURSOR**
Retrieve the message pointed to by the browse cursor, regardless of the MQMO_* options specified in the *MatchOptions* field in MQGMO. The message is removed from the queue.

The message pointed to by the browse cursor is the one that was last retrieved using either the MQGMO_BROWSE_FIRST or the MQGMO_BROWSE_NEXT option.

If MQGMO_COMPLETE_MSG is specified with MQGMO_MSG_UNDER_CURSOR, the browse cursor must identify a message whose *Offset* field in MQMD is zero. If this condition is not satisfied, the call fails with reason code MQRC_INVALID_MSG_UNDER_CURSOR.

This option is not valid with any of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT
- MQGMO_UNLOCK

It is also an error if the queue was not opened both for browse and for input. If the browse cursor is not currently pointing to a retrievable message, an error is returned by the MQGET call.

**MQGMO_MARK_BROWSE_HANDLE**
The message that is returned by a successful MQGET, or identified by the returned *MsgToken*, is marked. The mark is specific to the object handle used in the call.

The message is not removed from the queue.

MQGMO_MARK_BROWSE_HANDLE is valid only if one of the following options is also specified:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT

MQGMO_MARK_BROWSE_HANDLE is not valid with any of the following options:

- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_COMPLETE_MSG
- MQGMO_LOCK
- MQGMO_LOGICAL_ORDER
- MQGMO_UNLOCK

The message remains in this state until one of the following events occurs:

- The object handle concerned is closed, either normally or otherwise.
- The message is unmarked for this handle by a call to MQGET with the option MQGMO_UNMARK_BROWSE_HANDLE.
- The message is returned from a call to destructive MQGET, which completes with MQCC_OK or MQCC_WARNING. The message state remains changed even if the MQGET is later rolled-back.

- The message expires.

**MQGMO_MARK_BROWSE_CO_OP**
The message that is returned by a successful MQGET, or identified by the returned *MsgToken*, is marked for all handles in the cooperating set.

The cooperative level mark is in addition to any handle level mark that might have been set.

The message is not removed from the queue.

MQGMO_MARK_BROWSE_CO_OP is valid only if the object handle used was returned by a call to MQOPEN that specified MQOO_CO_OP. You must also specify one of the following MQGMO options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_BROWSE_NEXT

This option is not valid with any of the following options:

- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_COMPLETE_MSG
- MQGMO_LOCK
- MQGMO_LOGICAL_ORDER
- MQGMO_UNLOCK

If the message is already marked, and the option MQGMO_UNMARKED_BROWSE_MSG is not specified, the call fails with MQCC_FAILED and reason code MQRC_MSG_MARKED_BROWSE_CO_OP.

The message remains in this state until one of the following events occurs:

- All object handles in the cooperating set are closed.
- The message is unmarked for cooperating browsers by a call to MQGET with the option MQGMO_UNMARK_BROWSE_CO_OP.
- The message is automatically unmarked by the queue manager.
- The message is returned from a call to a non-browse MQGET. The message state remains changed even if the MQGET is later rolled-back.
- The message expires.

**MQGMO_UNMARKED_BROWSE_MSG**
A call to MQGET that specifies MQGMO_UNMARKED_BROWSE_MSG returns a message that is considered to be unmarked for its handle. It does not return a message if the message was marked for its handle. It also does not return the message if the queue was opened by a call to MQOPEN, with the option MQOO_CO_OP, and the message has been marked by a member of the cooperating set.

This option is not valid with any of the following options:

- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_COMPLETE_MSG
- MQGMO_LOCK
- MQGMO_LOGICAL_ORDER
- MQGMO_UNLOCK

**MQGMO_UNMARK_BROWSE_CO_OP**
After a call to MQGET that specifies this option, the message is no longer considered by any open handles in the set of cooperating handles to be marked for the cooperating set. The message is still considered to be marked at handle level if it was marked at handle level before this call.

Using MQGMO_UNMARK_BROWSE_CO_OP is valid only with a handle returned by a successful call to MQOPEN with the option MQOO_CO_OP. The MQGET succeeds even if the message is not considered to be marked by the cooperating set of handles.

MQGMO_UNMARK_BROWSE_CO_OP is not valid on a non-browse MQGET call, or with any of the following options:

- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_COMPLETE_MSG
- MQGMO_LOCK
- MQGMO_LOGICAL_ORDER
- MQGMO_MARK_BROWSE_CO_OP
- MQGMO_UNLOCK
- MQGMO_UNMARKED_BROWSE_MSG

**MQGMO_UNMARK_BROWSE_HANDLE**
After a call to MQGET that specifies this option, the message located is no longer considered to be marked by this handle.

The call succeeds even if the message is not marked for this handle.

This option is not valid on a non-browse MQGET call, or with any of the following options:

- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_COMPLETE_MSG
- MQGMO_LOCK
- MQGMO_LOGICAL_ORDER
- MQGMO_MARK_BROWSE_CO_OP
- MQGMO_UNLOCK
- MQGMO_UNMARKED_BROWSE_MSG

**Lock options**: The following options relate to locking messages on the queue:

**MQGMO_LOCK**
Lock the message that is browsed, so that the message becomes invisible to any other handle open for the queue. The option can be specified only if one of the following options is also specified:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_NEXT
- MQGMO_BROWSE_MSG_UNDER_CURSOR

Only one message can be locked for each queue handle. The message can be a logical message or a physical message:

- If you specify MQGMO_COMPLETE_MSG, all the message segments that make up the logical message are locked to the queue handle. The messages must all be present on the queue and available for retrieval.
- If you omit MQGMO_COMPLETE_MSG, only a single physical message is locked to the queue handle. If this message happens to be a segment of a logical message, the locked segment prevents other applications using MQGMO_COMPLETE_MSG to retrieve or browse the logical message.

The locked message is always the one under the browse cursor. The message can be removed from the queue by a later MQGET call that specifies the MQGMO_MSG_UNDER_CURSOR option. Other MQGET calls using the queue handle can also remove the message (for example, a call that specifies the message identifier of the locked message).

If the call returns completion code MQCC_FAILED, or MQCC_WARNING with reason code MQRC_TRUNCATED_MSG_FAILED, no message is locked.

If the application does not remove the message from the queue, the lock is released by one of the following actions:

- Issuing another MQGET call for this handle, specifying either MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT. The lock is released if the call completes with MQCC_OK or MQCC_WARNING. The message remains locked if the call completes with MQCC_FAILED. However, the following exceptions apply:
  - The message is not unlocked if MQCC_WARNING is returned with MQRC_TRUNCATED_MSG_FAILED.
  - The message is unlocked if MQCC_FAILED is returned with MQRC_NO_MSG_AVAILABLE.

  If you also specify MQGMO_LOCK, the message returned is locked. If you omit MQGMO_LOCK, there is no locked message after the call.

  If you specify MQGMO_WAIT, and no message is immediately available, the original message is unlocked before the start of the wait.
- Issuing another MQGET call for this handle, with MQGMO_BROWSE_MSG_UNDER_CURSOR, without MQGMO_LOCK. The lock is released if the call completes with MQCC_OK or MQCC_WARNING. The message remains locked if the call completes with MQCC_FAILED. However, the following exception applies:
  - The message is not unlocked if MQCC_WARNING is returned with MQRC_TRUNCATED_MSG_FAILED.
- Issuing another MQGET call for this handle with MQGMO_UNLOCK.
- Issuing an MQCLOSE call using the handle. The MQCLOSE might be implicit, caused by the application ending.

No special MQOPEN option is required to specify MQGMO_LOCK, other than MQOO_BROWSE, which is needed to specify an accompanying browse option.

MQGMO_LOCK is not valid with any of the following options:

- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

MQGMO_LOCK is not possible when you are using an IBM MQ client on HP Integrity NonStop Server to a z/OS queue manager when coordinated by TMF.

**MQGMO_UNLOCK**
The message to be unlocked must have been previously locked by an MQGET call with the MQGMO_LOCK option. If there is no message locked for this handle, the call completes with MQCC_WARNING and MQRC_NO_MSG_LOCKED.

The *MsgDesc*, *BufferLength*, *Buffer*, and *DataLength* parameters are not checked or altered if you specify MQGMO_UNLOCK. No message is returned in *Buffer*.

No special open option is required to specify MQGMO_UNLOCK (although MQOO_BROWSE is needed to issue the lock request in the first place).

This option is not valid with any options except the following:

- MQGMO_NO_WAIT
- MQGMO_NO_SYNCPOINT

Both of these options are assumed whether specified or not.

**Message-data options**: The following options relate to the processing of the message data when the message is read from the queue:

**MQGMO_ACCEPT_TRUNCATED_MSG**
If the message buffer is too small to hold the complete message, allow the MQGET call to fill the buffer. MQGET fills the buffer with as much of the message it can. It issues a warning completion code, and completes its processing. This means that:

- When browsing messages, the browse cursor is advanced to the returned message.
- When removing messages, the returned message is removed from the queue.
- Reason code MQRC_TRUNCATED_MSG_ACCEPTED is returned if no other error occurs.

Without this option, the buffer is still filled with as much of the message as it can hold. A warning completion code is issued, but processing is not completed. This means that:

- When browsing messages, the browse cursor is not advanced.
- When removing messages, the message is not removed from the queue.
- Reason code MQRC_TRUNCATED_MSG_FAILED is returned if no other error occurs.

**MQGMO_CONVERT**
This option converts the application data in the message to conform to the *CodedCharSetId* and *Encoding* values specified in the *MsgDesc* parameter on the MQGET call. The data is converted before it is copied to the *Buffer* parameter.

The *Format* field specified when the message was put is assumed by the conversion process to identify the nature of the data in the message. The message data is converted by the queue manager for built-in formats, and by a user-written exit for other formats. See "Data-conversion exit" on page 879 for details of the data-conversion exit.

- If conversion is successful, the *CodedCharSetId* and *Encoding* fields specified in the *MsgDesc* parameter are unchanged on return from the MQGET call.
- If only conversion fails the message data is returned unconverted The *CodedCharSetId* and *Encoding* fields in *MsgDesc* are set to the values for the unconverted message. The completion code is MQCC_WARNING in this case.

In either case, these fields describe the character-set identifier and encoding of the message data that is returned in the *Buffer* parameter.

See the *Format* field described in "MQMD - Message descriptor" on page 402 for a list of format names for which the queue manager performs the conversion.

**Group and segment options**: The following options relate to the processing of messages in groups and segments of logical messages. Before the option descriptions, here are some definitions of important terms:

**Physical message**
A physical message is the smallest unit of information that can be placed on or removed from a queue. It often corresponds to the information specified or retrieved on a single MQPUT, MQPUT1, or MQGET call. Every physical message has its own message descriptor, MQMD. Typically, physical messages are distinguished by differing values for the message identifier, the *MsgId* field in MQMD. The queue manager does not enforce different values.

**Logical message**
A logical message is a single unit of application information. In the absence of system constraints, a logical message is the same as a physical message. If logical messages are large, system constraints might make it advisable or necessary to split a logical message into two or more physical messages, called segments.

A logical message that has been segmented consists of two or more physical messages that have the same nonnull group identifier, *GroupId* field in MQMD. They have the same message sequence number, *MsgSeqNumber* field in MQMD. The segments are distinguished by differing values for the segment offset, *Offset* field in MQMD. The segment offset is the offset of the data in the physical

message from the start of the data in the logical message. Because each segment is a physical message, the segments in a logical message typically have different message identifiers.

A logical message that has not been segmented, but for which segmentation has been permitted by the sending application, also has a nonnull group identifier. In this case there is only one physical message with that group identifier if the logical message does not belong to a message group. Logical messages, for which segmentation has been inhibited by the sending application, have a null group identifier, MQGI_NONE, unless the logical message belongs to a message group.

**Message group**

A message group is a set of one or more logical messages that have the same nonnull group identifier. The logical messages in the group are distinguished by different values for the message sequence number. The sequence number is an integer in the range 1 through n, where n is the number of logical messages in the group. If one or more of the logical messages is segmented, there are more than n physical messages in the group.

**MQGMO_LOGICAL_ORDER**

MQGMO_LOGICAL_ORDER controls the order in which messages are returned by successive MQGET calls for the queue handle. The option must be specified on each call.

If MQGMO_LOGICAL_ORDER is specified for successive MQGET calls for the same queue handle, messages in groups are returned in the order of their message sequence numbers. Segments of logical messages are returned in the order given by their segment offsets. This order might be different from the order in which those messages and segments occur on the queue.

**Note:** Specifying MQGMO_LOGICAL_ORDER has no adverse consequences on messages that do not belong to groups and that are not segments. In effect, such messages are treated as though each belonged to a message group consisting of only one message. It is safe to specify MQGMO_LOGICAL_ORDER when retrieving messages from queues that contain a mixture of messages in groups, message segments, and unsegmented messages not in groups.

To return the messages in the required order, the queue manager retains the group and segment information between successive MQGET calls. The group and segment information identifies the current message group and current logical message for the queue handle. It also identifies the current position within the group and logical message, and whether the messages are being retrieved within a unit of work. Because the queue manager retains this information, the application does not need to set the group and segment information before each MQGET call. Specifically, it means that the application does not need to set the *GroupId*, *MsgSeqNumber*, and *Offset* fields in MQMD. However, the application must set the MQGMO_SYNCPOINT or MQGMO_NO_SYNCPOINT option correctly on each call.

When the queue is opened, there is no current message group and no current logical message. A message group becomes the current message group when a message that has the MQMF_MSG_IN_GROUP flag is returned by the MQGET call. With MQGMO_LOGICAL_ORDER specified on successive calls, that group remains the current group until a message is returned that has:

- MQMF_LAST_MSG_IN_GROUP without MQMF_SEGMENT (that is, the last logical message in the group is not segmented), or
- MQMF_LAST_MSG_IN_GROUP with MQMF_LAST_SEGMENT (that is, the message returned is the last segment of the last logical message in the group).

When such a message is returned, the message group is terminated, and on successful completion of the MQGET call there is no longer a current group. In a similar way, a logical message becomes the current logical message when a message that has the MQMF_SEGMENT flag is returned by the MQGET call. The logical message is terminated when the message that has the MQMF_LAST_SEGMENT flag is returned.

If no selection criteria are specified, successive MQGET calls return, in the correct order, the messages for the first message group on the queue. They then return the messages for the second message group, and so on, until there are no more messages available. It is possible to select the particular message groups returned by specifying one or more of the following options in the *MatchOptions* field:

- MQMO_MATCH_MSG_ID
- MQMO_MATCH_CORREL_ID
- MQMO_MATCH_GROUP_ID

However, these options are effective only when there is no current message group or logical message. See the *MatchOptions* field described in "MQGMO - Get-message options" on page 355 for further details.

Table 495 on page 374 shows the values of the *MsgId*, *CorrelId*, *GroupId*, *MsgSeqNumber*, and *Offset* fields that the queue manager looks for when attempting to find a message to return on the MQGET call. The rules apply both to removing messages from the queue, and browsing messages on the queue. In the table, Either means Yes or No:

**LOG ORD**
Indicates whether the MQGMO_LOGICAL_ORDER option is specified on the call.

**Cur grp**
Indicates whether a current message group exists before the call.

**Cur log msg**
Indicates whether a current logical message exists before the call.

**Other columns**
Show the values that the queue manager looks for. Previous denotes the value returned for the field in the previous message for the queue handle.

*Table 495. MQGET options relating to messages in groups and segments of logical messages*

| Options you specify | Group and log-msg status before call | | Values the queue manager looks for | | | | |
|---|---|---|---|---|---|---|---|
| **LOG ORD** | **Cur grp** | **Cur log msg** | *MsgId* | *CorrelId* | *GroupId* | *MsgSeqNumber* | *Offset* |
| Yes | No | No | Controlled by *MatchOptions* | Controlled by *MatchOptions* | Controlled by *MatchOptions* | 1 | 0 |
| Yes | No | Yes | Any message identifier | Any correlation identifier | Previous group identifier | 1 | Previous offset + previous segment length |
| Yes | Yes | No | Any message identifier | Any correlation identifier | Previous group identifier | Previous sequence number + 1 | 0 |
| Yes | Yes | Yes | Any message identifier | Any correlation identifier | Previous group identifier | Previous sequence number | Previous offset + previous segment length |
| No | Either | Either | Controlled by *MatchOptions* | Controlled by *MatchOptions* | Controlled by *MatchOptions* | Controlled by *MatchOptions* | Controlled by *MatchOptions* |

If multiple message groups are present on the queue and eligible for return, the groups are returned in the order determined by the position on the queue of the first segment of the first logical message in each group. That is, the physical messages that have message sequence numbers of 1, and offsets of 0, determine the order in which eligible groups are returned.

The MQGMO_LOGICAL_ORDER option affects units of work as follows:

- If the first logical message or segment in a group is retrieved within a unit of work, all the other logical messages and segments in the group must be retrieved within a unit of work, if the same queue handle is used. However, they need not be retrieved within the same unit of work. This allows a message group consisting of many physical messages to be split across two or more consecutive units of work for the queue handle.
- If the first logical message or segment in a group is *not* retrieved within a unit of work, and the same queue handle is used, none of the other logical messages and segments in the group can be retrieved within a unit of work.

If these conditions are not satisfied, the MQGET call fails with reason code MQRC_INCONSISTENT_UOW.

When MQGMO_LOGICAL_ORDER is specified, the MQGMO supplied on the MQGET call must not be less than MQGMO_VERSION_2, and the MQMD must not be less than MQMD_VERSION_2. If this condition is not satisfied, the call fails with reason code MQRC_WRONG_GMO_VERSION or MQRC_WRONG_MD_VERSION, as appropriate.

If MQGMO_LOGICAL_ORDER is *not* specified for successive MQGET calls for the queue handle, messages are returned without regard for whether they belong to message groups, or whether they are segments of logical messages. This means that messages or segments from a particular group or logical message might be returned out of order, or intermingled with messages or segments from other groups or logical messages, or with messages that are not in groups and are not segments. In this situation, the particular messages that are returned by successive MQGET calls is controlled by the MQMO_* options specified on those calls (see the *MatchOptions* field described in "MQGMO - Get-message options" on page 355 for details of these options).

This is the technique that can be used to restart a message group or logical message in the middle, after a system failure has occurred. When the system restarts, the application can set the *GroupId*, *MsgSeqNumber*, *Offset*, and *MatchOptions* fields to the appropriate values, and then issue the MQGET call with MQGMO_SYNCPOINT or MQGMO_NO_SYNCPOINT set, but *without* specifying MQGMO_LOGICAL_ORDER. If this call is successful, the queue manager retains the group and segment information, and subsequent MQGET calls using that queue handle can specify MQGMO_LOGICAL_ORDER as normal.

The group and segment information that the queue manager retains for the MQGET call is separate from the group and segment information that it retains for the MQPUT call. In addition, the queue manager retains separate information for:

- MQGET calls that remove messages from the queue.
- MQGET calls that browse messages on the queue.

For any given queue handle, the application can mix MQGET calls that specify MQGMO_LOGICAL_ORDER with MQGET calls that do not. However, note the following points:

- If you omit MQGMO_LOGICAL_ORDER, each successful MQGET call causes the queue manager to set the saved group and segment information to the values corresponding to the message returned; this replaces the existing group and segment information retained by the queue manager for the queue handle. Only the information appropriate to the action of the call (browse or remove) is modified.
- If you omit MQGMO_LOGICAL_ORDER, the call does not fail if there is a current message group or logical message; the call might succeed with an MQCC_WARNING completion code. Table 496 on page 376 shows the various cases that can arise. In these cases, if the completion code is not MQCC_OK, the reason code is one of the following (as appropriate):
  - MQRC_INCOMPLETE_GROUP
  - MQRC_INCOMPLETE_MSG
  - MQRC_INCONSISTENT_UOW

  **Note:** The queue manager does not check the group and segment information when browsing a queue, or when closing a queue that was opened for browse but not input; in those cases the completion code is always MQCC_OK (assuming no other errors).

| *Table 496. Outcome when MQGET or MQCLOSE call is not consistent with group and segment information* | | |
|---|---|---|
| **Current call is** | **Previous call was MQGET with MQGMO_LOGICAL_ORDER** | **Previous call was MQGET without MQGMO_LOGICAL_ORDER** |
| MQGET with MQGMO_LOGICAL_ORDER | MQCC_FAILED | MQCC_FAILED |
| MQGET without MQGMO_LOGICAL_ORDER | MQCC_WARNING | MQCC_OK |
| MQCLOSE with an unterminated group or logical message | MQCC_WARNING | MQCC_OK |

Applications that want to retrieve messages and segments in logical order are recommended to specify MQGMO_LOGICAL_ORDER, as this is the simplest option to use. This option relieves the application of the need to manage the group and segment information, because the queue manager manages that information. However, specialized applications might need more control than that provided by the MQGMO_LOGICAL_ORDER option, and this can be achieved by not specifying that option. The application must then ensure that the *MsgId*, *CorrelId*, *GroupId*, *MsgSeqNumber*, and *Offset* fields in MQMD, and the MQMO_* options in *MatchOptions* in MQGMO, are set correctly, before each MQGET call.

For example, an application that wants to *forward* physical messages that it receives, without regard for whether those messages are in groups or segments of logical messages, must *not* specify MQGMO_LOGICAL_ORDER. In a complex network with multiple paths between sending and receiving queue managers, the physical messages might arrive out of order. By specifying neither MQGMO_LOGICAL_ORDER, nor the corresponding MQPMO_LOGICAL_ORDER on the MQPUT call, the forwarding application can retrieve and forward each physical message as soon as it arrives, without having to wait for the next one in logical order to arrive.

You can specify MQGMO_LOGICAL_ORDER with any of the other MQGMO_* options, and with various of the MQMO_* options in appropriate circumstances (see preceding section).

- On z/OS, this option is supported for private and shared queues, but the queue must have an index type of MQIT_GROUP_ID. For shared queues, the CFSTRUCT object that the queue maps to must be at CFLEVEL(3) or higher.
- On AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems, this option is supported for all local queues.

**MQGMO_COMPLETE_MSG**

Only a complete logical message can be returned by the MQGET call. If the logical message is segmented, the queue manager reassembles the segments and returns the complete logical message to the application; the fact that the logical message was segmented is not apparent to the application retrieving it.

**Note:** This is the only option that causes the queue manager to reassemble message segments. If not specified, segments are returned individually to the application if they are present on the queue (and they satisfy the other selection criteria specified on the MQGET call). Applications that do not want to receive individual segments must always specify MQGMO_COMPLETE_MSG.

To use this option, the application must provide a buffer that is big enough to accommodate the complete message, or specify the MQGMO_ACCEPT_TRUNCATED_MSG option.

If the queue contains segmented messages with some of the segments missing (perhaps because they have been delayed in the network and have not yet arrived), specifying MQGMO_COMPLETE_MSG prevents the retrieval of segments belonging to incomplete logical messages. However, those message segments still contribute to the value of the *CurrentQDepth* queue attribute; this means that there might be no retrievable logical messages, even though *CurrentQDepth* is greater than zero.

For *persistent* messages, the queue manager can reassemble the segments only within a unit of work:

- If the MQGET call is operating within a user-defined unit of work, that unit of work is used. If the call fails during the reassembly process, the queue manager reinstates on the queue any segments that were removed during reassembly. However, the failure does not prevent the unit of work being committed successfully.
- If the call is operating outside a user-defined unit of work, and there is no user-defined unit of work in existence, the queue manager creates a unit of work for the duration of the call. If the call is successful, the queue manager commits the unit of work automatically (the application does not need to do this). If the call fails, the queue manager backs out the unit of work.
- If the call is operating outside a user-defined unit of work, but a user-defined unit of work exists, the queue manager cannot reassemble. If the message does not require reassembly, the call can still succeed. But if the message requires reassembly, the call fails with reason code MQRC_UOW_NOT_AVAILABLE.

For *nonpersistent* messages, the queue manager does not require a unit of work to be available to perform reassembly.

Each physical message that is a segment has its own message descriptor. For the segments constituting a single logical message, most of the fields in the message descriptor are the same for all segments in the logical message; typically it is only the *MsgId*, *Offset*, and *MsgFlags* fields that differ between segments in the logical message. However, if a segment is placed on a dead-letter queue at an intermediate queue manager, the DLQ handler retrieves the message specifying the MQGMO_CONVERT option, and this can result in the character set or encoding of the segment being changed. If the DLQ handler successfully sends the segment on its way, the segment might have a character set or encoding that differs from the other segments in the logical message when the segment arrives at the destination queue manager.

A logical message consisting of segments in which the *CodedCharSetId* and *Encoding* fields differ cannot be reassembled by the queue manager into a single logical message. Instead, the queue manager reassembles and returns the first few consecutive segments at the start of the logical message that have the same character-set identifiers and encodings, and the MQGET call completes with completion code MQCC_WARNING and reason code MQRC_INCONSISTENT_CCSIDS or MQRC_INCONSISTENT_ENCODINGS, as appropriate. This happens regardless of whether MQGMO_CONVERT is specified. To retrieve the remaining segments, the application must reissue the MQGET call without the MQGMO_COMPLETE_MSG option, retrieving the segments one by one. MQGMO_LOGICAL_ORDER can be used to retrieve the remaining segments in order.

An application that puts segments can also set other fields in the message descriptor to values that differ between segments. However, there is no advantage in doing this if the receiving application uses MQGMO_COMPLETE_MSG to retrieve the logical message. When the queue manager reassembles a logical message, it returns in the message descriptor the values from the message descriptor for the *first* segment; the only exception is the *MsgFlags* field, which the queue manager sets to indicate that the reassembled message is the only segment.

If MQGMO_COMPLETE_MSG is specified for a report message, the queue manager performs special processing. The queue manager checks the queue to see if all the report messages of that report type relating to the different segments in the logical message are present on the queue. If they are, they can be retrieved as a single message by specifying MQGMO_COMPLETE_MSG. For this to be possible, either the report messages must be generated by a queue manager or MCA which supports segmentation, or the originating application must request at least 100 bytes of message data (that is, the appropriate MQRO_*_WITH_DATA or MQRO_*_WITH_FULL_DATA options must be specified). If less than the full amount of application data is present for a segment, the missing bytes are replaced by nulls in the report message returned.

If MQGMO_COMPLETE_MSG is specified with MQGMO_MSG_UNDER_CURSOR or MQGMO_BROWSE_MSG_UNDER_CURSOR, the browse cursor must be positioned on a message whose *Offset* field in MQMD has a value of 0. If this condition is not satisfied, the call fails with reason code MQRC_INVALID_MSG_UNDER_CURSOR.

MQGMO_COMPLETE_MSG implies MQGMO_ALL_SEGMENTS_AVAILABLE, which need not therefore be specified.

MQGMO_COMPLETE_MSG can be specified with any of the other MQGMO_* options apart from MQGMO_SYNCPOINT_IF_PERSISTENT, and with any of the MQMO_* options apart from MQMO_MATCH_OFFSET.

- On z/OS, this option is supported for private and shared queues, but the queue must have an index type of MQIT_GROUP_ID. For shared queues, the CFSTRUCT object that the queue map to must be at CFLEVEL(3) or higher.
- On AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems, this option is supported for all local queues.

**MQGMO_ALL_MSGS_AVAILABLE**
Messages in a group become available for retrieval only when *all* messages in the group are available. If the queue contains message groups with some of the messages missing (perhaps because they have been delayed in the network and have not yet arrived), specifying MQGMO_ALL_MSGS_AVAILABLE prevents retrieval of messages belonging to incomplete groups. However, those messages still contribute to the value of the *CurrentQDepth* queue attribute; this means that there may be no retrievable message groups, even though *CurrentQDepth* is greater than zero. If there are no other messages that are retrievable, reason code MQRC_NO_MSG_AVAILABLE is returned after the specified wait interval (if any) has expired.

The processing of MQGMO_ALL_MSGS_AVAILABLE depends on whether MQGMO_LOGICAL_ORDER is also specified:

- If both options are specified, MQGMO_ALL_MSGS_AVAILABLE has an effect *only* when there is no current group or logical message. If there *is* a current group or logical message, MQGMO_ALL_MSGS_AVAILABLE is ignored. This means that MQGMO_ALL_MSGS_AVAILABLE can remain on when processing messages in logical order.
- If MQGMO_ALL_MSGS_AVAILABLE is specified without MQGMO_LOGICAL_ORDER, MQGMO_ALL_MSGS_AVAILABLE *always* has an effect. This means that the option must be turned off after the first message in the group has been removed from the queue, in order to be able to remove the remaining messages in the group.

Successful completion of an MQGET call specifying MQGMO_ALL_MSGS_AVAILABLE means that at the time that the MQGET call was issued, all the messages in the group were on the queue. However, be aware that other applications can still remove messages from the group (the group is not locked to the application that retrieves the first message in the group).

If you omit this option, messages belonging to groups can be retrieved even when the group is incomplete.

MQGMO_ALL_MSGS_AVAILABLE implies MQGMO_ALL_SEGMENTS_AVAILABLE, which need not therefore be specified.

MQGMO_ALL_MSGS_AVAILABLE can be specified with any of the other MQGMO_* options, and with any of the MQMO_* options.

- On z/OS, this option is supported for private and shared queues, but the queue must have an index type of MQIT_GROUP_ID. For shared queues, the CFSTRUCT object that the queue map to must be at CFLEVEL(3) or higher.
- On AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems, this option is supported for all local queues.

**MQGMO_ALL_SEGMENTS_AVAILABLE**
Segments in a logical message become available for retrieval only when *all* segments in the logical message are available. If the queue contains segmented messages with some of the segments missing (perhaps because they have been delayed in the network and have not yet arrived), specifying MQGMO_ALL_SEGMENTS_AVAILABLE prevents retrieval of segments belonging to incomplete logical messages. However, those segments still contribute to the value of the *CurrentQDepth* queue attribute; this means that there might be no retrievable logical messages, even though *CurrentQDepth* is greater than zero. If there are no other messages that are retrievable, reason code MQRC_NO_MSG_AVAILABLE is returned after the specified wait interval (if any) has expired.

The processing of MQGMO_ALL_SEGMENTS_AVAILABLE depends on whether MQGMO_LOGICAL_ORDER is also specified:

- If both options are specified, MQGMO_ALL_SEGMENTS_AVAILABLE has an effect *only* when there is no current logical message. If there *is* a current logical message, MQGMO_ALL_SEGMENTS_AVAILABLE is ignored. This means that MQGMO_ALL_SEGMENTS_AVAILABLE can remain on when processing messages in logical order.
- If MQGMO_ALL_SEGMENTS_AVAILABLE is specified without MQGMO_LOGICAL_ORDER, MQGMO_ALL_SEGMENTS_AVAILABLE *always* has an effect. This means that the option must be turned off after the first segment in the logical message has been removed from the queue, in order to be able to remove the remaining segments in the logical message.

If this option is not specified, message segments can be retrieved even when the logical message is incomplete.

While both MQGMO_COMPLETE_MSG and MQGMO_ALL_SEGMENTS_AVAILABLE require all segments to be available before any of them can be retrieved, the former returns the complete message, whereas the latter allows the segments to be retrieved one by one.

If MQGMO_ALL_SEGMENTS_AVAILABLE is specified for a report message, the queue manager checks the queue to see if there is at least one report message for each of the segments that make up the complete logical message. If there is, the MQGMO_ALL_SEGMENTS_AVAILABLE condition is satisfied. However, the queue manager does not check the *type* of the report messages present, and so there might be a mixture of report types in the report messages relating to the segments of the logical message. As a result, the success of MQGMO_ALL_SEGMENTS_AVAILABLE does not imply that MQGMO_COMPLETE_MSG will succeed. If there *is* a mixture of report types present for the segments of a particular logical message, those report messages must be retrieved one by one.

You can specify MQGMO_ALL_SEGMENTS_AVAILABLE with any of the other MQGMO_* options, and with any of the MQMO_* options.

- On z/OS, this option is supported for private and shared queues, but the queue must have an index type of MQIT_GROUP_ID. For shared queues, the CFSTRUCT object that the queue map to must be at CFLEVEL(3) or higher.
- On AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems, this option is supported for all local queues.

**Property options**: The following options relate to the properties of the message:

**MQGMO_PROPERTIES_AS_Q_DEF**

Properties of the message, except those contained in the message descriptor (or extension) should be represented as defined by the *PropertyControl* queue attribute. If a *MsgHandle* is provided this option is ignored and the properties of the message are available via the *MsgHandle*, unless the value of the *PropertyControl* queue attribute is MQPROP_FORCE_MQRFH2.

This is the default action if no property options are specified.

**MQGMO_PROPERTIES_IN_HANDLE**

Properties of the message should be made available via the *MsgHandle*. If no message handle is provided the call fails with reason MQRC_HMSG_ERROR.

**Note:** If the message is later read by an application that does not create a message handle, the queue manager places any message properties into an MQRFH2 structure. You might find that the presence of an unexpected MQRFH2 header disrupts the behavior of an existing application.

**MQGMO_NO_PROPERTIES**

No properties of the message, except those contained in the message descriptor (or extension) will be retrieved. If a *MsgHandle* is provided it will be ignored.

**MQGMO_PROPERTIES_FORCE_MQRFH2**

Properties of the message, except those contained in the message descriptor (or extension) should be represented using MQRFH2 headers. This provides compatibility with earlier version for applications which are expecting to retrieve properties but are unable to be changed to use message handles. If a *MsgHandle* is provided it is ignored.

**MQGMO_PROPERTIES_COMPATIBILITY**

If the message contains a property with a prefix of **"mcd."**, **"jms."**, **"usr."**, or **"mqext."**, all message properties are delivered to the application in an MQRFH2 header. Otherwise all properties of the message, except those contained in the message descriptor (or extension), are discarded and are no longer accessible to the application.

**Default option**: If none of the options described is required, the following option can be used:

**MQGMO_NONE**

Use this value to indicate that no other options have been specified; all options assume their default values. MQGMO_NONE aids program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

The initial value of the *Options* field is MQGMO_NO_WAIT plus MQGMO_PROPERTIES_AS_Q_DEF.

*Reserved1 (MQCHAR)*

This is a reserved field. The initial value of this field is a blank character. This field is ignored if *Version* is less than MQGMO_VERSION_2.

*Reserved2 (MQLONG)*

This is a reserved field. The initial value of this field is a blank character. This field is ignored if *Version* is less than **MQGMO_VERSION_4**.

*ResolvedQName (MQCHAR48)*

This is an output field that the queue manager sets to the local name of the queue from which the message was retrieved, as defined to the local queue manager. This is different from the name used to open the queue if:

- An alias queue was opened (in which case, the name of the local queue to which the alias resolved is returned), or
- A model queue was opened (in which case, the name of the dynamic local queue is returned).

The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ReturnedLength (MQLONG)*

This is an output field that the queue manager sets to the length in bytes of the message data returned by the MQGET call in the *Buffer* parameter. If the queue manager does not support this capability, *ReturnedLength* is set to the value MQRL_UNDEFINED.

When messages are converted between encodings or character sets, the message data can sometimes change size. On return from the MQGET call:

- If *ReturnedLength* is *not* MQRL_UNDEFINED, the number of bytes of message data returned is given by *ReturnedLength*.
- If *ReturnedLength* has the value MQRL_UNDEFINED, the number of bytes of message data returned is usually given by the smaller of *BufferLength* and *DataLength*, but can be *less than* this if the MQGET call completes with reason code MQRC_TRUNCATED_MSG_ACCEPTED. If this happens, the insignificant bytes in the *Buffer* parameter are set to nulls.

The following special value is defined:

**MQRL_UNDEFINED**
Length of returned data not defined.

On z/OS, the value returned for the *ReturnedLength* field is always MQRL_UNDEFINED.

The initial value of this field is MQRL_UNDEFINED. This field is ignored if *Version* is less than MQGMO_VERSION_3.

*Segmentation (MQCHAR)*

This is a flag that indicates whether further segmentation is allowed for the message retrieved. It has one of the following values:

**MQSEG_INHIBITED**
Segmentation not allowed.

**MQSEG_ALLOWED**
Segmentation allowed.

On z/OS, the queue manager always sets this field to MQSEG_INHIBITED.

This is an output field. The initial value of this field is MQSEG_INHIBITED. This field is ignored if *Version* is less than MQGMO_VERSION_2.

*SegmentStatus (MQCHAR)*

This is a flag that indicates whether the message retrieved is a segment of a logical message. It has one of the following values:

**MQSS_NOT_A_SEGMENT**
Message is not a segment.

**MQSS_SEGMENT**
Message is a segment, but is not the last segment of the logical message.

**MQSS_LAST_SEGMENT**
Message is the last segment of the logical message.

This is also the value returned if the logical message consists of only one segment.

On z/OS, the queue manager always sets this field to MQSS_NOT_A_SEGMENT.

This is an output field. The initial value of this field is MQSS_NOT_A_SEGMENT. This field is ignored if *Version* is less than MQGMO_VERSION_2.

*Signal1 (MQLONG)*

This is an input field that is used only in conjunction with the MQGMO_SET_SIGNAL option; it identifies a signal that is to be delivered when a message is available.

**Note:** The data type and usage of this field are determined by the environment; for this reason, applications that you want to port between different environments must not use signals.

- On z/OS, this field must contain the address of an Event Control Block (ECB). The ECB must be cleared by the application before the MQGET call is issued. The storage containing the ECB must not be freed until the queue is closed. The ECB is posted by the queue manager with one of the signal completion codes described. These completion codes are set in bits 2 through 31 of the ECB, the area defined in the z/OS mapping macro IHAECB as being for a user completion code.
- In all other environments, this is a reserved field; its value is not significant.

The signal completion codes are:

**MQEC_MSG_ARRIVED**
A suitable message has arrived on the queue. This message has not been reserved for the caller; a second MQGET request must be issued, but another application might retrieve the message before the second request is made.

**MQEC_WAIT_INTERVAL_EXPIRED**
The specified *WaitInterval* has expired without a suitable message arriving.

**MQEC_WAIT_CANCELED**
The wait was canceled for an indeterminate reason (such as the queue manager terminating or the queue being disabled). Reissue the request if you want further diagnosis.

**MQEC_Q_MGR_QUIESCING**
The wait was canceled because the queue manager has entered the quiescing state (MQGMO_FAIL_IF_QUIESCING was specified on the MQGET call).

**MQEC_CONNECTION_QUIESCING**
The wait was canceled because the connection has entered the quiescing state (MQGMO_FAIL_IF_QUIESCING was specified on the MQGET call).

The initial value of this field is determined by the environment:

- On z/OS, the initial value is the null pointer.
- In all other environments, the initial value is `0`.

*Signal2 (MQLONG)*

This is an input field that is used only in conjunction with the MQGMO_SET_SIGNAL option. It is a reserved field; its value is not significant.

The initial value of this field is `0`.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQGMO_STRUC_ID**
Identifier for get-message options structure.

For the C programming language, the constant MQGMO_STRUC_ID_ARRAY is also defined; this has the same value as MQGMO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQGMO_STRUC_ID.

*Version (MQLONG)*
Version is the structure version number.

The value must be one of the following:

**MQGMO_VERSION_1**
Version-1 get-message options structure.

This version is supported in all environments.

**MQGMO_VERSION_2**
Version-2 get-message options structure.

This version is supported in all environments.

**MQGMO_VERSION_3**
Version-3 get-message options structure.

This version is supported in all environments.

**MQGMO_VERSION_4**
Version-4 get-message options structure.

This version is supported in all environments.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQGMO_CURRENT_VERSION**
Current version of get-message options structure.

This is always an input field. The initial value of this field is MQGMO_VERSION_1.

*WaitInterval (MQLONG)*

This is the approximate time, expressed in milliseconds, that the MQGET call waits for a suitable message to arrive (that is, a message satisfying the selection criteria specified in the *MsgDesc* parameter of the MQGET call.

**Important:** There is no wait, or delay, if a suitable message is available immediately.

See the *MsgId* field described in "MQMD - Message descriptor" on page 402 for more details). If no suitable message has arrived after this time has elapsed, the call completes with MQCC_FAILED and reason code MQRC_NO_MSG_AVAILABLE.

On z/OS, the period of time that the MQGET call actually waits is affected by system loading and work-scheduling considerations, and can vary between the value specified for *WaitInterval* and approximately 100 milliseconds greater than *WaitInterval*.

*WaitInterval* is used in conjunction with the MQGMO_WAIT or MQGMO_SET_SIGNAL option. It is ignored if neither of these is specified. If one of these is specified, *WaitInterval* must be greater than or equal to zero, or the following special value:

**MQWI_UNLIMITED**
Unlimited wait interval.

The initial value of this field is 0.

## *Initial values and language declarations for MQGMO*

*Table 497. Initial values of fields in MQGMO for MQGMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQGMO_STRUC_ID | 'GMO¬' |
| *Version* | MQGMO_VERSION_1 | 1 |
| *Options* | MQGMO_NO_WAIT | 0 |
| *WaitInterval* | None | 0 |
| *Signal1* | None | Null pointer on z/OS ; 0 otherwise |
| *Signal2* | None | 0 |
| *ResolvedQName* | None | Null string or blanks |
| *MatchOptions* | MQMO_MATCH_MSG_ID + MQMO_MATCH_CORREL_ID | 3 |
| *GroupStatus* | MQGS_NOT_IN_GROUP | '¬' |
| *SegmentStatus* | MQSS_NOT_A_SEGMENT | '¬' |
| *Segmentation* | MQSEG_INHIBITED | '¬' |
| *Reserved1* | None | '¬' |
| *MsgToken* | MQMTOK_NONE | Nulls |
| *ReturnedLength* | MQRL_UNDEFINED | -1 |
| *Reserved2* | None | '¬' |
| *MsgHandle* | MQHM_NONE | 0 |

*Table 497. Initial values of fields in MQGMO for MQGMO (continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQGMO_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQGMO MyGMO = {MQGMO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQGMO MQGMO;
struct tagMQGMO {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    Options;         /* Options that control the action of */
                                MQGET */
  MQLONG    WaitInterval;    /* Wait interval */
  MQLONG    Signal1;         /* Signal */
  MQLONG    Signal2;         /* Signal identifier */
  MQCHAR48  ResolvedQName;   /* Resolved name of destination queue */
  /* Ver:1 */
  MQLONG    MatchOptions;    /* Options controlling selection */
                                criteria used for MQGET */
  MQCHAR    GroupStatus;     /* Flag indicating whether message */
                                retrieved is in a group */
  MQCHAR    SegmentStatus;   /* Flag indicating whether message */
                                retrieved is a segment of a logical */
                                message */
  MQCHAR    Segmentation;    /* Flag indicating whether further */
                                segmentation is allowed for the */
                                message retrieved */
  MQCHAR    Reserved1;       /* Reserved */
  /* Ver:2 */
  MQBYTE16  MsgToken;        /* Message token */
  MQLONG    ReturnedLength;  /* Length of message data returned */
                                (bytes) */
  /* Ver:3 */
  MQLONG    Reserved2;       /* Reserved */
  MQHMSG    MsgHandle;       /* Message handle */
  /* Ver:4 */
};
```

- On z/OS, the *Signal1* field is declared as PMQLONG.

*COBOL declaration*

```
**   MQGMO structure
  10 MQGMO.
**    Structure identifier
   15 MQGMO-STRUCID        PIC X(4).
**    Structure version number
   15 MQGMO-VERSION        PIC S9(9) BINARY.
**    Options that control the action of MQGET
   15 MQGMO-OPTIONS        PIC S9(9) BINARY.
**    Wait interval
   15 MQGMO-WAITINTERVAL   PIC S9(9) BINARY.
**    Signal
   15 MQGMO-SIGNAL1        PIC S9(9) BINARY.
**    Signal identifier
   15 MQGMO-SIGNAL2        PIC S9(9) BINARY.
**    Resolved name of destination queue
   15 MQGMO-RESOLVEDQNAME  PIC X(48).
```

```
**    Options controlling selection criteria used for MQGET
   15 MQGMO-MATCHOPTIONS   PIC S9(9) BINARY.
**    Flag indicating whether message retrieved is in a group
   15 MQGMO-GROUPSTATUS    PIC X.
**    Flag indicating whether message retrieved is a segment of a
**    logical message
   15 MQGMO-SEGMENTSTATUS  PIC X.
**    Flag indicating whether further segmentation is allowed for the
**    message retrieved
   15 MQGMO-SEGMENTATION   PIC X.
**    Reserved
   15 MQGMO-RESERVED1      PIC X.
**    Message token
   15 MQGMO-MSGTOKEN       PIC X(16).
**    Length of message data returned (bytes)
   15 MQGMO-RETURNEDLENGTH PIC S9(9) BINARY.
**    Reserved
   15 MQGMO-RESERVED2      PIC S9(9) BINARY.
**    Message handle
   15 MQGMO-MSGHANDLE      PIC S9(18) BINARY.
```

- On z/OS, the *Signal1* field is declared as POINTER.

*PL/I declaration*

```
dcl
 1 MQGMO based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 Options        fixed bin(31), /* Options that control the action of
                                     MQGET */
  3 WaitInterval   fixed bin(31), /* Wait interval */
  3 Signal1        fixed bin(31), /* Signal */
  3 Signal2        fixed bin(31), /* Signal identifier */
  3 ResolvedQName  char(48),      /* Resolved name of destination
                                     queue */
  3 MatchOptions   fixed bin(31), /* Options controlling selection
                                     criteria used for MQGET */
  3 GroupStatus    char(1),       /* Flag indicating whether message
                                     retrieved is in a group */
  3 SegmentStatus  char(1),       /* Flag indicating whether message
                                     retrieved is a segment of a logical
                                     message */
  3 Segmentation   char(1),       /* Flag indicating whether further
                                     segmentation is allowed for the
                                     message retrieved */
  3 Reserved1      char(1),       /* Reserved */
  3 MsgToken       char(16),      /* Message token */
  3 ReturnedLength fixed bin(31); /* Length of message data returned
                                     (bytes) */
  3 Reserved2      fixed bin(31); /* Reserved */
  3 MsgHandle      fixed bin(63); /* Message handle */
```

- On z/OS, the *Signal1* field is declared as pointer.

*High Level Assembler declaration*

```
MQGMO                 DSECT
MQGMO_STRUCID         DS   CL4   Structure identifier
MQGMO_VERSION         DS   F     Structure version number
MQGMO_OPTIONS         DS   F     Options that control the action of
*                                MQGET
MQGMO_WAITINTERVAL    DS   F     Wait interval
MQGMO_SIGNAL1         DS   F     Signal
MQGMO_SIGNAL2         DS   F     Signal identifier
MQGMO_RESOLVEDQNAME   DS   CL48  Resolved name of destination queue
MQGMO_MATCHOPTIONS    DS   F     Options controlling selection criteria
*                                used for MQGET
MQGMO_GROUPSTATUS     DS   CL1   Flag indicating whether message
*                                retrieved is in a group
MQGMO_SEGMENTSTATUS   DS   CL1   Flag indicating whether message
*                                retrieved is a segment of a logical
*                                message
MQGMO_SEGMENTATION    DS   CL1   Flag indicating whether further
*                                segmentation is allowed for the message
*                                retrieved
```

```
MQGMO_RESERVED1       DS   CL1   Reserved
MQGMO_MSGTOKEN        DS   XL16  Message token
MQGMO_RETURNEDLENGTH  DS   F     Length of message data returned (bytes)
MQGMO_RESERVED2       DS   F     Reserved
MQGMO_MSGHANDLE       DS   D     Message handle
MQGMO_LENGTH          EQU  *-MQGMO
                      ORG  MQGMO
MQGMO_AREA            DS   CL(MQGMO_LENGTH)
```

*Visual Basic declaration*

```
Type MQGMO
  StrucId        As String*4  'Structure identifier'
  Version        As Long      'Structure version number'
  Options        As Long      'Options that control the action of MQGET'
  WaitInterval   As Long      'Wait interval'
  Signal1        As Long      'Signal'
  Signal2        As Long      'Signal identifier'
  ResolvedQName  As String*48 'Resolved name of destination queue'
  MatchOptions   As Long      'Options controlling selection criteria'
                              'used for MQGET'
  GroupStatus    As String*1  'Flag indicating whether message'
                              'retrieved is in a group'
  SegmentStatus  As String*1  'Flag indicating whether message'
                              'retrieved is a segment of a logical'
                              'message'
  Segmentation   As String*1  'Flag indicating whether further'
                              'segmentation is allowed for the message'
                              'retrieved'
  Reserved1      As String*1  'Reserved'
  MsgToken       As MQBYTE16  'Message token'
  ReturnedLength As Long      'Length of message data returned (bytes)'
End Type
```

## MQIIH - IMS information header

The following table summarizes the fields in the structure.

*Table 498. Fields in MQIIH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQIIH structure | StrucLength |
| *Encoding* | Reserved | Encoding |
| *CodedCharSetId* | Reserved | CodedCharSetId |
| *Format* | MQ format name of data that follows MQIIH | Format |
| *Flags* | Flags | Flags |
| *LTermOverride* | Logical terminal override | LTermOverride |
| *MFSMapName* | Message format services map name | MFSMapName |
| *ReplyToFormat* | MQ format name of reply message | ReplyToFormat |
| *Authenticator* | RACF®™ password or passticket | Authenticator |
| *TranInstanceId* | Transaction instance identifier | TranInstanceId |
| *TranState* | Transaction state | TranState |
| *CommitMode* | Commit mode | CommitMode |
| *SecurityScope* | Security scope | SecurityScope |

| Table 498. Fields in MQIIH (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *Reserved* | Reserved | Reserved |

## *Overview for MQIIH*

The MQIIH structure describes the header information for a message sent to IMS across the IMS bridge. For any IBM MQ supported platform you can create and transmit a message that includes the MQIIH structure, but only an IBM MQ for z/OS queue manager can use the IMS bridge. Therefore, for the message to get to IMS from a non-z/OS queue manager, your queue manager network must include at least one z/OS queue manager through which the message can be routed.

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The MQIIH structure describes the information that must be present at the start of a message sent to the IMS bridge through IBM MQ for z/OS.

**Format name**: MQFMT_IMS.

**Character set and encoding**: Special conditions apply to the character set and encoding used for the MQIIH structure and application message data:

- Applications that connect to the queue manager that owns the IMS bridge queue must provide an MQIIH structure that is in the character set and encoding of the queue manager. This is because data conversion of the MQIIH structure is not performed in this case.
- Applications that connect to other queue managers can provide an MQIIH structure that is in any of the supported character sets and encodings; the receiving message channel agent connected to the queue manager that owns the IMS bridge queue converts the MQIIH.
- The application message data following the MQIIH structure must be in the same character set and encoding as the MQIIH structure. Do not use the *CodedCharSetId* and *Encoding* fields in the MQIIH structure to specify the character set and encoding of the application message data.

  You must provide a data-conversion exit to convert the application message data if the data is not one of the built-in formats supported by the queue manager.

## *Fields for MQIIH*

The MQIIH structure contains the following fields; the fields are described in **alphabetical order**:

*Authenticator (MQCHAR8)*

This is the RACF password or PassTicket. It is optional; if specified, it is used with the user ID in the MQMD security context to build a UTOKEN that is sent to IMS to provide a security context. If it is not specified, the user ID is used without verification. This depends on the setting of the RACF switches, which might require an authenticator to be present.

This is ignored if the first byte is blank or null. The following special value can be used:

**MQIAUT_NONE**
No authentication.

For the C programming language, the constant MQIAUT_NONE_ARRAY is also defined; this has the same value as MQIAUT_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_AUTHENTICATOR_LENGTH. The initial value of this field is MQIAUT_NONE.

*CodedCharSetId (MQLONG)*

This is a reserved field; its value is not significant. The initial value of this field is 0.

The Character Set Id for supported structures which follow a MQIIH structure is the same as that of the MQIIH structure itself and taken from any preceding MQ header.

*CommitMode (MQCHAR)*

This is the IMS commit mode. See the *OTMA Reference* for more information about IMS commit modes. The value must be one of the following:

**MQICM_COMMIT_THEN_SEND**
Commit then send.

This mode implies double queuing of output, but shorter region occupancy times. Fast-path and conversational transactions cannot run with this mode.

**MQICM_SEND_THEN_COMMIT**
Send then commit.

Any IMS transaction initiated as a result of a commit mode of MQICM_SEND_THEN_COMMIT runs in RESPONSE mode regardless of how the transaction is defined in the IMS system definition (MSGTYPE parameter in the TRANSACT macro). This also applies to transactions initiated by means of a transaction switch.

The initial value of this field is MQICM_COMMIT_THEN_SEND.

*Encoding (MQLONG)*

This is a reserved field; its value is not significant. The initial value of this field is 0.

The Encoding for supported structures which follow a MQIIH structure is the same as that of the MQIIH structure itself and taken from any preceding MQ header.

*Flags (MQLONG)*

The flags value must be:

**MQIIH_NONE**
No flags.

**MQIIH_PASS_EXPIRATION**
The reply message contains:

- The same expiry report options as the request message
- The remaining expiry time from the request message with no adjustment made for the bridge's processing time

If this value is not set, the expiry time is set to *unlimited*.

**MQIIH_REPLY_FORMAT_NONE**
Sets the MQIIH.Format field of the reply to MQFMT_NONE.

**MQIIH_IGNORE_PURG**
Sets the TMAMIPRG indicator in the OTMA prefix, which requests that OTMA ignores PURG calls on the TP PCB for CM0 transactions.

**MQIIH_CM0_REQUEST_RESPONSE**
For Commit Mode 0 (CM0) transactions this flag sets the TMAMHRSP indicator in the OTMA prefix. Setting this indicator requests that OTMA/IMS generate a DFS2082 RESPONSE MODE TRANSACTION TERMINATED WITHOUT REPLY message when the original IMS application program does not reply to the IOPCB nor message switch to another transaction.

The initial value of this field is MQIIH_NONE.

*Format (MQCHAR8)*

This specifies the MQ format name of the data that follows the MQIIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*LTermOverride (MQCHAR8)*

The logical terminal override, placed in the IO PCB field. It is optional; if it is not specified, the TPIPE name is used. It is ignored if the first byte is blank, or null.

The length of this field is given by MQ_LTERM_OVERRIDE_LENGTH. The initial value of this field is 8 blank characters.

*MFSMapName (MQCHAR8)*

The message format services map name, placed in the IO PCB field. It is optional. On input it represents the MID, on output it represents the MOD. It is ignored if the first byte is blank or null.

The length of this field is given by MQ_MFS_MAP_NAME_LENGTH. The initial value of this field is 8 blank characters.

*ReplyToFormat (MQCHAR8)*

This is the MQ format name of the reply message that is sent in response to the current message. The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

To convert the data in the reply message using MQGMO_CONVERT, specify either MQIIH.replyToFormat=MQFMT_STRING or MQIIH.replyToFormat=MQFMT_IMS_VAR_STRING. For an explanation of the use of these fields, see "Format (MQCHAR8)" on page 417.

If the default value (MQIIH.replyToFormat=MQFMT_NONE) is used on the request message and the reply message is retrieved using MQGMO_CONVERT then no data conversion is performed.

*Reserved (MQCHAR)*

This is a reserved field; it must be blank.

*SecurityScope (MQCHAR)*

This indicates the IMS security processing required. The following values are defined:

**MQISS_CHECK**
Check security scope: an ACEE is built in the control region, but not in the dependent region.

**MQISS_FULL**
Full security scope: a cached ACEE is built in the control region and a non-cached ACEE is built in the dependent region. If you use MQISS_FULL, ensure that the user ID for which the ACEE is built has access to the resources used in the dependent region.

If neither MQISS_CHECK nor MQISS_FULL is specified for this field, MQISS_CHECK is assumed.

The initial value of this field is MQISS_CHECK.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQIIH_STRUC_ID**
Identifier for the IMS information header structure.

For the C programming language, the constant MQIIH_STRUC_ID_ARRAY is also defined; this has the same value as MQIIH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQIIH_STRUC_ID.

*StrucLength (MQLONG)*

This is the length of MQIIH structure. The value must be:

**MQIIH_LENGTH_1**
Length of the IMS information header structure.

The initial value of this field is MQIIH_LENGTH_1.

*TranInstanceId (MQBYTE16)*

This is the transaction instance identifier. This field is used by output messages from IMS, so is ignored on first input. If you set *TranState* to MQITS_IN_CONVERSATION, this must be provided in the next input, and all subsequent inputs, to enable IMS to correlate the messages to the correct conversation. You can use the following special value:

**MQITII_NONE**
No transaction instance identifier.

For the C programming language, the constant MQITII_NONE_ARRAY is also defined; this has the same value as MQITII_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_TRAN_INSTANCE_ID_LENGTH. The initial value of this field is MQITII_NONE.

*TranState (MQCHAR)*

This indicates the IMS conversation state. This is ignored on first input because no conversation exists. On subsequent inputs it indicates whether a conversation is active or not. On output it is set by IMS. The value must be one of the following:

**MQITS_IN_CONVERSATION**
In conversation.

**MQITS_NOT_IN_CONVERSATION**
Not in conversation.

**MQITS_ARCHITECTED**
Return transaction state data in architected form.

This value is used only with the IMS /DISPLAY TRAN command. It returns the transaction state data in the IMS architected form instead of character form. z/OS For more information, see Writing IMS transaction programs through IBM MQ.

The initial value of this field is MQITS_NOT_IN_CONVERSATION.

*Version (MQLONG)*

This is the structure version number. The value must be:

**MQIIH_VERSION_1**
Version number for IMS information header structure.

The following constant specifies the version number of the current version:

**MQIIH_CURRENT_VERSION**
Current version of IMS information header structure.

The initial value of this field is MQIIH_VERSION_1.

## *Initial values and language declarations for MQIIH*

*Table 499. Initial values of fields in MQIIH for MQIIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQIIH_STRUC_ID | 'IIH?' |
| *Version* | MQIIH_VERSION_1 | 1 |
| *StrucLength* | MQIIH_LENGTH_1 | 84 |
| *Encoding* | None | 0 |
| *CodedCharSetId* | None | 0 |
| *Format* | MQFMT_NONE | Blanks |

| Table 499. Initial values of fields in MQIIH for MQIIH (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *Flags* | MQIIH_NONE | 0 |
| *LTermOverride* | None | Blanks |
| *MFSMapName* | None | Blanks |
| *ReplyToFormat* | MQFMT_NONE | Blanks |
| *Authenticator* | MQIAUT_NONE | Blanks |
| *TranInstanceId* | MQITII_NONE | Nulls |
| *TranState* | MQITS_NOT_IN_CONVERSATION | '?' |
| *CommitMode* | MQICM_COMMIT_THEN_SEND | '0' |
| *SecurityScope* | MQISS_CHECK | 'C' |
| *Reserved* | None | '?' |

**Notes:**

1. The symbol ? represents a single blank character.
2. In the C programming language, the macro variable MQIIH_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQIIH MyIIH = {MQIIH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQIIH MQIIH;
struct tagMQIIH {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    StrucLength;     /* Length of MQIIH structure */
  MQLONG    Encoding;        /* Reserved */
  MQLONG    CodedCharSetId;  /* Reserved */
  MQCHAR8   Format;          /* MQ format name of data that follows
                                MQIIH */
  MQLONG    Flags;           /* Flags */
  MQCHAR8   LTermOverride;   /* Logical terminal override */
  MQCHAR8   MFSMapName;      /* Message format services map name */
  MQCHAR8   ReplyToFormat;   /* MQ format name of reply message */
  MQCHAR8   Authenticator;   /* RACF password or passticket */
  MQBYTE16  TranInstanceId;  /* Transaction instance identifier */
  MQCHAR    TranState;       /* Transaction state */
  MQCHAR    CommitMode;      /* Commit mode */
  MQCHAR    SecurityScope;   /* Security scope */
  MQCHAR    Reserved;        /* Reserved */
};
```

*COBOL declaration*

```
**   MQIIH structure
  10 MQIIH.
**    Structure identifier
   15 MQIIH-STRUCID        PIC X(4).
**    Structure version number
   15 MQIIH-VERSION        PIC S9(9) BINARY.
**    Length of MQIIH structure
   15 MQIIH-STRUCLENGTH    PIC S9(9) BINARY.
**    Reserved
```

```
   15 MQIIH-ENCODING       PIC S9(9) BINARY.
**    Reserved
   15 MQIIH-CODEDCHARSETID PIC S9(9) BINARY.
**    MQ format name of data that follows MQIIH
   15 MQIIH-FORMAT         PIC X(8).
**    Flags
   15 MQIIH-FLAGS          PIC S9(9) BINARY.
**    Logical terminal override
   15 MQIIH-LTERMOVERRIDE  PIC X(8).
**    Message format services map name
   15 MQIIH-MFSMAPNAME     PIC X(8).
**    MQ format name of reply message
   15 MQIIH-REPLYTOFORMAT  PIC X(8).
**    RACF password or passticket
   15 MQIIH-AUTHENTICATOR  PIC X(8).
**    Transaction instance identifier
   15 MQIIH-TRANINSTANCEID PIC X(16).
**    Transaction state
   15 MQIIH-TRANSTATE      PIC X.
**    Commit mode
   15 MQIIH-COMMITMODE     PIC X.
**    Security scope
   15 MQIIH-SECURITYSCOPE  PIC X.
**    Reserved
   15 MQIIH-RESERVED       PIC X.
```

*PL/I declaration*

```
dcl
 1 MQIIH based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 StrucLength    fixed bin(31), /* Length of MQIIH structure */
  3 Encoding       fixed bin(31), /* Reserved */
  3 CodedCharSetId fixed bin(31), /* Reserved */
  3 Format         char(8),       /* MQ format name of data that follows
                                     MQIIH */
  3 Flags          fixed bin(31), /* Flags */
  3 LTermOverride  char(8),       /* Logical terminal override */
  3 MFSMapName     char(8),       /* Message format services map name */
  3 ReplyToFormat  char(8),       /* MQ format name of reply message */
  3 Authenticator  char(8),       /* RACF password or passticket */
  3 TranInstanceId char(16),      /* Transaction instance identifier */
  3 TranState      char(1),       /* Transaction state */
  3 CommitMode     char(1),       /* Commit mode */
  3 SecurityScope  char(1),       /* Security scope */
  3 Reserved       char(1);       /* Reserved */
```

*High Level Assembler declaration*

```
MQIIH                 DSECT
MQIIH_STRUCID         DS   CL4   Structure identifier
MQIIH_VERSION         DS   F     Structure version number
MQIIH_STRUCLENGTH     DS   F     Length of MQIIH structure
MQIIH_ENCODING        DS   F     Reserved
MQIIH_CODEDCHARSETID  DS   F     Reserved
MQIIH_FORMAT          DS   CL8   MQ format name of data that follows
*                                MQIIH
MQIIH_FLAGS           DS   F     Flags
MQIIH_LTERMOVERRIDE   DS   CL8   Logical terminal override
MQIIH_MFSMAPNAME      DS   CL8   Message format services map name
MQIIH_REPLYTOFORMAT   DS   CL8   MQ format name of reply message
MQIIH_AUTHENTICATOR   DS   CL8   RACF password or passticket
MQIIH_TRANINSTANCEID  DS   XL16  Transaction instance identifier
MQIIH_TRANSTATE       DS   CL1   Transaction state
MQIIH_COMMITMODE      DS   CL1   Commit mode
MQIIH_SECURITYSCOPE   DS   CL1   Security scope
MQIIH_RESERVED        DS   CL1   Reserved
*
MQIIH_LENGTH          EQU  *-MQIIH
                      ORG  MQIIH
MQIIH_AREA            DS   CL(MQIIH_LENGTH)
```

*Visual Basic declaration*

```
Type MQIIH
  StrucId        As String*4 'Structure identifier'
  Version        As Long     'Structure version number'
  StrucLength    As Long     'Length of MQIIH structure'
  Encoding       As Long     'Reserved'
  CodedCharSetId As Long     'Reserved'
  Format         As String*8 'MQ format name of data that follows MQIIH'
  Flags          As Long     'Flags'
  LTermOverride  As String*8 'Logical terminal override'
  MFSMapName     As String*8 'Message format services map name'
  ReplyToFormat  As String*8 'MQ format name of reply message'
  Authenticator  As String*8 'RACF password or passticket'
  TranInstanceId As MQBYTE16 'Transaction instance identifier'
  TranState      As String*1 'Transaction state'
  CommitMode     As String*1 'Commit mode'
  SecurityScope  As String*1 'Security scope'
  Reserved       As String*1 'Reserved'
End Type
```

## MQIMPO - Inquire message property options

The following table summarizes the fields in the structure. MQIMPO structure - inquire message property options

*Table 500. Fields in MQIMPO*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options controlling the action of MQINQMP | Options |
| *RequestedEncoding* | Encoding into which the inquired property is to be converted | RequestedEncoding |
| *RequestedCCSID* | Character set of the inquired property | RequestedCCSID |
| *ReturnedEncoding* | Encoding of the returned value | ReturnedEncoding |
| *ReturnedCCSID* | Character set of returned value | ReturnedCCSID |
| *Reserved1* | Reserved field | ReturnedCCSID |
| *ReturnedName* | Name of the inquired property | ReturnedName |
| *TypeString* | String representation of the data type of the property | TypeString |

### *Overview for MQIMPO*

The inquire message properties options structure.

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The MQIMPO structure allows applications to specify options that control how properties of messages are inquired. The structure is an input parameter on the MQINQMP call.

**Character set and encoding**: Data in MQIMPO must be in the character set of the application and encoding of the application (MQENC_NATIVE).

### *Fields for MQIMPO*

Inquire message property options structure - fields

The MQIMPO structure contains the following fields; the fields are described in **alphabetical order**:

The following options control the action of MQINQMP. You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

Combinations of options that are not valid are noted; all other combinations are valid.

**Value data options:** The following options relate to the processing of the value data when the property is retrieved from the message.

**MQIMPO_CONVERT_VALUE**
This option requests that the value of the property be converted to conform to the *RequestedCCSID* and *RequestedEncoding* values specified before the MQINQMP call returns the property value in the *Value* area.

- If conversion is successful, the *ReturnedCCSID* and *ReturnedEncoding* fields are set to the same as *RequestedCCSID* and *RequestedEncoding* on return from the MQINQMP call.
- If conversion fails, but the MQINQMP call otherwise completes without error, the property value is returned unconverted.

  If the property is a string, the *ReturnedCCSID* and *ReturnedEncoding* fields are set to the character set and encoding of the unconverted string.

  The completion code is MQCC_WARNING in this case, with reason code MQRC_PROP_VALUE_NOT_CONVERTED. The property cursor is advanced to the returned property.

If the property value expands during conversion, and exceeds the size of the *Value* parameter, the value is returned unconverted, with completion code MQCC_FAILED; the reason code is set to MQRC_PROPERTY_VALUE_TOO_BIG.

The *DataLength* parameter of the MQINQMP call returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

This option also requests that:

- If the property name contains a wildcard, and
- The *ReturnedName* field is initialized with an address or offset for the returned name,

then the returned name is converted to conform to the *RequestedCCSID* and *RequestedEncoding* values.

- If conversion is successful, the *VSCCSID* field of *ReturnedName* and the encoding of the returned name are set to the input value of *RequestedCCSID* and *RequestedEncoding*.
- If conversion fails, but the MQINQMP call otherwise completes without error or warning, the returned name is unconverted. The completion code is MQCC_WARNING in this case, with reason code MQRC_PROP_NAME_NOT_CONVERTED.

  The property cursor is advanced to the returned property. MQRC_PROP_VALUE_NOT_CONVERTED is returned if both the value and the name are not converted.

If the returned name expands during conversion, and exceeds the size of the *VSBufsize* field of the *RequestedName*, the returned string is left unconverted, with completion code MQCC_FAILED and the reason code is set to MQRC_PROPERTY_NAME_TOO_BIG.

The *VSLength* field of the MQCHARV structure returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

**MQIMPO_CONVERT_TYPE**

This option requests that the value of the property be converted from its current data type, into the data type specified on the *Type* parameter of the MQINQMP call.

- If conversion is successful, the *Type* parameter is unchanged on return of the MQINQMP call.
- If conversion fails, but the MQINQMP call otherwise completes without error, the call fails with reason MQRC_PROP_CONV_NOT_SUPPORTED. The property cursor is unchanged.

If the conversion of the data type causes the value to expand during conversion, and the converted value exceeds the size of the *Value* parameter, the value is returned unconverted, with completion code MQCC_FAILED and the reason code is set to MQRC_PROPERTY_VALUE_TOO_BIG.

The *DataLength* parameter of the MQINQMP call returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

If the value of the *Type* parameter of the MQINQMP call is not valid, the call fails with reason MQRC_PROPERTY_TYPE_ERROR.

If the requested data type conversion is not supported, the call fails with reason MQRC_PROP_CONV_NOT_SUPPORTED. The following data type conversions are supported:

| Property data type | Supported target data types |
|---|---|
| MQTYPE_BOOLEAN | MQTYPE_STRING, MQTYPE_INT8, MQTYPE_INT16, MQTYPE_INT32, MQTYPE_INT64 |
| MQTYPE_BYTE_STRING | MQTYPE_STRING |
| MQTYPE_INT8 | MQTYPE_STRING, MQTYPE_INT16, MQTYPE_INT32, MQTYPE_INT64 |
| MQTYPE_INT16 | MQTYPE_STRING, MQTYPE_INT32, MQTYPE_INT64 |
| MQTYPE_INT32 | MQTYPE_STRING, MQTYPE_INT64 |
| MQTYPE_INT64 | MQTYPE_STRING |
| MQTYPE_FLOAT32 | MQTYPE_STRING, MQTYPE_FLOAT64 |
| MQTYPE_FLOAT64 | MQTYPE_STRING |
| MQTYPE_STRING | MQTYPE_BOOLEAN, MQTYPE_INT8, MQTYPE_INT16, MQTYPE_INT32, MQTYPE_INT64, MQTYPE_FLOAT32, MQTYPE_FLOAT64 |
| MQTYPE_NULL | None |

The general rules governing the supported conversions are as follows:

- Numeric property values can be converted from one data type to another, provided that no data is lost during the conversion.

  For example, the value of a property with data type MQTYPE_INT32 can be converted into a value with data type MQTYPE_INT64, but cannot be converted into a value with data type MQTYPE_INT16.
- A property value of any data type can be converted into a string.
- A string property value can be converted to any other data type provided the string is formatted correctly for the conversion. If an application attempts to convert a string property value that is not formatted correctly, IBM MQ returns reason code MQRC_PROP_NUMBER_FORMAT_ERROR.
- If an application attempts a conversion that is not supported, IBM MQ returns reason code MQRC_PROP_CONV_NOT_SUPPORTED.

The specific rules for converting a property value from one data type to another are as follows:

- When converting an MQTYPE_BOOLEAN property value to a string, the value TRUE is converted to the string "TRUE", and the value false is converted to the string "FALSE".
- When converting an MQTYPE_BOOLEAN property value to a numeric data type, the value TRUE is converted to one, and the value FALSE is converted to zero.
- When converting a string property value to an MQTYPE_BOOLEAN value, the string "TRUE" , or "1" , is converted to TRUE, and the string "FALSE", or "0", is converted to FALSE.

  Note that the terms "TRUE" and "FALSE" are not case sensitive.

  Any other string cannot be converted; IBM MQ returns reason code MQRC_PROP_NUMBER_FORMAT_ERROR.
- When converting a string property value to a value with data type MQTYPE_INT8, MQTYPE_INT16, MQTYPE_INT32 or MQTYPE_INT64, the string must have the following format:

  ```
  [blanks][sign]digits
  ```

  The meanings of the components of the string are as follows:

  **blanks**
  Optional leading blank characters

  **sign**
  An optional plus sign (+) or minus sign (-) character.

  **digits**
  A contiguous sequence of digit characters (0-9). At least one digit character must be present.

  After the sequence of digit characters, the string can contain other characters that are not digit characters, but the conversion stops as soon as the first of these characters is reached. The string is assumed to represent a decimal integer.

  IBM MQ returns reason code MQRC_PROP_NUMBER_FORMAT_ERROR if the string is not formatted correctly.
- When converting a string property value to a value with data type MQTYPE_FLOAT32 or MQTYPE_FLOAT64, the string must have the following format:

  ```
  [blanks][sign]digits[.digits][e_char[e_sign]e_digits]
  ```

  The meanings of the components of the string are as follows:

  **blanks**
  Optional leading blank characters

  **sign**
  An optional plus sign (+) or minus sign (-) character.

  **digits**
  A contiguous sequence of digit characters (0-9). At least one digit character must be present.

  **e_char**
  An exponent character, which is either "E" or "e".

  **e_sign**
  An optional plus sign (+) or minus sign (-) character for the exponent.

  **e_digits**
  A contiguous sequence of digit characters (0-9) for the exponent. At least one digit character must be present if the string contains an exponent character.

  After the sequence of digit characters, or the optional characters representing an exponent, the string can contain other characters that are not digit characters, but the conversion stops as soon as the first of these characters is reached. The string is assumed to represent a decimal floating point number with an exponent that is a power of 10.

IBM MQ returns reason code MQRC_PROP_NUMBER_FORMAT_ERROR if the string is not formatted correctly.

- When converting a numeric property value to a string, the value is converted to the string representation of the value as a decimal number, not the string containing the ASCII character for that value. For example, the integer 65 is converted to the string "65", not the string "A".
- When converting a byte string property value to a string, each byte is converted to the two hexadecimal characters that represent the byte. For example, the byte array {0xF1, 0x12, 0x00, 0xFF} is converted to the string "F11200FF".

**MQIMPO_QUERY_LENGTH**
Query the type and length of the property value. The length is returned in the *DataLength* parameter of the MQINQMP call. The property value is not returned.

If a *ReturnedName* buffer is specified, the *VSLength* field of the MQCHARV structure is filled in with the length of the property name. The property name is not returned.

**Iteration options:** The following options relate to iterating over properties, using a name with a wildcard character

**MQIMPO_INQ_FIRST**
Inquire on the first property that matches the specified name. After this call, a cursor is established on the property that is returned.

This is the default value.

The MQIMPO_INQ_PROP_UNDER_CURSOR option can subsequently be used with an MQINQMP call, if required, to inquire on the same property again.

Note that there is only one property cursor; therefore, if the property name, specified in the MQINQMP call, changes the cursor is reset.

This option is not valid with either of the following options:

MQIMPO_INQ_NEXT
MQIMPO_INQ_PROP_UNDER_CURSOR

**MQIMPO_INQ_NEXT**
Inquires on the next property that matches the specified name, continuing the search from the property cursor. The cursor is advanced to the property that is returned.

If this is the first MQINQMP call for the specified name, then the first property that matches the specified name is returned.

The MQIMPO_INQ_PROP_UNDER_CURSOR option can subsequently be used with an MQINQMP call if required, to inquire on the same property again.

If the property under the cursor has been deleted, MQINQMP returns the next matching property following the one that has been deleted.

If a property is added that matches the wildcard, while an iteration is in progress, the property might or might not be returned during the completion of the iteration. The property is returned once the iteration restarts using MQIMPO_INQ_FIRST.

A property matching the wildcard that was deleted, while the iteration was in progress, is not returned subsequent to its deletion.

This option is not valid with either of the following options:

MQIMPO_INQ_FIRST
MQIMPO_INQ_PROP_UNDER_CURSOR

**MQIMPO_INQ_PROP_UNDER_CURSOR**
Retrieve the value of the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired, using either the MQIMPO_INQ_FIRST or the MQIMPO_INQ_NEXT option.

The property cursor is reset when the message handle is reused, when the message handle is specified in the *MsgHandle* field of the MQGMO on an MQGET call, or when the message handle is specified in *OriginalMsgHandle* or *NewMsgHandle* fields of the MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established, or if the property pointed to by the property cursor has been deleted, the call fails with completion code MQCC_FAILED and reason MQRC_PROPERTY_NOT_AVAILABLE.

This option is not valid with either of the following options:

MQIMPO_INQ_FIRST
MQIMPO_INQ_NEXT

If none of the options previously described is required, the following option can be used:

**MQIMPO_NONE**
Use this value to indicate that no other options have been specified; all options assume their default values.

MQIMPO_NONE aids program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

This is always an input field. The initial value of this field is MQIMPO_INQ_FIRST.

*RequestedCCSID (MQLONG)*
Inquire message property options structure - RequestedCCSID field

The character set that the inquired property value is to be converted into if the value is a character string. This is also the character set into which the *ReturnedName* is to be converted when MQIMPO_CONVERT_VALUE or MQIMPO_CONVERT_TYPE is specified.

The initial value of this field is MQCCSI_APPL.

*RequestedEncoding (MQLONG)*
Inquire message property options structure - RequestedEncoding field

This is the encoding into which the inquired property value is to be converted when MQIMPO_CONVERT_VALUE or MQIMPO_CONVERT_TYPE is specified.

The initial value of this field is MQENC_NATIVE.

*Reserved1 (MQCHAR)*

This is a reserved field. The initial value of this field is a blank character (4 byte field).

*ReturnedCCSID (MQLONG)*
Inquire message property options structure - ReturnedCCSID field

On output, this is the character set of the value returned if the *Type* parameter of the MQINQMP call is MQTYPE_STRING.

If the MQIMPO_CONVERT_VALUE option is specified and conversion was successful, the *ReturnedCCSID* field, on return, is the same value as the value passed in.

The initial value of this field is zero.

*ReturnedEncoding (MQLONG)*
Inquire message property options structure - ReturnedEncoding field

On output, this is the encoding of the value returned.

If the MQIMPO_CONVERT_VALUE option is specified and conversion was successful, the *ReturnedEncoding* field, on return, is the same value as the value passed in.

The initial value of this field is MQENC_NATIVE.

*ReturnedName (MQCHARV)*
Inquire message property options structure - ReturnedName field

The actual name of the inquired property.

On input a string buffer can be passed in using the *VSPtr* or *VSOffset* field of the MQCHARV structure. The length of the string buffer is specified using the *VSBufsize* field of the MQCHARV structure.

On return from the MQINQMP call, the string buffer is completed with the name of the property that was inquired, provided the string buffer was long enough to fully contain the name. The *VSLength* field of the MQCHARV structure is filled in with the length of the property name. The *VSCCSID* field of the MQCHARV structure is filled in to indicate the character set of the returned name, whether or not conversion of the name failed.

This is an input/output field. The initial value of this field is MQCHARV_DEFAULT.

*StrucId (MQCHAR4)*
Inquire message property options structure - StrucId field

This is the structure identifier. The value must be:

**MQIMPO_STRUC_ID**
Identifier for inquire message property options structure.

For the C programming language, the constant MQIMPO_STRUC_ID_ARRAY is also defined; this has the same value as MQIMPO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQIMPO_STRUC_ID.

*TypeString (MQCHAR8)*
Inquire message property options structure - TypeString field

A string representation of the data type of the property.

If the property was specified in an MQRFH2 header and the MQRFH2 `dt` attribute is not recognized, this field can be used to determine the data type of the property. *TypeString* is returned in coded character set 1208 (UTF-8), and is the first eight bytes of the value of the `dt` attribute of the property that failed to be recognized

This is always an output field. The initial value of this field is the null string in the C programming language, and 8 blank characters in other programming languages.

*Version (MQLONG)*
Inquire message property options structure - Version field

This is the structure version number. The value must be:

**MQIMPO_VERSION_1**
Version number for inquire message property options structure.

The following constant specifies the version number of the current version:

**MQIMPO_CURRENT_VERSION**
Current version of inquire message property options structure.

This is always an input field. The initial value of this field is MQIMPO_VERSION_1.

### *Initial values and language declarations for MQIMPO*

Inquire message property options structure - Initial values

*Table 501. Initial values of fields in MQIPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQIMPO_STRUC_ID | 'IMPO' |
| *Version* | MQIMPO_VERSION_1 | 1 |
| *Options* | MQIMPO_INQ_FIRST | |
| *RequestedEncoding* | MQENC_NATIVE | |
| *RequestedCCSID* | MQCCSI_APPL | |
| *ReturnedEncoding* | MQENC_NATIVE | |
| *ReturnedCCSID* | 0 | |
| *Reserved1* | 0 | |
| *ReturnedName* | MQCHARV_DEFAULT | |
| *TypeString* | Null string or blanks | |

**Notes:**

1. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
2. In the C programming language, the macro variable MQIMPO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQIMPO MyIMPO = {MQIMPO_DEFAULT};
```

*C declaration*

Inquire message property options structure - C language declaration

```
typedef struct tagMQIMPO MQIMPO;
struct tagMQIMPO {
  MQCHAR4  StrucId;            /* Structure identifier */
  MQLONG   Version;            /* Structure version number */
  MQLONG   Options;            /* Options that control the action of
                                  MQINQMP */
  MQLONG   RequestedEncoding;  /* Requested encoding of Value */
  MQLONG   RequestedCCSID;     /* Requested character set identifier
                                  of Value */
  MQLONG   ReturnedEncoding;   /* Returned encoding of Value */
  MQLONG   ReturnedCCSID;      /* Returned character set identifier
                                  of Value */
  MQCHAR   Reserved1           /* Reserved field */
  MQCHARV  ReturnedName;       /* Returned property name */
  MQCHAR8  TypeString;         /* Property data type as a string */
};
```

*COBOL declaration*

Inquire message property options structure - COBOL language declaration

```
**   MQIMPO structure
  10 MQIMPO.
**    Structure identifier
   15 MQIMPO-STRUCID               PIC X(4).
**    Structure version number
   15 MQIMPO-VERSION               PIC S9(9) BINARY.
**    Options that control the action of MQINQMP
   15 MQIMPO-OPTIONS               PIC S9(9) BINARY.
```

```
**    Requested encoding of VALUE
   15 MQIMPO-REQUESTEDENCODING      PIC S9(9) BINARY.
**    Requested character set identifier of VALUE
   15 MQIMPO-REQUESTEDCCSID         PIC S9(9) BINARY.
**    Returned encoding of VALUE
   15 MQIMPO-RETURNEDENCODING       PIC S9(9) BINARY.
**    Returned character set identifier of VALUE
   15 MQIMPO-RETURNEDCCSID          PIC S9(9) BINARY.
**    Reserved field
   15 MQIMPO-RESERVED1
**    Returned property name
   15 MQIMPO-RETURNEDNAME.
**     Address of variable length string
    20 MQIMPO-RETURNEDNAME-VSPTR    POINTER.
**     Offset of variable length string
    20 MQIMPO-RETURNEDNAME-VSOFFSET PIC S9(9) BINARY.
**     CCSID of variable length string
    20 MQIMPO-RETURNEDNAME-VSCCSID  PIC S9(9) BINARY.
**    Property data type as string
   15 MQIMPO-TYPESTRING             PIC S9(9) BINARY.
```

*PL/I declaration*
Inquire message property options structure - PL/I language declaration

```
dcl
 1 MQIMPO based,
  3 StrucId            char(4),       /* Structure identifier */
  3 Version            fixed bin(31), /* Structure version number */
  3 Options            fixed bin(31), /* Options that control the
                                         action of MQINQMP */
  3 RequestedEncoding  fixed bin(31), /* Requested encoding of
                                         Value */
  3 RequestedCCSID     fixed bin(31), /* Requested character set
                                         identifier of Value */
  3 ReturnedEncoding   fixed bin(31), /* Returned encoding of
                                         Value */
  3 ReturnedCCSID      fixed bin(31), /* Returned character set
                                         identifier of Value */
  3 Reserved1          fixed bin(31), /* Reserved field */
  3 ReturnedName,                     /* Returned property name */
   5 ReturnedName_VSPtr      pointer,       /* Address of returned
                                               name */
   5 5 ReturnedName_VSOffset fixed bin(31), /* Offset of returned
                                               name */
    5 5 ReturnedName_VSCCSID  fixed bin(31), /* CCSID of returned
                                               name */
  3 TypeString         char(8);       /* Property data type as
                                         string */
```

*High Level Assembler declaration*
Inquire message property options structure - Assembler language declaration

```
MQIMPO                      DSECT
MQIMPO_STRUCID              DS   CL4  Structure identifier
MQIMPO_VERSION              DS   F    Structure version number
MQIMPO_OPTIONS              DS   F    Options that control the
*                                     action of MQINQMP
MQIMPO_REQUESTEDENCODING    DS   F    Requested encoding of VALUE
MQIMPO_REQUESTEDCCSID       DS   F    Requested character set
*                                     identifier of VALUE
MQIMPO_RETURNEDENCODING     DS   F    Returned encoding of VALUE
MQIMPO_RETURNEDCCSID        DS   F    Returned character set
*                                     identifier of VALUE
MQIMPO_RESERVED1            DS   F    Reserved field
MQIMPO_RETURNEDNAME         DS   0F   Force fullword alignment
MQIMPO_RETURNEDNAME_VSPTR   DS   F    Address of returned name
MQIMPO_RETURNEDNAME_VSOFFSET DS  F    Offset of returned name
MQIMPO_RETURNEDNAME_VSLENGTH DS  F    Length of returned name
MQIMPO_RETURNEDNAME_VSCCSID DS   F    CCSID of returned name
MQIMPO_RETURNEDNAME_LENGTH  EQU  *-MQIMPO_RETURNEDNAME
                            ORG  MQIMPO_RETURNEDNAME
MQIMPO_RETURNEDNAME_AREA    DS   CL(MQIMPO_RETURNEDNAME_LENGTH)
*
MQIMPO_TYPESTRING           DS   CL8  Property data type as string
```

```
MQIMPO_LENGTH                EQU  *-MQIMPO
MQIMPO_AREA                  DS   CL(MQIMPO_LENGTH)
```

## MQMD - Message descriptor

The following table summarizes the fields in the structure.

*Table 502. Fields in MQMD*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Report* | Options for report messages | Report |
| *MsgType* | Message type | MsgType |
| *Expiry* | Message lifetime | MQMD - Expiry field |
| *Feedback* | Feedback or reason code | MQMD - Feedback field |
| *Encoding* | Numeric encoding of message data | Encoding |
| *CodedCharSetId* | Character set identifier of message data | CodedCharSetId |
| *Format* | Format name of message data | Format |
| *Priority* | Message priority | Priority |
| *Persistence* | Message persistence | Persistence |
| *MsgId* | Message identifier | MQMD - MsgId field |
| *CorrelId* | Correlation identifier | CorrelId |
| *BackoutCount* | Backout counter | BackoutCount |
| *ReplyToQ* | Name of reply queue | ReplyToQ |
| *ReplyToQMgr* | Name of reply queue manager | ReplyToQMgr |
| *UserIdentifier* | User identifier | UserIdentifier |
| *AccountingToken* | Accounting token | AccountingToken |
| *ApplIdentityData* | Application data relating to identity | ApplIdentityData |
| *PutApplType* | Type of application that put the message | PutApplType |
| *PutApplName* | Name of application that put the message | PutApplName |
| *PutDate* | Date when message was put | PutDate |
| *PutTime* | Time when message was put | PutTime |
| *ApplOriginData* | Application data relating to origin | ApplOriginData |
| **Note:** The remaining fields are ignored if *Version* is less than MQMD_VERSION_2. | | |
| *GroupId* | Group identifier | GroupId |
| *MsgSeqNumber* | Sequence number of logical message within group | MsgSeqNumber |
| *Offset* | Offset of data in physical message from start of logical message | Offset |

| Table 502. Fields in MQMD (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *MsgFlags* | Message flags | MQMD - MsgFlags field |
| *OriginalLength* | Length of original message | OriginalLength |

## *Overview for MQMD*

**Availability**: All IBM MQ systems, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQMD structure contains the control information that accompanies the application data when a message travels between the sending and receiving applications. The structure is an input/output parameter on the MQGET, MQPUT, and MQPUT1 calls.

**Version**: The current version of MQMD is MQMD_VERSION_2. Applications that are intended to be portable between several environments must ensure that the required version of MQMD is supported in all the environments concerned. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQMD that is supported by the environment, but with the initial value of the *Version* field set to MQMD_VERSION_1. To use fields that are not present in the version-1 structure, the application must set the *Version* field to the version number of the version required.

A declaration for the version-1 structure is available with the name MQMD1.

**Character set and encoding**: Data in MQMD must be in the character set and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE. However, if the application is running as an IBM MQ MQI client, the structure must be in the character set and encoding of the client.

If the sending and receiving queue managers use different character sets or encodings, the data in MQMD is converted automatically. It is not necessary for the application to convert the MQMD.

**Using different versions of MQMD**: A version-2 MQMD is equivalent to using a version-1 MQMD and prefixing the message data with an MQMDE structure. However, if all the fields in the MQMDE structure have their default values, the MQMDE can be omitted. A version-1 MQMD plus MQMDE are used as described:

- On the MQPUT and MQPUT1 calls, if the application provides a version-1 MQMD, the application can optionally prefix the message data with an MQMDE, setting the *Format* field in MQMD to MQFMT_MD_EXTENSION to indicate that an MQMDE is present. If the application does not provide an MQMDE, the queue manager assumes default values for the fields in the MQMDE.

  **Note:** Several of the fields that exist in the version-2 MQMD but not the version-1 MQMD are input/output fields on the MQPUT and MQPUT1 calls. However, the queue manager does *not* return any values in the equivalent fields in the MQMDE on output from the MQPUT and MQPUT1 calls; if the application requires those output values, it must use a version-2 MQMD.
- On the MQGET call, if the application provides a version-1 MQMD, the queue manager prefixes the message returned with an MQMDE, but only if one or more of the fields in the MQMDE has a non-default value. The *Format* field in MQMD will have the value MQFMT_MD_EXTENSION to indicate that an MQMDE is present.

The default values that the queue manager uses for the fields in the MQMDE are the same as the initial values of those fields, shown in Table 507 on page 456.

When a message is on a transmission queue, some of the fields in MQMD are set to particular values; see “MQXQH - Transmission-queue header” on page 598 for details.

**Message context**: Certain fields in MQMD contain the message context. There are two types of message context: *identity context* and *origin context*. Typically:

- Identity context relates to the application that *originally* put the message

- Origin context relates to the application that *most recently* put the message.

These two applications can be the same application, but they can also be different applications (for example, when a message is forwarded from one application to another).

Although identity and origin context typically have the meanings described, the content of both types of context fields in MQMD depends on the MQPMO_*_CONTEXT options that are specified when the message is put. As a result, identity context does not necessarily relate to the application that originally put the message, and origin context does not necessarily relate to the application that most-recently put the message; it depends on the design of the application suite.

The message channel agent (MCA) never alters message context. MCAs that receive messages from remote queue managers use the context option MQPMO_SET_ALL_CONTEXT on the MQPUT or MQPUT1 call. This allows the receiving MCA to preserve exactly the message context that traveled with the message from the sending MCA. However, the result is that the origin context does not relate to either of the MCAs that sent and received the message. The origin context refers to an earlier application that put the message. If all the intermediate applications have passed the message context, the origin context refers to the originating application itself.

In the descriptions, the context fields are described as though they are used as described previously. For more information about message context, see Message context.

## *Fields for MQMD*

The MQMD structure contains the following fields; the fields are described in **alphabetical order**:

*Table 503. Fields in MQMD*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Report* | Options for report messages | Report |
| *MsgType* | Message type | MsgType |
| *Expiry* | Message lifetime | MQMD - Expiry field |
| *Feedback* | Feedback or reason code | MQMD - Feedback field |
| *Encoding* | Numeric encoding of message data | Encoding |
| *CodedCharSetId* | Character set identifier of message data | CodedCharSetId |
| *Format* | Format name of message data | Format |
| *Priority* | Message priority | Priority |
| *Persistence* | Message persistence | Persistence |
| *MsgId* | Message identifier | MQMD - MsgId field |
| *CorrelId* | Correlation identifier | CorrelId |
| *BackoutCount* | Backout counter | BackoutCount |
| *ReplyToQ* | Name of reply queue | ReplyToQ |
| *ReplyToQMgr* | Name of reply queue manager | ReplyToQMgr |
| *UserIdentifier* | User identifier | UserIdentifier |
| *AccountingToken* | Accounting token | AccountingToken |
| *ApplIdentityData* | Application data relating to identity | ApplIdentityData |
| *PutApplType* | Type of application that put the message | PutApplType |

| Table 503. Fields in MQMD (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *PutApplName* | Name of application that put the message | PutApplName |
| *PutDate* | Date when message was put | PutDate |
| *PutTime* | Time when message was put | PutTime |
| *ApplOriginData* | Application data relating to origin | ApplOriginData |
| **Note:** The remaining fields are ignored if *Version* is less than MQMD_VERSION_2. | | |
| *GroupId* | Group identifier | GroupId |
| *MsgSeqNumber* | Sequence number of logical message within group | MsgSeqNumber |
| *Offset* | Offset of data in physical message from start of logical message | Offset |
| *MsgFlags* | Message flags | MQMD - MsgFlags field |
| *OriginalLength* | Length of original message | OriginalLength |

*AccountingToken (MQBYTE32)*

This is the accounting token, part of the **identity context** of the message. For more information about message context, see “Overview for MQMD” on page 403 ; also see Message context.

*AccountingToken* allows an application to charge appropriately for work done as a result of the message. The queue manager treats this information as a string of bits and does not check its content.

The queue manager generates this information as follows:

- The first byte of the field is set to the length of the accounting information present in the bytes that follow; this length is in the range zero through 30, and is stored in the first byte as a binary integer.
- The second and subsequent bytes (as specified by the length field) are set to the accounting information appropriate to the environment.
  - On z/OS the accounting information is set to:
    - For z/OS batch, the accounting information from the JES JOB card or from a JES ACCT statement in the EXEC card (comma separators are changed to X'FF'). This information is truncated, if necessary, to 31 bytes.
    - For TSO, the user's account number.
    - For CICS, the LU 6.2 unit of work identifier (UEPUOWDS) (26 bytes).
    - For IMS, the 8-character PSB name concatenated with the 16-character IMS recovery token.
  - On IBM i, the accounting information is set to the accounting code for the job.
  - On UNIX systems, the accounting information is set to the numeric user identifier, in ASCII characters.
  - On Windows, the accounting information is set to a Windows security identifier (SID) in a compressed format. The SID uniquely identifies the user identifier stored in the *UserIdentifier* field. When the SID is stored in the *AccountingToken* field, the 6-byte Identifier Authority (located in the third and subsequent bytes of the SID) is omitted. For example, if the Windows SID is 28 bytes long, 22 bytes of SID information are stored in the *AccountingToken* field.
- The last byte (byte 32) of the accounting field is set to the accounting token type (in this case MQACTT_NT_SECURITY_ID, x '0b'):

  **MQACTT_CICS_LUOW_ID**
  CICS LUOW identifier.

**MQACTT_NT_SECURITY_ID**
Windows security identifier.

**MQACTT_OS400_ACCOUNT_TOKEN**
IBM i accounting token.

**MQACTT_UNIX_NUMERIC_ID**
UNIX systems numeric identifier.

**MQACTT_USER**
User-defined accounting token.

**MQACTT_UNKNOWN**
Unknown accounting-token type.

The accounting-token type is set to an explicit value only in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems. In other environments, the accounting-token type is set to the value MQACTT_UNKNOWN. In these environments use the *PutApplType* field to deduce the type of accounting token received.

- All other bytes are set to binary zero.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. If neither MQPMO_SET_IDENTITY_CONTEXT nor MQPMO_SET_ALL_CONTEXT is specified, this field is ignored on input and is an output-only field. For more information about message context, see Message context.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *AccountingToken* that was transmitted with the message if it was put to a queue. This will be the value of *AccountingToken* that is kept with the message if it is retained (see description of MQPMO_RETAIN in "MQPMO options (MQLONG)" on page 487 for more details about retained publications) but is not used as the *AccountingToken* when the message is sent as a publication to subscribers since they provide a value to override *AccountingToken* in all publications sent to them. If the message has no context, the field is entirely binary zero.

This is an output field for the MQGET call.

This field is not subject to any translation based on the character set of the queue manager; the field is treated as a string of bits, and not as a string of characters.

The queue manager does nothing with the information in this field. The application must interpret the information if it wants to use the information for accounting purposes.

You can use the following special value for the *AccountingToken* field:

**MQACT_NONE**
No accounting token is specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQACT_NONE_ARRAY is also defined; this has the same value as MQACT_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_ACCOUNTING_TOKEN_LENGTH. The initial value of this field is MQACT_NONE.

*ApplIdentityData (MQCHAR32)*

This is part of the **identity context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

*ApplIdentityData* is information that is defined by the application suite, and can be used to provide additional information about the message or its originator. The queue manager treats this information as character data, but does not define the format of it. When the queue manager generates this information, it is entirely blank.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. If a null character is present,

the null and any following characters are converted to blanks by the queue manager. If neither MQPMO_SET_IDENTITY_CONTEXT nor MQPMO_SET_ALL_CONTEXT is specified, this field is ignored on input and is an output-only field. For more information about message context, see Message context.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *ApplIdentityData* that was transmitted with the message if it was put to a queue. This will be the value of *ApplIdentityData* that is kept with the message if it is retained (see description of MQPMO_RETAIN for more details about retained publications) but is not used as the *ApplIdentityData* when the message is sent as a publication to subscribers because they provide a value to override *ApplIdentityData* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by MQ_APPL_IDENTITY_DATA_LENGTH. The initial value of this field is the null string in C, and 32 blank characters in other programming languages.

*ApplOriginData (MQCHAR4)*

This is part of the **origin context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

*ApplOriginData* is information that is defined by the application suite that can be used to provide additional information about the origin of the message. For example, it could be set by applications running with suitable user authority to indicate whether the identity data is trusted.

The queue manager treats this information as character data, but does not define the format of it. When the queue manager generates this information, it is entirely blank.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. Any information following a null character within the field is discarded. The queue manager converts the null character and any following characters to blanks. If MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

This is an output field for the MQGET call. The length of this field is given by MQ_APPL_ORIGIN_DATA_LENGTH. The initial value of this field is the null string in C, and 4 blank characters in other programming languages.

When the message is published, although *ApplOriginData* is set, it is blank in the subscription that it receives.

*BackoutCount (MQLONG)*

This is a count of the number of times that the message has been previously returned by the MQGET call as part of a unit of work, and subsequently backed out. It helps the application to detect processing errors that are based on message content. The count excludes MQGET calls that specify any of the MQGMO_BROWSE_* options.

The accuracy of this count is affected by the *HardenGetBackout* queue attribute; see "Attributes for queues" on page 810.

On z/OS, a value of 255 means that the message has been backed out 255 or more times; the value returned is never greater than 255.

This is an output field for the MQGET call. It is ignored for the MQPUT and MQPUT1 calls. The initial value of this field is 0.

*CodedCharSetId (MQLONG)*
This field specifies the character set identifier of character data within the message body.

**Note:** Character data in MQMD and the other MQ data structures that are parameters on calls must be in the character set of the queue manager. This is defined by the queue manager's *CodedCharSetId* attribute; see "Attributes for the queue manager" on page 777 for details of this attribute.

If this field is set to MQCCSI_Q_MGR when calling MQGET with MQGMO_CONVERT in the options, the behavior is different between client and server applications. For server applications, the code page used

for character conversion is the *CodedCharSetId* of the queue manager; for client applications, the code page used for character conversion is the current locale code page.

For client applications, MQCCSI_Q_MGR is filled in, based on the locale of the client rather than the one on the queue manager. The exception to that rule is when you put a message to an IMS bridge queue; what is returned, in the *CodedCharSetId* field of MQMD, is the CCSID of the queue manager.

You must not use the following special value:

**MQCCSI_APPL**
This results in an incorrect value in the *CodedCharSetId* field of the MQMD and causes a return code of MQRC_SOURCE_CCSID_ERROR (or MQRC_FORMAT_ERROR for z/OS ) when the message is received using the MQGET call with the MQGMO_CONVERT option.

You can use the following special values:

**MQCCSI_Q_MGR**
Character data in the message is in the queue manager's character set.

On the MQPUT and MQPUT1 calls, the queue manager changes this value in the MQMD that is sent with the message to the true character set identifier of the queue manager. As a result, the value MQCCSI_Q_MGR is never returned by the MQGET call.

**MQCCSI_DEFAULT**
The *CodedCharSetId* of the data in the *String* field is defined by the *CodedCharSetId* field in the header structure that precedes the MQCFH structure, or by the *CodedCharSetId* field in the MQMD if the MQCFH is at the start of the message.

**MQCCSI_INHERIT**
Character data in the message is in the same character set as this structure; this is the queue manager's character set. (For MQMD only, MQCCSI_INHERIT has the same meaning as MQCCSI_Q_MGR).

The queue manager changes this value in the MQMD that is sent with the message to the actual character set identifier of MQMD. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

Do not use MQCCSI_INHERIT if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

**MQCCSI_EMBEDDED**
Character data in the message is in a character set with the identifier that is contained within the message data itself. There can be any number of character set identifiers embedded within the message data, applying to different parts of the data. This value must be used for PCF messages (with a format of MQFMT_ADMIN, MQFMT_EVENT, or MQFMT_PCF) that contain data in a mixture of character sets. Each MQCFST, MQCFSL, and MQCFSF structure contained within the PCF message must have an explicit character set identifier specified and not MQCCSI_DEFAULT.

If a message of format MQFMT_EMBEDDED_PCF is to contain data in a mixture of character sets, do not use MQCCSI_EMBEDDED. Instead set MQEPH_CCSID_EMBEDDED in the Flags field in the MQEPH structure. This is equivalent to setting MQCCSI_EMBEDDED in the preceding structure. Each MQCFST, MQCFSL, and MQCFSF structure contained within the PCF message must then have an explicit character set identifier specified and not MQCCSI_DEFAULT. For more information on the MQEPH structure, see “MQEPH - Embedded PCF header” on page 350.

Specify this value only on the MQPUT and MQPUT1 calls. If it is specified on the MQGET call, it prevents conversion of the message.

On the MQPUT and MQPUT1 calls, the queue manager changes the values MQCCSI_Q_MGR and MQCCSI_INHERIT in the MQMD that is sent with the message as described above, but does not change the MQMD specified on the MQPUT or MQPUT1 call. No other check is carried out on the value specified.

Applications that retrieve messages must compare this field against the value the application is expecting; if the values differ, the application might need to convert character data in the message.

If you specify the MQGMO_CONVERT option on the MQGET call, this field is an input/output field. The value specified by the application is the coded character set identifier to which to convert the

message data if necessary. If conversion is successful or unnecessary, the value is unchanged (except that the value MQCCSI_Q_MGR or MQCCSI_INHERIT is converted to the actual value). If conversion is unsuccessful, the value after the MQGET call represents the coded character set identifier of the unconverted message that is returned to the application.

Otherwise, this is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQCCSI_Q_MGR.

*CorrelId (MQBYTE24)*
The CorrelId field is property in the message header that may be used to identify a specific message or group of messages.

This is a byte string that the application can use to relate one message to another, or to relate the message to other work that the application is performing. The correlation identifier is a permanent property of the message, and persists across restarts of the queue manager. Because the correlation identifier is a byte string and not a character string, the correlation identifier is *not* converted between character sets when the message flows from one queue manager to another.

For the MQPUT and MQPUT1 calls, the application can specify any value. The queue manager transmits this value with the message and delivers it to the application that issues the get request for the message.

If the application specifies MQPMO_NEW_CORREL_ID, the queue manager generates a unique correlation identifier which is sent with the message, and also returned to the sending application on output from the MQPUT or MQPUT1 call.

A correlation identifier generated by the queue manager consists of a 3-byte product identifier (AMQ or CSQ in either ASCII or EBCDIC), followed by one reserved byte and a product-specific implementation of a unique string. In IBM MQ this product-specific implementation string contains the first 12 characters of the queue-manager name, and a value derived from the system clock. All queue managers that can intercommunicate must therefore have names that differ in the first 12 characters to ensure that message identifiers are unique. The ability to generate a unique string also depends on the system clock not being changed backward. To eliminate the possibility of a message identifier generated by the queue manager duplicating one generated by the application, the application must avoid generating identifiers with initial characters in the range A through I in ASCII or EBCDIC (X'41' through X'49' and X'C1' through X'C9'). However, the application is not prevented from generating identifiers with initial characters in these ranges.

This generated correlation identifier is kept with the message if it is retained, and is used as the correlation identifier when the message is sent as a publication to subscribers who specify MQCI_NONE in the SubCorrelId field in the MQSD passed on the MQSUB call. See MQPMO options for more details about retained publications.

When the queue manager or a message channel agent generates a report message, it sets the *CorrelId* field in the way specified by the *Report* field of the original message, either MQRO_COPY_MSG_ID_TO_CORREL_ID or MQRO_PASS_CORREL_ID. Applications that generate report messages must also do this.

For the MQGET call, *CorrelId* is one of the five fields that can be used to select a particular message to be retrieved from the queue. See the description of the *MsgId* field for details of how to specify values for this field.

Specifying MQCI_NONE as the correlation identifier has the same effect as *not* specifying MQMO_MATCH_CORREL_ID, that is, *any* correlation identifier will match.

If the MQGMO_MSG_UNDER_CURSOR option is specified in the *GetMsgOpts* parameter on the MQGET call, this field is ignored.

On return from an MQGET call, the *CorrelId* field is set to the correlation identifier of the message returned (if any).

The following special values can be used:

**MQCI_NONE**
No correlation identifier is specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQCI_NONE_ARRAY is also defined; this has the same value as MQCI_NONE, but is an array of characters instead of a string.

**MQCI_NEW_SESSION**
Message is the start of a new session.

This value is recognized by the CICS bridge as indicating the start of a new session, that is, the start of a new sequence of messages.

For the C programming language, the constant MQCI_NEW_SESSION_ARRAY is also defined; this has the same value as MQCI_NEW_SESSION, but is an array of characters instead of a string.

For the MQGET call, this is an input/output field. For the MQPUT and MQPUT1 calls, this is an input field if MQPMO_NEW_CORREL_ID is *not* specified, and an output field if MQPMO_NEW_CORREL_ID *is* specified. The length of this field is given by MQ_CORREL_ID_LENGTH. The initial value of this field is MQCI_NONE.

**Note:**

You cannot pass the correlation identifier of a publication in a hierarchy. The field is used by the queue manager.

*Encoding (MQLONG)*

This specifies the numeric encoding of numeric data in the message; it does not apply to numeric data in the MQMD structure itself. The numeric encoding defines the representation used for binary integers, packed-decimal integers, and floating-point numbers.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that the field is valid. The following special value is defined:

**MQENC_NATIVE**
The encoding is the default for the programming language and machine on which the application is running.

**Note:** The value of this constant depends on the programming language and environment. For this reason, applications must be compiled using the header, macro, COPY, or INCLUDE files appropriate to the environment in which the application will run.

Applications that put messages usually specify MQENC_NATIVE. Applications that retrieve messages must compare this field against the value MQENC_NATIVE; if the values differ, the application might need to convert numeric data in the message. Use the MQGMO_CONVERT option to request the queue manager to convert the message as part of the processing of the MQGET call. See “Machine encodings” on page 872 for details of how the *Encoding* field is constructed.

If you specify the MQGMO_CONVERT option on the MQGET call, this field is an input/output field. The value specified by the application is the encoding to which to convert the message data if necessary. If conversion is successful or unnecessary, the value is unchanged. If conversion is unsuccessful, the value after the MQGET call represents the encoding of the unconverted message that is returned to the application.

In other cases, this is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQENC_NATIVE.

*Expiry (MQLONG)*

This is a period of time expressed in tenths of a second, set by the application that puts the message. The message becomes eligible to be discarded if it has not been removed from the destination queue before this period of time elapses.

For example, to set one minute for the expiry time, you need to set **MQMD**.**Expiry** to 600.

The value is decremented to reflect the time that the message spends on the destination queue, and also on any intermediate transmission queues if the put is to a remote queue. It can also be decremented by message channel agents to reflect transmission times, if these are significant. Likewise, an application

forwarding this message to another queue might decrement the value if necessary, if it has retained the message for a significant time. However, the expiration time is treated as approximate, and the value need not be decremented to reflect small time intervals.

When the message is retrieved by an application using the MQGET call, the *Expiry* field represents the expiry time that still remains.

After a message's expiry time has elapsed, it becomes eligible to be discarded by the queue manager. The message is discarded when a browse or nonbrowse MQGET call occurs that would have returned the message had it not already expired. For example, a nonbrowse MQGET call with the *MatchOptions* field in MQGMO set to MQMO_NONE reading from a FIFO ordered queue discards all the expired messages up to the first unexpired message. With a priority ordered queue, the same call will discard expired messages of higher priority and messages of an equal priority that arrived on the queue before the first unexpired message.

A message that has expired is never returned to an application (either by a browse or a non-browse MQGET call), so the value in the *Expiry* field of the message descriptor after a successful MQGET call is either greater than zero, or the special value MQEI_UNLIMITED.

If a message is put on a remote queue, the message might expire (and be discarded) while it is on an intermediate transmission queue, before the message reaches the destination queue.

A report is generated when an expired message is discarded, if the message specified one of the MQRO_EXPIRATION_* report options. If none of these options is specified, no such report is generated; the message is assumed to be no longer relevant after this time period (perhaps because a later message has superseded it).

For a message put within syncpoint, the expiry interval begins at the time the message is put, not the time the syncpoint is committed. It is possible that the expiry interval can pass before the syncpoint is committed. In this case the message will be discarded at some time after the commit operation and the message will not be returned to an application in response to an MQGET operation.

Any other program that discards messages based on expiry time must also send an appropriate report message if one was requested.

**Notes:**

1. If a message is put with an *Expiry* time of zero or a number greater than 999 999 999, the MQPUT or MQPUT1 call fails with reason code MQRC_EXPIRY_ERROR; no report message is generated in this case.

   To enable reason code 2013, MQRC_EXPIRY_ERROR, you must enable the environment variable AMQ_ENFORCE_MAX_EXPIRY_ERROR.

   The following uses an example for Linux:

   ```
   $ export AMQ_ENFORCE_MAX_EXPIRY_ERROR=True
   ```

   Note that the:

   - Important thing is to export the variable
   - Actual value is ignored, however, using `True` might be helpful when reviewing the setup.
2. Because a message with an expiry time that has elapsed might not be discarded until later, there might be messages on a queue that have passed their expiry time, and that are not therefore eligible for retrieval. These messages nevertheless count toward the number of messages on the queue for all purposes, including depth triggering.
3. An expiration report is generated, if requested, when the message is discarded, not when it becomes eligible for discarding.
4. Discarding an expired message, and generating an expiration report if requested, are never part of the application's unit of work, even if the message was scheduled for discarding as a result of an MQGET call operating within a unit of work.

5. If a nearly-expired message is retrieved by an MQGET call within a unit of work, and the unit of work is subsequently backed out, the message might become eligible to be discarded before it can be retrieved again.
6. If a nearly-expired message is locked by an MQGET call with MQGMO_LOCK, the message might become eligible to be discarded before it can be retrieved by an MQGET call with MQGMO_MSG_UNDER_CURSOR; reason code MQRC_NO_MSG_UNDER_CURSOR is returned on this subsequent MQGET call if that happens.
7. When a request message with an expiry time greater than zero is retrieved, the application can take one of the following actions when it sends the reply message:
   - Copy the remaining expiry time from the request message to the reply message.
   - Set the expiry time in the reply message to an explicit value greater than zero.
   - Set the expiry time in the reply message to MQEI_UNLIMITED.

   The action to take depends on the design of the application. However, the default action for putting messages to a dead-letter (undelivered-message) queue must be to preserve the remaining expiry time of the message, and to continue to decrement it.
8. Trigger messages are always generated with MQEI_UNLIMITED.
9. A message (normally on a transmission queue) that has a *Format* name of MQFMT_XMIT_Q_HEADER has a second message descriptor within the MQXQH. It therefore has two *Expiry* fields associated with it. The following additional points should be noted in this case:
   - When an application puts a message on a remote queue, the queue manager places the message initially on a local transmission queue, and prefixes the application message data with an MQXQH structure. The queue manager sets the values of the two *Expiry* fields to be the same as that specified by the application.

     If an application puts a message directly on a local transmission queue, the message data must already begin with an MQXQH structure, and the format name must be MQFMT_XMIT_Q_HEADER. In this case, the application need not set the values of these two *Expiry* fields to be the same. (The queue manager checks that the *Expiry* field within the MQXQH contains a valid value, and that the message data is long enough to include it). For an application that can write directly to the transmission queue, the application has to create a transmission queue header with the embedded message descriptor. However, if the expiry value in the message descriptor written to the transmission queue is inconsistent with the value in the embedded message descriptor, an expiry error rejection occurs.
   - When a message with a *Format* name of MQFMT_XMIT_Q_HEADER is retrieved from a queue (whether this is a normal or a transmission queue), the queue manager decrements *both* these *Expiry* fields with the time spent waiting on the queue. No error is raised if the message data is not long enough to include the *Expiry* field in the MQXQH.
   - The queue manager uses the *Expiry* field in the separate message descriptor (that is, not the one in the message descriptor embedded within the MQXQH structure) to test whether the message is eligible for discarding.
   - If the initial values of the two *Expiry* fields are different, the *Expiry* time in the separate message descriptor when the message is retrieved might be greater than zero (so the message is not eligible for discarding), while the time according to the *Expiry* field in the MQXQH has elapsed. In this case the *Expiry* field in the MQXQH is set to zero.
10. The expiry time on a reply message returned from the IMS bridge is unlimited unless MQIIH_PASS_EXPIRATION is set in the Flags field of the MQIIH. See Flags for more information.

The following special value is recognized:

**MQEI_UNLIMITED**
The message has an unlimited expiration time.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQEI_UNLIMITED.

*Expired messages on z/OS*
On IBM MQ for z/OS, messages that have expired are discarded by the next appropriate MQGET call.

However, if no such call occurs, the expired message is not discarded, and, for some queues, a large number of expired messages can accumulate. To remedy this, set the queue manager to scan queues periodically and discard expired messages on one or more queues in one of the following ways:

**Periodic scan**
You can specify a period using the EXPRYINT (expiry interval) queue manager attribute. Each time the expiry interval is reached, the queue manager looks for candidate queues that are worth scanning to discard expired messages.

The queue manager maintains information about the expired messages on each queue, and knows whether a scan for expired messages is worthwhile. So, only a selection of queues is scanned at any time.

Shared queues are scanned by only one queue manager in a queue-sharing group. Generally, it is the first queue manager to restart, or the first to have EXPRYINT set. If this queue manager terminates, another queue manager in the queue-sharing group takes over the queue scanning. Set the expiry interval value for all queue managers within a queue-sharing group to the same value.

Note that expiry processing takes place for every queue when a queue manager restarts, regardless of the EXPRYINT setting.

**Explicit request**
Issue the REFRESH QMGR TYPE(EXPIRY) command, specifying the queue or queues that you want scanned.

V 8.0.0.4 *Enforcing lower expiration times*
Administrators can limit the expiry time of any message put to a queue or topic by using the *CAPEXPRY* attribute specified in the **CUSTOM** attribute on the queue or topic.

z/OS To enable this feature on z/OS, you must apply APAR PI50761 and enable the new feature with the MQSC command **RECOVER QMGR (TUNE CAPEXPRY ON)**.

**Important:** The **RECOVER QMGR** command is reserved for use by IBM, and should normally only be used under guidance by IBM support.

z/OS You can either enter the command at a console, or to the queue manager configuration, by adding to a file processed in the CSQINP2 concatenation during queue manager start up. Note that the effect of the command does not persist over a queue manager restart.

An expiry time specified in the **Expiry** field of the MQMD, by an application,which is greater than the *CAPEXPRY* value specified in the **CUSTOM** attribute on the queue or topic will be replaced by that *CAPEXPRY* value. An expiry time specified by an application, which is lower than the *CAPEXPRY* value will be used.

Note that the value of **CAPEXPRY** is expressed in tenths of seconds, so one minute has a value of 600.

If more than one object is used on the resolution path, for example, when a message is put to an alias or remote queue, then the lowest of all the *CAPEXPRY* values is used as the upper limit for message expiry.

Changes to the *CAPEXPRY* values take effect immediately. The expiry value is evaluated for each put to a queue or topic and so is sensitive to the object resolution, which may differ between each put operation.

However, note that existing messages in the queue, prior to a change in **CAPEXPRY**, are not affected by the change (that is, their expiry time remains intact). Only new messages that are put into the queue after the change in **CAPEXPRY** have the new expiry time.

For example, in a cluster where a put is performed to a queue opened with *MQOO_BIND_NOT_FIXED*, messages can be assigned different expiry values on each put, depending on the *CAPEXPRY* value set for the transmission queue, used by the channel, that sends the message to the selected target queue manager.

Note that a put to a queue or topic by a JMS application specifying a delivery delay fails with *MQRC_EXPIRY_ERROR*, if the delivery delay is beyond the resolved expiry time for the target queue or topic. A *CAPEXPRY* attribute set on a queue resolved for a JMS Destination can cause this error.

**Note: CAPEXPRY** must not be used on any queues that will hold IBM MQ internally-generated messages such as any SYSTEM.CLUSTER.* queue and the SYSTEM.PROTECTION.POLICY.QUEUE.

*Feedback (MQLONG)*
The Feedback field is used with a message of type MQMT_REPORT to indicate the nature of the report, and is only meaningful with that type of message.

The field can contain one of the MQFB_* values, or one of the MQRC_* values. Feedback codes are grouped as follows:

**MQFB_NONE**
No feedback provided.

**MQFB_SYSTEM_FIRST**
Lowest value for system-generated feedback.

**MQFB_SYSTEM_LAST**
Highest value for system-generated feedback.

The range of system-generated feedback codes MQFB_SYSTEM_FIRST through MQFB_SYSTEM_LAST includes the general feedback codes listed in this topic (MQFB_*), and also the reason codes (MQRC_*) that can occur when the message cannot be put on the destination queue.

**MQFB_APPL_FIRST**
Lowest value for application-generated feedback.

**MQFB_APPL_LAST**
Highest value for application-generated feedback.

Applications that generate report messages must not use feedback codes in the system range (other than MQFB_QUIT), unless they want to simulate report messages generated by the queue manager or message channel agent.

On the MQPUT or MQPUT1 calls, the value specified must either be MQFB_NONE, or be within the system range or application range. This is checked whatever the value of *MsgType*.

**General feedback codes**:

**MQFB_COA**
Confirmation of arrival on the destination queue (see MQRO_COA).

**MQFB_COD**
Confirmation of delivery to the receiving application (see MQRO_COD).

**MQFB_EXPIRATION**
Message was discarded because it had not been removed from the destination queue before its expiry time had elapsed.

**MQFB_PAN**
Positive action notification (see MQRO_PAN).

**MQFB_NAN**
Negative action notification (see MQRO_NAN).

**MQFB_QUIT**
End application.

This can be used by a workload scheduling program to control the number of instances of an application program that are running. Sending an MQMT_REPORT message with this feedback code to an instance of the application program indicates to that instance that it should stop processing. However, adherence to this convention is a matter for the application; it is not enforced by the queue manager.

**Channel feedback codes:**

**MQFB_CHANNEL_COMPLETED**
A channel ended normally.

**MQFB_CHANNEL_FAIL**
A channel ended abnormally and goes into STOPPED state.

**MQFB_CHANNEL_FAIL_RETRY**
A channel ended abnormally and goes into RETRY state.

**IMS-bridge feedback codes**

These codes are used when an unexpected IMS-OTMA sense code is received. The sense code or, when the sense code is 0x1A the reason code associated with that sense code, is indicated in the *Feedback*.

1. For *Feedback* codes in range MQFB_IMS_FIRST (300) through MQFB_IMS_LAST (399), a sense code other than 0x1A was received. The *sense code* is given by the expression (*Feedback* - MQFB_IMS_FIRST+1)
2. For *Feedback* codes in range MQFB_IMS_NACK_1A_REASON_FIRST (600) through MQFB_IMS_NACK_1A_REASON_LAST (855), a sense code of 0x1A was received. The *reason code* associated with the sense code is given by the expression (*Feedback* - MQFB_IMS_NACK_1A_REASON_FIRST)

The meaning of the IMS-OTMA sense codes and corresponding reason codes are described in *Open Transaction Manager Access Guide and Reference*.

The following feedback codes can be generated by the IMS bridge:

**MQFB_DATA_LENGTH_ZERO**
A segment length was zero in the application data of the message.

**MQFB_DATA_LENGTH_NEGATIVE**
A segment length was negative in the application data of the message.

**MQFB_DATA_LENGTH_TOO_BIG**
A segment length was too large in the application data of the message.

**MQFB_BUFFER_OVERFLOW**
The value of one of the length fields would cause the data to overflow the message buffer.

**MQFB_LENGTH_OFF_BY_ONE**
The value of one of the length fields was 1 byte too short.

**MQFB_IIH_ERROR**
The *Format* field in MQMD specifies MQFMT_IMS, but the message does not begin with a valid MQIIH structure.

**MQFB_NOT_AUTHORIZED_FOR_IMS**
The user ID contained in the message descriptor MQMD, or the password contained in the *Authenticator* field in the MQIIH structure, failed the validation performed by the IMS bridge. As a result the message was not passed to IMS.

**MQFB_IMS_ERROR**
An unexpected error was returned by IMS. Consult the IBM MQ error log on the system on which the IMS bridge resides for more information about the error.

**MQFB_IMS_FIRST**
When the IMS-OTMA sense code is not 0x1A, IMS-generated feedback codes are in the range MQFB_IMS_FIRST (300) through MQFB_IMS_LAST (399). The IMS-OTMA sense code itself is *Feedback* minus MQFB_IMS_ERROR.

**MQFB_IMS_LAST**
Highest value for IMS-generated feedback when the sense code is not 0x1A.

**MQFB_IMS_NACK_1A_REASON_FIRST**
When the sense code is 0x1A, IMS-generated feedback codes are in the range MQFB_IMS_NACK_1A_REASON_FIRST (600) through MQFB_IMS_NACK_1A_REASON_LAST (855).

**MQFB_IMS_NACK_1A_REASON_LAST**
Highest value for IMS-generated feedback when the sense code is 0x1A

**CICS-bridge feedback codes**: The following feedback codes can be generated by the CICS bridge:

**MQFB_CICS_APPL_ABENDED**
The application program specified in the message abnormally ended. This feedback code occurs only in the *Reason* field of the MQDLH structure.

**MQFB_CICS_APPL_NOT_STARTED**
The EXEC CICS LINK for the application program specified in the message failed. This feedback code occurs only in the *Reason* field of the MQDLH structure.

**MQFB_CICS_BRIDGE_FAILURE**
CICS bridge terminated abnormally without completing normal error processing.

**MQFB_CICS_CCSID_ERROR**
Character set identifier not valid.

**MQFB_CICS_CIH_ERROR**
CICS information header structure missing or not valid.

**MQFB_CICS_COMMAREA_ERROR**
Length of CICS COMMAREA not valid.

**MQFB_CICS_CORREL_ID_ERROR**
Correlation identifier not valid.

**MQFB_CICS_DLQ_ERROR**
The CICS bridge task was unable to copy a reply to this request to the dead-letter queue. The request was backed out.

**MQFB_CICS_ENCODING_ERROR**
Encoding not valid.

**MQFB_CICS_INTERNAL_ERROR**
CICS bridge encountered an unexpected error.

This feedback code occurs only in the *Reason* field of the MQDLH structure.

**MQFB_CICS_NOT_AUTHORIZED**
User identifier not authorized or password not valid.

This feedback code occurs only in the *Reason* field of the MQDLH structure.

**MQFB_CICS_UOW_BACKED_OUT**
The unit of work was backed out, for one of the following reasons:

- A failure was detected while processing another request within the same unit of work.
- A CICS abend occurred while the unit of work was in progress.

**MQFB_CICS_UOW_ERROR**
Unit-of-work control field *UOWControl* not valid.

**Trace-route message feedback codes**:

**MQFB_ACTIVITY**
Used with the MQFMT_EMBEDDED_PCF format to allow the option of user data following activity reports.

**MQFB_MAX_ACTIVITIES**
Returned when the trace-route message is discarded because the number of activities the message has been involved in exceeds the maximum activities limit.

**MQFB_NOT_FORWARDED**
Returned when the trace-route message is discarded because it is about to be sent to a remote queue manager that does not support trace-route messages.

**MQFB_NOT_DELIVERED**
Returned when the trace-route message is discarded because it is about to be put on a local queue.

**MQFB_UNSUPPORTED_FORWARDING**
Returned when the trace-route message is discarded because a value in the forwarding parameter is unrecognized, and is in the rejected bit mask.

**MQFB_UNSUPPORTED_DELIVERY**
Returned when the trace-route message is discarded because a value in the delivery parameter is unrecognized, and is in the rejected bit mask.

**IBM MQ reason codes**: For exception report messages, *Feedback* contains an IBM MQ reason code. Among possible reason codes are:

**MQRC_PUT_INHIBITED**
(2051, X'803') Put calls inhibited for the queue.

**MQRC_Q_FULL**
(2053, X'805') Queue already contains maximum number of messages.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_Q_SPACE_NOT_AVAILABLE**
(2056, X'808') No space available on disk for queue.

**MQRC_PERSISTENT_NOT_ALLOWED**
(2048, X'800') Queue does not support persistent messages.

**MQRC_MSG_TOO_BIG_FOR_Q_MGR**
(2031, X'7EF') Message length greater than maximum for queue manager.

**MQRC_MSG_TOO_BIG_FOR_Q**
(2030, X'7EE') Message length greater than maximum for queue.

For a full list of reason codes, see:

- For IBM MQ for z/OS, see API completion and reason codes.
- For all other platforms, see API completion and reason codes.

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This is an output field for the MQGET call, and an input field for MQPUT and MQPUT1 calls. The initial value of this field is MQFB_NONE.

*Format (MQCHAR8)*

This is a name that the sender of the message uses to indicate to the receiver the nature of the data in the message. Any characters that are in the character set of the queue manager can be specified for the name, but you must restrict the name to the following:

- Uppercase A through Z
- Numeric digits 0 through 9

If other characters are used, it might not be possible to translate the name between the character sets of the sending and receiving queue managers.

Pad the name with blanks to the length of the field, or use a null character to terminate the name before the end of the field; the null and any subsequent characters are treated as blanks. Do not specify a name with leading or embedded blanks. For the MQGET call, the queue manager returns the name padded with blanks to the length of the field.

The queue manager does not check that the name complies with the recommendations described above.

Names beginning MQ in upper, lower, and mixed case have meanings that are defined by the queue manager; do not use names beginning with these letters for your own formats. The queue manager built-in formats are:

**MQFMT_NONE**
The nature of the data is undefined: the data cannot be converted when the message is retrieved from a queue using the MQGMO_CONVERT option.

If you specify MQGMO_CONVERT on the MQGET call, and the character set or encoding of data in the message differs from that specified in the *MsgDesc* parameter, the message is returned with the following completion and reason codes (assuming no other errors):

- Completion code MQCC_WARNING and reason code MQRC_FORMAT_ERROR if the MQFMT_NONE data is at the beginning of the message.
- Completion code MQCC_OK and reason code MQRC_NONE if the MQFMT_NONE data is at the end of the message (that is, preceded by one or more MQ header structures). The MQ header structures are converted to the requested character set and encoding in this case.

For the C programming language, the constant MQFMT_NONE_ARRAY is also defined; this has the same value as MQFMT_NONE, but is an array of characters instead of a string.

**MQFMT_ADMIN**
The message is a command-server request or reply message in programmable command format (PCF). Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call. See Using Programmable Command Formats for more information about using programmable command format messages.

For the C programming language, the constant MQFMT_ADMIN_ARRAY is also defined; this has the same value as MQFMT_ADMIN, but is an array of characters instead of a string.

**MQFMT_CICS**
The message data begins with the CICS information header MQCIH, followed by the application data. The format name of the application data is given by the *Format* field in the MQCIH structure.

On z/OS, specify the MQGMO_CONVERT option on the MQGET call to convert messages that have format MQFMT_CICS.

For the C programming language, the constant MQFMT_CICS_ARRAY is also defined; this has the same value as MQFMT_CICS, but is an array of characters instead of a string.

**MQFMT_COMMAND_1**
The message is an MQSC command-server reply message containing the object count, completion code, and reason code. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_COMMAND_1_ARRAY is also defined; this has the same value as MQFMT_COMMAND_1, but is an array of characters instead of a string.

**MQFMT_COMMAND_2**
The message is an MQSC command-server reply message containing information about the objects requested. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_COMMAND_2_ARRAY is also defined; this has the same value as MQFMT_COMMAND_2, but is an array of characters instead of a string.

**MQFMT_DEAD_LETTER_HEADER**
The message data begins with the dead-letter header MQDLH. The data from the original message immediately follows the MQDLH structure. The format name of the original message data is given by the *Format* field in the MQDLH structure; see "MQDLH - Dead-letter header" on page 338 for details of this structure. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

COA and COD reports are not generated for messages that have a *Format* of MQFMT_DEAD_LETTER_HEADER.

For the C programming language, the constant MQFMT_DEAD_LETTER_HEADER_ARRAY is also defined; this has the same value as MQFMT_DEAD_LETTER_HEADER, but is an array of characters instead of a string.

**MQFMT_DIST_HEADER**
The message data begins with the distribution-list header MQDH; this includes the arrays of MQOR and MQPMR records. The distribution-list header can be followed by additional data. The format of the

additional data (if any) is given by the *Format* field in the MQDH structure; see "MQDH - Distribution header" on page 332 for details of this structure. Messages with format MQFMT_DIST_HEADER can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

This format is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

For the C programming language, the constant MQFMT_DIST_HEADER_ARRAY is also defined; this has the same value as MQFMT_DIST_HEADER, but is an array of characters instead of a string.

**MQFMT_EMBEDDED_PCF**
Format for a trace-route message, provided that the PCF command value is set to MQCMD_TRACE_ROUTE. Using this format allows user data to be sent along with the trace-route message, provided that their applications can cope with preceding PCF parameters.

The PCF header **must** be the first header, or the message will not be treated as a trace-route message. This means that the message cannot be in a group, and that trace-route messages cannot be segmented. If a trace-route message is sent in a group the message is rejected with reason code MQRC_MSG_NOT_ALLOWED_IN_GROUP.

Note that MQFMT_ADMIN can also be used for the format of a trace-route message, but in this case no user data can be sent along with the trace-route message.

**MQFMT_EVENT**
The message is an MQ event message that reports an event that occurred. Event messages have the same structure as programmable commands; see PCF command messages for more information about this structure, and Event monitoring for information about events.

Version-1 event messages can be converted in all environments if the MQGMO_CONVERT option is specified on the MQGET call. Version-2 event messages can be converted only on z/OS.

For the C programming language, the constant MQFMT_EVENT_ARRAY is also defined; this has the same value as MQFMT_EVENT, but is an array of characters instead of a string.

**MQFMT_IMS**
The message data begins with the IMS information header MQIIH, which is followed by the application data. The format name of the application data is given by the *Format* field in the MQIIH structure.

For details of how MQIIH structure is handled when using MQGET with MQGMO_CONVERT, see "Format (MQCHAR8)" on page 388 and "ReplyToFormat (MQCHAR8)" on page 389.

For the C programming language, the constant MQFMT_IMS_ARRAY is also defined; this has the same value as MQFMT_IMS, but is an array of characters instead of a string.

**MQFMT_IMS_VAR_STRING**
The message is an IMS variable string, which is a string of the form `llzzccc`, where:

**`ll`**
is a 2-byte length field specifying the total length of the IMS variable string item. This length is equal to the length of `ll` (2 bytes), plus the length of `zz` (2 bytes), plus the length of the character string itself. `ll` is a 2-byte binary integer in the encoding specified by the *Encoding* field.

**`zz`**
is a 2-byte field containing flags that are significant to IMS. `zz` is a byte string consisting of two MQBYTE fields, and is transmitted without change from sender to receiver (that is, `zz` is not subject to any conversion).

**`ccc`**
is a variable-length character string containing `ll-4` characters. `ccc` is in the character set specified by the *CodedCharSetId* field.

On z/OS, the message data can consist of a sequence of IMS variable strings butted together, with each string being of the form `llzzccc`. There must be no bytes skipped between successive IMS variable strings. This means that if the first string has an odd length, the second string will

be misaligned, that is, it will not begin on a boundary that is a multiple of two. Take care when constructing such strings on machines that require alignment of elementary data types.

Use the MQGMO_CONVERT option on the MQGET call to convert messages that have format MQFMT_IMS_VAR_STRING.

For the C programming language, the constant MQFMT_IMS_VAR_STRING_ARRAY is also defined; this has the same value as MQFMT_IMS_VAR_STRING, but is an array of characters instead of a string.

**MQFMT_MD_EXTENSION**
The message data begins with the message-descriptor extension MQMDE, and is optionally followed by other data (usually the application message data). The format name, character set, and encoding of the data that follow the MQMDE are given by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQMDE. See "MQMDE - Message descriptor extension" on page 452 for details of this structure. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_MD_EXTENSION_ARRAY is also defined; this has the same value as MQFMT_MD_EXTENSION, but is an array of characters instead of a string.

**MQFMT_PCF**
The message is a user-defined message that conforms to the structure of a programmable command format (PCF) message. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call. See Using Programmable Command Formats for more information about using programmable command format messages.

For the C programming language, the constant MQFMT_PCF_ARRAY is also defined; this has the same value as MQFMT_PCF, but is an array of characters instead of a string.

**MQFMT_REF_MSG_HEADER**
The message data begins with the reference message header MQRMH, and is optionally followed by other data. The format name, character set, and encoding of the data is given by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQRMH. See "MQRMH - Reference message header" on page 527 for details of this structure. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

This format is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

For the C programming language, the constant MQFMT_REF_MSG_HEADER_ARRAY is also defined; this has the same value as MQFMT_REF_MSG_HEADER, but is an array of characters instead of a string.

**MQFMT_RF_HEADER**
The message data begins with the rules and formatting header MQRFH, and is optionally followed by other data. The format name, character set, and encoding of the data (if any) are given by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQRFH. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_RF_HEADER_ARRAY is also defined; this has the same value as MQFMT_RF_HEADER, but is an array of characters instead of a string.

**MQFMT_RF_HEADER_2**
The message data begins with the version-2 rules and formatting header MQRFH2, and is optionally followed by other data. The format name, character set, and encoding of the optional data (if any) are given by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQRFH2. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_RF_HEADER_2_ARRAY is also defined; this has the same value as MQFMT_RF_HEADER_2, but is an array of characters instead of a string.

**MQFMT_STRING**
The application message data can be either an SBCS string (single-byte character set), or a DBCS string (double-byte character set). Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_STRING_ARRAY is also defined; this has the same value as MQFMT_STRING, but is an array of characters instead of a string.

**MQFMT_TRIGGER**
The message is a trigger message, described by the MQTM structure; see "MQTM - Trigger message" on page 579 for details of this structure. Messages of this format can be converted if the MQGMO_CONVERT option is specified on the MQGET call.

For the C programming language, the constant MQFMT_TRIGGER_ARRAY is also defined; this has the same value as MQFMT_TRIGGER, but is an array of characters instead of a string.

**MQFMT_WORK_INFO_HEADER**
The message data begins with the work information header MQWIH, which is followed by the application data. The format name of the application data is given by the *Format* field in the MQWIH structure.

On z/OS, specify the MQGMO_CONVERT option on the MQGET call to convert the *user data* in messages that have format MQFMT_WORK_INFO_HEADER. However, the MQWIH structure itself is always returned in the queue-manager's character set and encoding (that is, the MQWIH structure is converted whether or not the MQGMO_CONVERT option is specified).

For the C programming language, the constant MQFMT_WORK_INFO_HEADER_ARRAY is also defined; this has the same value as MQFMT_WORK_INFO_HEADER, but is an array of characters instead of a string.

**MQFMT_XMIT_Q_HEADER**
The message data begins with the transmission queue header MQXQH. The data from the original message immediately follows the MQXQH structure. The format name of the original message data is given by the *Format* field in the MQMD structure, which is part of the transmission queue header MQXQH. See "MQXQH - Transmission-queue header" on page 598 for details of this structure.

COA and COD reports are not generated for messages that have a *Format* of MQFMT_XMIT_Q_HEADER.

For the C programming language, the constant MQFMT_XMIT_Q_HEADER_ARRAY is also defined; this has the same value as MQFMT_XMIT_Q_HEADER, but is an array of characters instead of a string.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*GroupId (MQBYTE24)*

This is a byte string that is used to identify the particular message group or logical message to which the physical message belongs. *GroupId* is also used if segmentation is allowed for the message. In all these cases, *GroupId* has a non-null value, and one or more of the following flags is set in the *MsgFlags* field:

- MQMF_MSG_IN_GROUP
- MQMF_LAST_MSG_IN_GROUP
- MQMF_SEGMENT
- MQMF_LAST_SEGMENT
- MQMF_SEGMENTATION_ALLOWED

If none of these flags is set, *GroupId* has the special null value MQGI_NONE.

The application does not need to set this field on the MQPUT or MQGET call if:

- On the MQPUT call, MQPMO_LOGICAL_ORDER is specified.
- On the MQGET call, MQMO_MATCH_GROUP_ID is *not* specified.

These are the recommended ways of using these calls for messages that are not report messages. However, if the application requires more control, or the call is MQPUT1, the application must ensure that *GroupId* is set to an appropriate value.

Message groups and segments can be processed correctly only if the group identifier is unique. For this reason, *applications must not generate their own group identifiers* ; instead, applications must do one of the following:

- If MQPMO_LOGICAL_ORDER is specified, the queue manager automatically generates a unique group identifier for the first message in the group or segment of the logical message, and uses that group identifier for the remaining messages in the group or segments of the logical message, so the application does not need to take any special action. This is the recommended procedure.
- If MQPMO_LOGICAL_ORDER is *not* specified, the application must request the queue manager to generate the group identifier, by setting *GroupId* to MQGI_NONE on the first MQPUT or MQPUT1 call for a message in the group or segment of the logical message. The group identifier returned by the queue manager on output from that call must then be used for the remaining messages in the group or segments of the logical message. If a message group contains segmented messages, the same group identifier must be used for all segments and messages in the group.

  When MQPMO_LOGICAL_ORDER is not specified, messages in groups and segments of logical messages can be put in any order (for example, in reverse order), but the group identifier must be allocated by the *first* MQPUT or MQPUT1 call that is issued for any of those messages.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value described in Physical order on a queue. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message if the object opened is a single queue and not a distribution list, but leaves it unchanged if the object opened is a distribution list. In the latter case, if the application needs to know the group identifiers generated, the application must provide MQPMR records containing the *GroupId* field.

On input to the MQGET call, the queue manager uses the value described in Table 495 on page 374. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The following special value is defined:

**MQGI_NONE**
No group identifier specified.

The value is binary zero for the length of the field. This is the value that is used for messages that are not in groups, not segments of logical messages, and for which segmentation is not allowed.

For the C programming language, the constant MQGI_NONE_ARRAY is also defined; this has the same value as MQGI_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_GROUP_ID_LENGTH. The initial value of this field is MQGI_NONE. This field is ignored if *Version* is less than MQMD_VERSION_2.

*MsgFlags (MQLONG)*
MsgFlags are flags that specify attributes of the message, or control its processing.

MsgFlags are divided into the following categories:

- Segmentation flags
- Status flags

**Segmentation flags**: When a message is too big for a queue, an attempt to put the message on the queue typically fails. Segmentation is a technique whereby the queue manager or application splits the message into smaller pieces called segments, and places each segment on the queue as a separate physical message. The application that retrieves the message can either retrieve the segments one by one, or request the queue manager to reassemble the segments into a single message that is returned by the MQGET call. The latter is achieved by specifying the MQGMO_COMPLETE_MSG option on the MQGET call, and supplying a buffer that is big enough to accommodate the complete message. (See “MQGMO - Get-message options” on page 355 for details of the MQGMO_COMPLETE_MSG option.) A message can be segmented at the sending queue manager, at an intermediate queue manager, or at the destination queue manager.

You can specify one of the following to control the segmentation of a message:

**MQMF_SEGMENTATION_INHIBITED**
This option prevents the message being broken into segments by the queue manager. If specified for a message that is already a segment, this option prevents the segment being broken into smaller segments.

The value of this flag is binary zero. This is the default.

**MQMF_SEGMENTATION_ALLOWED**
This option allows the message to be broken into segments by the queue manager. If specified for a message that is already a segment, this option allows the segment to be broken into smaller segments. MQMF_SEGMENTATION_ALLOWED can be set without either MQMF_SEGMENT or MQMF_LAST_SEGMENT being set.

- On z/OS, the queue manager does not support the segmentation of messages. If a message is too big for the queue, the MQPUT or MQPUT1 call fails with reason code MQRC_MSG_TOO_BIG_FOR_Q. However, the MQMF_SEGMENTATION_ALLOWED option can still be specified, and allows the message to be segmented at a remote queue manager.

When the queue manager segments a message, the queue manager turns on the MQMF_SEGMENT flag in the copy of the MQMD that is sent with each segment, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call. For the last segment in the logical message, the queue manager also turns on the MQMF_LAST_SEGMENT flag in the MQMD that is sent with the segment.

**Note:** Take care when putting messages with MQMF_SEGMENTATION_ALLOWED but without MQPMO_LOGICAL_ORDER. If the message is:

- Not a segment, and
- Not in a group, and
- Not being forwarded,

the application must reset the *GroupId* field to MQGI_NONE before *each* MQPUT or MQPUT1 call, so that the queue manager can generate a unique group identifier for each message. If this is not done, unrelated messages can have the same group identifier, which might lead to incorrect processing subsequently. See the descriptions of the *GroupId* field and the MQPMO_LOGICAL_ORDER option for more information about when to reset the *GroupId* field.

The queue manager splits messages into segments as necessary so that the segments (plus any required header data) fit on the queue. However, there is a lower limit for the size of a segment generated by the queue manager, and only the last segment created from a message can be smaller than this limit (the lower limit for the size of an application-generated segment is one byte). Segments generated by the queue manager might be of unequal length. The queue-manager processes the message as follows:

- User-defined formats are split on boundaries that are multiples of 16 bytes; the queue manager does not generate segments that are smaller than 16 bytes (other than the last segment).
- Built-in formats other than MQFMT_STRING are split at points appropriate to the nature of the data present. However, the queue manager never splits a message in the middle of an IBM MQ header structure. This means that a segment containing a single MQ header structure cannot be split further by the queue manager, and as a result the minimum possible segment size for that message is greater than 16 bytes.

  The second or later segment generated by the queue manager begins with one of the following:

  – An MQ header structure
  – The start of the application message data
  – Part of the way through the application message data
- MQFMT_STRING is split without regard for the nature of the data present (SBCS, DBCS, or mixed SBCS/DBCS). When the string is DBCS or mixed SBCS/DBCS, this might result in segments that cannot be converted from one character set to another. The queue manager never splits

MQFMT_STRING messages into segments that are smaller than 16 bytes (other than the last segment).

- The queue manager sets the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQMD of each segment to describe correctly the data present at the *start* of the segment; the format name is either the name of a built-in format, or the name of a user-defined format.
- The *Report* field in the MQMD of segments with *Offset* greater than zero is modified. For each report type, if the report option is MQRO_*_WITH_DATA, but the segment cannot contain any of the first 100 bytes of user data (that is, the data following any IBM MQ header structures that may be present), the report option is changed to MQRO_*.

The queue manager follows the above rules, but otherwise splits messages unpredictably; do not make assumptions about where a message is split.

For *persistent* messages, the queue manager can perform segmentation only within a unit of work:

- If the MQPUT or MQPUT1 call is operating within a user-defined unit of work, that unit of work is used. If the call fails during the segmentation process, the queue manager removes any segments that were placed on the queue as a result of the failing call. However, the failure does not prevent the unit of work being committed successfully.
- If the call is operating outside a user-defined unit of work, and there is no user-defined unit of work in existence, the queue manager creates a unit of work just for the duration of the call. If the call is successful, the queue manager commits the unit of work automatically. If the call fails, the queue manager backs out the unit of work.
- If the call is operating outside a user-defined unit of work, but a user-defined unit of work exists, the queue manager cannot perform segmentation. If the message does not require segmentation, the call can still succeed. But if the message requires segmentation, the call fails with reason code MQRC_UOW_NOT_AVAILABLE.

For *nonpersistent* messages, the queue manager does not require a unit of work to be available in order to perform segmentation.

Take special care when converting data in messages that might be segmented:

- If the receiving application converts data on the MQGET call, and specifies the MQGMO_COMPLETE_MSG option, the data-conversion exit is passed the complete message for the exit to convert, and the fact that the message was segmented is apparent to the exit.
- If the receiving application retrieves one segment at a time, the data-conversion exit is invoked to convert one segment at a time. The exit must therefore convert the data in a segment independently of the data in any of the other segments.

  If the nature of the data in the message is such that arbitrary segmentation of the data on 16-byte boundaries might result in segments that cannot be converted by the exit, or the format is MQFMT_STRING and the character set is DBCS or mixed SBCS/DBCS, the sending application must create and put the segments, specifying MQMF_SEGMENTATION_INHIBITED to suppress further segmentation. In this way, the sending application can ensure that each segment contains sufficient information to allow the data-conversion exit to convert the segment successfully.
- If sender conversion is specified for a sending message channel agent (MCA), the MCA converts only messages that are not segments of logical messages; the MCA never attempts to convert messages that are segments.

This flag is an input flag on the MQPUT and MQPUT1 calls, and an output flag on the MQGET call. On the latter call, the queue manager also echoes the value of the flag to the *Segmentation* field in MQGMO.

The initial value of this flag is MQMF_SEGMENTATION_INHIBITED.

**Status flags**: These are flags that indicate whether the physical message belongs to a message group, is a segment of a logical message, both, or neither. One or more of the following can be specified on the MQPUT or MQPUT1 call, or returned by the MQGET call:

**MQMF_MSG_IN_GROUP**
Message is a member of a group.

**MQMF_LAST_MSG_IN_GROUP**
Message is the last logical message in a group.

If this flag is set, the queue manager turns on MQMF_MSG_IN_GROUP in the copy of MQMD that is sent with the message, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call.

It is valid for a group to consist of only one logical message. If this is the case, MQMF_LAST_MSG_IN_GROUP is set, but the *MsgSeqNumber* field has the value one.

**MQMF_SEGMENT**
Message is a segment of a logical message.

When MQMF_SEGMENT is specified without MQMF_LAST_SEGMENT, the length of the application message data in the segment ( *excluding* the lengths of any IBM MQ header structures that might be present) must be at least one. If the length is zero, the MQPUT or MQPUT1 call fails with reason code MQRC_SEGMENT_LENGTH_ZERO.

On z/OS, this option is not supported if the message is being put on a queue that has an index type of MQIT_GROUP_ID.

**MQMF_LAST_SEGMENT**
Message is the last segment of a logical message.

If this flag is set, the queue manager turns on MQMF_SEGMENT in the copy of MQMD that is sent with the message, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call.

A logical message can consist of only one segment. If so, MQMF_LAST_SEGMENT is set, but the *Offset* field has the value zero.

When MQMF_LAST_SEGMENT is specified, the length of the application message data in the segment ( *excluding* the lengths of any header structures that might be present) can be zero.

On z/OS, this option is not supported if the message is being put on a queue that has an index type of MQIT_GROUP_ID.

The application must ensure that these flags are set correctly when putting messages. If MQPMO_LOGICAL_ORDER is specified, or was specified on the preceding MQPUT call for the queue handle, the settings of the flags must be consistent with the group and segment information retained by the queue manager for the queue handle. The following conditions apply to *successive* MQPUT calls for the queue handle when MQPMO_LOGICAL_ORDER is specified:

- If there is no current group or logical message, all these flags (and combinations of them) are valid.
- Once MQMF_MSG_IN_GROUP has been specified, it must remain on until MQMF_LAST_MSG_IN_GROUP is specified. The call fails with reason code MQRC_INCOMPLETE_GROUP if this condition is not satisfied.
- Once MQMF_SEGMENT has been specified, it must remain on until MQMF_LAST_SEGMENT is specified. The call fails with reason code MQRC_INCOMPLETE_MSG if this condition is not satisfied.
- Once MQMF_SEGMENT has been specified without MQMF_MSG_IN_GROUP, MQMF_MSG_IN_GROUP must remain *off* until after MQMF_LAST_SEGMENT has been specified. The call fails with reason code MQRC_INCOMPLETE_MSG if this condition is not satisfied.

Physical order on a queue shows the valid combinations of the flags, and the values used for various fields.

These flags are input flags on the MQPUT and MQPUT1 calls, and output flags on the MQGET call. On the latter call, the queue manager also echoes the values of the flags to the *GroupStatus* and *SegmentStatus* fields in MQGMO.

You cannot use grouped or segmented messages with Publish/Subscribe.

**Default flags**: The following can be specified to indicate that the message has default attributes:

**MQMF_NONE**
No message flags (default message attributes).

This inhibits segmentation, and indicates that the message is not in a group and is not a segment of a logical message. MQMF_NONE is defined to aid program documentation. It is not intended that this flag be used with any other, but as its value is zero, such use cannot be detected.

The *MsgFlags* field is partitioned into subfields; for details see "Report options and message flags" on page 875.

The initial value of this field is MQMF_NONE. This field is ignored if *Version* is less than MQMD_VERSION_2.

*MsgId (MQBYTE24)*

This is a byte string that is used to distinguish one message from another. Generally, no two messages should have the same message identifier, although this is not disallowed by the queue manager. The message identifier is a permanent property of the message, and persists across restarts of the queue manager. Because the message identifier is a byte string and not a character string, the message identifier is *not* converted between character sets when the message flows from one queue manager to another.

For the MQPUT and MQPUT1 calls, if MQMI_NONE or MQPMO_NEW_MSG_ID is specified by the application, the queue manager generates a unique message identifier [2] when the message is put, and places it in the message descriptor sent with the message. The queue manager also returns this message identifier in the message descriptor belonging to the sending application. The application can use this value to record information about particular messages, and to respond to queries from other parts of the application.

If the message is being put to a topic, the queue manager generates unique message identifiers as necessary for each message published. If MQPMO_NEW_MSG_ID is specified by the application, the queue manager generates a unique message identifier to return on output. If MQMI_NONE is specified by the application, the value of the *MsgId* field in the MQMD is unchanged on return from the call.

See the description of MQPMO_RETAIN in "MQPMO options (MQLONG)" on page 487 for more details about retained publications.

If the message is being put to a distribution list, the queue manager generates unique message identifiers as necessary, but the value of the *MsgId* field in MQMD is unchanged on return from the call, even if MQMI_NONE or MQPMO_NEW_MSG_ID was specified. If the application needs to know the message identifiers generated by the queue manager, the application must provide MQPMR records containing the *MsgId* field.

The sending application can also specify a value for the message identifier other than MQMI_NONE; this stops the queue manager generating a unique message identifier. An application that is forwarding a message can use this to propagate the message identifier of the original message.

The queue manager does not use this field except to:

- Generate a unique value if requested, as described above
- Deliver the value to the application that issues the get request for the message
- Copy the value to the *CorrelId* field of any report message that it generates about this message (depending on the *Report* options)

[2] A *MsgId* generated by the queue manager consists of a 4-byte product identifier (AMQ¬ or CSQ¬ in either ASCII or EBCDIC, where ¬ represents a blank character), followed by a product-specific implementation of a unique string. In IBM MQ this contains the first 12 characters of the queue-manager name, and a value derived from the system clock. All queue managers that can intercommunicate must therefore have names that differ in the first 12 characters, in order to ensure that message identifiers are unique. The ability to generate a unique string also depends on the system clock not being changed backward. To eliminate the possibility of a message identifier generated by the queue manager duplicating one generated by the application, the application must avoid generating identifiers with initial characters in the range A through I in ASCII or EBCDIC (X'41' through X'49' and X'C1' through X'C9'). However, the application is not prevented from generating identifiers with initial characters in these ranges.

When the queue manager or a message channel agent generates a report message, it sets the *MsgId* field in the way specified by the *Report* field of the original message, either MQRO_NEW_MSG_ID or MQRO_PASS_MSG_ID. Applications that generate report messages must also do this.

For the MQGET call, *MsgId* is one of the five fields that can be used to retrieve a particular message from the queue. Normally the MQGET call returns the next message on the queue, but a particular message can be obtained by specifying one or more of the five selection criteria, in any combination; these fields are:

- *MsgId*
- *CorrelId*
- *GroupId*
- *MsgSeqNumber*
- *Offset*

The application sets one or more of these field to the values required, and then sets the corresponding MQMO_* match options in the *MatchOptions* field in MQGMO to use those fields as selection criteria. Only messages that have the specified values in those fields are candidates for retrieval. The default for the *MatchOptions* field (if not altered by the application) is to match both the message identifier and the correlation identifier.

On z/OS, the selection criteria that you can use are restricted by the type of index used for the queue. See the *IndexType* queue attribute for further details.

Normally, the message returned is the *first* message on the queue that satisfies the selection criteria. But if MQGMO_BROWSE_NEXT is specified, the message returned is the *next* message that satisfies the selection criteria; the scan for this message starts with the message *following* the current cursor position.

**Note:** The queue is scanned sequentially for a message that satisfies the selection criteria, so retrieval times are slower than if no selection criteria are specified, especially if many messages have to be scanned before a suitable one is found. The exceptions to this are:

- an MQGET call by *CorrelId* on 64-bit distributed platforms where the *CorrelId* index eliminates the need to perform a true sequential scan.
- an MQGET call by *IndexType* on z/OS.

In both these cases, retrieval performance is improved.

See Table 495 on page 374 for more information about how selection criteria are used in various situations.

Specifying MQMI_NONE as the message identifier has the same effect as *not* specifying MQMO_MATCH_MSG_ID, that is, *any* message identifier matches.

This field is ignored if the MQGMO_MSG_UNDER_CURSOR option is specified in the *GetMsgOpts* parameter on the MQGET call.

On return from an MQGET call, the *MsgId* field is set to the message identifier of the message returned (if any).

The following special value can be used:

**MQMI_NONE**
No message identifier is specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQMI_NONE_ARRAY is also defined; this has the same value as MQMI_NONE, but is an array of characters instead of a string.

This is an input/output field for the MQGET, MQPUT, and MQPUT1 calls. The length of this field is given by MQ_MSG_ID_LENGTH. The initial value of this field is MQMI_NONE.

*MsgSeqNumber (MQLONG)*
This is the sequence number of a logical message within a group.

Sequence numbers start at 1, and increase by 1 for each new logical message in the group, up to a maximum of 999 999 999. A physical message that is not in a group has a sequence number of 1.

The application does not have to set this field on the MQPUT or MQGET call if:

- On the MQPUT call, MQPMO_LOGICAL_ORDER is specified.
- On the MQGET call, MQMO_MATCH_MSG_SEQ_NUMBER is *not* specified.

These are the recommended ways of using these calls for messages that are not report messages. However, if the application requires more control, or the call is MQPUT1, the application must ensure that *MsgSeqNumber* is set to an appropriate value.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value described in Physical order on a queue. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message.

On input to the MQGET call, the queue manager uses the value shown in Table 495 on page 374. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The initial value of this field is one. This field is ignored if *Version* is less than MQMD_VERSION_2.

*MsgType (MQLONG)*

This indicates the type of the message. Message types are grouped as follows:

**MQMT_SYSTEM_FIRST**
Lowest value for system-defined message types.

**MQMT_SYSTEM_LAST**
Highest value for system-defined message types.

The following values are currently defined within the system range:

**MQMT_DATAGRAM**
The message is one that does not require a reply.

**MQMT_REQUEST**
The message is one that requires a reply.

Specify the name of the queue to which to send the reply in the *ReplyToQ* field. The *Report* field indicates how to set the *MsgId* and *CorrelId* of the reply.

**MQMT_REPLY**
The message is the reply to an earlier request message (MQMT_REQUEST). The message must be sent to the queue indicated by the *ReplyToQ* field of the request message. Use the *Report* field of the request to control how to set the *MsgId* and *CorrelId* of the reply.

**Note:** The queue manager does not enforce the request-reply relationship; this is an application responsibility.

**MQMT_REPORT**
The message is reporting on some expected or unexpected occurrence, usually related to some other message (for example, a request message was received that contained data that was not valid). Send the message to the queue indicated by the *ReplyToQ* field of the message descriptor of the original message. Set the *Feedback* field s to indicate the nature of the report. Use the *Report* field of the original message to control how to set the *MsgId* and *CorrelId* of the report message.

Report messages generated by the queue manager or message channel agent are always sent to the *ReplyToQ* queue, with the *Feedback* and *CorrelId* fields set as described above.

Application-defined values can also be used. They must be within the following range:

**MQMT_APPL_FIRST**
Lowest value for application-defined message types.

**MQMT_APPL_LAST**
Highest value for application-defined message types.

For the MQPUT and MQPUT1 calls, the *MsgType* value must be within either the system-defined range or the application-defined range; if it is not, the call fails with reason code MQRC_MSG_TYPE_ERROR.

This is an output field for the MQGET call, and an input field for MQPUT and MQPUT1 calls. The initial value of this field is MQMT_DATAGRAM.

*Offset (MQLONG)*

This is the offset in bytes of the data in the physical message from the start of the logical message of which the data forms part. This data is called a *segment*. The offset is in the range 0 through 999 999 999. A physical message that is not a segment of a logical message has an offset of zero.

The application does not need to set this field on the MQPUT or MQGET call if:

- On the MQPUT call, MQPMO_LOGICAL_ORDER is specified.
- On the MQGET call, MQMO_MATCH_OFFSET is *not* specified.

These are the recommended ways of using these calls for messages that are not report messages. However, if the application does not comply with these conditions, or the call is MQPUT1, the application must ensure that *Offset* is set to an appropriate value.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value described in Physical order on a queue. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message.

For a report message reporting on a segment of a logical message, the *OriginalLength* field (provided it is not MQOL_UNDEFINED) is used to update the offset in the segment information retained by the queue manager.

On input to the MQGET call, the queue manager uses the value shown in Table 495 on page 374. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The initial value of this field is zero. This field is ignored if *Version* is less than MQMD_VERSION_2.

*OriginalLength (MQLONG)*

This field is relevant only for report messages that are segments. It specifies the length of the message segment to which the report message relates; it does not specify the length of the logical message of which the segment forms part, or the length of the data in the report message.

**Note:** When generating a report message for a message that is a segment, the queue manager and message channel agent copy into the MQMD for the report message the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags*, fields from the original message. As a result, the report message is also a segment. Applications that generate report messages must do the same, and set the *OriginalLength* field correctly.

The following special value is defined:

**MQOL_UNDEFINED**
Original length of message not defined.

*OriginalLength* is an input field on the MQPUT and MQPUT1 calls, but the value that the application provides is accepted only in particular circumstances:

- If the message being put is a segment and is also a report message, the queue manager accepts the value specified. The value must be:
  - Greater than zero if the segment is not the last segment
  - Not less than zero if the segment is the last segment
  - Not less than the length of data present in the message

  If these conditions are not satisfied, the call fails with reason code MQRC_ORIGINAL_LENGTH_ERROR.

- If the message being put is a segment but not a report message, the queue manager ignores the field and uses the length of the application message data instead.
- In all other cases, the queue manager ignores the field and uses the value MQOL_UNDEFINED instead.

This is an output field on the MQGET call.

The initial value of this field is MQOL_UNDEFINED. This field is ignored if *Version* is less than MQMD_VERSION_2.

*Persistence (MQLONG)*

This indicates whether the message survives system failures and restarts of the queue manager. For the MQPUT and MQPUT1 calls, the value must be one of the following:

**MQPER_PERSISTENT**
The message survives system failures and restarts of the queue manager. Once the message has been put, and the unit of work in which it was put has been committed (if the message is put as part of a unit of work), the message is preserved on auxiliary storage. It remains there until the message is removed from the queue, and the unit of work in which it was got has been committed (if the message is retrieved as part of a unit of work).

When a persistent message is sent to a remote queue, a store-and-forward mechanism holds the message at each queue manager along the route to the destination, until the message is known to have arrived at the next queue manager.

Persistent messages cannot be placed on:

- Temporary dynamic queues
- Shared queues that map to a CFSTRUCT object at CFLEVEL(2) or below, or where the CFSTRUCT object is defined as RECOVER(NO).

Persistent messages can be placed on permanent dynamic queues, and predefined queues.

**MQPER_NOT_PERSISTENT**
The message does not usually survive system failures or queue manager restarts. This applies even if an intact copy of the message is found on auxiliary storage when the queue manager restarts.

In the case of NPMCLASS (HIGH) queues nonpersistent messages survive a normal queue manager shutdown and restart.

In the case of shared queues, nonpersistent messages survive queue manager restarts in the queue-sharing group, but do not survive failures of the coupling facility used to store messages on the shared queues.

**MQPER_PERSISTENCE_AS_Q_DEF**

- If the queue is a cluster queue, the persistence of the message is taken from the *DefPersistence* attribute defined at the *destination* queue manager that owns the particular instance of the queue on which the message is placed. Usually, all instances of a cluster queue have the same value for the *DefPersistence* attribute, although this is not mandated.

  The value of *DefPersistence* is copied into the *Persistence* field when the message is placed on the destination queue. If *DefPersistence* is changed subsequently, messages that have already been placed on the queue are not affected.
- If the queue is not a cluster queue, the persistence of the message is taken from the *DefPersistence* attribute defined at the *local* queue manager, even if the destination queue manager is remote.

  If there is more than one definition in the queue-name resolution path, the default persistence is taken from the value of this attribute in the *first* definition in the path. This can be:

  – An alias queue
  – A local queue
  – A local definition of a remote queue

- A queue-manager alias
- A transmission queue (for example, the *DefXmitQName* queue)

The value of *DefPersistence* is copied into the *Persistence* field when the message is put. If *DefPersistence* is changed subsequently, messages that have already been put are not affected.

Both persistent and nonpersistent messages can exist on the same queue.

When replying to a message, applications must use the persistence of the request message for the reply message.

For an MQGET call, the value returned is either MQPER_PERSISTENT or MQPER_NOT_PERSISTENT.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQPER_PERSISTENCE_AS_Q_DEF.

*Priority (MQLONG)*

For the MQPUT and MQPUT1 calls, the value must be greater than or equal to zero; zero is the lowest priority. The following special value can also be used:

**MQPRI_PRIORITY_AS_Q_DEF**

- If the queue is a cluster queue, the priority for the message is taken from the *DefPriority* attribute as defined at the *destination* queue manager that owns the particular instance of the queue on which the message is placed. Usually, all instances of a cluster queue have the same value for the *DefPriority* attribute, although this is not mandated.

  The value of *DefPriority* is copied into the *Priority* field when the message is placed on the destination queue. If *DefPriority* is changed subsequently, messages that have already been placed on the queue are not affected.
- If the queue is not a cluster queue, the priority for the message is taken from the *DefPriority* attribute as defined at the *local* queue manager, even if the destination queue manager is remote.

  If there is more than one definition in the queue-name resolution path, the default priority is taken from the value of this attribute in the *first* definition in the path. This can be:

  - An alias queue
  - A local queue
  - A local definition of a remote queue
  - A queue-manager alias
  - A transmission queue (for example, the *DefXmitQName* queue)

  The value of *DefPriority* is copied into the *Priority* field when the message is put. If *DefPriority* is changed subsequently, messages that have already been put are not affected.

The value returned by the MQGET call is always greater than or equal to zero; the value MQPRI_PRIORITY_AS_Q_DEF is never returned.

If a message is put with a priority greater than the maximum supported by the local queue manager (this maximum is given by the *MaxPriority* queue-manager attribute), the message is accepted by the queue manager, but placed on the queue at the queue manager's maximum priority; the MQPUT or MQPUT1 call completes with MQCC_WARNING and reason code MQRC_PRIORITY_EXCEEDS_MAXIMUM. However, the *Priority* field retains the value specified by the application that put the message.

On z/OS, if a message with a MsgSeqNumber of 1 is put to a queue that has a message delivery sequence of MQMDS_PRIORITY and an index type of MQIT_GROUP_ID, the queue might treat the message with a different priority. If the message was placed on the queue with a priority of 0 or 1, it is processed as though it has a priority of 2. This is because the order of messages placed on this type of queue is optimized to enable efficient group completeness tests. For more information on the message delivery sequence MQMDS_PRIORITY and the index type MQIT_GROUP_ID, see MsgDeliverySequence attribute.

When replying to a message, applications must use the priority of the request message for the reply message. In other situations, specifying MQPRI_PRIORITY_AS_Q_DEF allows priority tuning to be carried out without changing the application.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQPRI_PRIORITY_AS_Q_DEF.

*PutApplName (MQCHAR28)*
This is the name of application that put the message, and is part of the *origin context* of the message. The contents differ between platforms, and might differ between releases.

For more information about message context, see "Overview for MQMD" on page 403 and Message context.

The format of *PutApplName* depends on the value of *PutApplType* and can change from one release to another. Changes are rare, but do happen if the environment changes.

When the queue manager sets this field (that is, for all options except MQPMO_SET_ALL_CONTEXT), it sets the field to a value that is determined by the environment:

- z/OS On z/OS, the queue manager uses:
  - For z/OS batch, the 8-character job name from the JES JOB card
  - For TSO, the 7-character TSO user identifier
  - For CICS, the 8-character applid, followed by the 4-character tranid
  - For IMS, the 8-character IMS system identifier, followed by the 8-character PSB name
  - For XCF, the 8-character XCF group name, followed by the 16-character XCF member name
  - For a message generated by a queue manager, the first 28 characters of the queue manager name
  - For distributed queuing without CICS, the 8-character jobname of the channel initiator followed by the 8-character name of the module putting to the dead-letter queue followed by an 8-character task identifier.

  The name or names are each padded to the right with blanks, as is any space in the remainder of the field. Where there is more than one name, there is no separator between them.
- Windows On Windows systems, the queue manager uses the following names:
  - For a CICS application, the CICS transaction name
  - For a non-CICS application, the rightmost 28 characters of the fully-qualified name of the executable
- IBM i On IBM i, the queue manager uses the fully-qualified job name.
- UNIX On UNIX systems, the queue manager uses the following names:
  - For a CICS application, the CICS transaction name
  - For a non-CICS application, MQ asks the operating system for the name of the process. This is returned as the program file name, without full path. Then MQ places this process name in the MQMD.PutApplName field as follows:

    **AIX**
    If the name is less than or equal to 28 bytes, then the name is inserted, padded to the right with spaces.

    If the name is greater than 28 bytes, then the leftmost 28 bytes of the name are inserted.

    **Linux and Solaris**
    If the name is less than or equal to 15 bytes, then the name is inserted, padded to the right with spaces.

    If the name is greater than 15 bytes, then the leftmost 15 bytes of the name are inserted, padded to the right with spaces.

**HP-UX**
If the name is less than or equal to 14 bytes, then the name is inserted, padded to the right with spaces.

If the name is greater than 14 bytes, then the leftmost 14 bytes of the name are inserted, padded to the right with spaces.

For example, if you run `/opt/mqm/samp/bin/amqsput QNAME QMNAME`, then the PutApplName is `'amqsput '`. There are 21 space characters of padding in this MQCHAR28 field. Note that the full path including `/opt/mqm/samp/bin` is not included in the PutApplName.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. Any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

*PutApplType (MQLONG)*

This is the type of application that put the message, and is part of the **origin context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

*PutApplType* can have one of the following standard types. You can also define your own types, but only with values in the range MQAT_USER_FIRST through MQAT_USER_LAST.

**MQAT_AIX**
AIX application (same value as MQAT_UNIX).

V 8.0.0.4 **MQAT_AMQP**
AMQP protocol application

**MQAT_BROKER**
Broker.

**MQAT_CICS**
CICS transaction.

**MQAT_CICS_BRIDGE**
CICS bridge.

**MQAT_CICS_VSE**
CICS/VSE transaction.

**MQAT_DOS**
IBM MQ MQI client application on PC DOS.

**MQAT_DQM**
Distributed queue manager agent.

**MQAT_GUARDIAN**
Tandem Guardian application (same value as MQAT_NSK).

**MQAT_IMS**
IMS application.

**MQAT_IMS_BRIDGE**
IMS bridge.

**MQAT_JAVA**
Java.

**MQAT_MVS**
MVS or TSO application (same value as MQAT_ZOS).

**MQAT_NOTES_AGENT**
Lotus Notes® Agent application.

**MQAT_NSK**
HP Integrity NonStop Server application.

**MQAT_OS390**
OS/390® application (same value as MQAT_ZOS).

**MQAT_OS400**
IBM i application.

**MQAT_QMGR**
Queue manager.

**MQAT_UNIX**
UNIX application.

**MQAT_VOS**
Stratus VOS application.

**MQAT_WINDOWS**
16-bit Windows application.

**MQAT_WINDOWS_NT**
32-bit Windows application.

**MQAT_WLM**
z/OS workload manager application.

**MQAT_XCF**
XCF.

**MQAT_ZOS**
z/OS application.

**MQAT_DEFAULT**
Default application type.

This is the default application type for the platform on which the application is running.

**Note:** The value of this constant is environment-specific. Because of this, always compile the application using the header, include, or COPY files that are appropriate to the platform on which the application will run.

**MQAT_UNKNOWN**
Use this value to indicate that the application type is unknown, even though other context information is present.

**MQAT_USER_FIRST**
Lowest value for user-defined application type.

**MQAT_USER_LAST**
Highest value for user-defined application type.

The following special value can also occur:

**MQAT_NO_CONTEXT**
This value is set by the queue manager when a message is put with no context (that is, the MQPMO_NO_CONTEXT context option is specified).

When a message is retrieved, *PutApplType* can be tested for this value to decide whether the message has context (it is recommended that *PutApplType* is never set to MQAT_NO_CONTEXT, by an application using MQPMO_SET_ALL_CONTEXT, if any of the other context fields are nonblank).

When the queue manager generates this information as a result of an application put, the field is set to a value that is determined by the environment. On IBM i, it is set to MQAT_OS400; the queue manager never uses MQAT_CICS on IBM i.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. If MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

This is an output field for the MQGET call. The initial value of this field is MQAT_NO_CONTEXT.

*PutDate (MQCHAR8)*

This is the date when the message was put, and is part of the **origin context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

The format used for the date when this field is generated by the queue manager is:

- YYYYMMDD

where the characters represent:

**YYYY**
year (four numeric digits)

**MM**
month of year (01 through 12)

**DD**
day of month (01 through 31)

Greenwich Mean Time (GMT) is used for the *PutDate* and *PutTime* fields, subject to the system clock being set accurately to GMT.

If the message was put as part of a unit of work, the date is that when the message was put, and not the date when the unit of work was committed.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. The contents of the field are not checked by the queue manager, except that any information following a null character within the field is discarded. The queue manager converts the null character and any following characters to blanks. If MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

This is an output field for the MQGET call. The length of this field is given by MQ_PUT_DATE_LENGTH. The initial value of this field is the null string in C, and 8 blank characters in other programming languages.

*PutTime (MQCHAR8)*

This is the time when the message was put, and is part of the **origin context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

The format used for the time when this field is generated by the queue manager is:

- HHMMSSTH

where the characters represent (in order):

**HH**
hours (00 through 23)

**MM**
minutes (00 through 59)

**SS**
seconds (00 through 59; see note)

**T**
tenths of a second (0 through 9)

**H**
hundredths of a second (0 through 9)

**Note:** If the system clock is synchronized to a very accurate time standard, it is possible on rare occasions for 60 or 61 to be returned for the seconds in *PutTime*. This happens when leap seconds are inserted into the global time standard.

Greenwich Mean Time (GMT) is used for the *PutDate* and *PutTime* fields, subject to the system clock being set accurately to GMT.

If the message was put as part of a unit of work, the time is that when the message was put, and not the time when the unit of work was committed.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. The queue manager does not check the contents of the field, except that any information following a null character within the field is discarded. The queue manager converts the null character and any following characters to blanks. If MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

This is an output field for the MQGET call. The length of this field is given by MQ_PUT_TIME_LENGTH. The initial value of this field is the null string in C, and 8 blank characters in other programming languages.

*ReplyToQ (MQCHAR48)*

This is the name of the message queue to which the application that issued the get request for the message sends MQMT_REPLY and MQMT_REPORT messages. The name is the local name of a queue that is defined on the queue manager identified by *ReplyToQMgr*. This queue must not be a model queue, although the sending queue manager does not verify this when the message is put.

For the MQPUT and MQPUT1 calls, this field must not be blank if the *MsgType* field has the value MQMT_REQUEST, or if any report messages are requested by the *Report* field. However, the value specified (or substituted) is passed on to the application that issues the get request for the message, whatever the message type.

If the *ReplyToQMgr* field is blank, the local queue manager looks up the *ReplyToQ* name in its own queue definitions. If a local definition of a remote queue exists with this name, the *ReplyToQ* value in the transmitted message is replaced by the value of the *RemoteQName* attribute from the definition of the remote queue, and this value is returned in the message descriptor when the receiving application issues an MQGET call for the message. If a local definition of a remote queue does not exist, *ReplyToQ* is unchanged.

If the name is specified, it can contain trailing blanks; the first null character and characters following it are treated as blanks. Otherwise no check is made that the name satisfies the naming rules for queues; this is also true for the name transmitted, if the *ReplyToQ* is replaced in the transmitted message. The only check made is that a name has been specified, if the circumstances require it.

If a reply-to queue is not required, set the *ReplyToQ* field to blanks, or (in the C programming language) to the null string, or to one or more blanks followed by a null character; do not leave the field uninitialized.

For the MQGET call, the queue manager always returns the name padded with blanks to the length of the field.

If a message that requires a report message cannot be delivered, and the report message also cannot be delivered to the queue specified, both the original message and the report message go to the dead-letter (undelivered-message) queue (see the *DeadLetterQName* attribute described in "Attributes for the queue manager" on page 777 ).

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ReplyToQMgr (MQCHAR48)*

This is the name of the queue manager to which to send the reply message or report message. *ReplyToQ* is the local name of a queue that is defined on this queue manager.

If the *ReplyToQMgr* field is blank, the local queue manager looks up the *ReplyToQ* name in its queue definitions. If a local definition of a remote queue exists with this name, the *ReplyToQMgr* value in the transmitted message is replaced by the value of the *RemoteQMgrName* attribute from the definition of the remote queue, and this value is returned in the message descriptor when the receiving application issues an MQGET call for the message. If a local definition of a remote queue does not exist, the *ReplyToQMgr* that is transmitted with the message is the name of the local queue manager.

If the name is specified, it can contain trailing blanks; the first null character and characters following it are treated as blanks. Otherwise no check is made that the name satisfies the naming rules for queue managers, or that this name is known to the sending queue manager; this is also true for the name transmitted, if the *ReplyToQMgr* is replaced in the transmitted message.

If a reply-to queue is not required, set the *ReplyToQMgr* field to blanks, or (in the C programming language) to the null string, or to one or more blanks followed by a null character; do not leave the field uninitialized.

For the MQGET call, the queue manager always returns the name padded with blanks to the length of the field.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by MQ_Q_MGR_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*Report (MQLONG)*

A report message is a message about another message, used to inform an application about expected or unexpected events that relate to the original message. The *Report* field enables the application sending the original message to specify which report messages are required, whether the application message data is to be included in them, and also (for both reports and replies) how the message and correlation identifiers in the report or reply message are to be set. Any or all (or none) of the following types of report message can be requested:

- Exception
- Expiration
- Confirm on arrival (COA)
- Confirm on delivery (COD)
- Positive action notification (PAN)
- Negative action notification (NAN)

You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

The application that receives the report message can determine the reason that the report was generated by examining the *Feedback* field in the MQMD; see the *Feedback* field for more details.

The use of report options when putting a message to a topic can cause zero, one, or many report messages to be generated and sent to the application. This is because the publication message may be sent to zero, one, or many subscribing applications.

**Exception options**: Specify one of the options listed to request an exception report message.

**MQRO_EXCEPTION**
A message channel agent generates this type of report when a message is sent to another queue manager and the message cannot be delivered to the specified destination queue. For example, the destination queue or an intermediate transmission queue might be full, or the message might be too big for the queue.

Generation of the exception report message depends on the persistence of the original message, and the speed of the message channel (normal or fast) through which the original message travels:

- For all persistent messages, and for nonpersistent messages traveling through normal message channels, the exception report is generated *only* if the action specified by the sending application for the error condition can be completed successfully. The sending application can specify one of the following actions to control the disposition of the original message when the error condition arises:
  - MQRO_DEAD_LETTER_Q (this places the original message on the dead-letter queue).
  - MQRO_DISCARD_MSG (this discards the original message).

  If the action specified by the sending application cannot be completed successfully, the original message is left on the transmission queue, and no exception report message is generated.
- For nonpersistent messages traveling through fast message channels, the original message is removed from the transmission queue and the exception report generated *even if* the specified action for the error condition cannot be completed successfully. For example, if

MQRO_DEAD_LETTER_Q is specified, but the original message cannot be placed on the dead-letter queue because that queue is full, the exception report message is generated and the original message discarded.

For more information about normal and fast message channels, see Nonpersistent message speed (NPMSPEED).

An exception report is not generated if the application that put the original message can be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call.

Applications can also send exception reports, to indicate that a message cannot be processed (for example, because it is a debit transaction that would cause the account to exceed its credit limit).

Message data from the original message is not included with the report message.

Do not specify more than one of MQRO_EXCEPTION, MQRO_EXCEPTION_WITH_DATA, and MQRO_EXCEPTION_WITH_FULL_DATA.

**MQRO_EXCEPTION_WITH_DATA**
This is the same as MQRO_EXCEPTION, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of MQRO_EXCEPTION, MQRO_EXCEPTION_WITH_DATA, and MQRO_EXCEPTION_WITH_FULL_DATA.

**MQRO_EXCEPTION_WITH_FULL_DATA**
Exception reports with full data required.

This is the same as MQRO_EXCEPTION, except that all the application message data from the original message is included in the report message.

Do not specify more than one of MQRO_EXCEPTION, MQRO_EXCEPTION_WITH_DATA, and MQRO_EXCEPTION_WITH_FULL_DATA.

**Expiration options**: Specify one of the options listed to request an expiration report message.

**MQRO_EXPIRATION**
This type of report is generated by the queue manager if the message is discarded before delivery to an application because its expiry time has passed (see the *Expiry* field). If this option is not set, no report message is generated if a message is discarded for this reason (even if you specify one of the MQRO_EXCEPTION_* options).

Message data from the original message is not included with the report message.

Do not specify more than one of MQRO_EXPIRATION, MQRO_EXPIRATION_WITH_DATA, and MQRO_EXPIRATION_WITH_FULL_DATA.

**MQRO_EXPIRATION_WITH_DATA**
This is the same as MQRO_EXPIRATION, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of MQRO_EXPIRATION, MQRO_EXPIRATION_WITH_DATA, and MQRO_EXPIRATION_WITH_FULL_DATA.

**MQRO_EXPIRATION_WITH_FULL_DATA**
This is the same as MQRO_EXPIRATION, except that all the application message data from the original message is included in the report message.

Do not specify more than one of MQRO_EXPIRATION, MQRO_EXPIRATION_WITH_DATA, and MQRO_EXPIRATION_WITH_FULL_DATA.

**Confirm-on-arrival options**: Specify one of the options listed to request a confirm-on-arrival report message.

**MQRO_COA**
This type of report is generated by the queue manager that owns the destination queue when the message is placed on the destination queue. Message data from the original message is not included with the report message.

If the message is put as part of a unit of work, and the destination queue is a local queue, the COA report message generated by the queue manager can be retrieved only if the unit of work is committed.

A COA report is not generated if the *Format* field in the message descriptor is MQFMT_XMIT_Q_HEADER or MQFMT_DEAD_LETTER_HEADER. This prevents a COA report being generated if the message is put on a transmission queue, or is undeliverable and put on a dead-letter queue.

In the case of an IMS bridge queue, the COA report is generated when the message reaches the IMS queue (acknowledgment received from IMS ) and not when the message is put in the MQ bridge queue. That means that if IMS is not active, no COA report is generated until IMS is started and a message is queued on the IMS queue.

The user that runs a program that puts a message with MQMD.Report=MQRO_COA must have +passid authority on the reply queue. If the user does not have +passid authority, the COA report message does not reach the reply queue. An attempt is made to put the report message on the dead letter queue.

Do not specify more than one of MQRO_COA, MQRO_COA_WITH_DATA, and MQRO_COA_WITH_FULL_DATA.

**MQRO_COA_WITH_DATA**
This is the same as MQRO_COA, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of MQRO_COA, MQRO_COA_WITH_DATA, and MQRO_COA_WITH_FULL_DATA.

**MQRO_COA_WITH_FULL_DATA**
This is the same as MQRO_COA, except that all the application message data from the original message is included in the report message.

Do not specify more than one of MQRO_COA, MQRO_COA_WITH_DATA, and MQRO_COA_WITH_FULL_DATA.

**Confirm-on-delivery options**: Specify one of the options listed to request a confirm-on-delivery report message.

**MQRO_COD**
This type of report is generated by the queue manager when an application retrieves the message from the destination queue in a way that deletes the message from the queue. Message data from the original message is not included with the report message.

If the message is retrieved as part of a unit of work, the report message is generated within the same unit of work, so that the report is not available until the unit of work is committed. If the unit of work is backed out, the report is not sent.

A COD report is not always generated if a message is retrieved with the MQGMO_MARK_SKIP_BACKOUT option. If the primary unit of work is backed out but the secondary unit of work is committed, the message is removed from the queue, but a COD report is not generated.

A COD report is not generated if the *Format* field in the message descriptor is MQFMT_DEAD_LETTER_HEADER. This prevents a COD report being generated if the message is undeliverable and put on a dead-letter queue.

MQRO_COD is not valid if the destination queue is an XCF queue.

Do not specify more than one of MQRO_COD, MQRO_COD_WITH_DATA, and MQRO_COD_WITH_FULL_DATA.

**MQRO_COD_WITH_DATA**
This is the same as MQRO_COD, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

If MQGMO_ACCEPT_TRUNCATED_MSG is specified on the MQGET call for the original message, and the message retrieved is truncated, the amount of application message data placed in the report message depends on the environment:

- On z/OS, it is the minimum of:
  - The length of the original message
  - The length of the buffer used to retrieve the message
  - 100 bytes.
- In other environments, it is the minimum of:
  - The length of the original message
  - 100 bytes.

MQRO_COD_WITH_DATA is not valid if the destination queue is an XCF queue.

Do not specify more than one of MQRO_COD, MQRO_COD_WITH_DATA, and MQRO_COD_WITH_FULL_DATA.

**MQRO_COD_WITH_FULL_DATA**
This is the same as MQRO_COD, except that all the application message data from the original message is included in the report message.

MQRO_COD_WITH_FULL_DATA is not valid if the destination queue is an XCF queue.

Do not specify more than one of MQRO_COD, MQRO_COD_WITH_DATA, and MQRO_COD_WITH_FULL_DATA.

**Action-notification options**: Specify one or both of the options listed to request that the receiving application send a positive-action or negative-action report message.

**MQRO_PAN**
This type of report is generated by the application that retrieves the message and acts upon it. It indicates that the action requested in the message has been performed successfully. The application generating the report determines whether any data is to be included with the report.

Other than conveying this request to the application retrieving the message, the queue manager takes no action based on this option. The retrieving application must generate the report if appropriate.

**MQRO_NAN**
This type of report is generated by the application that retrieves the message and acts upon it. It indicates that the action requested in the message has *not* been performed successfully. The application generating the report determines whether any data is to be included with the report. For example, you might want to include some data indicating why the request could not be performed.

Other than conveying this request to the application retrieving the message, the queue manager takes no action based on this option. The retrieving application must generate the report if appropriate.

The application must determine which conditions correspond to a positive action and which correspond to a negative action. However, if the request has been only partially performed, generate a NAN report rather than a PAN report if requested. Every possible condition must correspond to either a positive action, or a negative action, but not both.

**Message-identifier options**: Specify one of the options listed to control how the *MsgId* of the report message (or of the reply message) is to be set.

**MQRO_NEW_MSG_ID**
This is the default action, and indicates that if a report or reply is generated as a result of this message, a new *MsgId* is generated for the report or reply message.

**MQRO_PASS_MSG_ID**
If a report or reply is generated as a result of this message, the *MsgId* of this message is copied to the *MsgId* of the report or reply message.

The *MsgId* of a publication message will be different for each subscriber that receives a copy of the publication and therefore the *MsgId* copied into the report or reply message will be different for each one.

If this option is not specified, MQRO_NEW_MSG_ID is assumed.

**Correlation-identifier options**: Specify one of the options listed to control how the *CorrelId* of the report message (or of the reply message) is to be set.

**MQRO_COPY_MSG_ID_TO_CORREL_ID**
This is the default action, and indicates that if a report or reply is generated as a result of this message, the *MsgId* of this message is copied to the *CorrelId* of the report or reply message.

The *MsgId* of a publication message will be different for each subscriber that receives a copy of the publication and therefore the *MsgId* copied into the *CorrelId* of the report or reply message will be different for each one.

**MQRO_PASS_CORREL_ID**
If a report or reply is generated as a result of this message, the *CorrelId* of this message is copied to the *CorrelId* of the report or reply message.

The *CorrelId* of a publication message will be specific to a subscriber unless it uses the MQSO_SET_CORREL_ID option and sets the SubCorrelId field in the MQSD to MQCI_NONE. Therefore it is possible that the *CorrelId* copied into the *CorrelId* of the report or reply message will be different for each one.

If this option is not specified, MQRO_COPY_MSG_ID_TO_CORREL_ID is assumed.

Servers replying to requests or generating report messages must check whether the MQRO_PASS_MSG_ID or MQRO_PASS_CORREL_ID options were set in the original message. If they were, the servers must take the action described for those options. If neither is set, the servers must take the corresponding default action.

**Disposition options**: Specify one of the options listed to control the disposition of the original message when it cannot be delivered to the destination queue. The application can set the disposition options independently of requesting exception reports.

**MQRO_DEAD_LETTER_Q**
This is the default action, and places the message on the dead-letter queue if the message cannot be delivered to the destination queue. This happens in the following situations:

- When the application that put the original message cannot be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call. An exception report message is generated, if one was requested by the sender.
- When the application that put the original message was putting to a topic

**MQRO_DISCARD_MSG**
This discards the message if it cannot be delivered to the destination queue. This happens in the following situations:

- When the application that put the original message cannot be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call. An exception report message is generated, if one was requested by the sender.
- When the application that put the original message was putting to a topic

If you want to return the original message to the sender, without the original message being placed on the dead-letter queue, the sender must specify MQRO_DISCARD_MSG with MQRO_EXCEPTION_WITH_FULL_DATA.

**MQRO_PASS_DISCARD_AND_EXPIRY**
If this option is set on a message, and a report or reply is generated because of it, the message descriptor of the report inherits:

- MQRO_DISCARD_MSG if it was set.
- The remaining expiry time of the message (if this is not an expiry report). If this is an expiry report the expiry time is set to 60 seconds.

**Activity option**

**MQRO_ACTIVITY**
Using this value allows the route of **any** message to be traced throughout a queue manager network. The report option can be specified on any current user message, instantly allowing you to begin calculating the route of the message through the network.

If the application generating the message cannot switch on activity reports, reports can be turned on using an API crossing exit supplied by queue manager administrators.

**Note:**

1. The fewer the queue managers in the network that are able to generate activity reports, the less detailed the route.
2. The activity reports might be difficult to place in the correct order to determine the route taken.
3. The activity reports might not be able to find a route to their requested destination.
4. Messages with this report option set must be accepted by any queue manager, even if they do not understand the option. This allows the report option to be set on any user message, even if they are processed by a non Version 6.0 or later queue manager.
5. If a process, either a queue manager or a user process, performs an activity on a message with this option set it can choose to generate and put an activity report.

**Default option**: Specify the following if no report options are required:

**MQRO_NONE**
Use this value to indicate that no other options have been specified. MQRO_NONE is defined to aid program documentation. It is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

**General information**:

1. All report types required must be specifically requested by the application sending the original message. For example, if a COA report is requested but an exception report is not, a COA report is generated when the message is placed on the destination queue, but no exception report is generated if the destination queue is full when the message arrives there. If no *Report* options are set, no report messages are generated by the queue manager or message channel agent (MCA).

   Some report options can be specified even though the local queue manager does not recognize them; this is useful when the option is to be processed by the *destination* queue manager. See "Report options and message flags" on page 875 for more details.

   If a report message is requested, the name of the queue to which to send the report must be specified in the *ReplyToQ* field. When a report message is received, the nature of the report can be determined by examining the *Feedback* field in the message descriptor.
2. If the queue manager or MCA that generates a report message cannot put the report message on the reply queue (for example, because the reply queue or transmission queue is full), the report message is placed instead on the dead-letter queue. If that *also* fails, or there is no dead-letter queue, the action taken depends on the type of the report message:

   - If the report message is an exception report, the message that generated the exception report is left on its transmission queue; this ensures that the message is not lost.
   - For all other report types, the report message is discarded and processing continues normally. This is done because either the original message has already been delivered safely (for COA or COD report messages), or is no longer of any interest (for an expiration report message).

Once a report message has been placed successfully on a queue (either the destination queue or an intermediate transmission queue), the message is no longer subject to special processing; it is treated just like any other message.

3. When the report is generated, the *ReplyToQ* queue is opened and the report message put using the authority of the *UserIdentifier* in the MQMD of the message causing the report, except in the following cases:
   - Exception reports generated by a receiving MCA are put with whatever authority the MCA used when it tried to put the message causing the report.
   - COA reports generated by the queue manager are put with whatever authority was used when the message causing the report was put on the queue manager generating the report. For example, if the message was put by a receiving MCA using the MCA's user identifier, the queue manager puts the COA report using the MCA's user identifier.

   Applications generating reports must use the same authority as they use to generate a reply; this is usually the authority of the user identifier in the original message.

   If the report has to travel to a remote destination, senders and receivers can decide whether to accept it, in the same way as they do for other messages.
4. If a report message with data is requested:
   - The report message is always generated with the amount of data requested by the sender of the original message. If the report message is too big for the reply queue, the processing described above occurs; the report message is never truncated to fit on the reply queue.
   - If the *Format* of the original message is MQFMT_XMIT_Q_HEADER, the data included in the report does not include the MQXQH. The report data starts with the first byte of the data beyond the MQXQH in the original message. This occurs whether or not the queue is a transmission queue.
5. If a COA, COD, or expiration report message is received at the reply queue, it is guaranteed that the original message arrived, was delivered, or expired, as appropriate. However, if one or more of these report messages is requested and is *not* received, the reverse cannot be assumed, because one of the following might have occurred:
   a. The report message is held up because a link is down.
   b. The report message is held up because a blocking condition exists at an intermediate transmission queue or at the reply queue (for example, the queue is full or inhibited for puts).
   c. The report message is on a dead-letter queue.
   d. When the queue manager was attempting to generate the report message, it could neither put it on the appropriate queue, nor on the dead-letter queue, so the report message could not be generated.
   e. A failure of the queue manager occurred between the action being reported (arrival, delivery, or expiry), and generation of the corresponding report message. (This does not happen for COD report messages if the application retrieves the original message within a unit of work, as the COD report message is generated within the same unit of work.)

   Exception report messages can be held up in the same way for reasons 1, 2, and 3 above. However, when an MCA cannot generate an exception report message (the report message cannot be put either on the reply queue or the dead-letter queue), the original message remains on the transmission queue at the sender, and the channel is closed. This occurs irrespective of whether the report message was to be generated at the sending or the receiving end of the channel.
6. If the original message is temporarily blocked (resulting in an exception report message being generated and the original message being put on a dead-letter queue), but the blockage clears and an application then reads the original message from the dead-letter queue and puts it again to its destination, the following might occur:
   - Even though an exception report message has been generated, the original message eventually arrives successfully at its destination.

- More than one exception report message is generated in respect of a single original message, because the original message might encounter another blockage later.

**Report messages when putting to a topic**:

1. Reports can be generated when putting a message to a topic. This message will be sent to all subscribers to the topic, which could be zero, one, or many. This should be taken into account when choosing to use report options as many report messages could be generated as a result.
2. When putting a message to a topic, there may be many destination queues that are to be given a copy of the message. If some of these destination queues have a problem, such as queue full, then the successful completion of the MQPUT depends on the setting of NPMSGDLV or PMSGDLV (depending on the persistence of the message). If the setting is such that message delivery to the destination queue must be successful (for example, it is a persistent message to a durable subscriber and PMSGDLV is set to ALL or ALLDUR), then success is defined as one of the following criteria being met:
   - Successful put to the subscriber queue
   - Use of MQRO_DEAD_LETTER_Q and a successful put to the Dead-letter queue if the subscriber queue cannot take the message
   - Use of MQRO_DISCARD_MSG if the subscriber queue cannot take the message.

**Report messages for message segments**:

1. Report messages can be requested for messages that have segmentation allowed (see the description of the MQMF_SEGMENTATION_ALLOWED flag). If the queue manager finds it necessary to segment the message, a report message can be generated for each of the segments that subsequently encounters the relevant condition. Applications must be prepared to receive multiple report messages for each type of report message requested. Use the *GroupId* field in the report message to correlate the multiple reports with the group identifier of the original message, and the *Feedback* field identify the type of each report message.
2. If MQGMO_LOGICAL_ORDER is used to retrieve report messages for segments, be aware that reports of *different types* might be returned by the successive MQGET calls. For example, if both COA and COD reports are requested for a message that is segmented by the queue manager, the MQGET calls for the report messages might return the COA and COD report messages interleaved in an unpredictable fashion. Avoid this by using the MQGMO_COMPLETE_MSG option (optionally with MQGMO_ACCEPT_TRUNCATED_MSG). MQGMO_COMPLETE_MSG causes the queue manager to reassemble report messages that have the same report type. For example, the first MQGET call might reassemble all the COA messages relating to the original message, and the second MQGET call might reassemble all the COD messages. Which is reassembled first depends on which type of report message occurs first on the queue.
3. Applications that themselves put segments can specify different report options for each segment. However, note the following points:
   - If the segments are retrieved using the MQGMO_COMPLETE_MSG option, only the report options in the *first* segment are honored by the queue manager.
   - If the segments are retrieved one by one, and most of them have one of the MQRO_COD_* options, but at least one segment does not, you cannot use the MQGMO_COMPLETE_MSG option to retrieve the report messages with a single MQGET call, or use the MQGMO_ALL_SEGMENTS_AVAILABLE option to detect when all the report messages have arrived.
4. In an MQ network, the queue managers can have different capabilities. If a report message for a segment is generated by a queue manager or MCA that does not support segmentation, the queue manager or MCA does not by default include the necessary segment information in the report message, and this might make it difficult to identify the original message that caused the report to be generated. Avoid this difficulty by requesting data with the report message, that is, by specifying the appropriate MQRO_*_WITH_DATA or MQRO_*_WITH_FULL_DATA options. However, be aware that if MQRO_*_WITH_DATA is specified, *less than* 100 bytes of application message data might be returned to the application that retrieves the report message, if the report message is generated by a queue manager or MCA that does not support segmentation.

**Contents of the message descriptor for a report message**: When the queue manager or message channel agent (MCA) generates a report message, it sets the fields in the message descriptor to the following values, and then puts the message in the normal way.

| Field in MQMD | Value used |
|---|---|
| *StrucId* | MQMD_STRUC_ID |
| *Version* | MQMD_VERSION_2 |
| *Report* | MQRO_NONE |
| *MsgType* | MQMT_REPORT |
| *Expiry* | MQEI_UNLIMITED |
| *Feedback* | As appropriate for the nature of the report (MQFB_COA, MQFB_COD, MQFB_EXPIRATION, or an MQRC_* value) |
| *Encoding* | Copied from the original message descriptor |
| *CodedCharSetId* | Copied from the original message descriptor |
| *Format* | Copied from the original message descriptor |
| *Priority* | Copied from the original message descriptor |
| *Persistence* | Copied from the original message descriptor |
| *MsgId* | As specified by the report options in the original message descriptor |
| *CorrelId* | As specified by the report options in the original message descriptor |
| *BackoutCount* | 0 |
| *ReplyToQ* | Blanks |
| *ReplyToQMgr* | Name of queue manager |
| *UserIdentifier* | As set by the MQPMO_PASS_IDENTITY_CONTEXT option |
| *AccountingToken* | As set by the MQPMO_PASS_IDENTITY_CONTEXT option |
| *ApplIdentityData* | As set by the MQPMO_PASS_IDENTITY_CONTEXT option |
| *PutApplType* | MQAT_QMGR, or as appropriate for the message channel agent |
| *PutApplName* | First 28 bytes of the queue-manager name or message channel agent name. For report messages generated by the IMS bridge, this field contains the XCF group name and XCF member name of the IMS system to which the message relates. |
| *PutDate* | Date when report message is sent |
| *PutTime* | Time when report message is sent |
| *ApplOriginData* | Blanks |
| *GroupId* | Copied from the original message descriptor |
| *MsgSeqNumber* | Copied from the original message descriptor |
| *Offset* | Copied from the original message descriptor |
| *MsgFlags* | Copied from the original message descriptor |
| *OriginalLength* | Copied from the original message descriptor if not MQOL_UNDEFINED, and set to the length of the original message data otherwise |

An application generating a report is recommended to set similar values, except for the following:

- The *ReplyToQMgr* field can be set to blanks (the queue manager changes this to the name of the local queue manager when the message is put).
- Set the context fields using the option that would have been used for a reply, normally MQPMO_PASS_IDENTITY_CONTEXT.

**Analyzing the report field**: The *Report* field contains subfields; because of this, applications that need to check whether the sender of the message requested a particular report must use one of the techniques described in "Analyzing the report field" on page 877.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is MQRO_NONE.

*StrucId (MQCHAR4)*

This is the structure identifier, and must be:

**MQMD_STRUC_ID**
Identifier for message descriptor structure.

For the C programming language, the constant MQMD_STRUC_ID_ARRAY is also defined; this has the same value as MQMD_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQMD_STRUC_ID.

*UserIdentifier (MQCHAR12)*

This is part of the **identity context** of the message. For more information about message context, see "Overview for MQMD" on page 403 and Message context.

*UserIdentifier* specifies the user identifier of the application that originated the message. The queue manager treats this information as character data, but does not define the format of it.

After a message has been received, use *UserIdentifier* in the *AlternateUserId* field of the *ObjDesc* parameter of a subsequent MQOPEN or MQPUT1 call to perform the authorization check for the *UserIdentifier* user instead of the application performing the open.

When the queue manager generates this information for an MQPUT or MQPUT1 call:

- On z/OS, the queue manager uses the *AlternateUserId* from the *ObjDesc* parameter of the MQOPEN or MQPUT1 call if the MQOO_ALTERNATE_USER_AUTHORITY or MQPMO_ALTERNATE_USER_AUTHORITY option was specified. If the relevant option was not specified, the queue manager uses a user identifier determined from the environment.
- In other environments, the queue manager always uses a user identifier determined from the environment.

When the user identifier is determined from the environment:

- On z/OS, the queue manager uses:
  - For MVS (batch), the user identifier from the JES JOB card or started task
  - For TSO, the user identifier propagated to the job during job submission
  - For CICS, the user identifier associated with the task
  - For IMS, the user identifier depends on the type of application:
    - For:
      - Nonmessage BMP regions
      - Nonmessage IFP regions
      - Message BMP and message IFP regions that have *not* issued a successful GU call

      the queue manager uses the user identifier from the region JES JOB card or the TSO user identifier. If these are blank or null, it uses the name of the program specification block (PSB).
    - For:

- Message BMP and message IFP regions that *have* issued a successful GU call
- MPP regions

the queue manager uses one of:

- The signed-on user identifier associated with the message
- The logical terminal (LTERM) name
- The user identifier from the region JES JOB card
- The TSO user identifier
- The PSB name

- On IBM i, the queue manager uses the name of the user profile associated with the application job.
- On UNIX systems, the queue manager uses:
  - The application's logon name
  - The effective user identifier of the process if no logon is available
  - The user identifier associated with the transaction, if the application is a CICS transaction
- On Windows systems, the queue manager uses the first 12 characters of the logged-on user name.

This field is normally an output field generated by the queue manager but for an MQPUT or MQPUT1 call you can make this field an input/output field and specify the UserIdentification field instead of letting the queue manager generate this information. Specify either MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT in the PutMsgOpts parameter and specify a user ID in the UserIdentifier field if you do not want the queue manager to generate the UserIdentifier field for an MQPUT or MQPUT1 call.

For the MQPUT and MQPUT1 calls, this is an input/output field if MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT is specified in the *PutMsgOpts* parameter. Any information following a null character within the field is discarded. The queue manager converts the null character and any following characters to blanks. If MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *UserIdentifier* that was transmitted with the message if it was put to a queue. This will be the value of *UserIdentifier* that is kept with the message if it is retained (see description of MQPMO_RETAIN for more details about retained publications) but is not used as the *UserIdentifier* when the message is sent as a publication to subscribers because they provide a value to override *UserIdentifier* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by MQ_USER_ID_LENGTH. The initial value of this field is the null string in C, and 12 blank characters in other programming languages.

*Version (MQLONG)*

This is the structure version number, and must be one of the following:

**MQMD_VERSION_1**
Version-1 message descriptor structure.

This version is supported in all environments.

**MQMD_VERSION_2**
Version-2 message descriptor structure.

This version is supported in all IBM MQ V6.0 and later environments, plus IBM MQ MQI clients connected to these systems.

**Note:** When a version-2 MQMD is used, the queue manager performs additional checks on any MQ header structures that might be present at the beginning of the application message data; for further details see the usage notes for the MQPUT call.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQMD_CURRENT_VERSION**
Current version of message descriptor structure.

This is always an input field. The initial value of this field is MQMD_VERSION_1.

## *Initial values and language declarations for MQMD*

*Table 504. Initial values of fields in MQMD for MQMD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQMD_STRUC_ID | 'MD' |
| *Version* | MQMD_VERSION_1 | 1 |
| *Report* | MQRO_NONE | 0 |
| *MsgType* | MQMT_DATAGRAM | 8 |
| *Expiry* | MQEI_UNLIMITED | -1 |
| *Feedback* | MQFB_NONE | 0 |
| *Encoding* | MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | MQCCSI_Q_MGR | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Priority* | MQPRI_PRIORITY_AS_Q_DEF | -1 |
| *Persistence* | MQPER_PERSISTENCE_AS_Q_DEF | 2 |
| *MsgId* | MQMI_NONE | Nulls |
| *CorrelId* | MQCI_NONE | Nulls |
| *BackoutCount* | None | 0 |
| *ReplyToQ* | None | Null string or blanks |
| *ReplyToQMgr* | None | Null string or blanks |
| *UserIdentifier* | None | Null string or blanks |
| *AccountingToken* | MQACT_NONE | Nulls |
| *ApplIdentityData* | None | Null string or blanks |
| *PutApplType* | MQAT_NO_CONTEXT | 0 |
| *PutApplName* | None | Null string or blanks |
| *PutDate* | None | Null string or blanks |
| *PutTime* | None | Null string or blanks |
| *ApplOriginData* | None | Null string or blanks |
| *GroupId* | MQGI_NONE | Nulls |
| *MsgSeqNumber* | None | 1 |
| *Offset* | None | 0 |
| *MsgFlags* | MQMF_NONE | 0 |
| *OriginalLength* | MQOL_UNDEFINED | -1 |

| *Table 504. Initial values of fields in MQMD for MQMD (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |

**Notes:**

1. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
2. In the C programming language, the macro variable MQMD_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQMD MyMD = {MQMD_DEFAULT};
```

*C declaration*

```
typedef struct tagMQMD MQMD;
struct tagMQMD {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    Report;            /* Options for report messages */
  MQLONG    MsgType;           /* Message type */
  MQLONG    Expiry;            /* Message lifetime */
  MQLONG    Feedback;          /* Feedback or reason code */
  MQLONG    Encoding;          /* Numeric encoding of message data */
  MQLONG    CodedCharSetId;    /* Character set identifier of message
                                  data */
  MQCHAR8   Format;            /* Format name of message data */
  MQLONG    Priority;          /* Message priority */
  MQLONG    Persistence;       /* Message persistence */
  MQBYTE24  MsgId;             /* Message identifier */
  MQBYTE24  CorrelId;          /* Correlation identifier */
  MQLONG    BackoutCount;      /* Backout counter */
  MQCHAR48  ReplyToQ;          /* Name of reply queue */
  MQCHAR48  ReplyToQMgr;       /* Name of reply queue manager */
  MQCHAR12  UserIdentifier;    /* User identifier */
  MQBYTE32  AccountingToken;   /* Accounting token */
  MQCHAR32  ApplIdentityData;  /* Application data relating to
                                  identity */
  MQLONG    PutApplType;       /* Type of application that put the
                                  message */
  MQCHAR28  PutApplName;       /* Name of application that put the
                                  message */
  MQCHAR8   PutDate;           /* Date when message was put */
  MQCHAR8   PutTime;           /* Time when message was put */
  MQCHAR4   ApplOriginData;    /* Application data relating to origin */
  MQBYTE24  GroupId;           /* Group identifier */
  MQLONG    MsgSeqNumber;      /* Sequence number of logical message
                                  within group */
  MQLONG    Offset;            /* Offset of data in physical message
                                  from start of logical message */
  MQLONG    MsgFlags;          /* Message flags */
  MQLONG    OriginalLength;    /* Length of original message */
};
```

*COBOL declaration*

```
**   MQMD structure
  10 MQMD.
**    Structure identifier
   15 MQMD-STRUCID          PIC X(4).
**    Structure version number
   15 MQMD-VERSION          PIC S9(9) BINARY.
**    Options for report messages
   15 MQMD-REPORT           PIC S9(9) BINARY.
**    Message type
   15 MQMD-MSGTYPE          PIC S9(9) BINARY.
**    Message lifetime
   15 MQMD-EXPIRY           PIC S9(9) BINARY.
**    Feedback or reason code
```

```
   15 MQMD-FEEDBACK         PIC S9(9) BINARY.
**    Numeric encoding of message data
   15 MQMD-ENCODING         PIC S9(9) BINARY.
**    Character set identifier of message data
   15 MQMD-CODEDCHARSETID   PIC S9(9) BINARY.
**    Format name of message data
   15 MQMD-FORMAT           PIC X(8).
**    Message priority
   15 MQMD-PRIORITY         PIC S9(9) BINARY.
**    Message persistence
   15 MQMD-PERSISTENCE      PIC S9(9) BINARY.
**    Message identifier
   15 MQMD-MSGID            PIC X(24).
**    Correlation identifier
   15 MQMD-CORRELID         PIC X(24).
**    Backout counter
   15 MQMD-BACKOUTCOUNT     PIC S9(9) BINARY.
**    Name of reply queue
   15 MQMD-REPLYTOQ         PIC X(48).
**    Name of reply queue manager
   15 MQMD-REPLYTOQMGR      PIC X(48).
**    User identifier
   15 MQMD-USERIDENTIFIER   PIC X(12).
**    Accounting token
   15 MQMD-ACCOUNTINGTOKEN  PIC X(32).
**    Application data relating to identity
   15 MQMD-APPLIDENTITYDATA PIC X(32).
**    Type of application that put the message
   15 MQMD-PUTAPPLTYPE      PIC S9(9) BINARY.
**    Name of application that put the message
   15 MQMD-PUTAPPLNAME      PIC X(28).
**    Date when message was put
   15 MQMD-PUTDATE          PIC X(8).
**    Time when message was put
   15 MQMD-PUTTIME          PIC X(8).
**    Application data relating to origin
   15 MQMD-APPLORIGINDATA   PIC X(4).
**    Group identifier
   15 MQMD-GROUPID          PIC X(24).
**    Sequence number of logical message within group
   15 MQMD-MSGSEQNUMBER     PIC S9(9) BINARY.
**    Offset of data in physical message from start of logical message
   15 MQMD-OFFSET           PIC S9(9) BINARY.
**    Message flags
   15 MQMD-MSGFLAGS         PIC S9(9) BINARY.
**    Length of original message
   15 MQMD-ORIGINALLENGTH   PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQMD based,
  3 StrucId          char(4),       /* Structure identifier */
  3 Version          fixed bin(31), /* Structure version number */
  3 Report           fixed bin(31), /* Options for report messages */
  3 MsgType          fixed bin(31), /* Message type */
  3 Expiry           fixed bin(31), /* Message lifetime */
  3 Feedback         fixed bin(31), /* Feedback or reason code */
  3 Encoding         fixed bin(31), /* Numeric encoding of message
                                       data */
  3 CodedCharSetId   fixed bin(31), /* Character set identifier of
                                       message data */
  3 Format           char(8),       /* Format name of message data */
  3 Priority         fixed bin(31), /* Message priority */
  3 Persistence      fixed bin(31), /* Message persistence */
  3 MsgId            char(24),      /* Message identifier */
  3 CorrelId         char(24),      /* Correlation identifier */
  3 BackoutCount     fixed bin(31), /* Backout counter */
  3 ReplyToQ         char(48),      /* Name of reply queue */
  3 ReplyToQMgr      char(48),      /* Name of reply queue manager */
  3 UserIdentifier   char(12),      /* User identifier */
  3 AccountingToken  char(32),      /* Accounting token */
  3 ApplIdentityData char(32),      /* Application data relating to
                                       identity */
  3 PutApplType      fixed bin(31), /* Type of application that put the
                                       message */
  3 PutApplName      char(28),      /* Name of application that put the
                                       message */
  3 PutDate          char(8),       /* Date when message was put */
```

```
  3 PutTime          char(8),       /* Time when message was put */
  3 ApplOriginData   char(4),       /* Application data relating to
                                      origin */
  3 GroupId          char(24),      /* Group identifier */
  3 MsgSeqNumber     fixed bin(31), /* Sequence number of logical
                                      message within group */
  3 Offset           fixed bin(31), /* Offset of data in physical
                                      message from start of logical
                                      message */
  3 MsgFlags         fixed bin(31), /* Message flags */
  3 OriginalLength   fixed bin(31); /* Length of original message */
```

*High Level Assembler declaration*

```
MQMD                    DSECT
MQMD_STRUCID            DS   CL4   Structure identifier
MQMD_VERSION            DS   F     Structure version number
MQMD_REPORT             DS   F     Options for report messages
MQMD_MSGTYPE            DS   F     Message type
MQMD_EXPIRY             DS   F     Message lifetime
MQMD_FEEDBACK           DS   F     Feedback or reason code
MQMD_ENCODING           DS   F     Numeric encoding of message data
MQMD_CODEDCHARSETID     DS   F     Character set identifier of message
*                                  data
MQMD_FORMAT             DS   CL8   Format name of message data
MQMD_PRIORITY           DS   F     Message priority
MQMD_PERSISTENCE        DS   F     Message persistence
MQMD_MSGID              DS   XL24  Message identifier
MQMD_CORRELID           DS   XL24  Correlation identifier
MQMD_BACKOUTCOUNT       DS   F     Backout counter
MQMD_REPLYTOQ           DS   CL48  Name of reply queue
MQMD_REPLYTOQMGR        DS   CL48  Name of reply queue manager
MQMD_USERIDENTIFIER     DS   CL12  User identifier
MQMD_ACCOUNTINGTOKEN    DS   XL32  Accounting token
MQMD_APPLIDENTITYDATA   DS   CL32  Application data relating to identity
MQMD_PUTAPPLTYPE        DS   F     Type of application that put the
*                                  message
MQMD_PUTAPPLNAME        DS   CL28  Name of application that put the
*                                  message
MQMD_PUTDATE            DS   CL8   Date when message was put
MQMD_PUTTIME            DS   CL8   Time when message was put
MQMD_APPLORIGINDATA     DS   CL4   Application data relating to origin
MQMD_GROUPID            DS   XL24  Group identifier
MQMD_MSGSEQNUMBER       DS   F     Sequence number of logical message
*                                  within group
MQMD_OFFSET             DS   F     Offset of data in physical message
*                                  from start of logical message
MQMD_MSGFLAGS           DS   F     Message flags
MQMD_ORIGINALLENGTH     DS   F     Length of original message
*
MQMD_LENGTH             EQU  *-MQMD
                        ORG  MQMD
MQMD_AREA               DS   CL(MQMD_LENGTH)
```

*Visual Basic declaration*

```
Type MQMD
  StrucId          As String*4  'Structure identifier'
  Version          As Long      'Structure version number'
  Report           As Long      'Options for report messages'
  MsgType          As Long      'Message type'
  Expiry           As Long      'Message lifetime'
  Feedback         As Long      'Feedback or reason code'
  Encoding         As Long      'Numeric encoding of message data'
  CodedCharSetId   As Long      'Character set identifier of message'
                                'data'
  Format           As String*8  'Format name of message data'
  Priority         As Long      'Message priority'
  Persistence      As Long      'Message persistence'
  MsgId            As MQBYTE24  'Message identifier'
  CorrelId         As MQBYTE24  'Correlation identifier'
  BackoutCount     As Long      'Backout counter'
  ReplyToQ         As String*48 'Name of reply queue'
  ReplyToQMgr      As String*48 'Name of reply queue manager'
  UserIdentifier   As String*12 'User identifier'
  AccountingToken  As MQBYTE32  'Accounting token'
```

```
  ApplIdentityData As String*32 'Application data relating to identity'
  PutApplType      As Long      'Type of application that put the'
                                'message'
  PutApplName      As String*28 'Name of application that put the'
                                'message'
  PutDate          As String*8  'Date when message was put'
  PutTime          As String*8  'Time when message was put'
  ApplOriginData   As String*4  'Application data relating to origin'
  GroupId          As MQBYTE24  'Group identifier'
  MsgSeqNumber     As Long      'Sequence number of logical message'
                                'within group'
  Offset           As Long      'Offset of data in physical message'
                                'from start of logical message'
  MsgFlags         As Long      'Message flags'
  OriginalLength   As Long      'Length of original message'
End Type
```

## MQMDE - Message descriptor extension

The following table summarizes the fields in the structure.

*Table 505. Fields in MQMDE*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQMDE structure | StrucLength |
| *Encoding* | Numeric encoding of data that follows MQMDE | Encoding |
| *CodedCharSetId* | Character set identifier of data that follows MQMDE | CodedCharSetId |
| *Format* | Format name of data that follows MQMDE | Format |
| *Flags* | General flags | Flags |
| *GroupId* | Group identifier | GroupId |
| *MsgSeqNumber* | Sequence number of logical message within group | MsgSeqNumber |
| *Offset* | Offset of data in physical message from start of logical message | Offset |
| *MsgFlags* | Message flags | MsgFlags |
| *OriginalLength* | Length of original message | OriginalLength |

### *Overview for MQMDE*

**Availability**: All IBM MQ systems, plus IBM MQ clients connected to these systems.

**Purpose**: The MQMDE structure describes the data that sometimes occurs preceding the application message data. The structure contains those MQMD fields that exist in the version-2 MQMD, but not in the version-1 MQMD.

**Format name**: MQFMT_MD_EXTENSION.

**Character set and encoding**: Data in MQMDE must be in the character set and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE for the C programming language.

Set the character set and encoding of the MQMDE into the *CodedCharSetId* and *Encoding* fields in:

- The MQMD (if the MQMDE structure is at the start of the message data), or
- The header structure that precedes the MQMDE structure (all other cases).

If the MQMDE is not in the queue manager's character set and encoding, the MQMDE is accepted but not honored, that is, the MQMDE is treated as message data.

**Note:** On Windows, applications compiled with Micro Focus COBOL use a value of MQENC_NATIVE that is different from the queue-manager's encoding. Although numeric fields in the MQMD structure on the MQPUT, MQPUT1, and MQGET calls must be in the Micro Focus COBOL encoding, numeric fields in the MQMDE structure must be in the queue-manager's encoding. This latter is given by MQENC_NATIVE for the C programming language, and has the value 546.

**Usage**: Applications that use a version-2 MQMD will not encounter an MQMDE structure. However, specialized applications, and applications that continue to use a version-1 MQMD, might encounter an MQMDE in some situations. The MQMDE structure can occur in the following circumstances:

- Specified on the MQPUT and MQPUT1 calls
- Returned by the MQGET call
- In messages on transmission queues

**MQMDE specified on MQPUT and MQPUT1 calls**: On the MQPUT and MQPUT1 calls, if the application provides a version-1 MQMD, the application can optionally prefix the message data with an MQMDE, setting the *Format* field in MQMD to MQFMT_MD_EXTENSION to indicate that an MQMDE is present. If the application does not provide an MQMDE, the queue manager assumes default values for the fields in the MQMDE. The default values that the queue manager uses are the same as the initial values for the structure; see Table 507 on page 456.

If the application provides a version-2 MQMD *and* prefixes the application message data with an MQMDE, the structures are processed as shown in Table 506 on page 453.

*Table 506. Queue-manager action when MQMDE specified on MQPUT or MQPUT1 for MQMDE*

| MQMD version | Values of version-2 fields | Values of corresponding fields in MQMDE | Action taken by queue manager |
|---|---|---|---|
| 1 | - | Valid | MQMDE is honored |
| 2 | Default | Valid | MQMDE is honored |
| 2 | Not default | Valid | MQMDE is treated as message data |
| 1 or 2 | Any | Not valid | Call fails with an appropriate reason code |
| 1 or 2 | Any | MQMDE is in the wrong character set or encoding, or is an unsupported version | MQMDE is treated as message data |

**Note:** On z/OS, if the application specifies a version-1 MQMD with an MQMDE, the queue manager validates the MQMDE only if the queue has an *IndexType* of MQIT_GROUP_ID.

There is one special case. If the application uses a version-2 MQMD to put a message that is a segment (that is, the MQMF_SEGMENT or MQMF_LAST_SEGMENT flag is set), and the format name in the MQMD is MQFMT_DEAD_LETTER_HEADER, the queue manager generates an MQMDE structure and inserts it *between* the MQDLH structure and the data that follows it. In the MQMD that the queue manager retains with the message, the version-2 fields are set to their default values.

Several of the fields that exist in the version-2 MQMD but not the version-1 MQMD are input/output fields on MQPUT and MQPUT1. However, the queue manager does *not* return any values in the equivalent fields in the MQMDE on output from the MQPUT and MQPUT1 calls; if the application requires those output values, it must use a version-2 MQMD.

**MQMDE returned by MQGET call**: On the MQGET call, if the application provides a version-1 MQMD, the queue manager prefixes the message returned with an MQMDE, but only if one or more of the fields in

the MQMDE has a nondefault value. The queue manager sets the *Format* field in MQMD to the value MQFMT_MD_EXTENSION to indicate that an MQMDE is present.

If the application provides an MQMDE at the start of the *Buffer* parameter, the MQMDE is ignored. On return from the MQGET call, it is replaced by the MQMDE for the message (if one is needed), or overwritten by the application message data (if the MQMDE is not needed).

If the MQGET call returns an MQMDE, the data in the MQMDE is usually in the queue manager's character set and encoding. However the MQMDE might be in some other character set and encoding if:

- The MQMDE was treated as data on the MQPUT or MQPUT1 call (see Table 506 on page 453 for the circumstances that can cause this).
- The message was received from a remote queue manager connected by a TCP connection, and the receiving message channel agent (MCA) was not set up correctly.

**Note:** On Windows, applications compiled with Micro Focus COBOL use a value of MQENC_NATIVE that is different from the queue-manager's encoding (see above).

**MQMDE in messages on transmission queues**: Messages on transmission queues are prefixed with the MQXQH structure, which contains within it a version-1 MQMD. An MQMDE might also be present, positioned between the MQXQH structure and application message data, but it is usually present only if one or more of the fields in the MQMDE has a nondefault value.

Other MQ header structures can also occur between the MQXQH structure and the application message data. For example, when the dead-letter header MQDLH is present, and the message is not a segment, the order is:

- MQXQH (containing a version-1 MQMD)
- MQMDE
- MQDLH
- application message data

## *Fields for MQMDE*

The MQMDE structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This specifies the character set identifier of the data that follows the MQMDE structure; it does not apply to character data in the MQMDE structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that this field is valid. The following special value can be used:

**MQCCSI_INHERIT**
Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

MQCCSI_INHERIT cannot be used if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

This value is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

The initial value of this field is MQCCSI_UNDEFINED.

*Encoding (MQLONG)*

This specifies the numeric encoding of the data that follows the MQMDE structure; it does not apply to numeric data in the MQMDE structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that the field is valid. See the *Encoding* field described in "MQMD - Message descriptor" on page 402 for more information about data encodings.

The initial value of this field is MQENC_NATIVE.

*Flags (MQLONG)*

The following flag can be specified:

**MQMDEF_NONE**
No flags.

The initial value of this field is MQMDEF_NONE.

*Format (MQCHAR8)*

This specifies the format name of the data that follows the MQMDE structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that this field is valid. See the *Format* field described in"MQMD - Message descriptor" on page 402for more information about format names.

The initial value of this field is MQFMT_NONE.

*GroupId (MQBYTE24)*

See the *GroupId* field described in"MQMD - Message descriptor" on page 402. The initial value of this field is MQGI_NONE.

*MsgFlags (MQLONG)*

See the *MsgFlags* field described in "MQMD - Message descriptor" on page 402. The initial value of this field is MQMF_NONE.

*MsgSeqNumber (MQLONG)*

See the *MsgSeqNumber* field described in"MQMD - Message descriptor" on page 402. The initial value of this field is 1.

*Offset (MQLONG)*

See the *Offset* field described in"MQMD - Message descriptor" on page 402. The initial value of this field is 0.

*OriginalLength (MQLONG)*

See the *OriginalLength* field described in"MQMD - Message descriptor" on page 402. The initial value of this field is MQOL_UNDEFINED.

*StrucId (MQCHAR4)*

The value must be:

**MQMDE_STRUC_ID**
Identifier for message descriptor extension structure.

For the C programming language, the constant MQMDE_STRUC_ID_ARRAY is also defined; this has the same value as MQMDE_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQMDE_STRUC_ID.

*StrucLength (MQLONG)*

This is the length of the MQMDE structure; the following value is defined:

**MQMDE_LENGTH_2**
Length of version-2 message descriptor extension structure.

The initial value of this field is MQMDE_LENGTH_2.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQMDE_VERSION_2**
Version-2 message descriptor extension structure.

The following constant specifies the version number of the current version:

**MQMDE_CURRENT_VERSION**
Current version of message descriptor extension structure.

The initial value of this field is MQMDE_VERSION_2.

## *Initial values and language declarations for MQMDE*

*Table 507. Initial values of fields in MQMDE for MQMDE*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQMDE_STRUC_ID | 'MDE¬' |
| *Version* | MQMDE_VERSION_2 | 2 |
| *StrucLength* | MQMDE_LENGTH_2 | 72 |
| *Encoding* | MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQMDEF_NONE | 0 |
| *GroupId* | MQGI_NONE | Nulls |
| *MsgSeqNumber* | None | 1 |
| *Offset* | None | 0 |
| *MsgFlags* | MQMF_NONE | 0 |
| *OriginalLength* | MQOL_UNDEFINED | -1 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQMDE_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQMDE MyMDE = {MQMDE_DEFAULT};
```

*C declaration*

```
typedef struct tagMQMDE MQMDE;
struct tagMQMDE {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    StrucLength;     /* Length of MQMDE structure */
  MQLONG    Encoding;        /* Numeric encoding of data that follows
                                MQMDE */
  MQLONG    CodedCharSetId;  /* Character-set identifier of data that
                                follows MQMDE */
```

```
  MQCHAR8   Format;          /* Format name of data that follows
                                MQMDE */
  MQLONG    Flags;           /* General flags */
  MQBYTE24  GroupId;         /* Group identifier */
  MQLONG    MsgSeqNumber;    /* Sequence number of logical message
                                within group */
  MQLONG    Offset;          /* Offset of data in physical message from
                                start of logical message */
  MQLONG    MsgFlags;        /* Message flags */
  MQLONG    OriginalLength;  /* Length of original message */
};
```

*COBOL declaration*

```
**   MQMDE structure
  10 MQMDE.
**    Structure identifier
   15 MQMDE-STRUCID        PIC X(4).
**    Structure version number
   15 MQMDE-VERSION        PIC S9(9) BINARY.
**    Length of MQMDE structure
   15 MQMDE-STRUCLENGTH    PIC S9(9) BINARY.
**    Numeric encoding of data that follows MQMDE
   15 MQMDE-ENCODING       PIC S9(9) BINARY.
**    Character-set identifier of data that follows MQMDE
   15 MQMDE-CODEDCHARSETID PIC S9(9) BINARY.
**    Format name of data that follows MQMDE
   15 MQMDE-FORMAT         PIC X(8).
**    General flags
   15 MQMDE-FLAGS          PIC S9(9) BINARY.
**    Group identifier
   15 MQMDE-GROUPID        PIC X(24).
**    Sequence number of logical message within group
   15 MQMDE-MSGSEQNUMBER   PIC S9(9) BINARY.
**    Offset of data in physical message from start of logical message
   15 MQMDE-OFFSET         PIC S9(9) BINARY.
**    Message flags
   15 MQMDE-MSGFLAGS       PIC S9(9) BINARY.
**    Length of original message
   15 MQMDE-ORIGINALLENGTH PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQMDE based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 StrucLength    fixed bin(31), /* Length of MQMDE structure */
  3 Encoding       fixed bin(31), /* Numeric encoding of data that
                                     follows MQMDE */
  3 CodedCharSetId fixed bin(31), /* Character-set identifier of data
                                     that follows MQMDE */
  3 Format         char(8),       /* Format name of data that follows
                                     MQMDE */
  3 Flags          fixed bin(31), /* General flags */
  3 GroupId        char(24),      /* Group identifier */
  3 MsgSeqNumber   fixed bin(31), /* Sequence number of logical message
                                     within group */
  3 Offset         fixed bin(31), /* Offset of data in physical message
                                     from start of logical message */
  3 MsgFlags       fixed bin(31), /* Message flags */
  3 OriginalLength fixed bin(31); /* Length of original message */
```

*High Level Assembler declaration*

```
MQMDE                 DSECT
MQMDE_STRUCID         DS   CL4   Structure identifier
MQMDE_VERSION         DS   F     Structure version number
MQMDE_STRUCLENGTH     DS   F     Length of MQMDE structure
MQMDE_ENCODING        DS   F     Numeric encoding of data that follows
*                                MQMDE
MQMDE_CODEDCHARSETID  DS   F     Character-set identifier of data that
*                                follows MQMDE
```

```
MQMDE_FORMAT          DS   CL8   Format name of data that follows MQMDE
MQMDE_FLAGS           DS   F     General flags
MQMDE_GROUPID         DS   XL24  Group identifier
MQMDE_MSGSEQNUMBER    DS   F     Sequence number of logical message
*                                within group
MQMDE_OFFSET          DS   F     Offset of data in physical message from
*                                start of logical message
MQMDE_MSGFLAGS        DS   F     Message flags
MQMDE_ORIGINALLENGTH  DS   F     Length of original message
*
MQMDE_LENGTH          EQU  *-MQMDE
                      ORG  MQMDE
MQMDE_AREA            DS   CL(MQMDE_LENGTH)
```

*Visual Basic declaration*

```
Type MQMDE
  StrucId        As String*4 'Structure identifier'
  Version        As Long     'Structure version number'
  StrucLength    As Long     'Length of MQMDE structure'
  Encoding       As Long     'Numeric encoding of data that follows'
                             'MQMDE'
  CodedCharSetId As Long     'Character-set identifier of data that'
                             'follows MQMDE'
  Format         As String*8 'Format name of data that follows MQMDE'
  Flags          As Long     'General flags'
  GroupId        As MQBYTE24 'Group identifier'
  MsgSeqNumber   As Long     'Sequence number of logical message within'
                             'group'
  Offset         As Long     'Offset of data in physical message from'
                             'start of logical message'
  MsgFlags       As Long     'Message flags'
  OriginalLength As Long     'Length of original message'
End Type
```

## MQMHBO - Message handle to buffer options

The following table summarizes the fields in the structure. MQMHBO structure - message handle to buffer options

*Table 508. Fields in MQMHBO*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options controlling the action of MQMHBUF | Options |

### *Overview for MQMHBO*

**Availability**: All IBM MQ systems and IBM MQ MQI clients.

**Purpose**: The MQMHBO structure allows applications to specify options that control how buffers are produced from message handles. The structure is an input parameter on the MQMHBUF call.

**Character set and encoding**: Data in MQMHBO must be in the character set of the application and encoding of the application (MQENC_NATIVE).

### *Fields for MQMHBO*

Message handle to buffer options structure - fields

The MQMHBO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*
Message handle to buffer options structure - Options field

These options control the action of MQMHBUF.

You must specify the following option:

**MQMHBO_PROPERTIES_IN_MQRFH2**
When converting properties from a message handle into a buffer, convert them into the MQRFH2 format.

Optionally, you can also specify the following option. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**MQMHBO_DELETE_PROPERTIES**
Properties that are added to the buffer are deleted from the message handle. If the call fails no properties are deleted.

This is always an input field. The initial value of this field is MQMHBO_PROPERTIES_IN_MQRFH2.

*StrucId (MQCHAR4)*
Message handle to buffer options structure - StrucId field

This is the structure identifier. The value must be:

**MQMHBO_STRUC_ID**
Identifier for message handle to buffer options structure.

For the C programming language, the constant MQMHBO_STRUC_ID_ARRAY is also defined; this has the same value as MQMHBO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQMHBO_STRUC_ID.

*Version (MQLONG)*
Message handle to buffer options structure - Version field

This is the structure version number. The value must be:

**MQMHBO_VERSION_1**
Version number for message handle to buffer options structure.

The following constant specifies the version number of the current version:

**MQMHBO_CURRENT_VERSION**
Current version of message handle to buffer options structure.

This is always an input field. The initial value of this field is MQMHBO_VERSION_1.

## *Initial values and language declarations for MQMHBO*

Message handle to buffer structure - Initial values

*Table 509. Initial values of fields in MQMHBO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQMHBO_STRUC_ID | 'MHBO' |
| *Version* | MQMHBO_VERSION_1 | 1 |
| *Options* | MQMHBO_PROPERTIES_IN_MQRFH2 | |

**Notes:**

1. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
2. In the C programming language, the macro variable MQMHBO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQMHBO MyMHBO = {MQMHBO_DEFAULT};
```

*C declaration*
Message handle to buffer options structure - C language declaration

```
typedef struct tagMQMHBO MQMHBO;
struct tagMQMHBO {
  MQCHAR4  StrucId;        /* Structure identifier */
  MQLONG   Version;        /* Structure version number */
  MQLONG   Options;        /* Options that control the action of
                              MQMHBUF */
};
```

*COBOL declaration*
Message handle to buffer options structure - COBOL language declaration

```
**  MQMHBO structure
  10 MQMHBO.
**    Structure identifier
   15 MQMHBO-STRUCID               PIC X(4).
**    Structure version number
   15 MQMHBO-VERSION               PIC S9(9) BINARY.
**    Options that control the action of MQMHBUF
   15 MQMHBO-OPTIONS               PIC S9(9) BINARY.
```

*PL/I declaration*
Message handle to buffer options structure - PL/I language declaration

```
Dcl
 1 MQMHBO based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 Options        fixed bin(31), /* Options that control the action
                                     of MQMHBUF */
```

*High Level Assembler declaration*
Message handle to buffer options structure - Assembler language declaration

```
MQMHBO                   DSECT
MQMHBO_STRUCID           DS   CL4  Structure identifier
MQMHBO_VERSION           DS   F    Structure version number
MQMHBO_OPTIONS           DS   F    Options that control the
*                                  action of MQMHBUF
MQMHBO_LENGTH            EQU  *-MQMHBO
MQMHBO_AREA              DS   CL(MQMHBO_LENGTH)
```

## MQOD - Object descriptor

The following table summarizes the fields in the structure.

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *ObjectType* | Object type | ObjectType |
| *ObjectName* | Object name | ObjectName |
| *ObjectQMgrName* | Object queue manager name | ObjectQMgrName |
| *DynamicQName* | Dynamic queue name | DynamicQName |
| *AlternateUserId* | Alternate user identifier | AlternateUserId |

| Field | Description | Topic |
|---|---|---|
| **Note:** The remaining fields are ignored if *Version* is less than MQOD_VERSION_2. | | |
| *RecsPresent* | Number of object records present | RecsPresent |
| *KnownDestCount* | Number of local queues opened successfully | KnownDestCount |
| *UnknownDestCount* | Number of remote queues opened successfully | UnknownDestCount |
| *InvalidDestCount* | Number of queues that failed to open | InvalidDestCount |
| *ObjectRecOffset* | Offset of first object record from start of MQOD | ObjectRecOffset |
| *ResponseRecOffset* | Offset of first response record from start of MQOD | ResponseRecOffset |
| *ObjectRecPtr* | Address of first object record | ObjectRecPtr |
| *ResponseRecPtr* | Address of first response record | ResponseRecPtr |
| **Note:** The remaining fields are ignored if *Version* is less than MQOD_VERSION_3. | | |
| *AlternateSecurityId* | Alternate security identifier | AlternateSecurityId |
| *ResolvedQName* | Resolved queue name | ResolvedQName |
| *ResolvedQMgrName* | Resolved queue manager name | ResolvedQMgrName |
| **Note:** The remaining fields are ignored if *Version* is less than MQOD_VERSION_4. | | |
| *ObjectString* | Long object name | ObjectString |
| *SelectionString* | Selection string | SelectionString |
| *ResObjectString* | Resolved long object name | ResObjectString |
| *ResolvedType* | Resolved object type | ResolvedType |

### *Overview for MQOD*

**Availability**: All IBM MQ systems, plus IBM MQ MQI clients connected to those systems.

**Purpose**: The MQOD structure is used to specify an object by name. The following types of object are valid:

- Queue or distribution list
- Namelist
- Process definition
- Queue manager
- Topic

The structure is an input/output parameter on the MQOPEN and MQPUT1 calls.

**Version**: The current version of MQOD is MQOD_VERSION_4. Applications that you want to port between several environments must ensure that the required version of MQOD is supported in all the environments concerned. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQOD that is supported by the environment, but with the initial value of the *Version* field set to MQOD_VERSION_1. To use fields that are not present in the version-1 structure, the application must set the *Version* field to the version number of the version required.

To open a distribution list, *Version* must be MQOD_VERSION_2 or greater.

**Character set and encoding**: Data in MQOD must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

## *Fields for MQOD*

The MQOD structure contains the following fields; the fields are described in **alphabetical order**:

*AlternateSecurityId (MQBYTE40)*

This is a security identifier that is passed with the *AlternateUserId* to the authorization service to allow appropriate authorization checks to be performed. *AlternateSecurityId* is used only if:

- MQOO_ALTERNATE_USER_AUTHORITY is specified on the MQOPEN call, or
- MQPMO_ALTERNATE_USER_AUTHORITY is specified on the MQPUT1 call,

*and* the *AlternateUserId* field is not entirely blank up to the first null character or the end of the field.

On Windows, *AlternateSecurityId* can be used to supply the Windows security identifier (SID) that uniquely identifies the *AlternateUserId*. The SID for a user can be obtained from the Windows system by use of the `LookupAccountName()` Windows API call.

On z/OS, this field is ignored.

The *AlternateSecurityId* field has the following structure:

- The first byte is a binary integer containing the length of the significant data that follows; the value excludes the length byte itself. If no security identifier is present, the length is zero.
- The second byte indicates the type of security identifier that is present; the following values are possible:

  **MQSIDT_NT_SECURITY_ID**
  Windows security identifier.

  **MQSIDT_NONE**
  No security identifier.
- The third and subsequent bytes up to the length defined by the first byte contain the security identifier itself.
- Remaining bytes in the field are set to binary zero.

You can use the following special value:

**MQSID_NONE**
No security identifier specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQSID_NONE_ARRAY is also defined; this has the same value as MQSID_NONE, but is an array of characters instead of a string.

This is an input field. The length of this field is given by MQ_SECURITY_ID_LENGTH. The initial value of this field is MQSID_NONE. This field is ignored if *Version* is less than MQOD_VERSION_3.

*AlternateUserId (MQCHAR12)*

If you specify MQOO_ALTERNATE_USER_AUTHORITY for the MQOPEN call, or MQPMO_ALTERNATE_USER_AUTHORITY for the MQPUT1 call, this field contains an alternative user identifier that is used to check the authorization for the open, in place of the user identifier that the application is currently running under. Some checks, however, are still carried out with the current user identifier (for example, context checks).

If MQOO_ALTERNATE_USER_AUTHORITY or MQPMO_ALTERNATE_USER_AUTHORITY is specified and this field is entirely blank up to the first null character or the end of the field, the open can succeed only if no user authorization is needed to open this object with the options specified.

If neither MQOO_ALTERNATE_USER_AUTHORITY nor MQPMO_ALTERNATE_USER_AUTHORITY is specified, this field is ignored.

The following differences exist in the environments indicated:

- On z/OS, only the first 8 characters of *AlternateUserId* are used to check the authorization for the open. However, the current user identifier must be authorized to specify this particular alternative user identifier; all 12 characters of the alternative user identifier are used for this check. The user identifier must contain only characters allowed by the external security manager.

  If *AlternateUserId* is specified for a queue, the value can be used subsequently by the queue manager when messages are put. If the MQPMO_*_CONTEXT options specified on the MQPUT or MQPUT1 call cause the queue manager to generate the identity context information, the queue manager places the *AlternateUserId* into the *UserIdentifier* field in the MQMD of the message, in place of the current user identifier.
- In other environments, *AlternateUserId* is used only for access control checks on the object being opened. If the object is a queue, *AlternateUserId* does not affect the content of the *UserIdentifier* field in the MQMD of messages sent using that queue handle.

This is an input field. The length of this field is given by MQ_USER_ID_LENGTH. The initial value of this field is the null string in C, and 12 blank characters in other programming languages.

*DynamicQName (MQCHAR48)*

This is the name of a dynamic queue that is to be created by the MQOPEN call. This is of relevance only when *ObjectName* specifies the name of a model queue; in all other cases *DynamicQName* is ignored.

The characters that are valid in the name are the same as those for *ObjectName*, except that an asterisk is also valid. A name that is blank (or one in which only blanks occur before the first null character) is not valid if *ObjectName* is the name of a model queue.

If the last nonblank character in the name is an asterisk ( *), the queue manager replaces the asterisk with a string of characters that guarantees that the name generated for the queue is unique at the local queue manager. To allow a sufficient number of characters for this, the asterisk is valid only in positions 1 through 33. There must be no characters other than blanks or a null character following the asterisk.

It is valid for the asterisk to occur in the first character position, in which case the name consists solely of the characters generated by the queue manager.

On z/OS, do not use a name with the asterisk in the first character position, as there can be no security checks made on a queue with a full name that is generated automatically.

This is an input field. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is determined by the environment:

- On z/OS, the value is `'CSQ.*'`.
- On other platforms, the value is `'AMQ.*'`.

The value is a null-terminated string in C, and a blank-padded string in other programming languages.

*InvalidDestCount (MQLONG)*

This is the number of queues in the distribution list that failed to open successfully. If present, this field is also set when opening a single queue that is not in a distribution list.

**Note:** If present, this field is set *only* if the *CompCode* parameter on the MQOPEN or MQPUT1 call is MQCC_OK or MQCC_WARNING; it is *not* set if the *CompCode* parameter is MQCC_FAILED.

This is an output field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_1.

*KnownDestCount (MQLONG)*

This is the number of queues in the distribution list that resolve to local queues and that were opened successfully. The count does not include queues that resolve to remote queues (even though a local transmission queue is used initially to store the message). If present, this field is also set when opening a single queue that is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_1.

*ObjectName (MQCHAR48)*

This is the local name of the object as defined on the queue manager identified by *ObjectQMgrName*. The name can contain the following characters:

- Uppercase alphabetic characters (A through Z)
- Lowercase alphabetic characters (a through z)
- Numeric digits (0 through 9)
- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but can contain trailing blanks. Use a null character to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply in the environments indicated:

- On systems that use EBCDIC Katakana, lowercase characters cannot be used.
- On z/OS:
  - Avoid names that begin or end with an underscore; they cannot be processed by the operations and control panels.
  - The percent character has a special meaning to RACF. If RACF is used as the external security manager, names must not contain the percent. If they do, those names are not included in any security checks when RACF generic profiles are used.
- On IBM i, names containing lowercase characters, forward slash, or percent, must be enclosed in quotation marks when specified on commands. These quotation marks must not be specified for names that occur as fields in structures or as parameters on calls.

The full topic name can be built from two different fields: *ObjectName* and *ObjectString*. For details of how these two fields are used, see “Using topic strings” on page 560.

The following points apply to the types of object indicated:

- If *ObjectName* is the name of a model queue, the queue manager creates a dynamic queue with the attributes of the model queue, and returns in the *ObjectName* field the name of the queue created. A model queue can be specified only on the MQOPEN call; a model queue is not valid on the MQPUT1 call.
- If *ObjectName* is the name of an alias queue with TARGTYPE(TOPIC), a security check is first made on the named alias queue; this is normal when alias queues are used. When the security check completes successfully, the MQOPEN call will continue and will behave like an MQOPEN call on an MQOT_TOPIC; this includes making a security check against the administrative topic object.
- If *ObjectName* and *ObjectQMgrName* identify a shared queue owned by the queue-sharing group to which the local queue manager belongs, there must not also be a queue definition of the same name on the local queue manager. If there is such a definition (a local queue, alias queue, remote queue, or model queue), the call fails with reason code MQRC_OBJECT_NOT_UNIQUE.
- If the object being opened is a distribution list (that is, *RecsPresent* is present and greater than zero), *ObjectName* must be blank or the null string. If this condition is not satisfied, the call fails with reason code MQRC_OBJECT_NAME_ERROR.
- If *ObjectType* is MQOT_Q_MGR, special rules apply; in this case the name must be entirely blank up to the first null character or the end of the field.

This is an input/output field for the MQOPEN call when *ObjectName* is the name of a model queue, and an input-only field in all other cases. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ObjectQMgrName (MQCHAR48)*

This is the name of the queue manager on which the *ObjectName* object is defined. The characters that are valid in the name are the same as those for *ObjectName* (see "ObjectName (MQCHAR48)" on page 464 ). A name that is entirely blank up to the first null character or the end of the field denotes the queue manager to which the application is connected (the local queue manager).

The following points apply to the types of object indicated:

- If *ObjectType* is MQOT_TOPIC, MQOT_NAMELIST, MQOT_PROCESS, or MQOT_Q_MGR, *ObjectQMgrName* must be blank or the name of the local queue manager.
- If *ObjectName* is the name of a model queue, the queue manager creates a dynamic queue with the attributes of the model queue, and returns in the *ObjectQMgrName* field the name of the queue manager on which the queue is created; this is the name of the local queue manager. A model queue can be specified only on the MQOPEN call; a model queue is not valid on the MQPUT1 call.
- If *ObjectName* is the name of a cluster queue, and *ObjectQMgrName* is blank, the destination of messages sent using the queue handle returned by the MQOPEN call is chosen by the queue manager (or cluster workload exit, if one is installed) as follows:
  - If MQOO_BIND_ON_OPEN is specified, the queue manager selects a particular instance of the cluster queue while processing the MQOPEN call, and all messages put using this queue handle are sent to that instance.
  - If MQOO_BIND_NOT_FIXED is specified, the queue manager can choose a different instance of the destination queue (residing on a different queue manager in the cluster) for each successive MQPUT call that uses this queue handle.

  If the application needs to send a message to a *specific* instance of a cluster queue (that is, a queue instance that resides on a particular queue manager in the cluster), the application must specify the name of that queue manager in the *ObjectQMgrName* field. This forces the local queue manager to send the message to the specified destination queue manager.
- If *ObjectName* is the name of a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *ObjectQMgrName* can be the name of the queue-sharing group, the name of the local queue manager, or blank; the message is placed on the same queue whichever of these values is specified.

  Queue-sharing groups are supported only on z/OS.
- If *ObjectName* is the name of a shared queue that is owned by a remote queue-sharing group (that is, a queue-sharing group to which the local queue manager does *not* belong), *ObjectQMgrName* must be the name of the queue-sharing group. You can use the name of a queue manager that belongs to that group, but this can delay the message if that particular queue manager is not available when the message arrives at the queue-sharing group.
- If the object being opened is a distribution list (that is, *RecsPresent* is greater than zero), *ObjectQMgrName* must be blank or the null string. If this condition is not satisfied, the call fails with reason code MQRC_OBJECT_Q_MGR_NAME_ERROR.

This is an input/output field for the MQOPEN call when *ObjectName* is the name of a model queue, and an input-only field in all other cases. The length of this field is given by MQ_Q_MGR_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ObjectRecOffset (MQLONG)*

This is the offset in bytes of the first MQOR object record from the start of the MQOD structure. The offset can be positive or negative. *ObjectRecOffset* is used only when a distribution list is being opened. The field is ignored if *RecsPresent* is zero.

When a distribution list is being opened, an array of one or more MQOR object records must be provided in order to specify the names of the destination queues in the distribution list. This can be done in one of two ways:

- By using the offset field *ObjectRecOffset*.

  In this case, the application must declare its own structure containing an MQOD followed by the array of MQOR records (with as many array elements as are needed), and set *ObjectRecOffset* to the offset of the first element in the array from the start of the MQOD. Ensure that this offset is correct and has a value that can be accommodated within an MQLONG (the most restrictive programming language is COBOL, for which the valid range is -999 999 999 through +999 999 999).

  Use *ObjectRecOffset* for programming languages that do not support the pointer data type, or that implement the pointer data type in a way that is not portable to different environments (for example, the COBOL programming language).

- By using the pointer field *ObjectRecPtr*.

  In this case, the application can declare the array of MQOR structures separately from the MQOD structure, and set *ObjectRecPtr* to the address of the array.

  Use *ObjectRecPtr* for programming languages that support the pointer data type in a way that is portable to different environments (for example, the C programming language).

Whatever technique you choose, use one of *ObjectRecOffset* and *ObjectRecPtr* ; the call fails with reason code MQRC_OBJECT_RECORDS_ERROR if both are zero, or both are nonzero.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_2.

*ObjectRecPtr (MQPTR)*

This is the address of the first MQOR object record. *ObjectRecPtr* is used only when a distribution list is being opened. The field is ignored if *RecsPresent* is zero.

You can use either *ObjectRecPtr* or *ObjectRecOffset* to specify the object records, but not both; for the description of the *ObjectRecOffset* field, see "ObjectRecOffset (MQLONG)" on page 465. If you do not use *ObjectRecPtr*, set it to the null pointer or null bytes.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQOD_VERSION_2.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length, with the initial value being the all-null byte string.

*ObjectString (MQCHARV)*
The ObjectString field specifies the long object name.

This specifies the long object name to be used. This field is only referenced for certain values of *ObjectType*, and is ignored for all other values. See the description of *ObjectType* for details of which values indicate that this field is used.

If *ObjectString* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code MQRC_OBJECT_STRING_ERROR.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

The full topic name can be built from two different fields: *ObjectName* and *ObjectString*. For details of how these two fields are used, see "Using topic strings" on page 560.

*ObjectType (MQLONG)*

The type of object being named in the object descriptor. Possible values are:

**MQOT_CLNTCONN_CHANNEL**
Client connection channel. The name of the object is found in the *ObjectName* field.

**MQOT_Q**
Queue. The name of the object is found in the *ObjectName* field.

**MQOT_NAMELIST**
Namelist. The name of the object is found in the *ObjectName* field

**MQOT_PROCESS**
Process definition. The name of the object is found in the *ObjectName* field

**MQOT_Q_MGR**
Queue manager. The name of the object is found in the *ObjectName* field

**MQOT_TOPIC**
Topic. The full topic name can be built from two different fields: *ObjectName* and *ObjectString*.

For details of how those two fields are used, see "Using topic strings" on page 560.

This is always an input field. The initial value of this field is MQOT_Q.

*RecsPresent (MQLONG)*

This is the number of MQOR object records that have been provided by the application. If this number is greater than zero, it indicates that a distribution list is being opened, with *RecsPresent* being the number of destination queues in the list. A distribution list can contain only one destination.

The value of *RecsPresent* must not be less than zero, and if it is greater than zero *ObjectType* must be MQOT_Q; the call fails with reason code MQRC_RECS_PRESENT_ERROR if these conditions are not satisfied.

On z/OS, this field must be zero.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_2.

*ResObjectString (MQCHARV)*
The ResObjectString field is the long object name after the queue manager resolves the name provided in the *ObjectName* field.

This field is returned only for topics and queue aliases that reference a topic object.

If the long object name is provided in *ObjectString* and nothing is provided in *ObjectName*, then the value returned in this field is the same as provided in *ObjectString*.

If this field is omitted (that is ResObjectString.VSBufSize is zero) then the *ResObjectString* will not be returned, but the length will be returned in ResObjectString.VSLength.

If the buffer length (provided in ResObjectStrng.VSBufSize) is shorter than the full *ResObjectString*, the string will be truncated and will return as many of the rightmost characters as can fit in the provided buffer.

If *ResObjectString* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code MQRC_RES_OBJECT_STRING_ERROR.

*ResolvedQMgrName (MQCHAR48)*

This is the name of the destination queue manager after the local queue manager resolves the name. The name returned is the name of the queue manager that owns the queue identified by *ResolvedQName*. *ResolvedQMgrName* can be the name of the local queue manager.

If *ResolvedQName* is a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *ResolvedQMgrName* is the name of the queue-sharing group. If the queue is owned by some other queue-sharing group, *ResolvedQName* can be the name of the queue-sharing group or the name of a queue manager that is a member of the queue-sharing group (the nature of the value returned is determined by the queue definitions that exist at the local queue manager).

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *ResolvedQMgrName* is set to blanks:

- Not a queue
- A queue, but not opened for browse, input, or output
- A cluster queue with MQOO_BIND_NOT_FIXED specified (or with MQOO_BIND_AS_Q_DEF in effect when the *DefBind* queue attribute has the value MQBND_BIND_NOT_FIXED)
- A distribution list

This is an output field. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages. This field is ignored if *Version* is less than MQOD_VERSION_3.

*ResolvedQName (MQCHAR48)*

This is the name of the destination queue after the local queue manager resolves the name. The name returned is the name of a queue that exists on the queue manager identified by *ResolvedQMgrName*.

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *ResolvedQName* is set to blanks:

- Not a queue
- A queue, but not opened for browse, input, or output
- A distribution list
- An alias queue that references a topic object (refer to ResObjectString instead).
- An alias queue that resolves to a topic object.

This is an output field. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages. This field is ignored if *Version* is less than MQOD_VERSION_3.

*ResolvedType (MQLONG)*
The type of the resolved (base) object being opened.

The possible values are:

**MQOT_Q**
The resolved object is a queue. This value applies when a queue is opened directly or when an alias queue pointing to a queue is opened.

**MQOT_TOPIC**
The resolved object is a topic. This value applies when a topic is opened directly or when an alias queue pointing to a topic object is opened.

**MQOT_NONE**
The resolved type is neither a queue nor a topic.

*ResponseRecOffset (MQLONG)*

This is the offset in bytes of the first MQRR response record from the start of the MQOD structure. The offset can be positive or negative. *ResponseRecOffset* is used only when a distribution list is being opened. The field is ignored if *RecsPresent* is zero.

When a distribution list is being opened, you can provide an array of one or more MQRR response records in order to identify the queues that failed to open (*CompCode* field in MQRR), and the reason for each failure (*Reason* field in MQRR). The data is returned in the array of response records in the same order as the queue names occur in the array of object records. The queue manager sets the response records only when the outcome of the call is mixed (that is, some queues were opened successfully while others failed, or all failed but for different reasons); reason code MQRC_MULTIPLE_REASONS from the call indicates this case. If the same reason code applies to all queues, that reason is returned in the *Reason* parameter of the MQOPEN or MQPUT1 call, and the response records are not set. Response records are optional, but if they are supplied there must be *RecsPresent* of them.

The response records can be provided in the same way as the object records, either by specifying an offset in *ResponseRecOffset*, or by specifying an address in *ResponseRecPtr* ; for details of how to do this, see "ObjectRecOffset (MQLONG)" on page 465. However, no more than one of *ResponseRecOffset* and *ResponseRecPtr* can be used; the call fails with reason code MQRC_RESPONSE_RECORDS_ERROR if both are nonzero.

For the MQPUT1 call, these response records are used to return information about errors that occur when the message is sent to the queues in the distribution list, as well as errors that occur when the queues are opened. The completion code and reason code from the put operation for a queue replace those from the open operation for that queue only if the completion code from the latter was MQCC_OK or MQCC_WARNING.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_2.

*ResponseRecPtr (MQPTR)*

This is the address of the first MQRR response record. *ResponseRecPtr* is used only when a distribution list is being opened. The field is ignored if *RecsPresent* is zero.

Use either *ResponseRecPtr* or *ResponseRecOffset* to specify the response records, but not both; for details, see "ResponseRecOffset (MQLONG)" on page 468. If you do not use *ResponseRecPtr*, set it to the null pointer or null bytes.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQOD_VERSION_2.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length, with the initial value being the all-null byte string.

*SelectionString (MQCHARV)*
This is the string used to provide the selection criteria used when retrieving messages off a queue.

*SelectionString* must not be provided in the following cases:

- If *ObjectType* is not MQOT_Q
- If the queue being opened is not being opened using one of the MQOO_BROWSE, or MQOO_INPUT_* options

If *SelectionString* is provided in these cases, the call fails with reason code MQRC_SELECTOR_INVALID_FOR_TYPE.

If *SelectionString* is specified incorrectly, according to the description of how to use the "MQCHARV - Variable Length String" on page 288 structure, or if it exceeds the maximum length, the call fails with reason code MQRC_SELECTION_STRING_ERROR. The maximum length of *SelectionString* is MQ_SELECTOR_LENGTH.

*SelectionString* usage is described in Selectors.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQOD_STRUC_ID**
Identifier for object descriptor structure.

For the C programming language, the constant MQOD_STRUC_ID_ARRAY is also defined; this has the same value as MQOD_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQOD_STRUC_ID.

*UnknownDestCount (MQLONG)*

This is the number of queues in the distribution list that resolve to remote queues and that were opened successfully. If present, this field is also set when opening a single queue that is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is ignored if *Version* is less than MQOD_VERSION_1.

*Version (MQLONG)*

This is the structure version number; the value must be one of the following:

**MQOD_VERSION_1**
Version-1 object descriptor structure.

**MQOD_VERSION_2**
Version-2 object descriptor structure.

**MQOD_VERSION_3**
Version-3 object descriptor structure.

**MQOD_VERSION_4**
Version-4 object descriptor structure.

All versions are supported in all IBM MQ V7.0 environments.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQOD_CURRENT_VERSION**
Current version of object descriptor structure.

This is always an input field. The initial value of this field is MQOD_VERSION_1.

## *Initial values and language declarations for MQOD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQOD_STRUC_ID | 'OD¬¬' |
| *Version* | MQOD_VERSION_1 | 1 |
| *ObjectType* | MQOT_Q | 1 |
| *ObjectName* | None | Null string or blanks |
| *ObjectQMgrName* | None | Null string or blanks |
| *DynamicQName* | None | 'CSQ.*' on z/OS ; 'AMQ.*' otherwise |
| *AlternateUserId* | None | Null string or blanks |
| *RecsPresent* | None | 0 |
| *KnownDestCount* | None | 0 |
| *UnknownDestCount* | None | 0 |
| *InvalidDestCount* | None | 0 |
| *ObjectRecOffset* | None | 0 |
| *ResponseRecOffset* | None | 0 |
| *ObjectRecPtr* | None | Null pointer or null bytes |
| *ResponseRecPtr* | None | Null pointer or null bytes |
| *AlternateSecurityId* | MQSID_NONE | Nulls |

| Field name | Name of constant | Value of constant |
|---|---|---|
| *ResolvedQName* | None | Null string or blanks |
| *ResolvedQMgrName* | None | Null string or blanks |
| *ObjectString* | MQCHARV_DEFAULT | As defined for MQCHARV |
| *SelectionString* | MQCHARV_DEFAULT | As defined for MQCHARV |
| *ResObjectString* | MQCHARV_DEFAULT | As defined for MQCHARV |
| *ResolvedType* | MQOT_NONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQOD_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQOD MyOD = {MQOD_DEFAULT};
```

*C declaration*

```
typedef struct tagMQOD MQOD;
struct tagMQOD {
  MQCHAR4    StrucId;             /* Structure identifier */
  MQLONG     Version;             /* Structure version number */
  MQLONG     ObjectType;          /* Object type */
  MQCHAR48   ObjectName;          /* Object name */
  MQCHAR48   ObjectQMgrName;      /* Object queue manager name */
  MQCHAR48   DynamicQName;        /* Dynamic queue name */
  MQCHAR12   AlternateUserId;     /* Alternate user identifier */
  /* Ver:1 */
  MQLONG     RecsPresent;         /* Number of object records present */
  MQLONG     KnownDestCount;      /* Number of local queues opened
                                     successfully */
  MQLONG     UnknownDestCount;    /* Number of remote queues opened
                                     successfully */
  MQLONG     InvalidDestCount;    /* Number of queues that failed to
                                     open */
  MQLONG     ObjectRecOffset;     /* Offset of first object record from
                                     start of MQOD */
  MQLONG     ResponseRecOffset;   /* Offset of first response record
                                     from start of MQOD */
  MQPTR      ObjectRecPtr;        /* Address of first object record */
  MQPTR      ResponseRecPtr;      /* Address of first response record */
  /* Ver:2 */
  MQBYTE40   AlternateSecurityId; /* Alternate security identifier */
  MQCHAR48   ResolvedQName;       /* Resolved queue name */
  MQCHAR48   ResolvedQMgrName;    /* Resolved queue manager name */
  /* Ver:3 */
  MQCHARV    ObjectString;        /* Object Long name */
  MQCHARV    SelectionString;     /* Message Selector */
  MQCHARV    ResObjectString;     /* Resolved Long object name*/
  MQLONG     ResolvedType         /* Alias queue resolved
                                     oject type */
  /* Ver:4 */
};
```

*COBOL declaration*

```
** MQOD structure
 10  MQOD.
** Structure identifier
```

```
 15  MQOD-STRUCID                     PIC X(4).
** Structure version number
 15  MQOD-VERSION                    PIC S9(9) BINARY.
** Object type
 15  MQOD-OBJECTTYPE                 PIC S9(9) BINARY.
** Object name
 15  MQOD-OBJECTNAME                 PIC X(48).
** Object queue manager name
 15  MQOD-OBJECTQMGRNAME             PIC X(48).
** Dynamic queue name
 15  MQOD-DYNAMICQNAME               PIC X(48).
** Alternate user identifier
 15  MQOD-ALTERNATEUSERID            PIC X(12).
** Number of object records present
 15  MQOD-RECSPRESENT                PIC S9(9) BINARY.
** Number of local queues opened successfully
 15  MQOD-KNOWNDESTCOUNT             PIC S9(9) BINARY.
** Number of remote queues opened successfully
 15  MQOD-UNKNOWNDESTCOUNT           PIC S9(9) BINARY.
** Number of queues that failed to open
 15  MQOD-INVALIDDESTCOUNT           PIC S9(9) BINARY.
** Offset of first object record from start of MQOD
 15  MQOD-OBJECTRECOFFSET             PIC S9(9) BINARY.
** Offset of first response record from start of MQOD
 15  MQOD-RESPONSERECOFFSET           PIC S9(9) BINARY.
** Address of first object record
 15  MQOD-OBJECTRECPTR                POINTER.
** Address of first response record
 15  MQOD-RESPONSERECPTR              POINTER.
** Alternate security identifier
 15  MQOD-ALTERNATESECURITYID         PIC X(40).
** Resolved queue name
 15  MQOD-RESOLVEDQNAME               PIC X(48).
** Resolved queue manager name
 15  MQOD-RESOLVEDQMGRNAME            PIC X(48).
** Object Long name
 15 MQOD-OBJECTSTRING.
** Address of variable length string
    20  MQOD-OBJECTSTRING-VSPTR        POINTER.
** Offset of variable length string
    20  MQOD-OBJECTSTRING-VSOFFSET     PIC S9(9) BINARY.
** size of buffer
    20  MQOD-OBJECTSTRING-VSBUFSIZE    PIC S9(9) BINARY.
** Length of variable length string
    20  MQOD-OBJECTSTRING-VSLENGTH     PIC S9(9) BINARY.
** CCSID of variable length string
    20  MQOD-OBJECTSTRING-VSCCSID      PIC S9(9) BINARY.
** Message Selector
 15 MQOD-SELECTIONSTRING.
** Address of variable length string
    20  MQOD-SELECTIONSTRING-VSPTR     POINTER.
** Offset of variable length string
    20  MQOD-SELECTIONSTRING-VSOFFSET  PIC S9(9) BINARY.
** size of buffer
    20  MQOD-SELECTIONSTRING-VSBUFSIZE PIC S9(9) BINARY.
** Length of variable length string
    20  MQOD-SELECTIONSTRING-VSLENGTH  PIC S9(9) BINARY.
** CCSID of variable length string
    20  MQOD-SELECTIONSTRING-VSCCSID   PIC S9(9) BINARY.
** Resolved Long object name
 15 MQOD-RESOBJECTSTRING.
** Address of variable length string
    20  MQOD-RESOBJECTSTRING-VSPTR     POINTER.
** Offset of variable length string
    20  MQOD-RESOBJECTSTRING-VSOFFSET  PIC S9(9) BINARY.
** size of buffer
    20  MQOD-RESOBJECTSTRING-VSBUFSIZE PIC S9(9) BINARY.
** Length of variable length string
    20  MQOD-RESOBJECTSTRING-VSLENGTH  PIC S9(9) BINARY.
** CCSID of variable length string
    20  MQOD-RESOBJECTSTRING-VSCCSID   PIC S9(9) BINARY.
** Alias queue resolved object type
    15  MQOD-RESOLVEDTYPE              PIC S9(9) BINARY.
```

*PL/I declaration*

```

dcl
 1 MQOD based,
  3 StrucId             char(4),       /* Structure identifier */
```

```
  3 Version              fixed bin(31), /* Structure version number */
  3 ObjectType           fixed bin(31), /* Object type */
  3 ObjectName           char(48),      /* Object name */
  3 ObjectQMgrName       char(48),      /* Object queue manager name */
  3 DynamicQName         char(48),      /* Dynamic queue name */
  3 AlternateUserId      char(12),      /* Alternate user identifier */
  3 RecsPresent          fixed bin(31), /* Number of object records
                                           present */
  3 KnownDestCount       fixed bin(31), /* Number of local queues opened
                                           successfully */
  3 UnknownDestCount     fixed bin(31), /* Number of remote queues opened
                                           successfully */
  3 InvalidDestCount     fixed bin(31), /* Number of queues that failed to
                                           open */
  3 ObjectRecOffset      fixed bin(31), /* Offset of first object record
                                           from start of MQOD */
  3 ResponseRecOffset    fixed bin(31), /* Offset of first response record
                                           from start of MQOD */
  3 ObjectRecPtr         pointer,       /* Address of first object record */
  3 ResponseRecPtr       pointer,       /* Address of first response
                                           record */
  3 AlternateSecurityId char(40),       /* Alternate security identifier */
  3 ResolvedQName        char(48),      /* Resolved queue name */
  3 ResolvedQMgrName     char(48),      /* Resolved queue manager name */
  3 ObjectString,                       /* Object Long name */
   5 VSPtr               pointer,       /* Address of variable length string */
   5 VSOffset            fixed bin(31), /* Offset of variable length string */
   5 VSBufSize           fixed bin(31), /* size of buffer */
   5 VSLength            fixed bin(31), /* Length of variable length string */
   5 VSCCSID             fixed bin(31), /* CCSID of variable length string */
  3 SelectionString,                    /* Message Selection */
   5 VSPtr               pointer,       /* Address of variable length string */
   5 VSOffset            fixed bin(31), /* Offset of variable length string */
   5 VSBufSize           fixed bin(31), /* size of buffer */
   5 VSLength            fixed bin(31), /* Length of variable length string */
   5 VSCCSID             fixed bin(31), /* CCSID of variable length string */
  3 ResObjectString,                    /* Resolved Long object name */
   5 VSPtr               pointer,       /* Address of variable length string */
   5 VSOffset            fixed bin(31), /* Offset of variable length string */
   5 VSBufSize           fixed bin(31), /* size of buffer */
   5 VSLength            fixed bin(31), /* Length of variable length string */
   5 VSCCSID             fixed bin(31), /* CCSID of variable length string */
  3 ResolvedType         fixed bin(31); /* Alias queue resolved object type */
```

*High Level Assembler declaration*

```
MQOD                          DSECT
MQOD_STRUCID                  DS   CL4   Structure identifier
MQOD_VERSION                  DS   F     Structure version number
MQOD_OBJECTTYPE               DS   F     Object type
MQOD_OBJECTNAME               DS   CL48  Object name
MQOD_OBJECTQMGRNAME           DS   CL48  Object queue manager name
MQOD_DYNAMICQNAME             DS   CL48  Dynamic queue name
MQOD_ALTERNATEUSERID          DS   CL12  Alternate user identifier
MQOD_RECSPRESENT              DS   F     Number of object records present
MQOD_KNOWNDESTCOUNT           DS   F     Number of local queues opened
*                                        successfully
MQOD_UNKNOWNDESTCOUNT         DS   F     Number of remote queues opened
*                                        successfully
MQOD_INVALIDDESTCOUNT         DS   F     Number of queues that failed to
*                                        open
MQOD_OBJECTRECOFFSET          DS   F     Offset of first object record from
*                                        start of MQOD
MQOD_RESPONSERECOFFSET        DS   F     Offset of first response record
*                                        from start of MQOD
MQOD_OBJECTRECPTR             DS   F     Address of first object record
MQOD_RESPONSERECPTR           DS   F     Address of first response record
MQOD_ALTERNATESECURITYID      DS   XL40  Alternate security identifier
MQOD_RESOLVEDQNAME            DS   CL48  Resolved queue name
MQOD_RESOLVEDQMGRNAME         DS   CL48  Resolved queue manager name
MQOD_OBJECTSTRING             DS   F     Object Long name
MQOD_OBJECTSTRING_VSPTR       DS   F     Address of variable length string
MQOD_OBJECTSTRING_VSOFFSET    DS   F     Offset of variable length string
MQOD_OBJECTSTRING_VSBUFSIZE   DS   F     size of buffer
MQOD_OBJECTSTRING_VSLENGTH    DS   F     Length of variable length string
MQOD_OBJECTSTRING_VSCCSID     DS   F     CCSID of variable length string
MQOD_OBJECTSTRING_LENGTH      EQU  *- MQOD_OBJECTSTRING
                              ORG  MQOD_OBJECTSTRING
MQOD_OBJECTSTRING_AREA        DS   CL(MQOD_OBJECTSTRING_LENGTH)
```

```
*
MQOD_SELECTIONSTRING           DS   F     Message Selector
MQOD_SELECTIONSTRING_VSPTR     DS   F     Address of variable length string
MQOD_SELECTIONSTRING_VSOFFSET  DS   F     Offset of variable length string
MQOD_SELECTIONSTRING_VSBUFSIZE DS   F     size of buffer
MQOD_SELECTIONSTRING_VSLENGTH  DS   F     Length of variable length string
MQOD_SELECTIONSTRING_VSCCSID   DS   F     CCSID of variable length string
MQOD_SELECTIONSTRING_LENGTH    EQU  *- MQOD_SELECTIONSTRING
                               ORG  MQOD_SELECTIONSTRING
MQOD_SELECTIONSTRING_AREA      DS   CL(MQOD_SELECTIONSTRING_LENGTH)
*
MQOD_RESOBJECTSTRING           DS   F     Resolved Long object name
MQOD_RESOBJECTSTRING_VSPTR     DS   F     Address of variable length string
MQOD_RESOBJECTSTRING_VSOFFSET  DS   F     Offset of variable length string
MQOD_RESOBJECTSTRING_VSBUFSIZE DS   F     size of buffer
MQOD_RESOBJECTSTRING_VSLENGTH  DS   F     Length of variable length string
MQOD_RESOBJECTSTRING_VSCCSID   DS   F     CCSID of variable length string
MQOD_RESOBJECTSTRING_LENGTH    EQU  *- MQOD_RESOBJECTSTRING
                               ORG  MQOD_RESOBJECTSTRING
MQOD_RESOBJECTSTRING_AREA      DS   CL(MQOD_RESOBJECTSTRING_LENGTH)
MQOD_RESOLVEDTYPE              DS   F     Alias queue object resolved type
*
MQOD_LENGTH                    EQU  *-MQOD
                               ORG  MQOD
MQOD_AREA                      DS   CL(MQOD_LENGTH)
```

*Visual Basic declaration*

```
Type MQOD
  StrucId             As String*4  'Structure identifier'
  Version             As Long      'Structure version number'
  ObjectType          As Long      'Object type'
  ObjectName          As String*48 'Object name'
  ObjectQMgrName      As String*48 'Object queue manager name'
  DynamicQName        As String*48 'Dynamic queue name'
  AlternateUserId     As String*12 'Alternate user identifier'
  RecsPresent         As Long      'Number of object records present'
  KnownDestCount      As Long      'Number of local queues opened'
                                   'successfully'
  UnknownDestCount    As Long      'Number of remote queues opened'
                                   'successfully'
  InvalidDestCount    As Long      'Number of queues that failed to'
                                   'open'
  ObjectRecOffset     As Long      'Offset of first object record from'
                                   'start of MQOD'
  ResponseRecOffset   As Long      'Offset of first response record'
                                   'from start of MQOD'
  ObjectRecPtr        As MQPTR     'Address of first object record'
  ResponseRecPtr      As MQPTR     'Address of first response record'
  AlternateSecurityId As MQBYTE40  'Alternate security identifier'
  ResolvedQName       As String*48 'Resolved queue name'
  ResolvedQMgrName    As String*48 'Resolved queue manager name'
End Type
```

## MQOR - Object record

The following table summarizes the fields in the structure.

*Table 510. Fields in MQOR*

| Field | Description | Topic |
|---|---|---|
| *ObjectName* | Object name | ObjectName |
| *ObjectQMgrName* | Object queue manager name | ObjectQMgrName |

### *Overview for MQOR*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

**Purpose**: Use the MQOR structure to specify the queue name and queue-manager name of a single destination queue. MQOR is an input structure for the MQOPEN and MQPUT1 calls.

**Character set and encoding**: Data in MQOR must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQOPEN call, you can open a list of queues; this list is called a *distribution list*. Each message put using the queue handle returned by that MQOPEN call is placed on each of the queues in the list, provided that the queue was opened successfully.

## *Fields for MQOR*

The MQOR structure contains the following fields; the fields are described in **alphabetical order**:

*ObjectName (MQCHAR48)*

This is the same as the *ObjectName* field in the MQOD structure (see MQOD for details), except that:

- It must be the name of a queue.
- It must not be the name of a model queue.

This is always an input field. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ObjectQMgrName (MQCHAR48)*

This is the same as the *ObjectQMgrName* field in the MQOD structure (see MQOD for details).

This is always an input field. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

## *Initial values and language declarations for MQOR*

*Table 511. Initial values of fields in MQOR for MQOR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *ObjectName* | None | Null string or blanks |
| *ObjectQMgrName* | None | Null string or blanks |

**Notes:**

1. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
2. In the C programming language, the macro variable MQOR_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQOR MyOR = {MQOR_DEFAULT};
```

*C declaration*

```
typedef struct tagMQOR MQOR;
struct tagMQOR {
  MQCHAR48  ObjectName;      /* Object name */
  MQCHAR48  ObjectQMgrName;  /* Object queue manager name */
};
```

*COBOL declaration*

```
**   MQOR structure
  10 MQOR.
```

```
**    Object name
   15 MQOR-OBJECTNAME     PIC X(48).
**    Object queue manager name
   15 MQOR-OBJECTQMGRNAME PIC X(48).
```

*PL/I declaration*

```
dcl
 1 MQOR based,
  3 ObjectName     char(48), /* Object name */
  3 ObjectQMgrName char(48); /* Object queue manager name */
```

*Visual Basic declaration*

```
Type MQOR
  ObjectName     As String*48 'Object name'
  ObjectQMgrName As String*48 'Object queue manager name'
End Type
```

## MQPD - Property descriptor

The following table summarizes the fields in the structure.

*Table 512. Fields in MQPD*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |
| *Support* | Required support for message property | Support |
| *Context* | Message context to which property belongs | Context |
| *CopyOptions* | Copy options to which property belongs | CopyOptions |

### *Overview for MQPD*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS and IBM MQ MQI clients.

**Purpose**: The **MQPD** is used to define the attributes of a property. The structure is an input/output parameter on the MQSETMP call and an output parameter on the MQINQMP call.

**Character set and encoding**: Data in **MQPD** must be in the character set of the application and encoding of the application ( **MQENC_NATIVE** ).

### *Fields for MQPD*

The MQPD structure contains the following fields; the fields are described in **alphabetical order**:

*Context (MQLONG)*

This describes what message context the property belongs to.

When a queue manager receives a message containing an IBM MQ-defined property that the queue manager recognizes as being incorrect, the queue manager corrects the value of the *Context* field.

The following option can be specified:

**MQPD_USER_CONTEXT**
The property is associated with the user context.

No special authorization is required to be able to set a property associated with the user context using the MQSETMP call.

On a IBM WebSphere® MQ 7.0 queue manager, a property associated with the user context is saved as described for MQOO_SAVE_ALL_CONTEXT. An MQPUT call with MQPMO_PASS_ALL_CONTEXT specified, causes the property to be copied from the saved context into the new message.

If the option previously described is not required, the following option can be used:

**MQPD_NO_CONTEXT**
The property is not associated with a message context.

An unrecognized value is rejected with a *Reason* code of MQRC_PD_ERROR

This is an input/output field to the MQSETMP call and an output field from the MQINQMP call. The initial value of this field is MQPD_NO_CONTEXT.

*CopyOptions (MQLONG)*

This describes which type of messages the property should be copied into. This is an output only field for recognized IBM MQ defined properties; IBM MQ sets the appropriate value.

When a queue manager receives a message containing an IBM MQ defined property that the queue manager recognizes as being incorrect, the queue manager corrects the value of the *CopyOptions* field.

You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**MQCOPY_FORWARD**
This property is copied into a message being forwarded.

**MQCOPY_PUBLISH**
This property is copied into the message received by a subscriber when a message is being published.

**MQCOPY_REPLY**
This property is copied into a reply message.

**MQCOPY_REPORT**
This property is copied into a report message.

**MQCOPY_ALL**
This property is copied into all types of subsequent messages.

**Default option:** The following option can be specified to supply the default set of copy options:

**MQCOPY_DEFAULT**
This property is copied into a message being forwarded, into a report message, or into a message received by a subscriber when a message is being published.

This is equivalent to specifying the combination of options MQCOPY_FORWARD, plus MQCOPY_REPORT, plus MQCOPY_PUBLISH.

If none of the options that are described previously is required, use the following option:

**MQCOPY_NONE**
Use this value to indicate that no other copy options are specified; programmatically no relationship exists between this property and subsequent messages. This is always returned for message descriptor properties.

This is an input/output field to the MQSETMP call and an output field from the MQINQMP call. The initial value of this field is MQCOPY_DEFAULT.

*Options (MQLONG)*

The value must be:

**MQPD_NONE**
No options specified

This is always an input field. The initial value of this field is MQPD_NONE.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQPD_STRUC_ID**
Identifier for property descriptor structure.

For the C programming language, the constant **MQPD_STRUC_ID_ARRAY** is also defined; this has the same value as **MQPD_STRUC_ID**, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is **MQPD_STRUC_ID**.

*Support (MQLONG)*

This field describes what level of support for the message property is required of the queue manager, in order for the message containing this property to be put to a queue. This applies only to IBM MQ-defined properties; support for all other properties is optional.

The field is automatically set to the correct value when the IBM MQ-defined property is known by the queue manager. If the property is not recognized, MQPD_SUPPORT_OPTIONAL is assigned. When a queue manager receives a message containing an IBM MQ-defined property that the queue manager recognizes as being incorrect, the queue manager corrects the value of the *Support* field.

When setting an IBM MQ-defined property using the MQSETMP call on a message handle where the MQCMHO_NO_VALIDATION option was set, *Support* becomes an input field. This allows an application to put an IBM MQ-defined property, with the correct value, where the property is unsupported by the connected queue manager, but where the message is intended to be processed on another queue manager.

The value MQPD_SUPPORT_OPTIONAL is always assigned to properties that are not IBM MQ-defined properties.

If a IBM WebSphere MQ 7.0 queue manager, that supports message properties, receives a property that contains an unrecognized *Support* value, the property is treated as if:

- MQPD_SUPPORT_REQUIRED was specified if any of the unrecognized values are contained in the MQPD_REJECT_UNSUP_MASK.
- MQPD_SUPPORT_REQUIRED_IF_LOCAL was specified if any of the unrecognized values are contained in the MQPD_ACCEPT_UNSUP_IF_XMIT_MASK
- MQPD_SUPPORT_OPTIONAL was specified otherwise.

One of the following values is returned by the MQINQMP call, or one of the values can be specified, when using the MQSETMP call on a message handle where the MQCMHO_NO_VALIDATION option is set:

**MQPD_SUPPORT_OPTIONAL**
The property is accepted by a queue manager even if it is not supported. The property can be discarded in order for the message to flow to a queue manager that does not support message properties. This value is also assigned to properties that are not IBM MQ-defined.

**MQPD_SUPPORT_REQUIRED**
Support for the property is required. The message is rejected by a queue manager that does not support the IBM MQ-defined property. The MQPUT or MQPUT1 call fails with completion code MQCC_FAILED and reason code MQRC_UNSUPPORTED_PROPERTY.

**MQPD_SUPPORT_REQUIRED_IF_LOCAL**
The message is rejected by a queue manager that does not support the IBM MQ-defined property if the message is destined for a local queue. The MQPUT or MQPUT1 call fails with completion code MQCC_FAILED and reason code MQRC_UNSUPPORTED_PROPERTY.

The MQPUT or MQPUT1 call succeeds if the message is destined for a remote queue manager.

This is an output field on the MQINQMP call and an input field on the MQSETMP call if the message handle was created with the MQCMHO_NO_VALIDATION option set. The initial value of this field is MQPD_SUPPORT_OPTIONAL.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQPD_VERSION_1**
Version-1 property descriptor structure.

The following constant specifies the version number of the current version:

**MQPD_CURRENT_VERSION**
Current version of property descriptor structure.

This is always an input field. The initial value of this field is **MQPD_VERSION_1**.

## *Initial values and language declarations for MQPD*

*Table 513. Initial values of fields in MQPD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQPD_STRUC_ID | 'PD' |
| *Version* | MQPD_VERSION_1 | 1 |
| *Options* | MQPD_NONE | 0 |
| *Support* | MQPD_SUPPORT_OPTIONAL | 0 |
| *Context* | MQPD_NO_CONTEXT | 0 |
| *CopyOptions* | MQCOPY_DEFAULT | 0 |

**Notes:**

1. In the C programming language, the macro variable MQPD_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQPD MyPD = {MQPD_DEFAULT};
```

*C declaration*

```
typedef struct tagMQPD MQPD;
struct tagMQPD {
  MQCHAR4  StrucId;     /* Structure identifier */
  MQLONG   Version;     /* Structure version number */
  MQLONG   Options;     /* Options that control the action of
                           MQSETMP and MQINQMP */
  MQLONG   Support;     /* Property support option */
  MQLONG   Context;     /* Property context */
  MQLONG   CopyOptions; /* Property copy options */
};
```

*COBOL declaration*

```
**   MQPD structure
  10 MQPD.
**    Structure identifier
   15 MQPD-STRUCID PIC X(4).
**    Structure version number
   15 MQPD-VERSION PIC S9(9) BINARY.
**    Options that control the action of MQSETMP and
**    MQINQMP
   15 MQPD-OPTIONS PIC S9(9) BINARY.
**    Property support option
```

```
   15 MQPD-SUPPORT PIC S9(9) BINARY.
**    Property context
   15 MQPD-CONTEXT PIC S9(9) BINARY.
**    Property copy options
   15 MQPD-COPYOPTIONS PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQPD based,
  3 StrucId     char(4),       /* Structure identifier */
  3 Version     fixed bin(31), /* Structure version number */
  3 Options     fixed bin(31), /* Options that control the action
                                  of MQSETMP and MQINQMP */
  3 Support     fixed bin(31), /* Property support option */
  3 Context     fixed bin(31), /* Property context */
  3 CopyOptions fixed bin(31); /* Property copy options */
```

*High Level Assembler declaration*

```
MQPD             DSECT
MQPD_STRUCID     DS   CL4    Structure identifier
MQPD_VERSION     DS   F      Structure version number
MQPD_OPTIONS     DS   F      Options that control the
*                            action of MQSETMP and MQINQMP
MQPD_SUPPORT     DS   F      Property support option
MQPD_CONTEXT     DS   F      Property context
MQPD_COPYOPTIONS DS   F      Property copy options
MQPD_LENGTH      EQU  *-MQPD
MQPD_AREA        DS   CL(MQPD_LENGTH)
```

## MQPMO - Put-message options

The following table summarizes the fields in the structure.

| *Table 514. MQPMO structure* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options that control the action of MQPUT and MQPUT1 | Options |
| *Timeout* | Reserved | Timeout |
| *Context* | Object handle of input queue | Context |
| *KnownDestCount* | Number of messages sent successfully to local queues | KnownDestCount |
| *UnknownDestCount* | Number of messages sent successfully to remote queues | UnknownDestCount |
| *InvalidDestCount* | Number of messages that could not be sent | InvalidDestCount |
| *ResolvedQName* | Resolved name of destination queue | ResolvedQName |
| *ResolvedQMgrName* | Resolved name of destination queue manager | ResolvedQMgrName |
| **Note:** The remaining fields are ignored if *Version* is less than MQPMO_VERSION_2. | | |
| *RecsPresent* | Number of put message records or response records present | RecsPresent |

| Table 514. MQPMO structure (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *PutMsgRecFields* | Flags indicating which MQPMR fields are present | PutMsgRecFields |
| *PutMsgRecOffset* | Offset of first put-message record from start of MQPMO | PutMsgRecOffset |
| *ResponseRecOffset* | Offset of first response record from start of MQPMO | ResponseRecOffset |
| *PutMsgRecPtr* | Address of first put message record | PutMsgRecPtr |
| *ResponseRecPtr* | Address of first response record | ResponseRecPtr |
| **Note:** The remaining fields are ignored if *Version* is less than MQPMO_VERSION_3. | | |
| *OriginalMsgHandle* | Original message handle | OriginalMsgHandle |
| *NewMsgHandle* | New message handle | NewMsgHandle |
| *Action* | Type of put being performed and the relationship between the original message specified by the *OriginalMsgHandle* field and the new message specified by the *NewMsgHandle* field | Action |
| *PubLevel* | Level of subscription targeted by the publication | PubLevel |

## *Overview for MQPMO*

**Availability**: All IBM MQ systems, plus IBM MQ clients connected to these systems.

**Purpose**: The MQPMO structure allows the application to specify options that control how messages are placed on queues, or published to topics. The structure is an input/output parameter on the MQPUT and MQPUT1 calls.

**Version**: The current version of MQPMO is MQPMO_VERSION_3. Certain fields are available only in certain versions of MQPMO. If you need to port applications between several environments, you must ensure that the version of MQPMO is consistent across all environments. Fields that exist only in particular versions of the structure are identified as such in "MQPMO - Put-message options" on page 480 and in the field descriptions.

The header, COPY, and INCLUDE files provided for the supported programming languages contain the most-recent version of MQPMO that is supported by the environment, but with the initial value of the *Version* field set to MQPMO_VERSION_1. To use fields that are not present in the version-1 structure, the application must set the *Version* field to the version number of the version required.

**Character set and encoding**: Data in MQPMO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

## *Fields for MQPMO*

The MQPMO structure contains the following fields; the fields are described in **alphabetical order**:

*Action (MQLONG)*
This specifies the type of put being performed and the relationship between the original message specified by the OriginalMsgHandle field and the new message specified by the NewMsgHandle field.

The properties of the message are chosen by the queue manager according to the value of the Action specified.

You can choose to supply the contents of the message descriptor using the MsgDesc parameter on the MQPUT or MQPUT1 calls. Alternatively it is possible not to supply the MsgDesc parameter, or to specify that it is output-only by including MQPMO_MD_FOR_OUTPUT_ONLY in the Options field of the MQPMO structure.

If the MsgDesc parameter is not supplied, or if it is specified to be output-only, then the message descriptor for the new message is populated from the message handle fields of the MQPMO, according to the rules described in this topic.

The context setting and passing activities described in Controlling context information take effect after the message descriptor has been composed.

If an incorrect action value is specified, the call fails with the reason code MQRC_ACTION_ERROR.

Any one of the following actions can be specified:

**MQACTP_NEW**
A new message is being put, and no relationship to a previous message is being specified by the program. The message descriptor is composed as follows:

- If a MsgDesc is supplied on the MQPUT or MQPUT1 call, and MQPMO_MD_FOR_OUTPUT_ONLY is not in the MQPMO.Options, this is used as the message descriptor unmodified.
- If a MsgDesc is not supplied, or MQPMO_MD_FOR_OUTPUT_ONLY is in the MQPMO.Options then the queue manager generates the message descriptor using a combination of properties from OriginalMsgHandle and NewMsgHandle. Any message descriptor fields explicitly set on the new message handle take precedence over those in the original message handle.

Message data is taken from the MQPUT or MQPUT1 Buffer parameter.

**MQACTP_FORWARD**
A previously retrieved message is being forwarded. The original message handle specifies the message that was previously retrieved.

The new message handle specifies any modifications to the properties (including any in the message descriptor) in the original message handle.

The message descriptor is composed as follows:

- If a MsgDesc is supplied on the MQPUT or MQPUT1 call, and MQPMO_MD_FOR_OUTPUT_ONLY is not in the MQPMO.Options, this is used as the message descriptor unmodified.
- If a MsgDesc is not supplied, or MQPMO_MD_FOR_OUTPUT_ONLY is in the MQPMO.Options then the queue manager generates the message descriptor using a combination of properties from OriginalMsgHandle and NewMsgHandle. Any message descriptor fields explicitly set on the new message handle take precedence over those in the original message handle.
- If MQPMO_NEW_MSG_ID or MQPMO_NEW_CORREL_ID are specified in the MQPMO.Options, then these are honoured.

The message properties are composed as follows:

- All properties from the original message handle which have MQCOPY_FORWARD in the MQPD.CopyOptions
- All properties from the new message handle. For each property in the new message handle that has the same name as a property in the original message handle, the value is taken from the new message handle. The only exception to this rule is the special case when the property in the new message handle has the same name as a property in the original message handle, but the value of the property is null. In this case the property is removed from the message.

The message data to be forwarded is taken from the MQPUT or MQPUT1 Buffer parameter.

**MQACTP_REPLY**

A reply is being made to a previously retrieved message. The original message handle specifies the message that was previously retrieved.

The new message handle specifies any modifications to the properties (including any in the message descriptor) in the original message handle.

The message descriptor is composed as follows:

- If a MsgDesc is supplied on the MQPUT or MQPUT1 call, and MQPMO_MD_FOR_OUTPUT_ONLY is not in the MQPMO.Options, this is used as the message descriptor unmodified.
- If a MsgDesc is not supplied, or MQPMO_MD_FOR_OUTPUT_ONLY is in the MQPMO.Options then initial message descriptor fields are chosen as follows:

*Table 515. Reply message handle transformation*

| **Field in MQMD** | **Value used** |
|---|---|
| Report | If MQRO_PASS_DISCARD_AND_EXPIRY and MQRO_DISCARD_MSG are set: MQRO_DISCARD_MSG otherwise MQRO_NONE |
| MsgType | MQMT_REPLY |
| Expiry | If MQRO_PASS_DISCARD_AND_EXPIRY is set: Copied from the input message otherwise MQEI_UNLIMITED |
| Feedback | MQFB_NONE |
| MsgId | If MQPMO_NEW_MSG_ID is set: A new message identifier is generated else if MQRO_PASS_MSG_ID is set: Copied from the input message otherwise MQMI_NONE |
| CorrelId | If MQPMO_NEW_CORREL_ID is set: A new correlation identifier is generated else if MQRO_COPY_MSG_ID_TO_CORREL_ID is set: Copied from the MsgId field of the input message else if MQRO_PASS_CORREL_ID is set: Copied from the CorrelId field of the input message otherwise MQCI_NONE |
| BackoutCount | 0 |
| ReplyToQ | Blanks |
| ReplyToQMgr | Blanks |
| GroupId | MQGI_NONE |

| *Table 515. Reply message handle transformation (continued)* | |
|---|---|
| **Field in MQMD** | **Value used** |
| MsgSeqNumber | 1 |
| Offset | 0 |
| MsgFlags | MQMF_NONE |
| OriginalLength | MQOL_UNDEFINED |

- The message descriptor is then modified by the new message handle - any message descriptor fields explicitly set as properties in the new message handle take precedence over the message descriptor fields as described previously.

The message properties are composed as follows:

- All properties from the original message handle which have MQCOPY_REPLY in the MQPD.CopyOptions
- All properties from the new message handle. For each property in the new message handle that has the same name as a property in the original message handle, the value is taken from the new message handle. The only exception to this rule is the special case when the property in the new message handle has the same name as a property in the original message handle, but the value of the property is null. In this case the property is removed from the message.

The message data to be forwarded is taken from the MQPUT/MQPUT1 Buffer parameter.

**MQACTP_REPORT**

A report is being generated as a result of a previously retrieved message. The original message handle specifies the message causing the report to be generated.

The new message handle specifies any modifications to the properties (including any in the message descriptor) in the original message handle.

The message descriptor is composed as follows:

- If a MsgDesc is supplied on the MQPUT or MQPUT1 call, and MQPMO_MD_FOR_OUTPUT_ONLY is not in the MQPMO.Options, this is used as the message descriptor unmodified.
- If a MsgDesc is not supplied, or MQPMO_MD_FOR_OUTPUT_ONLY is in the MQPMO.Options then initial message descriptor fields are chosen as follows:

| *Table 516. Report message handle transformation* | |
|---|---|
| **Field in MQMD** | **Value used** |
| Report | If MQRO_PASS_DISCARD_AND_EXPIRY and MQRO_DISCARD_MSG are set:<br>MQRO_DISCARD_MSG<br>otherwise<br>MQRO_NONE |
| MsgType | MQMT_REPORT |
| Expiry | If MQRO_PASS_DISCARD_AND_EXPIRY is set:<br>Copied from the input message<br>otherwise<br>MQEI_UNLIMITED |

| *Table 516. Report message handle transformation (continued)* | |
|---|---|
| **Field in MQMD** | **Value used** |
| MsgId | If MQPMO_NEW_MSG_ID is set:<br>A new message identifier is generated<br>else if MQRO_PASS_MSG_ID is set:<br>Copied from the input message<br>otherwise<br>MQMI_NONE |
| CorrelId | If MQPMO_NEW_CORREL_ID is set:<br>A new correlation identifier is generated<br>else if MQRO_COPY_MSG_ID_TO_CORREL_ID is set:<br>Copied from the MsgId field of the<br>input message<br>else if MQRO_PASS_CORREL_ID is set:<br>Copied from the CorrelId field of the<br>input message<br>otherwise<br>MQCI_NONE |
| BackoutCount | 0 |
| ReplyToQ | Blanks |
| ReplyToQMgr | Blanks |
| OriginalLength | Set to the *BufferLength* |

- The message descriptor is then modified by the new message handle - any message descriptor fields explicitly set as properties in the new message handle take precedence over the message descriptor fields as described previously.

The message properties are composed as follows:

- All properties from the original message handle which have MQCOPY_REPORT in the MQPD.CopyOptions
- All properties from the new message handle. For each property in the new message handle that has the same name as a property in the original message handle, the value is taken from the new message handle. The only exception to this rule is the special case when the property in the new message handle has the same name as a property in the original message handle, but the value of the property is null. In this case the property is removed from the message.

The Feedback field in the resultant MQMD represents the report that is to be generated. A Feedback value of MQFB_NONE causes the MQPUT or MQPUT1 call to fail with reason code MQRC_FEEDBACK_ERROR.

To choose the user data of the report message, IBM MQ consults the Report and Feedback fields in the resultant MQMD, and the Buffer and BufferLength parameters of the MQPUT or MQPUT1 call.

- If Feedback is MQFB_COA, MQFB_COD or MQFB_EXPIRATION then the value of Report is inspected.
- If any of the following cases is true, the full message data from Buffer for a length of BufferLength is used.
  - Feedback is MQFB_EXPIRATION and Report contains MQRO_EXPIRATION_WITH_FULL_DATA
  - Feedback is MQFB_COD and Report contains MQRO_COD_WITH_FULL_DATA
  - Feedback is MQFB_COA and Report contains MQRO_COA_WITH_FULL_DATA
- If any of the following cases is true, the first 100 bytes of the message (or BufferLength if this is less than 100) from Buffer are used

  - Feedback is MQFB_EXPIRATION and Report contains MQRO_EXPIRATION_WITH_DATA
  - Feedback is MQFB_COD and Report contains MQRO_COD_WITH_DATA
  - Feedback is MQFB_COA and Report contains MQRO_COA_WITH_DATA
- If Feedback is MQFB_EXPIRATION, MQFB_COD or MQFB_COA, and Report does not contain the *_WITH_FULL_DATA or *_WITH_DATA options relevant to that Feeback value, then no user data is included with the message.
- If Feedback takes a different value from those listed above, then Buffer and BufferLength are used as normal.

The derivation of the user data is shown in the following table:

*Context (MQHOBJ)*

If MQPMO_PASS_IDENTITY_CONTEXT or MQPMO_PASS_ALL_CONTEXT is specified, this field must contain the input queue handle from which context information to be associated with the message being put is taken.

If neither MQPMO_PASS_IDENTITY_CONTEXT nor MQPMO_PASS_ALL_CONTEXT is specified, this field is ignored.

This is an input field. The initial value of this field is `0`.

*InvalidDestCount (MQLONG)*

This is the number of messages that could not be sent to queues in the distribution list. The count includes queues that failed to open, as well as queues that were opened successfully but for which the put operation failed. This field is also set when putting a message to a single queue that is not in a distribution list.

**Note:** This field is set if the *CompCode* parameter on the MQPUT or MQPUT1 call is MQCC_OK or MQCC_WARNING; it might be set if the *CompCode* parameter is MQCC_FAILED, but do not rely on this in application code.

This is an output field. The initial value of this field is 0. This field is not set if *Version* is less than MQPMO_VERSION_1.

This field is undefined on z/OS because distribution lists are not supported.

*KnownDestCount (MQLONG)*

This is the number of messages that the current MQPUT or MQPUT1 call has sent successfully to queues in the distribution list that are local queues. The count does not include messages sent to queues that resolve to remote queues (even though a local transmission queue is used initially to store the message). This field is also set when putting a message to a single queue that is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is not set if *Version* is less than MQPMO_VERSION_1.

This field is undefined on z/OS because distribution lists are not supported.

*NewMsgHandle (MQHMSG)*

This is an optional handle to the message being put subject to the value of the Action field. It defines the properties of the message and overrides the values of the *OriginalMsgHandle*, if specified.

On return from the **MQPUT** or **MQPUT1** call, the contents of the handle reflect the message that was actually put.

This is an input field. The initial value of this field is **MQHM_NONE**. This field is ignored if Version is less than **MQPMO_VERSION_3**.

*MQPMO options (MQLONG)*
The Options field controls the operation of **MQPUT** and **MQPUT1** calls.

**Scope option**. You can specify any or none of the MQPMO options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations). Combinations that are not valid are noted; any other combinations are valid.

The following option controls the scope of the publications sent:

**MQPMO_SCOPE_QMGR**

The publication is sent only to subscribers that have subscribed on this queue manager. The publication is not forwarded to any remote publish/subscribe queue managers that have made a subscription to this queue manager, which overrides any behavior that has been set using the PUBSCOPE topic attribute.

**Note:** If not set, the publication scope is determined by the PUBSCOPE topic attribute.

**Publishing options**. The following options control the way messages are published to a topic:

**MQPMO_SUPPRESS_REPLYTO**

Any information specified in the *ReplyToQ* and *ReplyToQMgr* fields of the MQMD of this publication is not passed on to subscribers. If this option is used with a report option that requires a *ReplyToQ*, the call fails with MQRC_MISSING_REPLY_TO_Q.

**MQPMO_RETAIN**

The publication being sent is to be retained by the queue manager. This retention allows a subscriber to request a copy of this publication after the time it was published, by using the MQSUBRQ call. It also allows a publication to be sent to applications which make their subscription after the time this publication was made (unless they choose not to be sent it by using the option MQSO_NEW_PUBLICATIONS_ONLY). If an application is sent a publication which was retained, it is indicated by the MQIsRetained message property of that publication.

Only one publication can be retained at each node of the topic tree. Therefore, if there already is a retained publication for this topic, published by any other application, it is replaced with this publication. It is therefore better to avoid having more than one publisher retaining messages on the same topic.

When retained publications are requested by a subscriber, the subscription used might contain a wildcard in the topic, in which case a number of retained publications might match (at various nodes in the topic tree) and several publications might be sent to the requesting application. See the description of the "MQSUBRQ - Subscription request" on page 773 call for more details.

For information about how retained publications interact with subscription levels, see Intercepting publications.

If this option is used and the publication cannot be retained, the message is not published and the call fails with MQRC_PUT_NOT_RETAINED.

**MQPMO_NOT_OWN_SUBS**
Tells the queue manager that the application does not want to send any of its publications to subscriptions it owns. Subscriptions are considered to be owned by the same application if the connection handles are the same.

**MQPMO_WARN_IF_NO_SUBS_MATCHED**
If no subscription matches the publication, return a completion code (*CompCode*) of MQCC_WARNING and reason code MQRC_NO_SUBS_MATCHED.

If MQRC_NO_SUBS_MATCHED is returned by the put operation, the publication was not delivered to any subscriptions. However, if the MQPMO_RETAIN option is specified on the put operation, the message is retained and delivered to any subsequently defined matching subscription.

A subscription on the topic matches the publication if any of the following conditions are met:

- The message is delivered to the subscription queue
- The message would have been delivered to the subscription queue but a problem with the queue means that the message cannot be put to the queue, and it was consequently placed on the dead letter queue or discarded.
- A routing exit is defined that suppresses delivery of the message to the subscription

A subscription on the topic does not match the publication if any of the following conditions are met:

- The subscription has a selection string that does not match the publication
- The subscription specified the MQSO_PUBLICATION_ON_REQUEST option
- The publication is not delivered because the MQPMO_NOT_OWN_SUBS option was specified on the put operation and the subscription matches the identity of the publisher

**Syncpoint options**. The following options relate to the participation of the MQPUT or MQPUT1 call within a unit of work:

**MQPMO_SYNCPOINT**
The request is to operate within the normal unit-of-work protocols. The message is not visible outside the unit of work until the unit of work is committed. If the unit of work is backed out, the message is deleted.

If MQPMO_SYNCPOINT and MQPMO_NO_SYNCPOINT are not specified, the inclusion of the put request in unit-of-work protocols is determined by the environment running the queue manager and not the environment running the application. On z/OS, the put request is within a unit of work. In all other environments, the put request is not within a unit of work.

Because of these differences, an application that you want to port must not allow this option to default; specify either MQPMO_SYNCPOINT or MQPMO_NO_SYNCPOINT explicitly.

Do not specify MQPMO_SYNCPOINT with MQPMO_NO_SYNCPOINT.

**MQPMO_NO_SYNCPOINT**
The request is to operate outside the normal unit-of-work protocols. The message is available immediately, and it cannot be deleted by backing out a unit of work.

If MQPMO_NO_SYNCPOINT and MQPMO_SYNCPOINT are not specified, the inclusion of the put request in unit-of-work protocols is determined by the environment running the queue manager and not the environment running the application. On z/OS, the put request is within a unit of work. In all other environments, the put request is not within a unit of work.

Because of these differences, an application that you want to port must not allow this option to default; specify either MQPMO_SYNCPOINT or MQPMO_NO_SYNCPOINT explicitly.

Do not specify MQPMO_NO_SYNCPOINT with MQPMO_SYNCPOINT.

**Message-identifier and correlation-identifier options**. The following options request the queue manager to generate a new message identifier or correlation identifier:

**MQPMO_NEW_MSG_ID**
The queue manager replaces the contents of the *MsgId* field in MQMD with a new message identifier. This message identifier is sent with the message, and returned to the application on output from the MQPUT or MQPUT1 call.

The MQPMO_NEW_MSG_ID option can also be specified when the message is being put to a distribution list; see the description of the *MsgId* field in the MQPMR structure for details.

Using this option relieves the application of the need to reset the *MsgId* field to MQMI_NONE before each MQPUT or MQPUT1 call.

**MQPMO_NEW_CORREL_ID**
The queue manager replaces the contents of the *CorrelId* field in MQMD with a new correlation identifier. This correlation identifier is sent with the message, and returned to the application on output from the MQPUT or MQPUT1 call.

The MQPMO_NEW_CORREL_ID option can also be specified when the message is being put to a distribution list; see the description of the *CorrelId* field in the MQPMR structure for details.

MQPMO_NEW_CORREL_ID is useful in situations where the application requires a unique correlation identifier.

**Group and segment options**. The following options relate to the processing of messages in groups and segments of logical messages. Read the definitions that follow to help you to understand the option.

**Attention:** You cannot use segmented or grouped messages with Publish/ Subscribe.

**Physical message**

The is the smallest unit of information that can be placed on or removed from a queue; it often corresponds to the information specified or retrieved on a single MQPUT, MQPUT1, or MQGET call. Every physical message has its own message descriptor (MQMD). Generally, physical messages are distinguished by differing values for the message identifier (*MsgId* field in MQMD), although this is not enforced by the queue manager.

**Logical message**

A logical message is a single unit of application information for non- z/OS platforms only. In the absence of system constraints, a logical message is the same as a physical message. But where logical messages are extremely large, system constraints might make it advisable or necessary to split a logical message into two or more physical messages, called *segments*.

A logical message that has been segmented consists of two or more physical messages that have the same non-null group identifier (*GroupId* field in MQMD), and the same message sequence number (*MsgSeqNumber* field in MQMD). The segments are distinguished by differing values for the segment offset (*Offset* field in MQMD), which gives the offset of the data in the physical message from the start of the data in the logical message. Because each segment is a physical message, the segments in a logical message usually have differing message identifiers.

A logical message that has not been segmented, but for which segmentation has been permitted by the sending application, also has a non-null group identifier, although in this case there is only one physical message with that group identifier if the logical message does not belong to a message group. Logical messages for which segmentation has been inhibited by the sending application have a null group identifier (MQGI_NONE), unless the logical message belongs to a message group.

**Message group**

A message group is a set of one or more logical messages that have the same non-null group identifier. The logical messages in the group are distinguished by differing values for the message sequence number, which is an integer in the range 1 through *n*, where *n* is the number of logical messages in the group. If one or more of the logical messages is segmented, there are more than *n* physical messages in the group.

**MQPMO_LOGICAL_ORDER**

This option tells the queue manager how the application puts messages in groups and segments of logical messages. It can be specified only on the MQPUT call; it is not valid on the MQPUT1 call.

If MQPMO_LOGICAL_ORDER is specified, it indicates that the application uses successive MQPUT calls to:

1. Put the segments in each logical message in the order of increasing segment offset, starting from 0, with no gaps.
2. Put all the segments in one logical message before putting the segments in the next logical message.
3. Put the logical messages in each message group in the order of increasing message sequence number, starting from 1, with no gaps. IBM MQ increments the message sequence number automatically.
4. Put all the logical messages in one message group before putting logical messages in the next message group.

For detailed information about MQPMO_LOGICAL_ORDER, see Logical and physical ordering

**Context options**. The following options control the processing of message context:

**MQPMO_NO_CONTEXT**
Both identity and origin context are set to indicate no context. This means that the context fields in MQMD are set to:

- Blanks for character fields
- Nulls for byte fields
- Zeros for numeric fields

**MQPMO_DEFAULT_CONTEXT**
The message is to have default context information associated with it, for both identity and origin. The queue manager sets the context fields in the message descriptor as follows:

| Field in MQMD | Value used |
|---|---|
| *UserIdentifier* | Determined from the environment if possible; set to blanks otherwise. |
| *AccountingToken* | Determined from the environment if possible; set to MQACT_NONE otherwise. |
| *ApplIdentityData* | Set to blanks. |
| *PutApplType* | Determined from the environment. |
| *PutApplName* | Determined from the environment if possible; set to blanks otherwise. |
| *PutDate* | Set to the date when message is put. |
| *PutTime* | Set to the time when message is put. |
| *ApplOriginData* | Set to blanks. |

For more information about message context, see Message context.

These are the default values and actions if no context options are specified.

**MQPMO_PASS_IDENTITY_CONTEXT**
The message is to have context information associated with it. Identity context is taken from the queue handle specified in the *Context* field. Origin context information is generated by the queue manager in the same way that it is for MQPMO_DEFAULT_CONTEXT (see the preceding table for values). For more information about message context, see Message context.

For the MQPUT call, the queue must have been opened with the MQOO_PASS_IDENTITY_CONTEXT option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the MQOO_PASS_IDENTITY_CONTEXT option.

**MQPMO_PASS_ALL_CONTEXT**
The message is to have context information associated with it. Context is taken from the queue handle specified in the *Context* field. For more information about message context, see Controlling context information.

For the MQPUT call, the queue must have been opened with the MQOO_PASS_ALL_CONTEXT option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the MQOO_PASS_ALL_CONTEXT option.

**MQPMO_SET_IDENTITY_CONTEXT**
The message is to have context information associated with it. The application specifies the identity context in the MQMD structure. Origin context information is generated by the queue manager in the same way that it is for MQPMO_DEFAULT_CONTEXT (see the preceding table for values). For more information about message context, see Message context.

For the MQPUT call, the queue must have been opened with the MQOO_SET_IDENTITY_CONTEXT option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the MQOO_SET_IDENTITY_CONTEXT option.

**MQPMO_SET_ALL_CONTEXT**
The message is to have context information associated with it. The application specifies the identity, origin, and user context in the MQMD structure. For more information about message context, see Message context.

For the MQPUT call, the queue must have been opened with the MQOO_SET_ALL_CONTEXT option. For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the MQOO_SET_ALL_CONTEXT option.

You can specify only one of the MQPMO_*_CONTEXT context options. If you specify none, MQPMO_DEFAULT_CONTEXT is assumed.

**Property options**. The following option relates to the properties of the message:

**MQPMO_MD_FOR_OUTPUT_ONLY**
The message descriptor parameter must only be used for output to return the message descriptor of the message that was put. The message descriptor fields associated with the *NewMsgHandle*, *OriginalMsgHandle*, or both fields, of the **MQPMO** structure must be used for input.

If a valid message handle is not provided then the call fails with reason code **MQRC_MD_ERROR**.

**Put response options**. The following options control the response returned to an MQPUT or MQPUT1 call. You can specify only one of these options. If MQPMO_ASYNC_RESPONSE and MQPMO_SYNC_RESPONSE are not specified, MQPMO_RESPONSE_AS_Q_DEF or MQPMO_RESPONSE_AS_TOPIC_DEF is assumed.

**MQPMO_ASYNC_RESPONSE**
The MQPMO_ASYNC_RESPONSE option requests that an MQPUT or MQPUT1 operation is completed without the application waiting for the queue manager to complete the call. Using this option can improve messaging performance, particularly for applications using client bindings. An application can periodically check, using the MQSTAT verb, whether an error has occurred during any previous asynchronous calls.

With this option, only the following fields are guaranteed to be completed in the MQMD;

- ApplIdentityData
- PutApplType
- PutApplName
- ApplOriginData

Additionally, if either or both of MQPMO_NEW_MSG_ID or MQPMO_NEW_CORREL_ID are specified as options, the MsgId and CorrelId returned are also completed. (MQPMO_NEW_MSG_ID can be implicitly specified by specifying a blank MsgId field).

Only the preceding specified fields are completed. Other information that would normally be returned in the MQMD or MQPMO structure is undefined.

When requesting asynchronous put response for MQPUT1, the ResolvedQName and ResolvedQMgrName returned in the MQOD structure are undefined.

When requesting asynchronous put response for MQPUT or MQPUT1, a CompCode and Reason of MQCC_OK and MQRC_NONE does not necessarily mean that the message was successfully put to a queue. When developing an MQI application that uses asynchronous put response and requires confirmation that messages have been put to a queue you must check both CompCode and Reason codes from the put operations and also use MQSTAT to query asynchronous error information.

Although the success or failure of each individual MQPUT or MQPUT1 call mightnot be returned immediately, the first error that occurred under an asynchronous call can be determined later through a call to MQSTAT.

If a persistent message under syncpoint fails to be delivered using asynchronous put response, and you attempt to commit the transaction, the commit fails and the transaction is backed out with a

completion code of MQCC_FAILED and a reason of MQRC_BACKED_OUT. The application can make a call to MQSTAT to determine the cause of a previous MQPUT or MQPUT1 failure.

**MQPMO_SYNC_RESPONSE**
Specifying this put response type ensures that the MQPUT or MQPUT1 operation is always issued synchronously. If the put operation is successful, all fields in the MQMD and MQPMO are completed.

This option ensures a synchronous response irrespective of the default put response value defined on the queue or topic object.

**MQPMO_RESPONSE_AS_Q_DEF**
If this value is specified for an MQPUT call, the put response type used is taken from the DEFPRESP value specified on the queue when it was first opened by the application. If a client application is connected to a queue manager at a level earlier than Version 7.0, it behaves as if MQPMO_SYNC_RESPONSE was specified.

If this option is specified for an MQPUT1 call, the value of the DEFPRESP attribute is not known before the request is sent to the server. By default, if the MQPUT1 call is using MQPMO_SYNCPOINT it behaves as for MQPMO_ASYNC_RESPONSE, and if it is using MQPMO_NO_SYNCPOINT it behaves as for MQPMO_SYNC_RESPONSE. However, you can override this default behavior by setting the Put1DefaultAlwaysSync property in the client configuration file, see CHANNELS stanza of the client configuration file.

**MQPMO_RESPONSE_AS_TOPIC_DEF**
MQPMO_RESPONSE_AS_TOPIC_DEF is a synonym for MQPMO_RESPONSE_AS_Q_DEF for use with topic objects.

**Other options**. The following options control authorization checking, what happens when the queue manager is quiescing, and resolving queue and queue manager names:

**MQPMO_ALTERNATE_USER_AUTHORITY**
MQPMO_ALTERNATE_USER_AUTHORITY indicates that the *AlternateUserId* field in the *ObjDesc* parameter of the MQPUT1 call contains a user identifier that is to be used to validate authority to put messages on the queue. The call can succeed only if *AlternateUserId* is authorized to open the queue with the specified options, regardless of whether the user identifier under which the application is running is authorized to do so. (This does not apply to the context options specified, however, which are always checked against the user identifier under which the application is running.)

This option is valid only with the MQPUT1 call.

**MQPMO_FAIL_IF_QUIESCING**
This option forces the MQPUT or MQPUT1 call to fail if the queue manager is in the quiescing state.

On z/OS, this option also forces the MQPUT or MQPUT1 call to fail if the connection (for a CICS or IMS application) is in the quiescing state.

The call returns completion code MQCC_FAILED with reason code MQRC_Q_MGR_QUIESCING or MQRC_CONNECTION_QUIESCING.

**MQPMO_RESOLVE_LOCAL_Q**
Use this option to fill *ResolvedQName* in the MQPMO structure with the name of the local queue to which the message is put, and *ResolvedQMgrName* with the name of the local queue manager that hosts the local queue. For more information about MQPMO_RESOLVE_LOCAL_Q, see topic MQOO_RESOLVE_LOCAL_Q.

If you are authorized to put to a queue, you have the required authority to specify this flag on the MQPUT call; no special authority is needed.

**Default option**. If you need none of the options described, use the following option:

**MQPMO_NONE**
Use this value to indicate that no other options have been specified; all options assume their default values. MQPMO_NONE is defined to aid program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

MQPMO_NONE is an input field. The initial value of the *Options* field is MQPMO_NONE.

*OriginalMsgHandle (MQHMSG)*

This is an optional handle to a message. It might have been previously retrieved from a queue. The use of this handle is subject to the value of the *Action* field; see also NewMsgHandle.

The contents of the original message handle will not be altered by the **MQPUT** or **MQPUT1** call.

This is an input field. The initial value of this field is **MQHM_NONE**. This field is ignored if Version is less than **MQPMO_VERSION_3**.

*PubLevel (MQLONG)*
The initial value of this field is 9. The level of subscription targeted by this publication. Only those subscriptions with the highest SubLevel less than or equal to this value receive this publication. This value must be in the range zero to 9; zero is the lowest level. However, if a publication has been retained, it is no longer available to subscribers at higher levels because it is republished at PubLevel 1.

For information, see Intercepting publications.

*PutMsgRecFields (MQLONG)*

This field contains flags that indicate which MQPMR fields are present in the put message records provided by the application. Use *PutMsgRecFields* only when the message is being put to a distribution list. The field is ignored if *RecsPresent* is zero, or both *PutMsgRecOffset* and *PutMsgRecPtr* are zero.

For fields that are present, the queue manager uses for each destination the values from the fields in the corresponding put message record. For fields that are absent, the queue manager uses the values from the MQMD structure.

Use one or more of the following flags to indicate which fields are present in the put message records:

**MQPMRF_MSG_ID**
Message-identifier field is present.

**MQPMRF_CORREL_ID**
Correlation-identifier field is present.

**MQPMRF_GROUP_ID**
Group-identifier field is present.

**MQPMRF_FEEDBACK**
Feedback field is present.

**MQPMRF_ACCOUNTING_TOKEN**
Accounting-token field is present.

If you specify this flag, specify either MQPMO_SET_IDENTITY_CONTEXT or MQPMO_SET_ALL_CONTEXT in the *Options* field; if this condition is not satisfied, the call fails with reason code MQRC_PMO_RECORD_FLAGS_ERROR.

If no MQPMR fields are present, the following can be specified:

**MQPMRF_NONE**
No put-message record fields are present.

If this value is specified, either *RecsPresent* must be zero, or both *PutMsgRecOffset* and *PutMsgRecPtr* must be zero.

MQPMRF_NONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

If *PutMsgRecFields* contains flags that are not valid, or put message records are provided but *PutMsgRecFields* has the value MQPMRF_NONE, the call fails with reason code MQRC_PMO_RECORD_FLAGS_ERROR.

This is an input field. The initial value of this field is MQPMRF_NONE. This field is ignored if *Version* is less than MQPMO_VERSION_2.

*PutMsgRecOffset (MQLONG)*

This is the offset in bytes of the first MQPMR put message record from the start of the MQPMO structure. The offset can be positive or negative. *PutMsgRecOffset* is used only when the message is being put to a distribution list. The field is ignored if *RecsPresent* is zero.

When the message is being put to a distribution list, an array of one or more MQPMR put message records can be provided in order to specify certain properties of the message for each destination individually; these properties are:

- Message identifier
- Correlation identifier
- Group identifier
- Feedback value
- Accounting token

You do not need to specify all these properties, but whatever subset you choose, specify the fields in the correct order. See the description of the MQPMR structure for further details.

Usually, there must be as many put message records as there are object records specified by MQOD when the distribution list is opened; each put message record supplies the message properties for the queue identified by the corresponding object record. Queues in the distribution list that fail to open must still have put message records allocated for them at the appropriate positions in the array, although the message properties are ignored in this case.

The number of put message records can differ from the number of object records. If there are fewer put message records than object records, the message properties for the destinations that do not have put message records are taken from the corresponding fields in the message descriptor MQMD. If there are more put message records than object records, the excess are not used (although it must still be possible to access them). Put message records are optional, but if they are supplied there must be *RecsPresent* of them.

Provide the put message records in a similar way to the object records in MQOD, either by specifying an offset in *PutMsgRecOffset*, or by specifying an address in *PutMsgRecPtr* ; for details of how to do this, see the *ObjectRecOffset* field described in"MQOD - Object descriptor" on page 460.

No more than one of *PutMsgRecOffset* and *PutMsgRecPtr* can be used; the call fails with reason code MQRC_PUT_MSG_RECORDS_ERROR if both are nonzero.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQPMO_VERSION_2.

*PutMsgRecPtr (MQPTR)*

This is the address of the first MQPMR put message record. Use *PutMsgRecPtr* only when the message is being put to a distribution list. The field is ignored if *RecsPresent* is zero.

You can use either *PutMsgRecPtr* or *PutMsgRecOffset* can be used to specify the put message records, but not both; for details, see "PutMsgRecOffset (MQLONG)" on page 494. If you do not use *PutMsgRecPtr*, set it to the null pointer or null bytes.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQPMO_VERSION_2.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length, with the initial value being the all-null byte string.

*RecsPresent (MQLONG)*

This is the number of MQPMR put message records or MQRR response records that have been provided by the application. This number can be greater than zero only if the message is being put to a distribution list. Put message records and response records are optional; the application need not provide any

records, or it can choose to provide records of only one type. However, if the application provides records of both types, it must provide *RecsPresent* records of each type.

The value of *RecsPresent* need not be the same as the number of destinations in the distribution list. If too many records are provided, the excess are not used; if too few records are provided, default values are used for the message properties for those destinations that do not have put message records (see *PutMsgRecOffset*).

If *RecsPresent* is less than zero, or is greater than zero but the message is not being put to a distribution list, the call fails with reason code MQRC_RECS_PRESENT_ERROR.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQPMO_VERSION_2.

*ResolvedQMgrName (MQCHAR48)*

This is the name of the destination queue manager after name resolution has been performed by the local queue manager. The name returned is the name of the queue manager that owns the queue identified by *ResolvedQName*, and can be the name of the local queue manager.

If *ResolvedQName* is a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *ResolvedQMgrName* is the name of the queue-sharing group. If the queue is owned by some other queue-sharing group, *ResolvedQName* can be the name of the queue-sharing group or the name of a queue manager that is a member of the queue-sharing group (the nature of the value returned is determined by the queue definitions that exist at the local queue manager).

A nonblank value is returned only if the object is a single queue; if the object is a distribution list or a topic, the value returned is undefined.

This is an output field. The length of this field is given by MQ_Q_MGR_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ResolvedQName (MQCHAR48)*

This is the name of the destination queue after name resolution has been performed by the local queue manager. The name returned is the name of a queue that exists on the queue manager identified by *ResolvedQMgrName*.

A nonblank value is returned only if the object is a single queue; if the object is a distribution list or a topic, the value returned is undefined.

This is an output field. The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*ResponseRecOffset (MQLONG)*

This is the offset in bytes of the first MQRR response record from the start of the MQPMO structure. The offset can be positive or negative. *ResponseRecOffset* is used only when the message is being put to a distribution list. The field is ignored if *RecsPresent* is zero.

When putting the message to a distribution list, you can provide an array of one or more MQRR response records to identify the queues to which the message was not sent successfully (*CompCode* field in MQRR), and the reason for each failure (*Reason* field in MQRR). The message might not have been sent either because the queue failed to open, or because the put operation failed. The queue manager sets the response records only when the outcome of the call is mixed (that is, some messages were sent successfully while others failed, or all failed but for differing reasons); reason code MQRC_MULTIPLE_REASONS from the call indicates this case. If the same reason code applies to all queues, that reason is returned in the *Reason* parameter of the MQPUT or MQPUT1 call, and the response records are not set.

Usually, there are as many response records as there are object records specified by MQOD when the distribution list is opened; when necessary, each response record is set to the completion code and reason code for the put to the queue identified by the corresponding object record. Queues in the distribution list that fail to open must still have response records allocated for them at the appropriate

positions in the array, although they are set to the completion code and reason code resulting from the open operation, rather than the put operation.

The number of response records can differ from the number of object records. If there are fewer response records than object records, the application might not be able to identify all the destinations for which the put operation failed, or the reasons for the failures. If there are more response records than object records, the excess are not used (although it must still be possible to access them). Response records are optional, but if they are supplied there must be *RecsPresent* of them.

Provide the response records in a similar way to the object records in MQOD, either by specifying an offset in *ResponseRecOffset*, or by specifying an address in *ResponseRecPtr* ; for details of how to do this, see the *ObjectRecOffset* field described in "MQOD - Object descriptor" on page 460. However, use no more than one of *ResponseRecOffset* and *ResponseRecPtr* ; the call fails with reason code MQRC_RESPONSE_RECORDS_ERROR if both are nonzero.

For the MQPUT1 call, this field must be zero. This is because the response information (if requested) is returned in the response records specified by the object descriptor MQOD.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQPMO_VERSION_2.

*ResponseRecPtr (MQPTR)*

This is the address of the first MQRR response record. *ResponseRecPtr* is used only when the message is being put to a distribution list. The field is ignored if *RecsPresent* is zero.

Use either *ResponseRecPtr* or *ResponseRecOffset* to specify the response records, but not both; for details, see "ResponseRecOffset (MQLONG)" on page 495. If you do not use *ResponseRecPtr* set it to the null pointer or null bytes.

For the MQPUT1 call, this field must be the null pointer or null bytes. This is because the response information (if requested) is returned in the response records specified by the object descriptor MQOD.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise. This field is ignored if *Version* is less than MQPMO_VERSION_2.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length, with the initial value being the all-null byte string.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQPMO_STRUC_ID**
Identifier for put-message options structure.

For the C programming language, the constant MQPMO_STRUC_ID_ARRAY is also defined; this has the same value as MQPMO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQPMO_STRUC_ID.

*Timeout (MQLONG)*

This is a reserved field; its value is not significant. The initial value of this field is -1.

*UnknownDestCount (MQLONG)*

This is the number of messages that the current MQPUT or MQPUT1 call has sent successfully to queues in the distribution list that resolve to remote queues. Messages that the queue manager retains temporarily in distribution-list form count as the number of individual destinations that those distribution lists contain. This field is also set when putting a message to a single queue that is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is not set if *Version* is less than MQPMO_VERSION_1.

This field is undefined on z/OS because distribution lists are not supported.

*Version (MQLONG)*
Structure version number.

The value must be one of the following:

**MQPMO_VERSION_1**
Version-1 put-message options structure.

This version is supported in all environments.

**MQPMO_VERSION_2**
Version-2 put-message options structure.

This version is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

**MQPMO_VERSION_3**
Version-3 put-message options structure.

This version is supported in all environments.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQPMO_CURRENT_VERSION**
Current version of put-message options structure.

This is always an input field. The initial value of this field is MQPMO_VERSION_1.

## *Initial values and language declarations for MQPMO*

*Table 517. Initial values of fields in MQPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQPMO_STRUC_ID | 'PMO¬' |
| *Version* | MQPMO_VERSION_1 | 1 |
| *Options* | MQPMO_NONE | 0 |
| *Timeout* | None | -1 |
| *Context* | None | 0 |
| *KnownDestCount* | None | 0 |
| *UnknownDestCount* | None | 0 |
| *InvalidDestCount* | None | 0 |
| *ResolvedQName* | None | Null string or blanks |
| *ResolvedQMgrName* | None | Null string or blanks |
| *RecsPresent* | None | 0 |
| *PutMsgRecFields* | MQPMRF_NONE | 0 |
| *PutMsgRecOffset* | None | 0 |
| *ResponseRecOffset* | None | 0 |
| *PutMsgRecPtr* | None | Null pointer or null bytes |
| *ResponseRecPtr* | None | Null pointer or null bytes |
| *OriginalMsgHandle* | MQHM_NONE | 0 |

| *Table 517. Initial values of fields in MQPMO (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *NewMsgHandle* | MQHM_NONE | 0 |
| *Action* | MQACTP_NEW | 0 |
| *PubLevel* | None | 9 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQPMO_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQPMO MyPMO = {MQPMO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQPMO MQPMO;
struct tagMQPMO {
  MQCHAR4   StrucId;            /* Structure identifier */
  MQLONG    Version;            /* Structure version number */
  MQLONG    Options;            /* Options that control the action of
                                   MQPUT and MQPUT1 */
  MQLONG    Timeout;            /* Reserved */
  MQHOBJ    Context;            /* Object handle of input queue */
  MQLONG    KnownDestCount;     /* Number of messages sent
                                   successfully to local queues */
  MQLONG    UnknownDestCount;   /* Number of messages sent
                                   successfully to remote queues */
  MQLONG    InvalidDestCount;   /* Number of messages that could not
                                   be sent */
  MQCHAR48  ResolvedQName;      /* Resolved name of destination
                                   queue */
  MQCHAR48  ResolvedQMgrName;   /* Resolved name of destination queue
                                   manager */
  /* Ver:1 */
  MQLONG    RecsPresent;        /* Number of put message records or
                                   response records present */
  MQLONG    PutMsgRecFields;    /* Flags indicating which MQPMR fields
                                   are present */
  MQLONG    PutMsgRecOffset;    /* Offset of first put message record
                                   from start of MQPMO */
  MQLONG    ResponseRecOffset;  /* Offset of first response record
                                   from start of MQPMO */
  MQPTR     PutMsgRecPtr;       /* Address of first put message
                                   record */
  MQPTR     ResponseRecPtr;     /* Address of first response record */
  /* Ver:2 */
  MQHMSG    OriginalMsgHandle;  /* Original message handle */
  MQHMSG    NewMsgHandle;       /* New message handle */
  MQLONG    Action;             /* The action being performed */
  MQLONG    PubLevel;           /* Subscription level */
  /* Ver:3 */
};
```

*COBOL declaration*

```
**   MQPMO structure
  10 MQPMO.
**    Structure identifier
   15 MQPMO-STRUCID           PIC X(4).
**    Structure version number
   15 MQPMO-VERSION           PIC S9(9) BINARY.
**    Options that control the action of MQPUT and MQPUT1
```

```
   15 MQPMO-OPTIONS           PIC S9(9) BINARY.
**    Reserved
   15 MQPMO-TIMEOUT           PIC S9(9) BINARY.
**    Object handle of input queue
   15 MQPMO-CONTEXT           PIC S9(9) BINARY.
**    Number of messages sent successfully to local queues
   15 MQPMO-KNOWNDESTCOUNT    PIC S9(9) BINARY.
**    Number of messages sent successfully to remote queues
   15 MQPMO-UNKNOWNDESTCOUNT  PIC S9(9) BINARY.
**    Number of messages that could not be sent
   15 MQPMO-INVALIDDESTCOUNT  PIC S9(9) BINARY.
**    Resolved name of destination queue
   15 MQPMO-RESOLVEDQNAME     PIC X(48).
**    Resolved name of destination queue manager
   15 MQPMO-RESOLVEDQMGRNAME  PIC X(48).
**    Number of put message records or response records present
   15 MQPMO-RECSPRESENT       PIC S9(9) BINARY.
**    Flags indicating which MQPMR fields are present
   15 MQPMO-PUTMSGRECFIELDS   PIC S9(9) BINARY.
**    Offset of first put message record from start of MQPMO
   15 MQPMO-PUTMSGRECOFFSET   PIC S9(9) BINARY.
**    Offset of first response record from start of MQPMO
   15 MQPMO-RESPONSERECOFFSET PIC S9(9) BINARY.
**    Address of first put message record
   15 MQPMO-PUTMSGRECPTR      POINTER.
**    Address of first response record
   15 MQPMO-RESPONSERECPTR    POINTER.
**    Original message handle
   15 MQPMO-ORIGINALMSGHANDLE PIC S9(18) BINARY.
**    New message handle
   15 MQPMO-NEWMSGHANDLE      PIC S9(18) BINARY.
**    The action being performed
   15 MQPMO-ACTION            PIC S9(9) BINARY.
**    Publish level
   15 MQPMO-PUBLEVEL          PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQPMO based,
  3 StrucId           char(4),       /* Structure identifier */
  3 Version           fixed bin(31), /* Structure version number */
  3 Options           fixed bin(31), /* Options that control the action
                                        of MQPUT and MQPUT1 */
  3 Timeout           fixed bin(31), /* Reserved */
  3 Context           fixed bin(31), /* Object handle of input queue */
  3 KnownDestCount    fixed bin(31), /* Number of messages sent
                                        successfully to local queues */
  3 UnknownDestCount  fixed bin(31), /* Number of messages sent
                                        successfully to remote queues */
  3 InvalidDestCount  fixed bin(31), /* Number of messages that could
                                        not be sent */
  3 ResolvedQName     char(48),      /* Resolved name of destination
                                        queue */
  3 ResolvedQMgrName  char(48),      /* Resolved name of destination
                                        queue manager */
  3 RecsPresent       fixed bin(31), /* Number of put message records or
                                        response records present */
  3 PutMsgRecFields   fixed bin(31), /* Flags indicating which MQPMR
                                        fields are present */
  3 PutMsgRecOffset   fixed bin(31), /* Offset of first put message
                                        record from start of MQPMO */
  3 ResponseRecOffset fixed bin(31), /* Offset of first response record
                                        from start of MQPMO */
  3 PutMsgRecPtr      pointer,       /* Address of first put message
                                        record */
  3 ResponseRecPtr    pointer,       /* Address of first response
                                        record */
  3 OriginalMsgHandle fixed bin(63), /* Original message handle */
  3 NewMsgHandle      fixed bin(63); /* New message handle */
  3 Action            fixed bin(31); /* The action being performed */
  3 PubLevel          fixed bin(31); /* Publish level */
```

*High Level Assembler declaration*

```
MQPMO                   DSECT
```

```
MQPMO_STRUCID           DS   CL4   Structure identifier
MQPMO_VERSION           DS   F     Structure version number
MQPMO_OPTIONS           DS   F     Options that control the action of
*                                  MQPUT and MQPUT1
MQPMO_TIMEOUT           DS   F     Reserved
MQPMO_CONTEXT           DS   F     Object handle of input queue
MQPMO_KNOWNDESTCOUNT    DS   F     Number of messages sent successfully
*                                  to local queues
MQPMO_UNKNOWNDESTCOUNT  DS   F     Number of messages sent successfully
*                                  to remote queues
MQPMO_INVALIDDESTCOUNT  DS   F     Number of messages that could not be
*                                  sent
MQPMO_RESOLVEDQNAME     DS   CL48  Resolved name of destination queue
MQPMO_RESOLVEDQMGRNAME  DS   CL48  Resolved name of destination queue
*                                  manager
MQPMO_RECSPRESENT       DS   F     Number of put message records or
*                                  response records present
MQPMO_PUTMSGRECFIELDS   DS   F     Flags indicating which MQPMR
*                                  fields are present
MQPMO_PUTMSGRECOFFSET   DS   F     Offset of first put message record
*                                  from start of MQPMO
MQPMO_RESPONSERECOFFSET DS   F     Offset of first response record
*                                  from start of MQPMO
MQPMO_PUTMSGRECPTR      DS   F     Address of first put message
*                                  record
MQPMO_RESPONSERECPTR    DS   F     Address of first response record
MQPMO_ORIGINALMSGHANDLE DS   D     Original message handle
MQPMO_NEWMSGHANDLE      DS   D     New message handle
MQPMO_ACTION            DS   F     The action being performed
MQPMO_PUBLEVEL          DS   F     Publish level
*
MQPMO_LENGTH            EQU  *-MQPMO
                        ORG  MQPMO
MQPMO_AREA              DS   CL(MQPMO_LENGTH)
```

*Visual Basic declaration*

```
Type MQPMO
  StrucId           As String*4  'Structure identifier'
  Version           As Long      'Structure version number'
  Options           As Long      'Options that control the action of'
                                 'MQPUT and MQPUT1'
  Timeout           As Long      'Reserved'
  Context           As Long      'Object handle of input queue'
  KnownDestCount    As Long      'Number of messages sent successfully'
                                 'to local queues'
  UnknownDestCount  As Long      'Number of messages sent successfully'
                                 'to remote queues'
  InvalidDestCount  As Long      'Number of messages that could not be'
                                 'sent'
  ResolvedQName     As String*48 'Resolved name of destination queue'
  ResolvedQMgrName  As String*48 'Resolved name of destination queue'
                                 'manager'
  RecsPresent       As Long      'Number of put message records or'
                                 'response records present'
  PutMsgRecFields   As Long      'Flags indicating which MQPMR fields'
                                 'are present'
  PutMsgRecOffset   As Long      'Offset of first put message record'
                                 'from start of MQPMO'
  ResponseRecOffset As Long      'Offset of first response record from'
                                 'start of MQPMO'
  PutMsgRecPtr      As MQPTR     'Address of first put message record'
  ResponseRecPtr    As MQPTR     'Address of first response record'
End Type
```

## MQPMR - Put-message record

The following table summarizes the fields in the structure.

| *Table 518. Fields in MQPMR* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *MsgId* | Message identifier | MsgId |

| Table 518. Fields in MQPMR (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *CorrelId* | Correlation identifier | CorrelId |
| *GroupId* | Group identifier | GroupId |
| *Feedback* | Feedback or reason code | Feedback |
| *AccountingToken* | Accounting token | AccountingToken |

## *Overview for MQPMR*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

**Purpose**: Use the MQPMR structure to specify various message properties for a single destination when putting a message to a distribution list. MQPMR is an input/output structure for the MQPUT and MQPUT1 calls.

**Character set and encoding**: Data in MQPMR must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQPUT or MQPUT1 call, you can specify different values for each destination queue in a distribution list. Some of the fields are input only, others are input/output.

**Note:** This structure is unusual in that it does not have a fixed layout. The fields in this structure are optional, and the presence or absence of each field is indicated by the flags in the *PutMsgRecFields* field in MQPMO. Fields that are present ***must occur in the following order*** :

- *MsgId*
- *CorrelId*
- *GroupId*
- *Feedback*
- *AccountingToken*

Fields that are absent occupy no space in the record.

Because MQPMR does not have a fixed layout, no definition of it is provided in the header, COPY, and INCLUDE files for the supported programming languages. The application programmer must create a declaration containing the fields that are required by the application, and set the flags in *PutMsgRecFields* to indicate the fields that are present.

## *Fields for MQPMR*

The MQPMR structure contains the following fields; the fields are described in **alphabetical order**:

*AccountingToken (MQBYTE32)*

This is the accounting token to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *AccountingToken* field in MQMD for a put to a single queue. See the description of *AccountingToken* in “MQMD - Message descriptor” on page 402 for information about the content of this field.

If this field is not present, the value in MQMD is used.

This is an input field.

*CorrelId (MQBYTE24)*

This is the correlation identifier to be used for the message sent to the queue with a name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *CorrelId* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *CorrelId* field.

If MQPMO_NEW_CORREL_ID is specified, a *single* new correlation identifier is generated and used for all the destinations in the distribution list, regardless of whether they have MQPMR records. This is different from the way that MQPMO_NEW_MSG_ID is processed (see *MsgId* field).

This is an input/output field.

*Feedback (MQLONG)*

This is the feedback code to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *Feedback* field in MQMD for a put to a single queue.

If this field is not present, the value in MQMD is used.

This is an input field.

*GroupId (MQBYTE24)*

GroupId is the group identifier to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *GroupId* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *GroupId* field. The value is processed as documented in Physical order on a queue, but with the following differences:

- GroupId is created from the QMName and a timestamp. Therefore to keep a GroupId unique keep queue manager names unique too. Also do not set the clocks back on the queue managers machine.
- In those cases where a new group identifier would be used, the queue manager generates a different group identifier for each destination (that is, no two destinations have the same group identifier).
- In those cases where the value in the field would be used, the call fails with reason code MQRC_GROUP_ID_ERROR

This is an input/output field.

*MsgId (MQBYTE24)*

This is the message identifier to be used for the message sent to the queue with a name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MsgId* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *MsgId* field. If that value is MQMI_NONE, a new message identifier is generated for *each* of those destinations (that is, no two of those destinations have the same message identifier).

If MQPMO_NEW_MSG_ID is specified, new message identifiers are generated for all the destinations in the distribution list, regardless of whether they have MQPMR records. This is different from the way that MQPMO_NEW_CORREL_ID is processed (see *CorrelId* field).

This is an input/output field.

### *Initial values and language declarations for MQPMR*

There are no initial values defined for this structure, as no structure declarations are provided in the header, COPY, and INCLUDE files for the supported programming languages. The sample declarations show how to declare the structure if all the fields are required.

*C declaration*

```
typedef struct tagMQPMR MQPMR;
struct tagMQPMR {
  MQBYTE24  MsgId;            /* Message identifier */
  MQBYTE24  CorrelId;         /* Correlation identifier */
  MQBYTE24  GroupId;          /* Group identifier */
  MQLONG    Feedback;         /* Feedback or reason code */
  MQBYTE32  AccountingToken;  /* Accounting token */
};
```

*COBOL declaration*

```
**   MQPMR structure
  10 MQPMR.
**    Message identifier
   15 MQPMR-MSGID           PIC X(24).
**    Correlation identifier
   15 MQPMR-CORRELID        PIC X(24).
**    Group identifier
   15 MQPMR-GROUPID         PIC X(24).
**    Feedback or reason code
   15 MQPMR-FEEDBACK        PIC S9(9) BINARY.
**    Accounting token
   15 MQPMR-ACCOUNTINGTOKEN PIC X(32).
```

*PL/I declaration*

```
dcl
 1 MQPMR based,
  3 MsgId           char(24),      /* Message identifier */
  3 CorrelId        char(24),      /* Correlation identifier */
  3 GroupId         char(24),      /* Group identifier */
  3 Feedback        fixed bin(31), /* Feedback or reason code */
  3 AccountingToken char(32);      /* Accounting token */
```

*Visual Basic declaration*

```
Type MQPMR
  MsgId           As MQBYTE24 'Message identifier'
  CorrelId        As MQBYTE24 'Correlation identifier'
  GroupId         As MQBYTE24 'Group identifier'
  Feedback        As Long     'Feedback or reason code'
  AccountingToken As MQBYTE32 'Accounting token'
End Type
```

## MQRFH - Rules and formatting header

This section describes the rules and formatting header, what fields it contains, and initial values of those fields.

### *Overview for MQRFH*

**Availability**: All IBM MQ systems, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQRFH structure defines the layout of the rules and formatting header. Use this header to send string data in the form of name/value pairs.

**Format name**: MQFMT_RF_HEADER.

**Character set and encoding**: The fields in the MQRFH structure (including *NameValueString*) are in the character set and encoding given by the *CodedCharSetId* and *Encoding* fields in the header structure that precedes the MQRFH, or by those fields in the MQMD structure if the MQRFH is at the start of the application message data.

The character set must be one that has single-byte characters for the characters that are valid in queue names.

## *Fields for MQRFH*

The MQRFH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This specifies the character set identifier of the data that follows *NameValueString* ; it does not apply to character data in the MQRFH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**MQCCSI_INHERIT**
Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

MQCCSI_INHERIT cannot be used if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

The initial value of this field is MQCCSI_UNDEFINED.

*Encoding (MQLONG)*

This specifies the numeric encoding of the data that follows *NameValueString* ; it does not apply to numeric data in the MQRFH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is MQENC_NATIVE.

*Flags (MQLONG)*

The following can be specified:

**MQRFH_NONE**
No flags.

The initial value of this field is MQRFH_NONE.

*Format (MQCHAR8)*

This specifies the format name of the data that follows *NameValueString*.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *Format* field in MQMD.

The initial value of this field is MQFMT_NONE.

*NameValueString (MQCHARn)*

This is a variable-length character string containing name/value pairs in the form:

```
name1 value1 name2 value2 name3 value3 ...
```

Each name or value must be separated from the adjacent name or value by one or more blank characters; these blanks are not significant. A name or value can contain significant blanks by prefixing and suffixing the name or value with double quotation marks; all characters between the open double quotation mark

and the matching closing double quotation mark are treated as significant. In the following example, the name is FAMOUS_WORDS, and the value is Hello World:

```
FAMOUS_WORDS "Hello World"
```

A name or value can contain any characters other than the null character (which acts as a delimiter for *NameValueString*). However, to assist interoperability an application can restrict names to the following characters:

- First character: upper or lowercase alphabetic (A through Z, or a through z), or underscore.
- Subsequent characters: upper or lowercase alphabetic, decimal digit (0 through 9), underscore, hyphen, or dot.

If a name or value contains one or more double quotation marks, the name or value must be enclosed in double quotation marks, and each double quotation mark within the string must be doubled:

```
Famous_Words "The program displayed ""Hello World"""
```

Names and values are case sensitive, that is, lowercase letters are not considered to be the same as uppercase letters. For example, FAMOUS_WORDS and Famous_Words are two different names.

The length in bytes of *NameValueString* is equal to *StrucLength* minus MQRFH_STRUC_LENGTH_FIXED. To avoid problems converting the user data in some environments, make this length a multiple of four. Pad *NameValueString* with blanks to this length, or terminate it earlier by placing a null character following the last significant character in the string. The null character and the bytes following it, up to the specified length of *NameValueString*, are ignored.

**Note:** Because the length of this field is not fixed, the field is omitted from the declarations of the structure that are provided for the supported programming languages.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQRFH_STRUC_ID**
Identifier for rules and formatting header structure.

For the C programming language, the constant MQRFH_STRUC_ID_ARRAY is also defined; this has the same value as MQRFH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQRFH_STRUC_ID.

*StrucLength (MQLONG)*

This is the length in bytes of the MQRFH structure, including the *NameValueString* field at the end of the structure. The length does *not* include any user data that follows the *NameValueString* field.

To avoid problems converting the user data in some environments, *StrucLength* must be a multiple of four.

The following constant gives the length of the *fixed* part of the structure, that is, the length excluding the *NameValueString* field:

**MQRFH_STRUC_LENGTH_FIXED**
Length of fixed part of MQRFH structure.

The initial value of this field is MQRFH_STRUC_LENGTH_FIXED.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQRFH_VERSION_1**
Version-1 rules and formatting header structure.

The initial value of this field is MQRFH_VERSION_1.

### *Initial values and language declarations for MQRFH*

*Table 519. Initial values of fields in MQRFH for MQRFH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQRFH_STRUC_ID | 'RFH¬' |
| *Version* | MQRFH_VERSION_1 | 1 |
| *StrucLength* | MQRFH_STRUC_LENGTH_FIXED | 32 |
| *Encoding* | MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQRFH_NONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQRFH_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQRFH MyRFH = {MQRFH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQRFH MQRFH;
struct tagMQRFH {
  MQCHAR4  StrucId;         /* Structure identifier */
  MQLONG   Version;         /* Structure version number */
  MQLONG   StrucLength;     /* Total length of MQRFH including
                               NameValueString */
  MQLONG   Encoding;        /* Numeric encoding of data that follows
                               NameValueString */
  MQLONG   CodedCharSetId;  /* Character set identifier of data that
                               follows NameValueString */
  MQCHAR8  Format;          /* Format name of data that follows
                               NameValueString */
  MQLONG   Flags;           /* Flags */
};
```

*COBOL declaration*

```
**   MQRFH structure
  10 MQRFH.
**    Structure identifier
   15 MQRFH-STRUCID        PIC X(4).
**    Structure version number
   15 MQRFH-VERSION        PIC S9(9) BINARY.
**    Total length of MQRFH including NAMEVALUESTRING
   15 MQRFH-STRUCLENGTH    PIC S9(9) BINARY.
**    Numeric encoding of data that follows NAMEVALUESTRING
   15 MQRFH-ENCODING       PIC S9(9) BINARY.
**    Character set identifier of data that follows NAMEVALUESTRING
   15 MQRFH-CODEDCHARSETID PIC S9(9) BINARY.
**    Format name of data that follows NAMEVALUESTRING
   15 MQRFH-FORMAT         PIC X(8).
**    Flags
   15 MQRFH-FLAGS          PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQRFH based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 StrucLength    fixed bin(31), /* Total length of MQRFH including
                                     NameValueString */
  3 Encoding       fixed bin(31), /* Numeric encoding of data that
                                     follows NameValueString */
  3 CodedCharSetId fixed bin(31), /* Character set identifier of data
                                     that follows NameValueString */
  3 Format         char(8),       /* Format name of data that follows
                                     NameValueString */
  3 Flags          fixed bin(31); /* Flags */
```

*High Level Assembler declaration*

```
MQRFH                 DSECT
MQRFH_STRUCID         DS   CL4  Structure identifier
MQRFH_VERSION         DS   F    Structure version number
MQRFH_STRUCLENGTH     DS   F    Total length of MQRFH including
*                               NAMEVALUESTRING
MQRFH_ENCODING        DS   F    Numeric encoding of data that follows
*                               NAMEVALUESTRING
MQRFH_CODEDCHARSETID  DS   F    Character set identifier of data that
*                               follows NAMEVALUESTRING
MQRFH_FORMAT          DS   CL8  Format name of data that follows
*                               NAMEVALUESTRING
MQRFH_FLAGS           DS   F    Flags
*
MQRFH_LENGTH          EQU  *-MQRFH
                      ORG  MQRFH
MQRFH_AREA            DS   CL(MQRFH_LENGTH)
```

*Visual Basic declaration*

```
Type MQRFH
  StrucId        As String*4 'Structure identifier'
  Version        As Long     'Structure version number'
  StrucLength    As Long     'Total length of MQRFH including'
                             'NameValueString'
  Encoding       As Long     'Numeric encoding of data that follows'
                             'NameValueString'
  CodedCharSetId As Long     'Character set identifier of data that'
                             'follows NameValueString'
  Format         As String*8 'Format name of data that follows'
                             'NameValueString'
  Flags          As Long     'Flags'
End Type
```

## MQRFH2 - Rules and formatting header 2

This section describes the rules and formatting header 2, what fields it contains, and initial values of those fields.

### *Overview for MQRFH2*

### Availability

All IBM MQ systems, plus IBM MQ MQI clients connected to these systems.

### Purpose

The MQRFH2 header is based on the MQRFH header, but it allows Unicode strings to be transported without translation, and it can carry numeric data types.

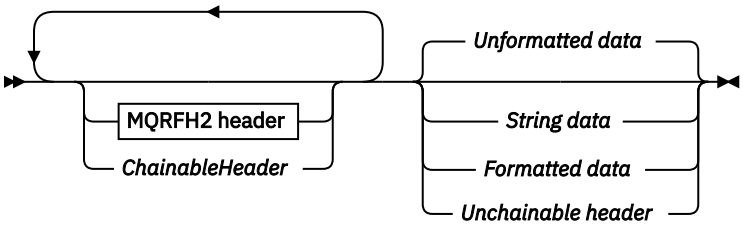
The MQRFH2 structure defines the format of the version-2 rules and formatting header. Use this header to send data that has been encoded using an XML-like syntax. A message can contain two or more MQRFH2 structures in series, with user data optionally following the last MQRFH2 structure in the series.

## Format name

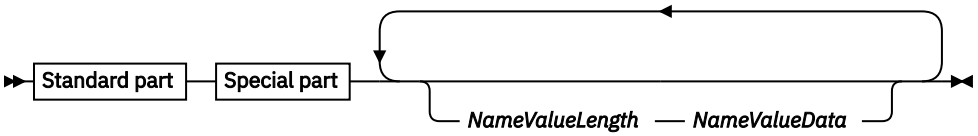
MQFMT_RF_HEADER_2

## Syntax

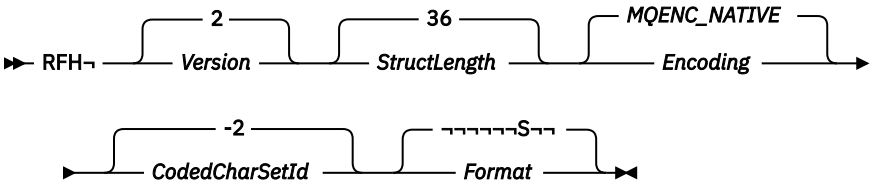
### IBM MQ Message



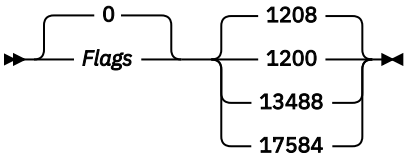

### MQRFH2 header




### Standard part




### Special part




## Character set and encoding

Special rules apply to the character set and encoding used for the MQRFH2 structure:

- Fields other than *NameValueData* are in the character set and encoding given by the *CodedCharSetId* and *Encoding* fields in the header structure that precedes MQRFH2, or by those fields in the MQMD structure if the MQRFH2 is at the start of the application message data.

  The character set must be one that has single-byte characters for the characters that are valid in queue names.

  When MQGMO_CONVERT is specified on the MQGET call, the queue manager converts the MQRFH2 fields, other than *NameValueData*, to the requested character set and encoding.
- *NameValueData* is in the character set given by the *NameValueCCSID* field. Only the listed Unicode character sets are valid for *NameValueCCSID* ; see the description of *NameValueCCSID* for details.

Some character sets have a representation that depends on the encoding. If *NameValueCCSID* is one of these character sets, *NameValueData* must be in the same encoding as the other fields in the MQRFH2.

When MQGMO_CONVERT is specified on the MQGET call, the queue manager converts *NameValueData* to the requested encoding, but does not change its character set.

## *Fields for MQRFH2*

The MQRFH2 structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This specifies the character set identifier of the data that follows the last *NameValueData* field; it does not apply to character data in the MQRFH2 structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**MQCCSI_INHERIT**
Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

MQCCSI_INHERIT cannot be used if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

The initial value of this field is MQCCSI_INHERIT.

*Encoding (MQLONG)*

This specifies the numeric encoding of the data that follows the last *NameValueData* field; it does not apply to numeric data in the MQRFH2 structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is MQENC_NATIVE.

*Flags (MQLONG)*

The initial value of this field is MQRFH_NONE. MQRFH_NONE must be specified.

**MQRFH_NONE**
No flags.

**MQRFH_INTERNAL**
The MQRFH2 header contains internally set properties.

MQRFH_INTERNAL is for queue manager use.

The top 16 bits, MQRFH_FLAGS_RESTRICTED_MASK, are reserved for flags the queue manager sets. Flags that a user might set are defined in the bottom 16 bits.

*Format (MQCHAR8)*

This specifies the format name of the data that follows the last *NameValueData* field.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *Format* field in MQMD.

The initial value of this field is MQFMT_NONE.

*NameValueCCSID (MQLONG)*

This specifies the coded character set identifier of the data in the *NameValueData* field. This is different from the character set of the other strings in the MQRFH2 structure, and can be different from the character set of the data (if any) that follows the last *NameValueData* field at the end of the structure.

*NameValueCCSID* must have one of the following values:

| CCSID | Meaning |
|---|---|
| 1200 | UCS-2 open-ended |
| 13488 | UCS-2 2.0 subset |
| 17584 | UCS-2 2.1 subset (includes the Euro symbol) |
| 1208 | UTF-8 |

For the UCS-2 character sets, the encoding (byte order) of the *NameValueData* must be the same as the encoding of the other fields in the MQRFH2 structure. Surrogate characters (X'D800' through X'DFFF') are not supported.

**Note:** If *NameValueCCSID* does not have one of the values listed above, and the MQRFH2 structure requires conversion on the MQGET call, the call completes with reason code MQRC_SOURCE_CCSID_ERROR and the message is returned unconverted.

The initial value of this field is 1208.

*NameValueData ( MQCHARn)*
*NameValueData* is a variable length field that contains a folder containing name/value pairs of message properties. A folder is a variable-length character string containing data encoded using an XML-like syntax. The length in bytes of the character string is given by the *NameValueLength* field that precedes the *NameValueData* field. The length must be a multiple of four.

The *NameValueLength* and *NameValueData* fields are optional, but if present they must occur as a pair and be adjacent. The pair of fields can be repeated as many times as required, for example:

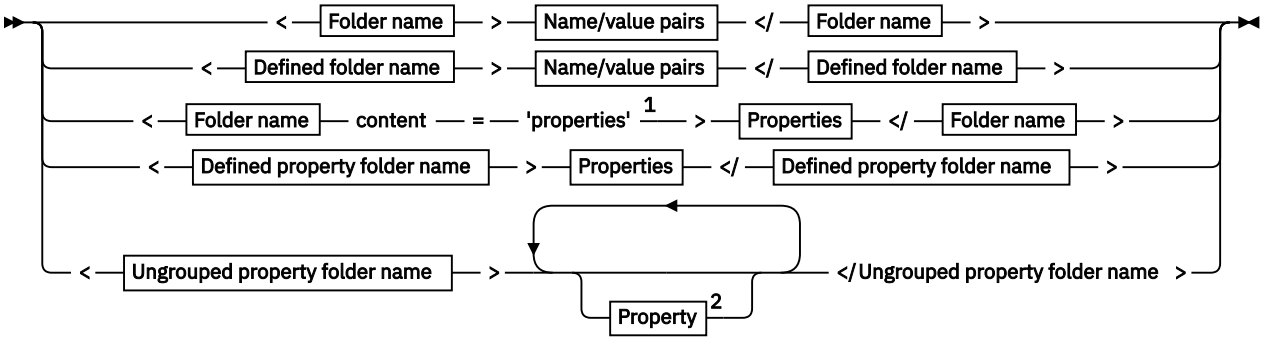
```
length1 data1 length2 data2 length3 data3
```

*NameValueData* is *not* converted to the character set specified on the MQGET call. Even if the message is retrieved with the MQGMO_CONVERT option in effect *NameValueData* remains in its original character set. However, *NameValueData is* converted to the encoding specified on the MQGET call.

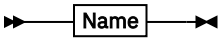
**Note:**

- Because these fields are optional, they are omitted from the declarations of the structure that are provided for the various programming languages supported.
- The terms "defined" and "reserved" are used in the syntax diagram. "Defined" means that the name is used by IBM MQ. "Reserved" means that the name is reserved for future use by IBM MQ.

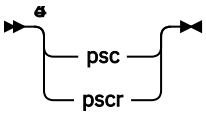
## *NameValueData* syntax



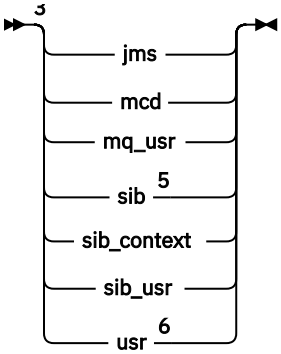

**Folder name**



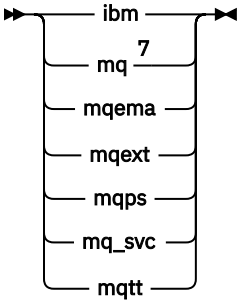

**Defined folder name**



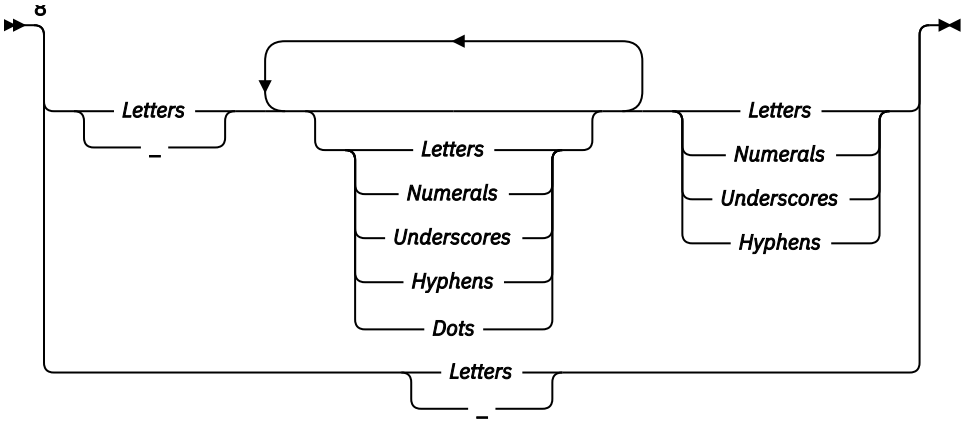

**Defined property folder name**



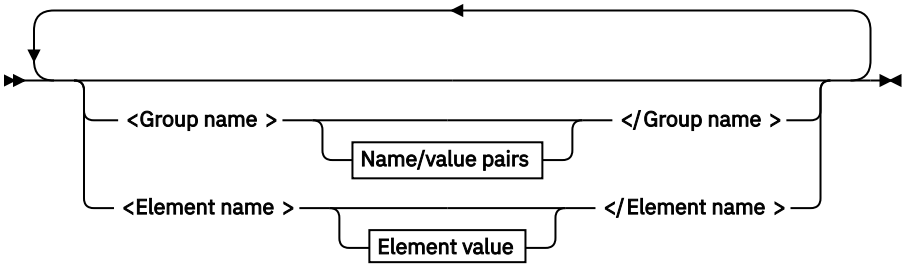

**Ungrouped property folder name**



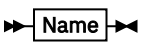

**Name**



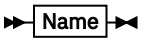

**Name/value pairs**



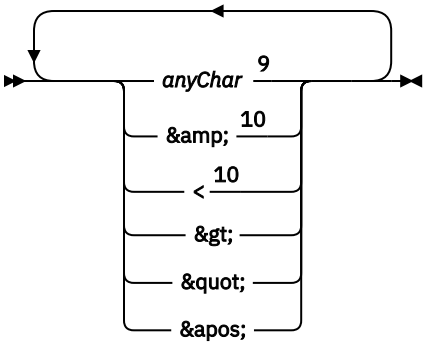

**Group name**



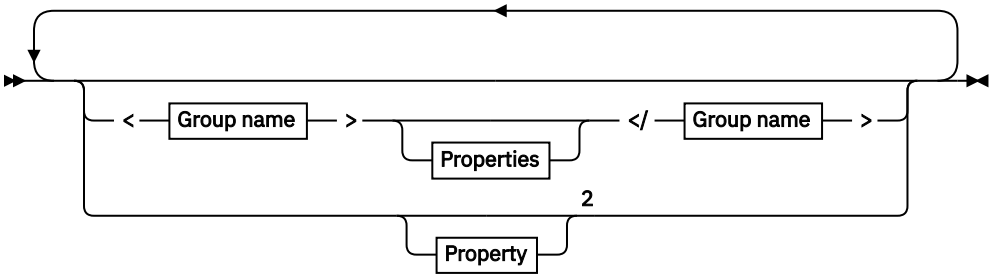

**Element name**



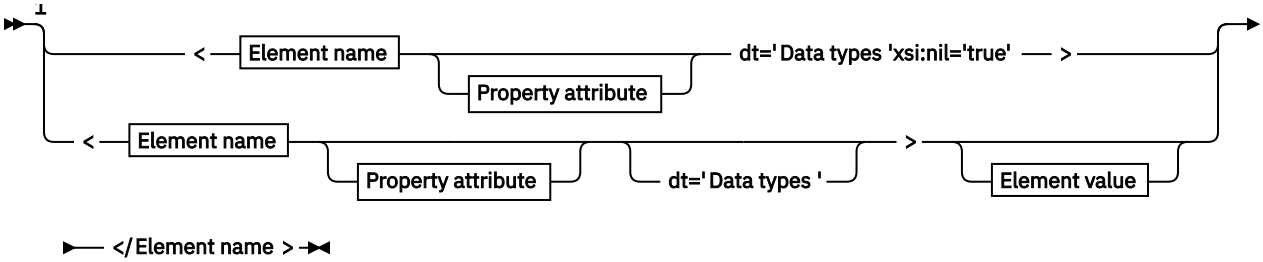

**Element value**



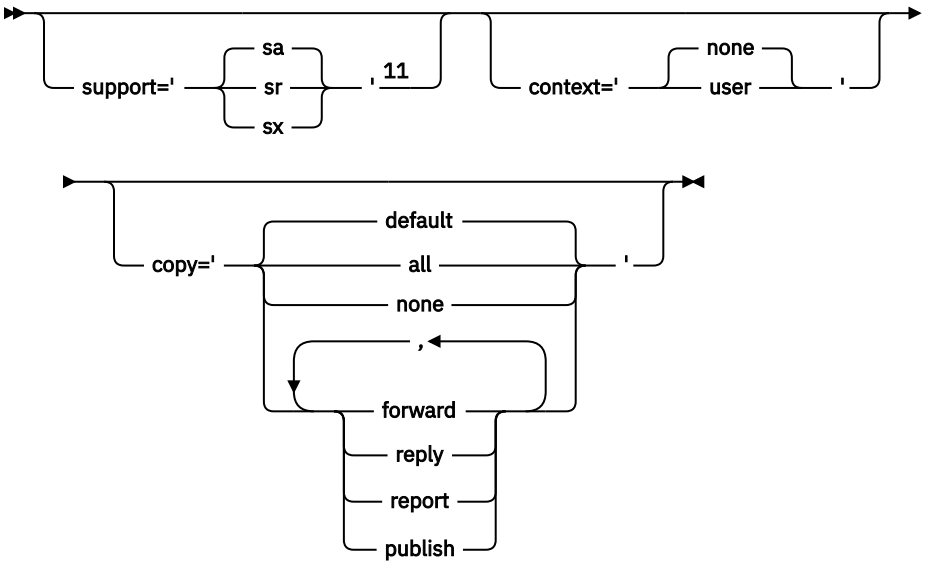

**Properties**



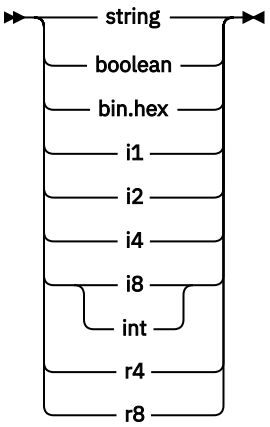

**Property**




**Property attribute**




**Data types**




Notes:

[1] Double quotation marks or single quotation marks are valid.
[2] Do not use an invalid property name; see “Invalid property name” on page 524. Use a reserved property name only for its defined purpose; see “Defined property names” on page 524.
[3] The name must be in lowercase.
[4] Only one `psc` and `pscr` folder is supported.
[5] Only properties in the first MQRFH2 header are significant. WebSphere Application Server Service Integration Bus ignores sib, sib_context, and sib_usr folders in subsequent MQRFH2 headers.
[6] Not more than one `usr` folder must be present in an MQRFH2. Properties in the `usr` folder must occur no more than once.
[7] Only properties in the first `mq` folder are significant. If the folder is `UTF-8`, only single byte `UTF-8` characters are supported. The only white space character is Unicode `U+0020`.
[8] Valid characters are defined in the W3C XML specification, and consist essentially of Unicode categories `Ll, Lu, Lo, Lt, Nl, Mc, Mn, Lm,` and `Nd` ; see Unicode character categories.
[9] All characters are significant. Leading and trailing blanks are part of the element value.
[10] Do not use an invalid character; see “Invalid characters” on page 523. Use an escape sequence, rather than these invalid characters.
[11] The support property attribute is only valid on the `mq` folder

## Folder name

*NameValueData* contains a single folder. To create multiple folders, create multiple *NameValueData* fields. You can create multiple *NameValueData* fields in a single MQRFH2 header within a message. Alternatively you can create multiple chained MQRFH2 headers, each containing multiple *NameValueData* fields.

The order of MQRFH2 headers, and the order of *NameValueData* fields makes no difference to the logical contents of a folder. If the same folder is present more than once in a message the folder is parsed as a whole. If the same property occurs in muliple instances of the same folder, it is parsed as a list.

A correct parse of an MQRFH2 is not affected by the alternative ways a folder can be physically stored in a message.

Four folders do not follow this rule. Only the first instance of the `mq`, `sib`, `sib_context`, and `sib_usr` folder are parsed.

If the same property occurs more than once in the combined contents of the chained MQRFH2 headers, only the first instance of the property is parsed. If a property is set using an API call, such as MQSETMP, and added to an MQRFH2 directly by an application, the API call takes precedence.

A folder name is the name of a folder containing name/value pairs or groups. Groups and name/value pairs can be mixed at the same level in the folder tree; see Figure 1 on page 514. Do not combine a group name and an element name; see Figure 2 on page 514

```
<group1><nvp1>value</nvp1></group1><group2><nvp2>value</nvp2></group2>
<group3><nvp1> value </nvp1></group3><nvp3> value </nvp3>
```

*Figure 1. Correct uses of groups and name/value pairs*

```
<group1><nvp1>value</nvp1>value</group1>
```

*Figure 2. Incorrect use of groups and name/value pairs*

Do not use an invalid or reserved folder name; see "Invalid path name" on page 523 and "Reserved folder or property folder name" on page 523. Use a defined folder name only for its defined purpose; see "Defined folder name" on page 515.

If you add the attribute `'content=properties'` to the folder name tag, the folder becomes a property folder; see Figure 3 on page 514.

```
<myFolder></myfolder>
<myPropertyFolder contents='properties'></myPropertyFolder>
```

*Figure 3. Example of a folder and a property folder*

Folder names are case-sensitive. Folder names and property folder names share the same namespace. They must have different names. `Folder1` in Figure 4 on page 514 must be a different name to `Folder2` in Figure 5 on page 514.

```
<Folder1><NVP1>value</NVP1></Folder1>
```

*Figure 4. `Folder1` namespace*

```
<Folder2 content='properties'><Property1>value</Property1></Folder2>
```

*Figure 5. `Folder2` namespace*

Groups, properties, and name/value pairs in different folders have different namespaces. `Property1` in Figure 5 on page 514 is a different property to `Property1` in Figure 6 on page 514.

```
<Folder3 content='properties'><Property1>value</Property1></Folder3>
```

*Figure 6. `Folder3` namespace*

Property folders are different to non-property folders in two important respects:

1. Property folders contain properties, and non-property folders contain name/value pairs. The folders differ slightly, syntactically.
2. Use the defined interfaces, such as the properties MQI, or JMS message properties, to access message properties. The interfaces ensure the property folders in the MQRFH2 are well-formed. A well-formed property folder is interoperable between queue managers on different platforms and different releases.

The message property MQI is a robust way to read and write an MQRFH2, and avoids the difficulties of parsing an MQRFH2 correctly.

## Defined folder name

A defined folder name is the name of a folder that is reserved for use by IBM MQ, or another product. Do not create a folder of the same name, and do not add your own name/value pairs to the folders. The defined folders are psc and pscr .

psc and pscr are used by queued publish/subscribe.

A segmented message put with either MQMF_SEGMENT or MQMF_SEGMENTATION_ALLOWED cannot contain an MQRFH2 with a defined folder name. The MQPUT fails with reason code 2443, MQRC_SEGMENTATION_NOT_ALLOWED.

## Defined property folder name

A defined property folder name is the name of a property folder that is used by IBM MQ, or another product. For the names of the folders and their contents, see Property folders. Defined property folder names are a subset of all the folder names reserved by IBM MQ; see “Reserved folder or property folder name” on page 523.

Any element stored in a defined property folder is a property. An element stored in a defined property folder must not have a content='properties' attribute.

You can add properties only to the defined property folders usr , mq_usr , and sib_usr . In other property folders, such as mq and sib , IBM MQ ignores or throws away properties it does not recognize.

The description of each defined property folder lists the properties that IBM MQ has defined that can be used by application programs. Some of the properties are accessed indirectly by setting or getting a JMS property, and some are accessed directly using the MQSETMP and MQINQMP MQI calls.

The defined property folders also contain other properties that IBM MQ has reserved, but which applications do not have access to. The names of the reserved properties are not listed. No reserved properties are present in the usr , mq_usr , and sib_usr property folders. But do not create properties with invalid property names; see “Invalid property name” on page 524.

## Property folders

### jms

jms contains JMS header fields, and JMSX properties that cannot be fully expressed in the MQMD. The jms folder is always present in a JMS MQRFH2.

*Table 520. jms property name, synonym, data type, and folder*

| Property synonym | Property name | Data type | Folder |
|---|---|---|---|
| JMSDestination | jms.Dst | string | <jms><Dst>*destination*</Dst></jms> |
| JMSExpiration | jms.Exp | i8 | <jms><Exp>*expiration*</Exp></jms> |
| JMSCorrelation | jms.Cid | string | <jms><Cid>*correlationId*</Cid></jms> |
| JMSDelivery | jms.Dlv | i4 | <jms><Dlv>*delivery*</Dlv></jms> |
| JMSPriority | jms.Pri | i4 | <jms><Pri>*priority*</Pri></jms> |

| *Table 520. jms property name, synonym, data type, and folder (continued)* | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| JMSReplyTo | jms.Rto | string | <jms><Rto>*replyToURI*</Rto></jms> |
| JMSTimeStamp | jms.Tms | i8 | <jms><Tms>*timestamp*</Tms></jms> |
| JMSXGroupID | jms.Gid | string | <jms><Gid>*groupId*</Gid></jms> |
| JMSXGroupSeq | jms.Seq | i4 | <jms><Seq>*messageSequenceNo*</Seq></jms> |

Do not add your own properties in the jms folder.

**mcd**

mcd contains properties that describe the format of the message. For example, the message service domain Msd property identifies a JMS message as being JMSTextMessage, JMSBytesMessage, JMSStreamMessage, JMSMapMessage, JMSObjectMessage, or null.

The mcd folder is always present in a JMS message containing an MQRFH2.

It is always present in a message containing an MQRFH2 sent from IBM Integration Bus. It describes the domain, format, type, and message set of a message.

| *Table 521. mcd property name, synonym, data type, and folder* | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| | mcd.Msd | string | <mcd><Msd>*messageDomain*</Msd></mcd> |
| | mcd.Set | string | <mcd><Set>*messageDomain*</Set></mcd> |
| | mcd.Type | string | <mcd><Type>*messageDomain*</Type></mcd> |
| | mcd.Fmt | string | <mcd><Fmt>*messageDomain*</Fmt></mcd> |

Do not add your own properties in the mcd folder.

**mq_usr**

mq_usr contains application-defined properties that are not exposed as JMS user-defined properties. Properties that do not meet JMS requirements can be placed in this folder.

You can create properties in the mq_usr folder. Properties you create in the mq_usr are like properties you create in new folders with the content='properties' attribute.

**sib**

sib contains WebSphere Application Server service integration bus (WAS/SIB) system message properties. sib properties are not exposed as JMS properties to IBM MQ JMS applications because they are not of the supported types. For example, some sib properties cannot be exposed as JMS properties because they are byte arrays. Some sib properties are exposed to WAS/SIB applications as JMS_IBM_* properties; these include forward and reverse routing paths properties.

Do not add your own properties in the sib folder.

**sib_context**

`sib_context` contains WAS/SIB system message properties that are not exposed to WAS/SIB user applications or as JMS properties. `sib_context` contains security and transactional properties that are used for web services.

Do not add your own properties in the `sib_context` folder.

**sib_usr**

`sib_usr` contains WAS/SIB user message properties that are not exposed as JMS user properties because they are not of supported types. `sib_usr` is exposed to WAS/SIB applications in the `SIMessage` interface. See Developing Service Integration.

The type of a `sib_usr` property must be `bin.hex`, and the value must be in the correct format. If an IBM MQ application writes a `bin.hex` typed element to the folder in the wrong format, the application receives an `IOException`. If the data type of the property is not `bin.hex` the application receives a `ClassCastException`.

Do not attempt to make JMS user properties available to WAS/SIB by using this folder; instead use the `usr` folder.

You can create properties in the `sib_usr` folder.

**usr**

`usr` contains application-defined JMS properties associated with the message. The `usr` folder is present only if an application has set an application-defined property.

`usr` is the default property folder. If a property is set without a folder name, it is placed in the `usr` folder.

*Table 522. `usr` property name, synonym, data type, and folder.*

The web services property values are described in MQRFH2 SOAP settings

| Property synonym | Property name | Data type | Folder |
|---|---|---|---|
| | `usr.contentType` | `string` | `<usr><contentType>text/xml; charset=utf-8</contentType></usr>` |
| | `usr.endPointURL` | `string` | `<usr><endPointURL>`*URI*`</endPointURL></usr>` |
| | `usr.targetService` | `string` | `<usr><targetService>`*serviceName*`</targetService></usr>` |
| | `usr.soapAction` | `string` | `<usr><soapAction>`*name*`</soapAction></usr>` |
| | `usr.transportVersion` | `string` | `<usr><transportVersion>`*version*`</transportVersion></usr>` |

You can create properties in the `usr` folder.

A segmented message put with either `MQMF_SEGMENT` or `MQMF_SEGMENTATION_ALLOWED` cannot contain an `MQRFH2` with a defined property folder name. The `MQPUT` fails with reason code 2443, `MQRC_SEGMENTATION_NOT_ALLOWED`.

## Ungrouped property folder name

**ibm**

ibm contains properties that are used only by IBM MQ.

*Table 523. ibm property name, synonym, data type, and folder*

| Property synonym | Property name | Data type | Folder |
|---|---|---|---|
| | ibm.rfp | string | <ibm><rfp>fingerprint</rfp></ibm> |

Do not add your own properties in the ibm folder.

**mq**

mq contains properties that are used only by IBM MQ.

The following restrictions apply to properties in the mq folder:

- Only properties in the first significant mq folder in the message are acted upon by MQ; properties in any other mq folder in the message are ignored.
- Only single-byte UTF-8 characters are allowed in the folder. A multi-byte character in the folder, can cause parsing to fail, and the message to be rejected.
- Do not use escape strings in the folder. An escape string is treated as the actual value of the element.
- Only Unicode character U+0020 is treated as white space within the folder. All other characters are treated as significant and can cause parsing of the folder to fail, and the message to be rejected.

If parsing of the mq folder fails, or if the folder does not observe these restrictions, the message is rejected with reason code 2527, MQRC_RFH_RESTRICTED_FORMAT_ERR.

Do not add your own properties in the mq folder.

**mqema**

mqema contains properties that are used only by WebSphere Application Server. The folder has been replaced by mqext.

Do not add your own properties in the mqema folder.

**mqext**

mqext contains the following types of property:

- Properties that are used only by WebSphere Application Server.
- Properties relating to delayed delivery of messages.

The folder is present if the application has either set at least one of the IBM defined properties or used delivery delay.

*Table 524. mqext property name, synonym, data type, and folder*

| Property synonym | Property name | Data type | Folder |
|---|---|---|---|
| JMSArmCorrelator | mqext.Arm | string | <mqext><Arm>*armCorrelator*</Arm></mqext> |
| JMSRMCorrelator | mqext.Wrm | string | <mqext><Wrm>*wrmCorrelator*</Wrm></mqext> |
| JMSDeliveryTime | mqext.Dlt | i8 | <mqext><Dlt>*DeliveryTime*</Dlt></mqext> |

| Table 524. mqext property name, synonym, data type, and folder (continued) | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| JMSDeliveryDelay | mqext.Dly | i8 | <mqext><Dly>*DeliveryTime*</Dly></mqext> |

Do not add your own properties in the mqext folder.

**mqps**

mqps contains properties that are used only by IBM MQ publish/subscribe. The folder is present only if the application has set at least one of the integrated publish/subscribe properties.

| Table 525. mqps property name, synonym, data type, and folder | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| MQTopicString | mqps.Top | string | <mqps><Top>*topicString*</Top></mqps> |
| MQSubUserData | mqps.Sud | string | <mqps><Sud>*subscriberUserData*</Sud></mqps> |
| MQIsRetained | mqps.Ret | boolean | <mqps><Ret>*isRetained*</Ret></mqps> |
| MQPubOptions | mqps.Pub | i8 | <mqps><Pub>*publicationOptions*</Pub></mqps> |
| MQPubLevel | mqps.Pbl | i8 | <mqps><Pbl>*publicationLevel*</Pbl></mqps> |
| MQPubTime | mqpse.Pts | string | <mqps><Pts>*publicationTime*</Pts></mqps> |
| MQPubSeqNum | mqpse.Seq | i8 | <mqps><Seq>*publicationSequenceNumber*</Seq></mqps> |
| MQPubStrIntData | mqpse.Sid | string | <mqps><Sid>*publicationData*</Sid></mqps> |
| MQPubFormat | mqpse.Pfmt | i8 | <mqps><Pfmt>*messageFormat*</Pfmt></mqps> |

Do not add your own properties in the mqps folder.

**mq_svc**

mq_svc contains properties used by SupportPac MA93.

Do not add your own properties in the mq_svc folder.

**mqtt**

mqtt contains properties use by IBM MQ Telemetry

| Table 526. mqtt property name, synonym, data type, and folder | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| | mqtt.clientId | string | <mqtt><clientId>*topicString*</clientId></mqtt> |
| | mqtt.qos | i4 | <mqtt><qos>*qualityOfService*</qos></mqtt> |

| Table 526. mqtt property name, synonym, data type, and folder (continued) | | | |
|---|---|---|---|
| **Property synonym** | **Property name** | **Data type** | **Folder** |
| | mqtt.msgid | string | <mqtt><msgid>*messageIdentifier*</msgid></mqtt> |

Do not add your own properties in the mqtt folder.

A segmented message put with either MQMF_SEGMENT or MQMF_SEGMENTATION_ALLOWED cannot contain an MQRFH2 with an ungrouped property folder name. The MQPUT fails with reason code 2443, MQRC_SEGMENTATION_NOT_ALLOWED.

## Name/value pairs

In the syntax diagram, "Name/value pairs" describes the content of an ordinary folder. An ordinary folder contains groups, and elements. An element is a name/value pair. A group contains elements and other groups.

In terms of trees, elements are leaf nodes, and groups are internal nodes. An internal node, and the folder, which is the root node, can contain a mixture of internal nodes and leaf nodes. A node cannot be both an internal node and a leaf node at the same time; see Figure 2 on page 514.

## Properties

In the syntax diagram, "Properties" describes the content of a property folder. A property folder contains groups, and properties. A property is a name/value pair with an optional data type attribute. A group contains properties and other groups.

In terms of trees, properties are leaf nodes, and groups are internal nodes. An internal node, and the property folder, which is the root node, can contain a mixture of internal nodes and leaf nodes. A node cannot be both an internal node and a leaf node at the same time; see Figure 2 on page 514.

## Property

A message property is a name/value pair in a property folder. It can optionally include a data type attribute and a property attribute; for an example, see the following code. If the data type attribute is omitted, the property type is string.

```
<pf><p1 dt='i8' > value </p1></pf>
```

The name of a message property is its full path name, with the XML-like, <> syntax, replaced by dots. For example, myPropertyFolder1.myGroup1.myGroup2.myProperty1 is mapped to a *NameValueData* string as follows. The string is formatted for easier reading.

```
<myPropertyFolder1>
    <myGroup1>
        <myGroup2>
            <myProperty1>value</myProperty1>
        </myGroup2>
    </myGroup1>
</myPropertyFolder1>
```

A property folder can contain multiple properties. For example the properties in Figure 7 on page 521 are mapped to the property folder in Figure 8 on page 521

```
 myPropertyFolder1.myProperty4
myPropertyFolder1.myGroup1.myGroup2.myProperty1
myPropertyFolder1.myGroup1.myGroup2.myProperty2
myPropertyFolder1.myGroup1.myProperty3
```

*Figure 7. Multiple properties with the same root name*

```
<myPropertyFolder1>
    <myProperty4>value</myProperty4>
    <myGroup1>
        <myGroup2>
            <myProperty1>value</myProperty1>
            <myProperty2>value</myProperty2>
        </myGroup2>
        <myProperty3>value</myProperty3>
    </myGroup1>
</myPropertyFolder1>
```

*Figure 8. Multiple property name mapping*

## Name

A name must begin with a *Letter* or an *Underscore*. It must not contain a *Colon*, not end in a *Period* and contain only *Letters*, *Numerals*, *Underscores*, *Hyphens*, and *Dots*. Valid characters are defined in the W3C XML specification, and consist essentially of Unicode categories `Ll, Lu, Lo, Lt, Nl, Mc, Mn, Lm,` and `Nd` ; see Unicode character categories.

The complete path of a property or name/value pair must not break the rule described in "Invalid path name" on page 523. Paths are restricted to 4095 bytes, must not contain Unicode compatibility characters, and must not start with the string `XML`.

## Group name

A group name has the same syntax as a name. Group names are optional. Properties and name/value pairs can be placed in the root of a folder. Use groups if it helps to organize properties and name/value pairs.

## Element name

An element name has the same syntax as a name.

## Element value

An element value includes all the white space between the < *Element name* > tag and the < / *Element name* >. Do not use the two characters < and & in a value. Replace then with < and `&`.

## Property attributes

The property attributes map property descriptor fields: The mappings are as follows:

**Support**

**sa**
MQPD_SUPPORT_OPTIONAL

**sr**
MQPD_SUPPORT_REQUIRED

**sx**
MQPD_SUPPORT_REQUIRED_IF_LOCAL

**Context**

**none**
MQPD_NO_CONTEXT

**user**
MQPD_USER _CONTEXT

**CopyOptions**

**forward**
MQPD_COPY_FORWARD

**reply**
MQPD_COPY_REPLY

**report**
MQPD_COPY_REPORT

**publish**
MQPD_COPY_PUBLISH

**all**
MQPD_COPY_ALL

Do not use `all` in combination with other options.

**default**
MQPD_COPY_DEFAULT

Do not use `default` in combination with other options. `default` is the same as `forward` + `report` + `publish`

**none**
MQPD_COPY_NONE

Do not use none in combination with other options.

The Support property attributes are only applicable to properties in the `mq` folder.

The Context and CopyOptions property attributes are applicable to all property folders.

## Data types

MQRFH2 data types map to message property types as follows:

*Table 527. Data type mappings*

| **MQRFH2 data type** | **Message property type** |
|---|---|
| bin.hex | MQBYTE[] |
| boolean | MQBOOL |
| i1 | MQINT8 |
| i2 | MQINT16 |
| i4 | MQINT32 |
| i8 | MQINT64 |
| r4 | MQFLOAT32 |
| r8 | MQFLOAT64 |
| string | MQCHAR[] |

Any element without a data type is assumed to be of type `string`.

A null value is indicated by the element attribute `xsi:nil='true'`. Do not use the attribute `xsi:nil='false'` for non-null values. For example, the following property has a null value:

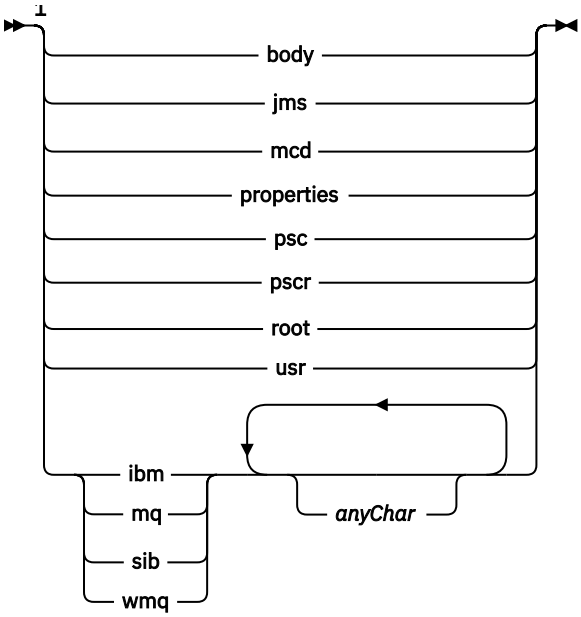
```
<NullProperty
xsi:nil='true'></NullProperty>
```

A byte or character string property can have an empty value. An empty value is represented by an MQRFH2 element with a zero length element value. For example, the following property has an empty value:

```
<EmptyProperty></EmptyProperty>
```

## Reserved folder or property folder name

Restrict the name of a folder or property folder not to start with any of the following strings. The prefixes are reserved for folder or property names created by IBM.

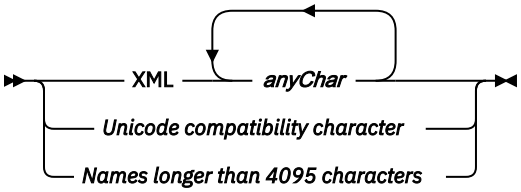



Notes:

[1] A reserved folder or property name contains any mixture of lower and uppercase letters.

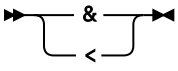
## Invalid path name

Restrict the complete path of a name/value pair or a property not to include any of the following strings.




## Invalid characters

Always use the escape sequences & and < instead of the literals "&" and "<".

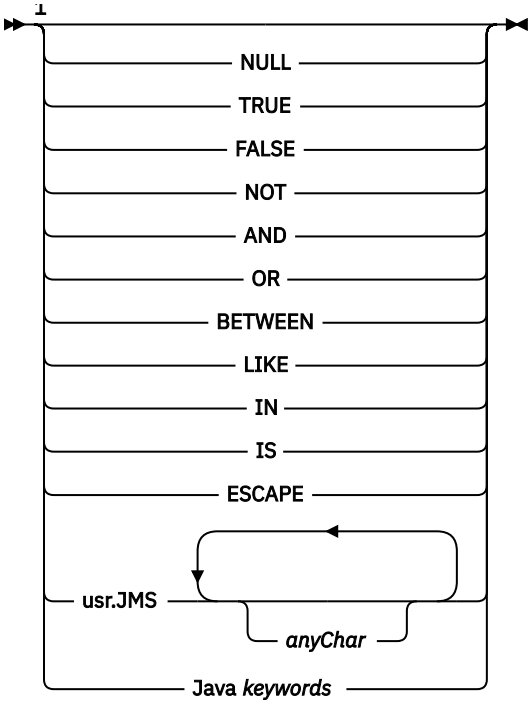


## Defined property names

Defined property names are the names of properties that are defined by IBM MQ, or other products, and used by IBM MQ and user applications. Defined properties exist only in defined property folders. Defined property names are described in the description of property folders; see Property folders.

## Invalid property name

Do not construct property names that match the following rule. The rule applies to the full property path that names a property, and not only to the property element name.




Notes:

[1] An invalid property name can contain any combination of upper and lowercase.

## Invalid attributes

Property folders and properties can include only supported “Property attributes” on page 521 and “Data types” on page 522.

Any non-supported XML-like attributes, for example, names with quoted string values, that are included in property folders or properties might be removed.

XML-like attributes included in non-property folders or non-property elements that remain in MQRFH2 headers.

*NameValueLength ( MQLONG)*
The length of the corresponding `NameValueData` field

This specifies the length in bytes of the data in the *`NameValueData`* field. *`NameValueLength`* must be a multiple of four.

**Note:** The *`NameValueLength`* and *`NameValueData`* fields are optional, but if present they must occur as a pair and be adjacent. The pair of fields can be repeated as many times as required, for example:

```
length1 data1 length2 data2 length3 data3
```

Because these fields are optional, they are omitted from the declarations of the structure that are provided for the various programming languages supported.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQRFH_STRUC_ID**
Identifier for rules and formatting header structure.

For the C programming language, the constant MQRFH_STRUC_ID_ARRAY is also defined; this has the same value as MQRFH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQRFH_STRUC_ID.

*StrucLength (MQLONG)*

This is the length in bytes of the MQRFH2 structure, including the *NameValueLength* and *NameValueData* fields at the end of the structure. It is valid for there to be multiple pairs of *NameValueLength* and *NameValueData* fields at the end of the structure, in the sequence:

```
length1, data1, length2, data2, ...
```

*StrucLength* does *not* include any user data that might follow the last *NameValueData* field at the end of the structure.

To avoid problems with converting the user data in some environments, *StrucLength* must be a multiple of four.

The following constant gives the length of the *fixed* part of the structure, that is, the length excluding the *NameValueLength* and *NameValueData* fields:

**MQRFH_STRUC_LENGTH_FIXED_2**
Length of fixed part of MQRFH2 structure.

The initial value of this field is MQRFH_STRUC_LENGTH_FIXED_2.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQRFH_VERSION_2**
Version-2 rules and formatting header structure.

The initial value of this field is MQRFH_VERSION_2.

## *Initial values and language declarations for MQRFH2*

*Table 528. Initial values of fields in MQRFH2 for MQRFH2*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQRFH_STRUC_ID | 'RFH¬' |
| *Version* | MQRFH_VERSION_2 | 2 |
| *StrucLength* | MQRFH_STRUC_LENGTH_FIXED_2 | 36 |
| *Encoding* | MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | MQCCSI_INHERIT | -2 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQRFH_NONE | 0 |

*Table 528. Initial values of fields in MQRFH2 for MQRFH2 (continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *NameValueCCSID* | None | 1208 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQRFH2_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQRFH2 MyRFH2 = {MQRFH2_DEFAULT};
```

*C declaration*

```
typedef struct tagMQRFH2 MQRFH2;
struct tagMQRFH2 {
  MQCHAR4  StrucId;         /* Structure identifier */
  MQLONG   Version;         /* Structure version number */
  MQLONG   StrucLength;     /* Total length of MQRFH2 including all
                               NameValueLength and NameValueData
                               fields */
  MQLONG   Encoding;        /* Numeric encoding of data that follows
                               last NameValueData field */
  MQLONG   CodedCharSetId;  /* Character set identifier of data that
                               follows last NameValueData field */
  MQCHAR8  Format;          /* Format name of data that follows last
                               NameValueData field */
  MQLONG   Flags;           /* Flags */
  MQLONG   NameValueCCSID;  /* Character set identifier of
                               NameValueData */
};
```

*COBOL declaration*

```
**   MQRFH2 structure
  10 MQRFH2.
**    Structure identifier
   15 MQRFH2-STRUCID        PIC X(4).
**    Structure version number
   15 MQRFH2-VERSION        PIC S9(9) BINARY.
**    Total length of MQRFH2 including all NAMEVALUELENGTH and
**    NAMEVALUEDATA fields
   15 MQRFH2-STRUCLENGTH    PIC S9(9) BINARY.
**    Numeric encoding of data that follows last NAMEVALUEDATA field
   15 MQRFH2-ENCODING       PIC S9(9) BINARY.
**    Character set identifier of data that follows last NAMEVALUEDATA
**    field
   15 MQRFH2-CODEDCHARSETID PIC S9(9) BINARY.
**    Format name of data that follows last NAMEVALUEDATA field
   15 MQRFH2-FORMAT         PIC X(8).
**    Flags
   15 MQRFH2-FLAGS          PIC S9(9) BINARY.
**    Character set identifier of NAMEVALUEDATA
   15 MQRFH2-NAMEVALUECCSID PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQRFH2 based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 StrucLength    fixed bin(31), /* Total length of MQRFH2 including
                                     all NameValueLength and
                                     NameValueData fields */
  3 Encoding       fixed bin(31), /* Numeric encoding of data that
                                     follows last NameValueData field */
```

```
  3 CodedCharSetId fixed bin(31), /* Character set identifier of data
                                     that follows last NameValueData
                                     field */
  3 Format         char(8),       /* Format name of data that follows
                                     last NameValueData field */
  3 Flags          fixed bin(31), /* Flags */
  3 NameValueCCSID fixed bin(31); /* Character set identifier of
                                     NameValueData */
```

*High Level Assembler declaration*

```
MQRFH                 DSECT
MQRFH_STRUCID         DS   CL4  Structure identifier
MQRFH_VERSION         DS   F    Structure version number
MQRFH_STRUCLENGTH     DS   F    Total length of MQRFH2 including all
*                               NAMEVALUELENGTH and NAMEVALUEDATA fields
MQRFH_ENCODING        DS   F    Numeric encoding of data that follows
*                               last NAMEVALUEDATA field
MQRFH_CODEDCHARSETID  DS   F    Character set identifier of data that
*                               follows last NAMEVALUEDATA field
MQRFH_FORMAT          DS   CL8  Format name of data that follows last
*                               NAMEVALUEDATA field
MQRFH_FLAGS           DS   F    Flags
MQRFH_NAMEVALUECCSID  DS   F    Character set identifier of
*                               NAMEVALUEDATA
*
MQRFH_LENGTH          EQU  *-MQRFH
                      ORG  MQRFH
MQRFH_AREA            DS   CL(MQRFH_LENGTH)
```

*Visual Basic declaration*

```
Type MQRFH2
  StrucId        As String*4 'Structure identifier'
  Version        As Long     'Structure version number'
  StrucLength    As Long     'Total length of MQRFH2 including all'
                             'NameValueLength and NameValueData fields'
  Encoding       As Long     'Numeric encoding of data that follows'
                             'last NameValueData field'
  CodedCharSetId As Long     'Character set identifier of data that'
                             'follows last NameValueData field'
  Format         As String*8 'Format name of data that follows last'
                             'NameValueData field'
  Flags          As Long     'Flags'
  NameValueCCSID As Long     'Character set identifier of NameValueData'
End Type
```

## MQRMH - Reference message header

The following table summarizes the fields in the structure.

*Table 529. Fields in MQRMH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Total length of MQRMH, including strings at end of fixed fields, but not the bulk data | StrucLength |
| *Encoding* | Numeric encoding of bulk data | Encoding |
| *CodedCharSetId* | Character set identifier of bulk data | CodedCharSetId |
| *Format* | Format name of bulk data | Format |
| *Flags* | Reference message flags | Flags |

| Table 529. Fields in MQRMH (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *ObjectType* | Object type | ObjectType |
| *ObjectInstanceId* | Object instance identifier | ObjectInstanceId |
| *SrcEnvLength* | Length of source environment data | SrcEnvLength |
| *SrcEnvOffset* | Offset of source environment data | SrcEnvOffset |
| *SrcNameLength* | Length of source object name | SrcNameLength |
| *SrcNameOffset* | Offset of source object name | SrcNameOffset |
| *DestEnvLength* | Length of destination environment data | DestEnvLength |
| *DestEnvOffset* | Offset of destination environment data | DestEnvOffset |
| *DestNameLength* | Length of destination object name | DestNameLength |
| *DestNameOffset* | Offset of destination object name | DestNameOffset |
| *DataLogicalLength* | Length of bulk data | DataLogicalLength |
| *DataLogicalOffset* | Low offset of bulk data | DataLogicalOffset |
| *DataLogicalOffset2* | High offset of bulk data | DataLogicalOffset2 |

## *Overview for MQRMH*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

**Purpose**: The MQRMH structure defines the format of a reference message header. This header is used with user-written message channel exits to send extremely large amounts of data (called *bulk data* ) from one queue manager to another. The difference compared to normal messaging is that the bulk data is not stored on a queue; instead, only a *reference* to the bulk data is stored on the queue. This reduces the possibility of MQ resources being exhausted by a small number of extremely large messages.

**Format name**: MQFMT_REF_MSG_HEADER.

**Character set and encoding**: Character data in MQRMH, and the strings addressed by the offset fields, must be in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute. Numeric data in MQRMH must be in the native machine encoding; this is given by the value of MQENC_NATIVE for the C programming language.

Set the character set and encoding of the MQRMH into the *CodedCharSetId* and *Encoding* fields in:

- The MQMD (if the MQRMH structure is at the start of the message data), or
- The header structure that precedes the MQRMH structure (all other cases).

**Usage**: An application puts a message consisting of an MQRMH, but omitting the bulk data. When a message channel agent (MCA) reads the message from the transmission queue, a user-supplied message exit is invoked to process the reference message header. The exit can append to the reference message the bulk data identified by the MQRMH structure, before the MCA sends the message through the channel to the next queue manager.

At the receiving end, a message exit that waits for reference messages must exist. When a reference message is received, the exit must create the object from the bulk data that follows the MQRMH in the message, and then pass on the reference message without the bulk data. The reference message can later be retrieved by an application reading the reference message (without the bulk data) from a queue.

Normally, the MQRMH structure is all that is in the message. However, if the message is on a transmission queue, one or more additional headers precede the MQRMH structure.

A reference message can also be sent to a distribution list. In this case, the MQDH structure and its related records precede the MQRMH structure when the message is on a transmission queue.

**Note:** Do not send a reference message as a segmented message, because the message exit cannot process it correctly.

**Data conversion**: For data conversion purposes, converting the MQRMH structure includes conversion of the source environment data, source object name, destination environment data, and destination object name. Any other bytes within *StrucLength* bytes of the start of the structure are either discarded or have undefined values after data conversion. The bulk data is converted provided that all the following are true:

- The bulk data is present in the message when the data conversion is performed.
- The *Format* field in MQRMH has a value other than MQFMT_NONE.
- A user-written data-conversion exit exists with the format name specified.

Be aware, however, that usually the bulk data is *not* present in the message when the message is on a queue, and that as a result the bulk data is converted by the MQGMO_CONVERT option.

## *Fields for MQRMH*

The MQRMH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This specifies the character set identifier of the bulk data; it does not apply to character data in the MQRMH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**MQCCSI_INHERIT**
Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

Do not use MQCCSI_INHERIT if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

This value is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

The initial value of this field is MQCCSI_UNDEFINED.

*DataLogicalLength (MQLONG)*

The *DataLogicalLength* field specifies the length of the bulk data referenced by the MQRMH structure.

If the bulk data is actually present in the message, the data begins at an offset of *StrucLength* bytes from the start of the MQRMH structure. The length of the entire message minus *StrucLength* gives the length of the bulk data present.

If data is present in the message, *DataLogicalLength* specifies the amount of that data that is relevant. The normal case is for *DataLogicalLength* to have the same value as the length of data present in the message.

If the MQRMH structure represents the remaining data in the object (starting from the specified logical offset), you can use the value zero for *DataLogicalLength*, provided that the bulk data is not actually present in the message.

If no data is present, the end of MQRMH coincides with the end of the message.

The initial value of this field is 0.

*DataLogicalOffset (MQLONG)*

This field specifies the low offset of the bulk data from the start of the object of which the bulk data forms part. The offset of the bulk data from the start of the object is called the *logical offset*. This is *not* the physical offset of the bulk data from the start of the MQRMH structure; that offset is given by *StrucLength*.

To allow large objects to be sent using reference messages, the logical offset is divided into two fields, and the actual logical offset is given by the sum of these two fields:

- *DataLogicalOffset* represents the remainder obtained when the logical offset is divided by 1 000 000 000. It is thus a value in the range 0 through 999 999 999.
- *DataLogicalOffset2* represents the result obtained when the logical offset is divided by 1 000 000 000. It is thus the number of complete multiples of 1 000 000 000 that exist in the logical offset. The number of multiples is in the range 0 through 999 999 999.

The initial value of this field is 0.

*DataLogicalOffset2 (MQLONG)*

This field specifies the high offset of the bulk data from the start of the object of which the bulk data forms part. It is a value in the range 0 through 999 999 999. See *DataLogicalOffset* for details.

The initial value of this field is 0.

*DestEnvLength (MQLONG)*

This is the length of the destination environment data. If this field is zero, there is no destination environment data, and *DestEnvOffset* is ignored.

*DestEnvOffset (MQLONG)*

This field specifies the offset of the destination environment data from the start of the MQRMH structure. Destination environment data can be specified by the creator of the reference message, if that data is known to the creator. For example, on Windows the destination environment data might be the directory path of the object where the bulk data is to be stored. However, if the creator does not know the destination environment data, it is the responsibility of the user-supplied message exit to determine any environment information needed.

The length of the destination environment data is given by *DestEnvLength* ; if this length is zero, there is no destination environment data, and *DestEnvOffset* is ignored. If present, the destination environment data must reside completely within *StrucLength* bytes from the start of the structure.

Applications must not assume that the destination environment data is contiguous with any of the data addressed by the *SrcEnvOffset*, *SrcNameOffset*, and *DestNameOffset* fields.

The initial value of this field is 0.

*DestNameLength (MQLONG)*

The length of the destination object name. If this field is zero, there is no destination object name, and *DestNameOffset* is ignored.

*DestNameOffset (MQLONG)*

This field specifies the offset of the destination object name from the start of the MQRMH structure. The destination object name can be specified by the creator of the reference message, if that data is known to the creator. However, if the creator does not know the destination object name, it is the responsibility of the user-supplied message exit to identify the object to be created or modified.

The length of the destination object name is given by *DestNameLength* ; if this length is zero, there is no destination object name, and *DestNameOffset* is ignored. If present, the destination object name must reside completely within *StrucLength* bytes from the start of the structure.

Applications must not assume that the destination object name is contiguous with any of the data addressed by the *SrcEnvOffset*, *SrcNameOffset*, and *DestEnvOffset* fields.

The initial value of this field is 0.

*Encoding (MQLONG)*

This specifies the numeric encoding of the bulk data; it does not apply to numeric data in the MQRMH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is MQENC_NATIVE.

*Flags (MQLONG)*

These are reference message flags. The following flags are defined:

**MQRMHF_LAST**
This flag indicates that the reference message represents or contains the last part of the referenced object.

**MQRMHF_NOT_LAST**
Reference message does not contain or represent last part of object. MQRMHF_NOT_LAST aids program documentation. It is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is MQRMHF_NOT_LAST.

*Format (MQCHAR8)*

This specifies the format name of the bulk data.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *Format* field in MQMD.

The initial value of this field is MQFMT_NONE.

*ObjectInstanceId (MQBYTE24)*

Use this field to identify a specific instance of an object. If it is not needed, set it to the following value:

**MQOII_NONE**
No object instance identifier specified. The value is binary zero for the length of the field.

For the C programming language, the constant MQOII_NONE_ARRAY is also defined; this has the same value as MQOII_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_OBJECT_INSTANCE_ID_LENGTH. The initial value of this field is MQOII_NONE.

*ObjectType (MQCHAR8)*

This is a name that the message exit can use to recognize types of reference message that it supports. The name must conform to the same rules as the *Format* field, see "Format (MQCHAR8)" on page 531.

The initial value of this field is 8 blanks.

*SrcEnvLength (MQLONG)*

The length of the source environment data. If this field is zero, there is no source environment data, and *SrcEnvOffset* is ignored.

The initial value of this field is 0.

*SrcEnvOffset (MQLONG)*

This field specifies the offset of the source environment data from the start of the MQRMH structure. Source environment data can be specified by the creator of the reference message, if that data is known to the creator. For example, on Windows the source environment data might be the directory path of the object containing the bulk data. However, if the creator does not know the source environment data, the user-supplied message exit must determine any environment information needed.

The length of the source environment data is given by *SrcEnvLength* ; if this length is zero, there is no source environment data, and *SrcEnvOffset* is ignored. If present, the source environment data must reside completely within *StrucLength* bytes from the start of the structure.

Applications must not assume that the environment data starts immediately after the last fixed field in the structure or that it is contiguous with any of the data addressed by the *SrcNameOffset*, *DestEnvOffset*, and *DestNameOffset* fields.

The initial value of this field is 0.

*SrcNameLength (MQLONG)*

The length of the source object name. If this field is zero, there is no source object name, and *SrcNameOffset* is ignored.

The initial value of this field is 0.

*SrcNameOffset (MQLONG)*

This field specifies the offset of the source object name from the start of the MQRMH structure. The source object name can be specified by the creator of the reference message, if that data is known to the creator. However, if the creator does not know the source object name, the user-supplied message exit must identify the object to be accessed.

The length of the source object name is given by *SrcNameLength* ; if this length is zero, there is no source object name, and *SrcNameOffset* is ignored. If present, the source object name must reside completely within *StrucLength* bytes from the start of the structure.

Applications must not assume that the source object name is contiguous with any of the data addressed by the *SrcEnvOffset*, *DestEnvOffset*, and *DestNameOffset* fields.

The initial value of this field is 0.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQRMH_STRUC_ID**
Identifier for reference message header structure.

For the C programming language, the constant MQRMH_STRUC_ID_ARRAY is also defined; this has the same value as MQRMH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQRMH_STRUC_ID.

*StrucLength (MQLONG)*
The total length of MQRMH, including strings at the end of fixed fields, but not the bulk data.

The initial value of this field is zero.

*Version (MQLONG)*

The structure version number. The value must be:

**MQRMH_VERSION_1**
Version-1 reference message header structure.

The following constant specifies the version number of the current version:

**MQRMH_CURRENT_VERSION**
Current version of reference message header structure.

The initial value of this field is MQRMH_VERSION_1.

### *Initial values and language declarations for MQRMH*

*Table 530. Initial values of fields in MQRMH for MQRMH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQRMH_STRUC_ID | 'RMH¬' |
| *Version* | MQRMH_VERSION_1 | 1 |
| *StrucLength* | None | 0 |
| *Encoding* | MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQRMHF_NOT_LAST | 0 |
| *ObjectType* | None | Blanks |
| *ObjectInstanceId* | MQOII_NONE | Nulls |
| *SrcEnvLength* | None | 0 |
| *SrcEnvOffset* | None | 0 |
| *SrcNameLength* | None | 0 |
| *SrcNameOffset* | None | 0 |
| *DestEnvLength* | None | 0 |
| *DestEnvOffset* | None | 0 |
| *DestNameLength* | None | 0 |
| *DestNameOffset* | None | 0 |
| *DataLogicalLength* | None | 0 |
| *DataLogicalOffset* | None | 0 |
| *DataLogicalOffset2* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQRMH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQRMH MyRMH = {MQRMH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQRMH MQRMH;
struct tagMQRMH {
  MQCHAR4   StrucId;             /* Structure identifier */
  MQLONG    Version;             /* Structure version number */
  MQLONG    StrucLength;         /* Total length of MQRMH, including
                                    strings at end of fixed fields, but
                                    not the bulk data */
  MQLONG    Encoding;            /* Numeric encoding of bulk data */
  MQLONG    CodedCharSetId;      /* Character set identifier of bulk
                                    data */
  MQCHAR8   Format;              /* Format name of bulk data */
```

```
  MQLONG    Flags;               /* Reference message flags */
  MQCHAR8   ObjectType;          /* Object type */
  MQBYTE24  ObjectInstanceId;    /* Object instance identifier */
  MQLONG    SrcEnvLength;        /* Length of source environment data */
  MQLONG    SrcEnvOffset;        /* Offset of source environment data */
  MQLONG    SrcNameLength;       /* Length of source object name */
  MQLONG    SrcNameOffset;       /* Offset of source object name */
  MQLONG    DestEnvLength;       /* Length of destination environment
                                    data */
  MQLONG    DestEnvOffset;       /* Offset of destination environment
                                    data */
  MQLONG    DestNameLength;      /* Length of destination object name */
  MQLONG    DestNameOffset;      /* Offset of destination object name */
  MQLONG    DataLogicalLength;   /* Length of bulk data */
  MQLONG    DataLogicalOffset;   /* Low offset of bulk data */
  MQLONG    DataLogicalOffset2;  /* High offset of bulk data */
};
```

*COBOL declaration*

```
**   MQRMH structure
  10 MQRMH.
**    Structure identifier
   15 MQRMH-STRUCID            PIC X(4).
**    Structure version number
   15 MQRMH-VERSION            PIC S9(9) BINARY.
**    Total length of MQRMH, including strings at end of fixed fields,
**    but not the bulk data
   15 MQRMH-STRUCLENGTH        PIC S9(9) BINARY.
**    Numeric encoding of bulk data
   15 MQRMH-ENCODING           PIC S9(9) BINARY.
**    Character set identifier of bulk data
   15 MQRMH-CODEDCHARSETID     PIC S9(9) BINARY.
**    Format name of bulk data
   15 MQRMH-FORMAT             PIC X(8).
**    Reference message flags
   15 MQRMH-FLAGS              PIC S9(9) BINARY.
**    Object type
   15 MQRMH-OBJECTTYPE         PIC X(8).
**    Object instance identifier
   15 MQRMH-OBJECTINSTANCEID   PIC X(24).
**    Length of source environment data
   15 MQRMH-SRCENVLENGTH       PIC S9(9) BINARY.
**    Offset of source environment data
   15 MQRMH-SRCENVOFFSET       PIC S9(9) BINARY.
**    Length of source object name
   15 MQRMH-SRCNAMELENGTH      PIC S9(9) BINARY.
**    Offset of source object name
   15 MQRMH-SRCNAMEOFFSET      PIC S9(9) BINARY.
**    Length of destination environment data
   15 MQRMH-DESTENVLENGTH      PIC S9(9) BINARY.
**    Offset of destination environment data
   15 MQRMH-DESTENVOFFSET      PIC S9(9) BINARY.
**    Length of destination object name
   15 MQRMH-DESTNAMELENGTH     PIC S9(9) BINARY.
**    Offset of destination object name
   15 MQRMH-DESTNAMEOFFSET     PIC S9(9) BINARY.
**    Length of bulk data
   15 MQRMH-DATALOGICALLENGTH  PIC S9(9) BINARY.
**    Low offset of bulk data
   15 MQRMH-DATALOGICALOFFSET  PIC S9(9) BINARY.
**    High offset of bulk data
   15 MQRMH-DATALOGICALOFFSET2 PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQRMH based,
  3 StrucId            char(4),       /* Structure identifier */
  3 Version            fixed bin(31), /* Structure version number */
  3 StrucLength        fixed bin(31), /* Total length of MQRMH,
                                         including strings at end of
                                         fixed fields, but not the bulk
                                         data */
  3 Encoding           fixed bin(31), /* Numeric encoding of bulk
                                         data */
```

```
  3 CodedCharSetId     fixed bin(31), /* Character set identifier of
                                         bulk data */
  3 Format             char(8),       /* Format name of bulk data */
  3 Flags              fixed bin(31), /* Reference message flags */
  3 ObjectType         char(8),       /* Object type */
  3 ObjectInstanceId   char(24),      /* Object instance identifier */
  3 SrcEnvLength       fixed bin(31), /* Length of source environment
                                         data */
  3 SrcEnvOffset       fixed bin(31), /* Offset of source environment
                                         data */
  3 SrcNameLength      fixed bin(31), /* Length of source object name */
  3 SrcNameOffset      fixed bin(31), /* Offset of source object name */
  3 DestEnvLength      fixed bin(31), /* Length of destination
                                         environment data */
  3 DestEnvOffset      fixed bin(31), /* Offset of destination
                                         environment data */
  3 DestNameLength     fixed bin(31), /* Length of destination object
                                         name */
  3 DestNameOffset     fixed bin(31), /* Offset of destination object
                                         name */
  3 DataLogicalLength  fixed bin(31), /* Length of bulk data */
  3 DataLogicalOffset  fixed bin(31), /* Low offset of bulk data */
  3 DataLogicalOffset2 fixed bin(31); /* High offset of bulk data */
```

*High Level Assembler declaration*

```
MQRMH                     DSECT
MQRMH_STRUCID             DS   CL4   Structure identifier
MQRMH_VERSION             DS   F     Structure version number
MQRMH_STRUCLENGTH         DS   F     Total length of MQRMH, including
*                                     strings at end of fixed fields, but
*                                     not the bulk data
MQRMH_ENCODING            DS   F     Numeric encoding of bulk data
MQRMH_CODEDCHARSETID      DS   F     Character set identifier of bulk
*                                     data
MQRMH_FORMAT              DS   CL8   Format name of bulk data
MQRMH_FLAGS               DS   F     Reference message flags
MQRMH_OBJECTTYPE          DS   CL8   Object type
MQRMH_OBJECTINSTANCEID    DS   XL24  Object instance identifier
MQRMH_SRCENVLENGTH        DS   F     Length of source environment data
MQRMH_SRCENVOFFSET        DS   F     Offset of source environment data
MQRMH_SRCNAMELENGTH       DS   F     Length of source object name
MQRMH_SRCNAMEOFFSET       DS   F     Offset of source object name
MQRMH_DESTENVLENGTH       DS   F     Length of destination environment
*                                     data
MQRMH_DESTENVOFFSET       DS   F     Offset of destination environment
*                                     data
MQRMH_DESTNAMELENGTH      DS   F     Length of destination object name
MQRMH_DESTNAMEOFFSET      DS   F     Offset of destination object name
MQRMH_DATALOGICALLENGTH   DS   F     Length of bulk data
MQRMH_DATALOGICALOFFSET   DS   F     Low offset of bulk data
MQRMH_DATALOGICALOFFSET2  DS   F     High offset of bulk data
*
MQRMH_LENGTH              EQU  *-MQRMH
                          ORG  MQRMH
MQRMH_AREA                DS   CL(MQRMH_LENGTH)
```

*Visual Basic declaration*

```
Type MQRMH
  StrucId            As String*4 'Structure identifier'
  Version            As Long     'Structure version number'
  StrucLength        As Long     'Total length of MQRMH, including'
                                 'strings at end of fixed fields, but'
                                 'not the bulk data'
  Encoding           As Long     'Numeric encoding of bulk data'
  CodedCharSetId     As Long     'Character set identifier of bulk data'
  Format             As String*8 'Format name of bulk data'
  Flags              As Long     'Reference message flags'
  ObjectType         As String*8 'Object type'
  ObjectInstanceId   As MQBYTE24 'Object instance identifier'
  SrcEnvLength       As Long     'Length of source environment data'
  SrcEnvOffset       As Long     'Offset of source environment data'
  SrcNameLength      As Long     'Length of source object name'
  SrcNameOffset      As Long     'Offset of source object name'
  DestEnvLength      As Long     'Length of destination environment'
```

```
                                'data'
  DestEnvOffset      As Long     'Offset of destination environment'
                                 'data'
  DestNameLength     As Long     'Length of destination object name'
  DestNameOffset     As Long     'Offset of destination object name'
  DataLogicalLength  As Long     'Length of bulk data'
  DataLogicalOffset  As Long     'Low offset of bulk data'
  DataLogicalOffset2 As Long     'High offset of bulk data'
End Type
```

## MQRR - Response record

The following table summarizes the fields in the structure.

*Table 531. Fields in MQRR*

| Field | Description | Topic |
|---|---|---|
| *CompCode* | Completion code for queue | CompCode |
| *Reason* | Reason code for queue | Reason |

### *Overview for MQRR*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

**Purpose**: Use the MQRR structure to receive the completion code and reason code resulting from the open or put operation for a single destination queue, when the destination is a distribution list. MQRR is an output structure for the MQOPEN, MQPUT, and MQPUT1 calls.

**Character set and encoding**: Data in MQRR must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQOPEN and MQPUT calls, or on the MQPUT1 call, you can determine the completion codes and reason codes for all the queues in a distribution list when the outcome of the call is mixed, that is, when the call succeeds for some queues in the list but fails for others. Reason code MQRC_MULTIPLE_REASONS from the call indicates that the response records (if provided by the application) have been set by the queue manager.

### *Fields for MQRR*

The MQRR structure contains the following fields; the fields are described in **alphabetical order**:

*CompCode (MQLONG)*

This is the completion code resulting from the open or put operation for the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call.

This is always an output field. The initial value of this field is MQCC_OK.

*Reason (MQLONG)*

This is the reason code resulting from the open or put operation for the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call.

This is always an output field. The initial value of this field is MQRC_NONE.

### *Initial values and language declarations for MQRR*

*Table 532. Initial values of fields in MQRR for MQRR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CompCode* | MQCC_OK | 0 |
| *Reason* | MQRC_NONE | 0 |

**Notes:**

1. In the C programming language, the macro variable MQRR_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQRR MyRR = {MQRR_DEFAULT};
```

*C declaration*

```
typedef struct tagMQRR MQRR;
struct tagMQRR {
  MQLONG  CompCode;  /* Completion code for queue */
  MQLONG  Reason;    /* Reason code for queue */
};
```

*COBOL declaration*

```
**   MQRR structure
  10 MQRR.
**    Completion code for queue
   15 MQRR-COMPCODE PIC S9(9) BINARY.
**    Reason code for queue
   15 MQRR-REASON   PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQRR based,
  3 CompCode fixed bin(31), /* Completion code for queue */
  3 Reason   fixed bin(31); /* Reason code for queue */
```

*Visual Basic declaration*

```
Type MQRR
  CompCode As Long 'Completion code for queue'
  Reason   As Long 'Reason code for queue'
End Type
```

## MQSCO - SSL configuration options

The following table summarizes the fields in the structure.

*Table 533. Fields in MQSCO*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *KeyRepository* | Location of key repository | KeyRepository |

| Table 533. Fields in MQSCO (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *CryptoHardware* | Details of cryptographic hardware | CryptoHardware |
| *AuthInfoRecCount* | Number of MQAIR records present | AuthInfoRecCount |
| *AuthInfoRecOffset* | Offset of first MQAIR record from start of MQSCO | AuthInfoRecOffset |
| *AuthInfoRecPtr* | Address of first MQAIR record | AuthInfoRecPtr |
| **Note:** The following two fields are ignored if *Version* is less than MQSCO_VERSION_2. | | |
| *KeyResetCount* | SSL secret key reset count | KeyResetCount |
| *FipsRequired* | Use FIPS-certified cryptographic algorithms in IBM MQ | "FipsRequired (MQLONG)" on page 540 |
| **Note:** The following field is ignored if *Version* is less than MQSCO_VERSION_3. | | |
| *EncryptionPolicySuiteB* | Use only Suite B cryptographic algorithms | EncryptionPolicySuiteB |
| **Note:** The following field is ignored if *Version* is less than MQSCO_VERSION_4. | | |
| *CertificateValPolicy* | Certificate validation policy | CertificateValPolicy |
| **Note:** The following field is ignored if *Version* is less than MQSCO_VERSION_5. | | |
| *CertificateLabel* | Details the certificate label that is being used. | CertificateLabel |

**Related reference**

"MQCNO - Connect options" on page 310
The following table summarizes the fields in the structure.

"Overview for MQSCO" on page 538
**Availability**: AIX, HP-UX, IBM i, Solaris, Linux and Windows clients.

"Fields for MQSCO" on page 538

"Initial values and language declarations for MQSCO" on page 542

## *Overview for MQSCO*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux and Windows clients.

**Purpose**: The MQSCO structure (in conjunction with the SSL fields in the MQCD structure) allows an application running as an IBM MQ MQI client to specify configuration options that control the use of SSL for the client connection when the channel protocol is TCP/IP. The structure is an input parameter on the MQCONNX call.

If the channel protocol for the client channel is not TCP/IP, the MQSCO structure is ignored.

**Character set and encoding**: Data in MQSCO must be in the character set given by the *CodedCharSetId* queue-manager attribute, and encoding of the local queue manager given by MQENC_NATIVE.

## *Fields for MQSCO*

The MQSCO structure contains the following fields; the fields are described in **alphabetical order**:

*AuthInfoRecCount (MQLONG)*

This is the number of authentication information (MQAIR) records addressed by the *AuthInfoRecPtr* or *AuthInfoRecOffset* fields. For more information, see"MQAIR - Authentication information record"

on page 267. The value must be zero or greater. If the value is not valid, the call fails with reason code MQRC_AUTH_INFO_REC_COUNT_ERROR.

This is an input field. The initial value of this field is 0.

*AuthInfoRecOffset (MQLONG)*

This is the offset in bytes of the first authentication information record from the start of the MQSCO structure. The offset can be positive or negative. The field is ignored if *AuthInfoRecCount* is zero.

You can use either *AuthInfoRecOffset* or *AuthInfoRecPtr* to specify the MQAIR records, but not both; see the description of the *AuthInfoRecPtr* field for details.

This is an input field. The initial value of this field is 0.

*AuthInfoRecPtr (PMQAIR)*

This is the address of the first authentication information record. The field is ignored if *AuthInfoRecCount* is zero.

You can provide the array of MQAIR records in one of two ways:

- By using the pointer field *AuthInfoRecPtr*

  In this case, the application can declare an array of MQAIR records that is separate from the MQSCO structure, and set *AuthInfoRecPtr* to the address of the array.

  Consider using *AuthInfoRecPtr* for programming languages that support the pointer data type in a fashion that is portable to different environments (for example, the C programming language).
- By using the offset field *AuthInfoRecOffset*

  In this case, the application must declare a compound structure containing an MQSCO followed by the array of MQAIR records, and set *AuthInfoRecOffset* to the offset of the first record in the array from the start of the MQSCO structure. Ensure that this value is correct, and has a value that can be accommodated within an MQLONG (the most restrictive programming language is COBOL, for which the valid range is -999 999 999 through +999 999 999).

  Consider using *AuthInfoRecOffset* for programming languages that do not support the pointer data type, or that implement the pointer data type in a fashion that is not portable to different environments (for example, the COBOL programming language).

Whatever technique you choose, only one of *AuthInfoRecPtr* and *AuthInfoRecOffset* can be used; the call fails with reason code MQRC_AUTH_INFO_REC_ERROR if both are nonzero.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

*CertificateLabel (MQCHAR64)*
This field gives details of the certificate label being used.

IBM MQ initializes the default value for the *CertificateLabel* field as blanks.

This is interpreted at runtime as the default value, and is backwards compatible.

For example, specifying a MQSCO version less than 5.0, or using the default value of blanks for the *CertificateLabel* field, uses the preexisting default value of `ibmwebspheremq<user_id>`.

*CertificateValPolicy (MQLONG)*

This field specifies what type of certificate validation policy is used. The field can be set to one of the following values:

**MQ_CERT_VAL_POLICY_ANY**
Apply each of the certificate validation policies supported by the secure sockets library. Accept the certificate chain if any of the policies considers the certificate chain valid.

**MQ_CERT_VAL_POLICY_RFC5280**
Apply only the RFC5280 compliant certificate validation policy. This setting provides stricter validation than the ANY setting, but rejects some older digital certificates.

The initial value of this field is MQ_CERT_VAL_POLICY_ANY

*CryptoHardware (MQCHAR256)*
This field gives configuration details for cryptographic hardware connected to the client system.

Set the field to a string of the following format, or leave it blank or null:

```
GSK_PKCS11=< the PKCS #11 driver path and file name >;< the PKCS #11
token label >;< the PKCS #11 token password >; <symmetric cipher setting>;
```

To use cryptographic hardware which conforms to the PKCS #11 interface, for example, the IBM 4960 or IBM 4764, the PKCS #11 driver path, PKCS #11 token label, and PKCS #11 token password strings must be specified, each terminated by a semi-colon.

The PKCS #11 driver path is an absolute path to the shared library providing support for the PKCS #11 card. The PKCS #11 driver file name is the name of the shared library. An example of the value required for the PKCS #11 path and file name is:

```
/usr/lib/pkcs11/PKCS11_API.so
```

The PKCS #11 token label must match the label you configured your hardware with.

If no cryptographic hardware configuration is required, set the field to blank or null.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. If the value is not valid, or leads to a failure when used to configure the cryptographic hardware, the call fails with reason code MQRC_CRYPTO_HARDWARE_ERROR.

This is an input field. The length of this field is given by MQ_SSL_CRYPTO_HARDWARE_LENGTH. The initial value of this field is the null string in C, and blank characters in other programming languages.

*EncryptionPolicySuiteB(MQLONG)*

This field Specifies whether Suite B compliant cryptography is used and what level of strength is employed. The value can be one or more of:

- MQ_SUITE_B_NONE

  Suite B compliant cryptography is not used.
- MQ_SUITE_B_128_BIT

  Suite B 128-bit strength security is used.
- MQ_SUITE_B_192_BIT

  Suite B 192-bit strength security is used.

**Note:** Using the MQ_SUITE_B_NONE with any other value in this field is invalid.

*FipsRequired (MQLONG)*
IBM MQ can be configured with cryptographic hardware so that the cryptography modules used are those provided by the hardware product; these can be FIPS-certified to a particular level depending on the cryptographic hardware product in use. Use this field to specify that only FIPS-certified algorithms are used if the cryptography is provided in IBM MQ-provided software.

When IBM MQ is installed an implementation of SSL cryptography is also installed which provides some FIPS-certified modules.

The values can be:

**MQSSL_FIPS_NO**
This is the default value. When set to this value:

- Any CipherSpec supported on a particular platform can be used.
- If run without use of cryptographic hardware, the following CipherSpecs run using FIPS 140-2 certified cryptography on the IBM MQ platforms:
  - TLS_RSA_WITH_3DES_EDE_CBC_SHA
  - TLS_RSA_WITH_AES_128_CBC_SHA
  - TLS_RSA_WITH_AES_256_CBC_SHA

**MQSSL_FIPS_YES**
When set to this value, unless you are using cryptographic hardware to perform the cryptography, you can be sure that

- Only FIPS-certified cryptographic algorithms can be used in the CipherSpec applying to this client connection.
- Inbound and outbound SSL channel connections only succeed if one of the following Cipher Specs are used:
  - TLS_RSA_WITH_3DES_EDE_CBC_SHA
  - TLS_RSA_WITH_AES_128_CBC_SHA
  - TLS_RSA_WITH_AES_256_CBC_SHA

**Notes:**

1. CipherSpec TLS_RSA_WITH_3DES_EDE_CBC_SHA is deprecated.
2. Where possible, if FIPS-only CipherSpecs are configured then the MQI client rejects connections which specify a non-FIPS CipherSpec with MQRC_SSL_INITIALIZATION_ERROR. IBM MQ does not guarantee to reject all such connections and it is your responsibility to determine whether your IBM MQ configuration is FIPS-compliant.

*KeyRepository (MQCHAR256)*

This field is relevant only for IBM MQ MQI clients running on UNIX, Linux, and Windows systems. It specifies the location of the key database file in which keys and certificates are stored. The key database file must have a file name of the form `zzz.kdb`, where `zzz` is user-selectable. The *KeyRepository* field contains the path to this file, along with the file name stem (all characters in the file name up to but not including the final `.kdb`). The `.kdb` file suffix is added automatically.

Each key database file has an associated *password stash file*. This holds encoded passwords that are used to allow programmatic access to the key database. The password stash file must reside in the same directory and have the same file stem as the key database, and must end with the suffix `.sth`.

For example, if the *KeyRepository* field has the value `/xxx/yyy/key`, the key database file must be `/xxx/yyy/key.kdb`, and the password stash file must be `/xxx/yyy/key.sth`, where `xxx` and `yyy` represent directory names.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. The value is not checked; if there is an error in accessing the key repository, the call fails with reason code MQRC_KEY_REPOSITORY_ERROR.

To run an SSL connection from an IBM MQ MQI client, set *KeyRepository* to a valid key database file name.

This is an input field. The length of this field is given by MQ_SSL_KEY_REPOSITORY_LENGTH. The initial value of this field is the null string in C, and blank characters in other programming languages.

*KeyResetCount (MQLONG)*
This represents the total number of unencrypted bytes sent and received within an SSL or TLS conversation before the secret key is renegotiated.

The number of bytes includes control information sent by the MCA.

If you specify an SSL or TLS secret key reset count in the range 1 byte through 32 KB, SSL or TLS channels will use a secret key reset count of 32 KB. This is to avoid the processing cost of excessive key resets which would occur for small SSL or TLS secret key reset values.

This is an input field. The value is a number in the range 0 through 999 999 999, with a default value of 0. Use a value of 0 to indicate that secret keys are never renegotiated.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQSCO_STRUC_ID**
Identifier for SSL configuration options structure.

For the C programming language, the constant MQSCO_STRUC_ID_ARRAY is also defined; this has the same value as MQSCO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQSCO_STRUC_ID.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQSCO_VERSION_1**
Version-1 SSL configuration options structure.

**MQSCO_VERSION_2**
Version-2 SSL configuration options structure.

**MQSCO_VERSION_3**
Version-3 SSL configuration options structure.

**MQSCO_VERSION_4**
Version-4 SSL configuration options structure.

**MQSCO_VERSION_5**
Version-5 SSL configuration options structure.

The following constant specifies the version number of the current version:

**MQSCO_CURRENT_VERSION**
Current version of SSL configuration options structure.

This is always an input field. The initial value of this field is MQSCO_VERSION_1.

## *Initial values and language declarations for MQSCO*

*Table 534. Initial values of fields in MQSCO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQSCO_STRUC_ID | 'SCO¬' |
| *Version* | MQSCO_CURRENT_VERSION | 1 |
| *KeyRepository* | None | Null string or blanks |
| *CryptoHardware* | None | Null string or blanks |
| *AuthInfoRecCount* | None | 0 |
| *AuthInfoRecOffset* | None | 0 |
| *AuthInfoRecPtr* | None | Null pointer or null bytes |

| Table 534. Initial values of fields in MQSCO (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *KeyResetCount* | MQSCO_RESET_COUNT_DEFAULT | 0 |
| *FipsRequired* | MQSSL_FIPS_NO | 0 |
| *EncryptionPolicySuiteB* | MQ_SUITE_B_NONE,<br>MQ_SUITE_B_NOT_AVAILABLE,<br>MQ_SUITE_B_NOT_AVAILABLE,<br>MQ_SUITE_B_NOT_AVAILABLE | 1,<br>0,<br>0,<br>0 |
| *CertificateValPolicy* | MQ_CERT_VAL_POLICY_DEFAULT | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQSCO_DEFAULT contains the values listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQSCO MySCO = {MQSCO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQSCO MQSCO;
struct tagMQSCO {
   MQCHAR4    StrucId;                    /* Structure identifier */
   MQLONG     Version;                    /* Structure version number */
   MQCHAR256  KeyRepository;              /* Location of SSL key */
                                          /* repository */
   MQCHAR256  CryptoHardware;             /* Cryptographic hardware */
                                          /* configuration string */
   MQLONG     AuthInfoRecCount;           /* Number of MQAIR records */
                                          /* present */
   MQLONG     AuthInfoRecOffset;          /* Offset of first MQAIR */
                                          /* record from start of */
                                          /* MQSCO structure */
   PMQAIR     AuthInfoRecPtr;             /* Address of first MQAIR */
                                          /* record */
/* Ver:1 */
   MQLONG     KeyResetCount;              /* Number of unencrypted */
                                          /* bytes sent/received */
                                          /* before secret key is */
                                          /* reset */
   MQLONG     FipsRequired;               /* Using FIPS-certified */
/* Ver:2 */
                                          /* algorithms */
   MQLONG     EncryptionPolicySuiteB[4];  /* Use only Suite B */
/* Ver:3 */
                                          /* cryptographic algorithms */
   MQLONG     CertificateValPolicy;       /* Certificate validation */
                                          /* policy */
/* Ver:4 */
MQCHAR64  CertificateLabel;      /* Certificate label */
/* Ver:5 */
```

*COBOL declaration*

```
**   MQSCO structure
  10 MQSCO.
**    Structure identifier
   15 MQSCO-STRUCID                 PIC X(4).
**    Structure version number
   15 MQSCO-VERSION                 PIC S9(9) BINARY.
**    Location of SSL key repository
   15 MQSCO-KEYREPOSITORY           PIC X(256).
```

```
**    Cryptographic hardware configuration string
   15 MQSCO-CRYPTOHARDWARE           PIC X(256).
**    Number of MQAIR records present
   15 MQSCO-AUTHINFORECCOUNT         PIC S9(9) BINARY.
**    Offset of first MQAIR record from start of MQSCO structure
   15 MQSCO-AUTHINFORECOFFSET        PIC S9(9) BINARY.
** Address of first MQAIR record
    15  MQSCO-AUTHINFORECPTR POINTER.
** Version 1 **
** Number of unencrypted bytes sent/received before secret key is
** reset
15  MQSCO-KEYRESETCOUNT PIC S9(9) BINARY.
** Using FIPS-certified algorithms
15  MQSCO-FIPSREQUIRED PIC S9(9) BINARY.
** Version 2 **
** Use only Suite B cryptographic algorithms
15  MQSCO-ENCRYPTIONPOLICYSUITEB PIC S9(9) BINARY OCCURS 4.
** Version 3 **
** Certificate validation policy setting
15  MQSCO-CERTIFICATEVALPOLICY PIC S9(9) BINARY.
** Version 4
```

*PL/I declaration*

```
dcl
 1 MQSCO based,
  3 StrucId                   char(4),       /* Structure identifier */
  3 Version                   fixed bin(31), /* Structure version number */
  3 KeyRepository             char(256),     /* Location of SSL key
                                                repository */
  3 CryptoHardware            char(256),     /* Cryptographic hardware
                                                configuration string */
  3 AuthInfoRecCount          fixed bin(31), /* Number of MQAIR records
                                                present */
  3 AuthInfoRecOffset         fixed bin(31), /* Offset of first MQAIR record
                                                from start of MQSCO structure */
  3 AuthInfoRecPtr            pointer,       /* Address of first MQAIR record */
  3 KeyResetCount             fixed bin(31), /* Key reset count */
/* Version 1 */
  3 FipsRequired              fixed bin(31), /* FIPS required */
/* Version 2 */
  3 EncryptionPolicySuiteB (4) fixed bin(31), /* Suite B encryption policy */
/* Version 3 */
  3 CertificateValPolicy      fixed bin(31); /* Certificate validation policy */
/* Version 4 */
```

*Visual Basic declaration*

```
Type MQSCO
  StrucId           As String*4   'Structure identifier'
  Version           As Long       'Structure version number'
  KeyRepository     As String*256 'Location of SSL key repository'
  CryptoHardware    As String*256 'Cryptographic hardware configuration'
                                  'string'
  AuthInfoRecCount  As Long       'Number of MQAIR records present'
  AuthInfoRecOffset As Long       'Offset of first MQAIR record from'
                                  'start of MQSCO structure'
  AuthInfoRecPtr    As MQPTR      'Address of first MQAIR record'
  KeyResetCount     As Long       'Number of unencrypted bytes sent/received before secret key
is reset'
'Version 1'
  FipsRequired      As Long       'Mandatory FIPS CipherSpecs?'
'Version 2'
End Type
```

## MQSD - Subscription descriptor

The following table summarizes the fields in the structure.

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |

| Field | Description | Topic |
|---|---|---|
| *Version* | Structure version number | Version |
| *Options* | Options | Options |
| *ObjectName* | Object name | ObjectName |
| *AlternateUserId* | Alternate User Id | AlternateUserId |
| *AlternateSecurityId* | Alternate Security ID | AlternateSecurityId |
| *SubExpiry* | Subscription Expiry | SubExpiry |
| *ObjectString* | Object String | ObjectString |
| *SubName* | Subscription Name | SubName |
| *SubUserData* | Subscription user data | SubUserData |
| *SubCorrelId* | Subscription Correlation ID | SubCorrelId |
| *PubPriority* | Publication priority | PubPriority |
| *PubAccountingToken* | Publication Accounting Token | PubAccountingToken |
| *PubAppIdentityData* | Publication application identity data | PubAppIdentityData |
| *SelectionString* | String providing selection criteria | SelectionString |
| *SubLevel* | Subscription Level | SubLevel |
| *ResObjectString* | Long object name | ResObjectString |

## *Overview for MQSD*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS, plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQSD structure is used to specify details about the subscription being made.

The structure is an input/output parameter on the MQSUB call. For more information, see MQSUB usage notes.

**Managed subscriptions**: If an application has no specific need to use a particular queue as the destination for those publications that match its subscription, it can use the managed subscription feature. If an application elects to use a managed subscription, the queue manager informs the subscriber about the destination where published messages are sent, by providing an object handle as an output from the MQSUB call. For more information, see Hobj (MQHOBJ) - input/output.

When the subscription is removed, the queue manager also undertakes to clean up messages that have not been retrieved from the managed destination, in the following situations:

- When the subscription is removed - by use of MQCLOSE with MQCO_REMOVE_SUB - and the managed Hobj is closed.
- By implicit means when the connection is lost to an application using a non-durable subscription (MQSO_NON_DURABLE)
- By expiration when a subscription is removed because it has expired and the managed Hobj is closed.

You must use managed subscriptions with non-durable subscriptions, so that this clean up can occur, and so that messages for closed non-durable subscriptions do not take up space in your queue manager. Durable subscriptions can also use managed destinations.

**Version**: The current version of MQSD is MQSD_VERSION_1.

**Character set and encoding**: Data in MQSD must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if

the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

### *Fields for MQSD*

The MQSD structure contains the following fields; the fields are described in alphabetical order:

*AlternateSecurityId (MQBYTE40)*

This is a security identifier that is passed with the AlternateUserId to the authorization service to allow appropriate authorization checks to be performed.

AlternateSecurityId is used only if MQSO_ALTERNATE_USER_AUTHORITY is specified, and the AlternateUserId field is not entirely blank up to the first null character or the end of the field.

On return from an MQSUB call using MQSO_RESUME, this field is unchanged.

See the description of "AlternateSecurityId (MQBYTE40)" on page 462 in the MQOD data type for more information.

*AlternateUserId (MQCHAR12)*

If you specify MQSO_ALTERNATE_USER_AUTHORITY, this field contains an alternative user identifier that is used to check the authorization for the subscription and for output to the destination queue (specified in the *Hobj* parameter of the MQSUB call), in place of the user identifier that the application is currently running under.

If successful, the user identifier specified in this field is recorded as the subscription owning user identifier in place of the user identifier that the application is currently running under.

If MQSO_ALTERNATE_USER_AUTHORITY is specified and this field is entirely blank up to the first null character or the end of the field, the subscription can succeed only if no user authorization is needed to subscribe to this topic with the options specified or the destination queue for output.

If MQSO_ALTERNATE_USER_AUTHORITY is not specified, this field is ignored.

The following differences exist in the environments indicated:

- On z/OS, only the first 8 characters of AlternateUserId are used to check the authorization for the subscription. However, the current user identifier must be authorized to specify this particular alternative user identifier; all 12 characters of the alternative user identifier are used for this check. The user identifier must contain only characters allowed by the external security manager.

On return from an MQSUB call using MQSO_RESUME, this field is unchanged.

This is an input field. The length of this field is given by MQ_USER_ID_LENGTH. The initial value of this field is the null string in C, and 12 blank characters in other programming languages.

*ObjectName (MQCHAR48)*

This is the name of the topic object as defined on the local queue manager.

The name can contain the following characters:

- Uppercase alphabetic characters (A through Z)
- Lowercase alphabetic characters (a through z)
- Numeric digits (0 through 9)
- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but can contain trailing blanks. Use a null character to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply in the environments indicated:

- On systems that use EBCDIC Katakana, lowercase characters cannot be used.
- On z/OS:
  - Avoid names that begin or end with an underscore; they cannot be processed by the operations and control panels.
  - The percent character has a special meaning to RACF. If RACF is used as the external security manager, names must not contain the percent. If they do, those names are not included in any security checks when RACF generic profiles are used.
- On IBM i, names containing lowercase characters, forward slash, or percent, must be enclosed in quotation marks when specified on commands. These quotation marks must not be specified for names that occur as fields in structures or as parameters on calls.

The *ObjectName* is used to form the full topic name.

The full topic name can be built from two different fields: *ObjectName* and *ObjectString*. For details of how these two fields are used, see "Using topic strings" on page 560.

If the object identified by the *ObjectName* field cannot be found, the call fails with reason code MQRC_UNKNOWN_OBJECT_NAME even if there is a string specified in *ObjectString*.

On return from an MQSUB call using the MQSO_RESUME option this field is unchanged.

The length of this field is given by MQ_TOPIC_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

If altering an existing subscription using the MQSO_ALTER option, the name of the topic object subscribed to cannot be changed. This field and the *ObjectString* field can be omitted. If they are provided, they must resolve to the same full topic name. If they do not, the call fails with MQRC_TOPIC_NOT_ALTERABLE.

*ObjectString (MQCHARV)*

This is the long object name to be used.

The *ObjectString* is used to form the Full topic name.

The full topic name can be built from two different fields: *ObjectName* and *ObjectString*. For details of how these two fields are used, see "Using topic strings" on page 560.

The maximum length of *ObjectString* is 10240.

If *ObjectString* is not specified correctly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code MQRC_OBJECT_STRING_ERROR.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

If there are wildcards in the *ObjectString* the interpretation of those wildcards can be controlled using the Wildcard options specified in the Options field of the MQSD.

On return from an MQSUB call using the MQSO_RESUME option this field is unchanged. The full topic name used is returned in the *ResObjectString* field if a buffer is provided.

If altering an existing subscription using the MQSO_ALTER option, the long name of the topic object subscribed to cannot be changed. This field and the *ObjectName* field can be omitted. If they are provided they must resolve to the same full topic name or the call fails with MQRC_TOPIC_NOT_ALTERABLE.

*Options (MQLONG)*
This provides options to control the action of the MQSUB call.

You must specify at least one of the following options:

- MQSO_ALTER
- MQSO_RESUME
- MQSO_CREATE

To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

Combinations that are not valid are noted in this topic; any other combinations are valid.

**Access or creation options**: Access and creation options control whether a subscription is created, or whether an existing subscription is returned or altered. You must specify at least one of these options. The table displays valid combinations of access and creation options.

| Combination of options | Notes |
|---|---|
| MQSO_CREATE | Creates a subscription if one does not exist. This combination fails if the subscription exists. |
| MQSO_RESUME | Resumes an existing subscription. This combination fails if no subscription exists. |
| MQSO_CREATE + MQSO_RESUME | Creates a subscription if one does not exist and resumes a matching one, if it does exist. This combination is useful when it is used in an application that is run a number of times. |
| MQSO_ALTER (see note) | Resumes an existing subscription, altering any fields to match that specified in the MQSD. This combination fails if no subscription exists. |
| MQSO_CREATE + MQSO_ALTER (see note) | Creates a subscription if one does not exist and resumes a matching one, if it does exist, altering any fields to match that specified in the MQSD. This combination is useful combination when used in an application that wants to ensure that its subscription is in a certain state before proceeding. |

**Note:**

Options specifying MQSO_ALTER can also specify MQSO_RESUME, but this combination has no additional effect to specifying MQSO_ALTER alone. MQSO_ALTER implies MQSO_RESUME, because calling MQSUB to alter a subscription implies that the subscription will also be resumed. The opposite is not true, however: resuming a subscription does not imply it is to be altered.

**MQSO_CREATE**

Create a new subscription for the topic specified. If a subscription using the same *SubName* exists, the call fails with MQRC_SUB_ALREADY_EXISTS. This failure can be avoided by combining the MQSO_CREATE option with MQSO_RESUME. The *SubName* is not always necessary. For more details, see the description of that field.

Combining MQSO_CREATE with MQSO_RESUME returns a handle to a pre-existing subscription for the specified *SubName* if one is found; if there is no existing subscription, a new one is created using all the fields provided in the MQSD.

MQSO_CREATE can also be combined with MQSO_ALTER to similar effect.

**MQSO_RESUME**

Return a handle to a pre-existing subscription which matches that specified by *SubName*. No changes are made to the matching subscriptions attributes and they are returned on output in the MQSD structure. Only the following MQSD fields are used: StrucId, Version, Options, AlternateUserId and AlternateSecurityId, and SubName.

The call fails with reason code MQRC_NO_SUBSCRIPTION if a subscription does not exist matching the full subscription name. This failure can be avoided by combining the MQSO_CREATE option with MQSO_RESUME.

The user ID of the subscription is the user ID that created the subscription, or if it has been later altered by a different user ID, it is the user ID of the most recent successful alteration. If an AlternateUserId is used, and use of alternate user IDs is allowed for that user, the alternate user ID is recorded as the user ID that created the subscription instead of the user ID under which the subscription was made.

If a matching subscription exists that was created without the MQSO_ANY_USERID option, and the user ID of the subscription is different from that of the application requesting a handle to the subscription, the call fails with reason code MQRC_IDENTITY_MISMATCH.

If a matching subscription exists and is currently in use, the call fails with MQRC_SUBSCRIPTION_IN_USE.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call fails with MQRC_INVALID_SUBSCRIPTION.

MQSO_RESUME is implied by MQSO_ALTER so you do not need to combine it with that option. However, combining the two options does not cause an error.

**MQSO_ALTER**

Return a handle to a pre-existing subscription with the full subscription name matching that specified by the name in *SubName*. Any attributes of the subscription that are different from that specified in the MQSD are altered in the subscription unless alteration is disallowed for that attribute. Details are noted in the description of each attribute and are summarized in the following table. If you try to alter an attribute that cannot be changed, or to alter a subscription that has set the MQSO_IMMUTABLE option, the call fails with the reason code shown in the following table.

The call fails with reason code MQRC_NO_SUBSCRIPTION if a subscription matching the full subscription name does not exist. You can avoid this failure by combining the MQSO_CREATE option with MQSO_ALTER.

Combining MQSO_CREATE with MQSO_ALTER returns a handle to a pre-existing subscription for the specified *SubName* if one is found; if there is no existing subscription, a new one is created using all the fields provided in the MQSD.

The user ID of the subscription is the user ID that created the subscription, or if it is later altered by a different user ID, it is the user ID of the most recent, successful alteration. If an AlternateUserId is used, and use of alternate user IDs is allowed for that user, then the alternate user ID is recorded as the user ID that created the subscription instead of the user ID under which the subscription was made.

If a matching subscription exists that was created without the option MQSO_ANY_USERID and the user ID of the subscription is different from that of the application requesting a handle to the subscription, the call fails with reason code MQRC_IDENTITY_MISMATCH.

If a matching subscription exists and is currently in use, the call fails with MQRC_SUBSCRIPTION_IN_USE.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call fails with MQRC_INVALID_SUBSCRIPTION.

The following table shows the ability of MQSO_ALTER to alter attribute values in MQSD and MQSUB.

*Table 535. Attributes in MQSD and MQSUB that can be altered*

| Data type descriptor or function call | Field name | Can this attribute be altered using MQSO_ALTER | Reason Code |
|---|---|---|---|
| MQSD | Durability options | No | MQRC_DURABILITY_NOT_ALTERABLE |
| MQSD | Destination Options | Yes | None |
| MQSD | Registration options | Yes (see note “1” on page 550) | MQRC_GROUPING_NOT_ALTERABLE if you try to alter MQSO_GROUP_SUB |
| MQSD | Publication options | Yes (see note “2” on page 550) | None |
| MQSD | Wildcard options | No | MQRC_TOPIC_NOT_ALTERABLE |
| MQSD | Other options | No (see note “3” on page 550) | None |
| MQSD | ObjectName | No | MQRC_TOPIC_NOT_ALTERABLE |
| MQSD | AlternateUserId | No (see note “4” on page 550) | None |
| MQSD | AlternateSecurityId | No (see note “4” on page 550) | None |
| MQSD | SubExpiry | Yes | None |
| MQSD | ObjectString | No | MQRC_TOPIC_NOT_ALTERABLE |
| MQSD | SubName | No (see note “5” on page 550 ) | None |
| MQSD | SubUserData | Yes | None |
| MQSD | SubCorrelId | Yes (see note “6” on page 550) | MQRC_GROUPING_NOT_ALTERABLE when in a grouped subscription |
| MQSD | PubPriority | Yes | None |
| MQSD | PubAccountingToken | Yes | None |
| MQSD | PubApplIdentityData | Yes | None |
| MQSD | SubLevel | No | MQRC_SUBLEVEL_NOT_ALTERABLE |
| MQSUB | Hobj | Yes (see note “6” on page 550) | MQRC_GROUPING_NOT_ALTERABLE when in a grouped subscription |

**Notes:**

1. MQSO_GROUP_SUB cannot be altered.
2. MQSO_NEW_PUBLICATIONS_ONLY cannot be altered because it is not part of the subscription
3. These options are not part of the subscription
4. This attribute is not part of the subscription
5. This attribute is the identity of the subscription being altered
6. Alterable except when part of a grouped sub (MQSO_GROUP_SUB)

**Durability options:** The following options control how durable the subscription is. You can specify only one of these options. If you are altering an existing subscription using the MQSO_ALTER option, you cannot change the durability of the subscription. On return from an MQSUB call using MQSO_RESUME, the appropriate durability option is set.

**MQSO_DURABLE**

Request that the subscription to this topic remains until it is explicitly removed using MQCLOSE with the MQCO_REMOVE_SUB option. If this subscription is not explicitly removed it will remain even after this applications connection to the queue manager is closed.

If a durable subscription is requested to a topic that is defined as not allowing durable subscriptions, the call fails with MQRC_DURABILITY_NOT_ALLOWED.

**MQSO_NON_DURABLE**
Request that the subscription to this topic is removed when the applications connection to the queue manager is closed, if it is not already explicitly removed. MQSO_NON_DURABLE is the opposite of the MQSO_DURABLE option, and is defined to aid program documentation. It is the default if neither is specified.

**Destination options:** The following option controls the destination that publications for a topic that has been subscribed to are sent to. If altering an existing subscription using the MQSO_ALTER option, the destination used for publications for the subscription can be changed. On return from an MQSUB call using MQSO_RESUME, this option is set if appropriate.

**MQSO_MANAGED**

Request that the destination that the publications are sent to is managed by the queue manager.

The object handle returned in *Hobj* represents a queue manager managed queue and is for use with subsequent MQGET, MQCB, MQINQ, or MQCLOSE calls.

An object handle returned from a previous MQSUB call cannot be provided in the *Hobj* parameter when MQSO_MANAGED is not specified.

**MQSO_NO_MULTICAST**

Request that the destination that the publications are sent to is not a multicast group address. This option is only valid when combined with the MQSO_MANAGED option. When a handle to a queue is provided in the *Hobj* parameter, multicast cannot be used for this subscription, and the option is not valid.

If the topic is defined to only allow multicast subscriptions, using the `MCAST(ONLY)` setting, then the call fails with reason code MQRC_MULTICAST_REQUIRED.

**Scope Option:** The following option controls the scope of the subscription being made. If altering an existing subscription using the MQSO_ALTER option, this subscription scope option cannot be changed. On returning from an MQSUB call using MQSO-RESUME, the appropriate scope option is set.

**MQSO_SCOPE_QMGR**
This subscription is made only on the local queue manager. No proxy subscription is distributed to other queue managers in the network. Only publications that are published at this queue manager are sent to this subscriber. This overrides any behavior set using the SUBSCOPE topic attribute.

**Note:** If not set, the subscription scope is determined by the SUBSCOPE topic attribute.

**Registration options:** The following options control the details of the registration that is made to the queue manager for this subscription. If altering an existing subscription using the MQSO_ALTER option, these registration options can be changed. On return from an MQSUB call using MQSO_RESUME the appropriate registration options is set.

**MQSO_GROUP_SUB**

This subscription is to be grouped with other subscriptions of the same SubLevel using the same queue and specifying the same correlation ID so that any publications to topics that would cause more than one publication message to be provided to the group of subscriptions, due to an overlapping set of topic strings being used, only causes one message to be delivered to the queue. If this option is not used, then each unique subscription (identified by SubName) that matches is provided with a copy of the publication which could mean more than one copy of the publication may be placed on the queue shared by a number of subscriptions.

Only the most significant subscription in the group is provided with a copy of the publication. The most significant subscription is based on the Full topic name up to the point where a wildcard is found. If a mixture of wildcard schemes is used within the group, only the position of the wildcard is important. You are advised not to combine different wildcard schemes within a group of subscriptions that share the same queue.

When creating a new grouped subscription it must still have a unique SubName, but if it matches the full topic name of an existing subscription in the group, the call fails with MQRC_DUPLICATE_GROUP_SUB.

If the most significant subscription in group also specifies MQSO_NOT_OWN_PUBS and this is a publication from the same application, then no publication is delivered to the queue.

When altering a subscription made with this option, the fields which imply the grouping, Hobj on the MQSUB call (representing the queue and queue manager name), and the SubCorrelId cannot be changed. Attempting to alter them causes the call to fail with MQRC_GROUPING_NOT_ALTERABLE.

This option must be combined with MQSO_SET_CORREL_ID with a SubCorrelId that is not set to MQCI_NONE, and cannot be combined with MQSO_MANAGED.

**MQSO_ANY_USERID**

When MQSO_ANY_USERID is specified, the identity of the subscriber is not restricted to a single user ID. This allows any user to alter or resume the subscription when they have suitable authority. Only a single user may have the subscription at any one time. An attempt to resume use of a subscription currently in use by another application causes the call to fail with MQRC_SUBSCRIPTION_IN_USE.

To add this option to an existing subscription the MQSUB call (using MQSO_ALTER) must come from the same user ID as the original subscription itself.

If an MQSUB call refers to an existing subscription with MQSO_ANY_USERID set, and the user ID differs from the original subscription, the call succeeds only if the new user ID has authority to subscribe to the topic. On successful completion, future publications to this subscriber are put to the subscribers queue with the new user ID set in the publication message.

Do not specify both MQSO_ANY_USERID and MQSO_FIXED_USERID. If neither is specified, the default is MQSO_FIXED_USERID.

**MQSO_FIXED_USERID**

When MQSO_FIXED_USERID is specified, the subscription can be altered or resumed by only the last user ID to alter the subscription. If the subscription has not been altered, it is the user ID that created the subscription.

If an MQSUB verb refers to an existing subscription with MQSO_ANY_USERID set and alters the subscription using MQSO_ALTER to use option MQSO_FIXED_USERID, the user ID of the subscription is now fixed at this new user ID. The call succeeds only if the new user ID has authority to subscribe to the topic.

If a user ID other than the one recorded as owning a subscription tries to resume or alter an MQSO_FIXED_USERID subscription, the call fails with MQRC_IDENTITY_MISMATCH. The owning user ID of a subscription can be viewed using the DISPLAY SBSTATUS command.

Do not specify both MQSO_ANY_USERID and MQSO_FIXED_USERID. If neither is specified, the default is MQSO_FIXED_USERID.

**Publication options:** The following options control the way publications are sent to this subscriber. If altering an existing subscription using the MQSO_ALTER option, these publication options can be changed.

**MQSO_NOT_OWN_PUBS**

Tells the broker that the application does not want to see any of its own publications. Publications are considered to originate from the same application if the connection handles are the same. On return from an MQSUB call using MQSO_RESUME, this option is set if appropriate.

**MQSO_NEW_PUBLICATIONS_ONLY**

No currently retained publications are to be sent, when this subscription is created, only new publications. This option only applies when MQSO_CREATE is specified. Any subsequent changes to a subscription do not alter the flow of publications and so any publications retained on a topic, will have already been sent to the subscriber as new publications.

If this option is specified without MQSO_CREATE the call fails with MQRC_OPTIONS_ERROR. On return from an MQSUB call using MQSO_RESUME, this option is not set even if the subscription was created using this option.

If this option is not used, previously retained messages are sent to the destination queue provided. If this action fails due to an error, either MQRC_RETAINED_MSG_Q_ERROR or MQRC_RETAINED_NOT_DELIVERED, the creation of the subscription fails.

**MQSO_PUBLICATIONS_ON_REQUEST**
Setting this option indicates that the subscriber will request information specifically when required. The queue manager does not send unsolicited messages to the subscriber. The retained publication (or possibly multiple publications if a wildcard is specified in the topic) is sent to the subscriber each time an MQSUBRQ call is made using the Hsub handle from a previous MQSUB call. No publications are sent as a result of the MQSUB call using this option. On return from an MQSUB call using MQSO_RESUME, this option is set if appropriate.

This option is not valid in combination with a SubLevel greater than 1.

**Read ahead options:** The following options control whether non-persistent messages are sent to an application ahead of the application requesting them.

**MQSO_READ_AHEAD_AS_Q_DEF**
If the MQSUB call uses a managed handle, the default read ahead attribute of the model queue associated with the topic subscribed to determines whether messages are sent to the application before the application requests them.

This is the default value.

**MQSO_NO_READ_AHEAD**
If the MQSUB call uses a managed handle, messages are not sent to the application before the application requests them.

**MQSO_READ_AHEAD**
If the MQSUB call uses a managed handle, messages might be sent to the application before the application requests them.

**Note:**

The following notes apply to the read ahead options:

1. Only one of these options can be specified. If both MQOO_READ_AHEAD and MQOO_NO_READ_AHEAD are specified, reason code MQRC_OPTIONS_ERROR is returned. These options are only applicable if MQSO_MANAGED is specified.
2. They are not applicable for MQSUB when a queue is passed which has been opened previously. Read ahead might not be enabled when requested. The MQGET options used on the first MQGET call might prevent read ahead from being enabled. Also, read ahead is disabled when the client is connecting to a queue manager where read ahead is not supported. If the application is not running as an IBM MQ client, these options are ignored.

**Wildcard options:** The following options control how wildcards are interpreted in the string provided in the ObjectString field of the MQSD. You can specify only one of these options. If altering an existing subscription using the MQSO_ALTER option, these wildcard options cannot be changed. On return from an MQSUB call using MQSO_RESUME, the appropriate wildcard option is set.

**MQSO_WILDCARD_CHAR**
Wildcards only operate on characters within the topic string.

The behavior defined by MQSO_WILDCARD_CHAR is shown in the following table.

| Special Character | Behavior |
|---|---|
| Forward slash (/) | No significance, just another character |
| Asterisk (*) | Wildcard, zero or more characters |
| Question mark (?) | Wildcard, 1 character |

| Special Character | Behavior |
|---|---|
| Percent sign (%) | Escape character to allow the characters (*), (?) or (%) to be used in a string and not be interpreted as a special character, for example, (%*), (%?) or (%%). |

For example, publishing on the following topic:

```
/level0/level1/level2/level3/level4
```

matches subscribers using the following topics:

```
*
/*
/ level0/level1/level2/level3/*
/ level0/level1/*/level3/level4
/ level0/level1/le?el2/level3/level4
```

**Note:** This use of wildcards supplies exactly the meaning provided in IBM MQ V6 and WebSphere MB V6 when using MQRFH1 formatted messages for publish/subscribe. It is recommended that this is not used for newly written applications and is only used for applications that were previously running against that version and have not been changed to use the default wildcard behavior as described in MQSO_WILDCARD_TOPIC.

**MQSO_WILDCARD_TOPIC**

Wildcards only operate on topic elements within the topic string. This is the default behavior if none is chosen.

The behavior required by MQSO_WILDCARD_TOPIC is shown in the following table:

| Special Character | Behavior |
|---|---|
| (/) | Topic level separator |
| Number sign (#) | Wildcard: multiple topic level |
| Plus sign (+) | Wildcard: single topic level |

**Notes:**

The (+) and (#) are not treated as wildcards if they are mixed in with other characters (including themselves) within a topic level. In the following string, the (#) and (+) characters are treated as ordinary characters.

```
level0/level1/#+/level3/level#
```

For example, publishing on the following topic:

```
/level0/level1/level2/level3/level4
```

matches subscribers using the following topics:

```
#
/#
/ level0/level1/level2/level3/#
/ level0/level1/+/level3/level4
```

**Other options:** The following options control the way the API call is issued rather than the subscription. On return from an MQSUB call using MQSO_RESUME, these options are unchanged. See “AlternateUserId (MQCHAR12)” on page 546 for more details.

**MQSO_ALTERNATE_USER_AUTHORITY**

The AlternateUserId field contains a user identifier to use to validate this MQSUB call. The call can succeed only if this AlternateUserId is authorized to open the object with the specified access options, regardless of whether the user identifier under which the application is running is authorized to do so.

**MQSO_SET_CORREL_ID**

The subscription is to use the correlation identifier supplied in the *SubCorrelId* field. If this option is not specified, a correlation identifier is automatically created by the queue manager at subscription time and is returned to the application in the *SubCorrelId* field. For more information, see "SubCorrelId (MQBYTE24)" on page 557 for more information.

This option cannot be combined with MQSO_MANAGED.

**MQSO_SET_IDENTITY_CONTEXT**

The subscription is to use the accounting token and application identity data supplied in the *PubAccountingToken* and *PubApplIdentityData* fields.

If this option is specified, the same authorization check is carried out as if the destination queue was accessed using an MQOPEN call with MQOO_SET_IDENTITY_CONTEXT, except in the case where the MQSO_MANAGED option is also used in which case there is no authorization check on the destination queue.

If this option is not specified, the publications sent to this subscriber have default context information associated with them as follows:

| Field in MQMD | Value used |
|---|---|
| *UserIdentifier* | The user ID associated with the subscription at the time the subscription was made. |
| *AccountingToken* | Determined from the environment if possible; Set to MQACT_NONE if not. |
| *ApplIdentityData* | Set to blanks |

This option is only valid with MQSO_CREATE and MQSO_ALTER. If used with MQSO_RESUME, the *PubAccountingToken* and *PubApplIdentityData* fields are ignored, so this option has no effect.

If a subscription is altered without using this option where previously the subscription supplied identity context information, default context information is generated for the altered subscription.

If a subscription allowing different user IDs to use it with option MQSO_ANY_USERID, is resumed by a different user ID, default identity context is generated for the new user ID now owning the subscription and any subsequent publications are delivered containing the new identity context.

**MQSO_FAIL_IF_QUIESCING**

The MQSUB call fails if the queue manager is in quiescing state. On z/OS, for a CICS or IMS application, this option also forces the MQSUB call to fail if the connection is in quiescing state.

*PubAccountingToken (MQBYTE32)*

This is the value that will be in the *AccountingToken* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. *AccountingToken* is part of the identity context of the message. For more information about message context, see Message context. For more information about the *AccountingToken* field in the MQMD, see "AccountingToken (MQBYTE32)" on page 405

You can use the following special value for the *PubAccountingToken* field:

**MQACT_NONE**

No accounting token is specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQACT_NONE_ARRAY is also defined; this has the same value as MQACT_NONE, but is an array of characters instead of a string.

If the option MQSO_SET_IDENTITY_CONTEXT is not specified, the accounting token is generated by the queue manager as default context information and this field is an output field which contains the *AccountingToken* which will be set in each message published for this subscription.

If the option MQSO_SET_IDENTITY_CONTEXT is specified, the accounting token is being generated by the user and this field is an input field which contains the *AccountingToken* to be set in each publication for this subscription.

The length of this field is given by MQ_ACCOUNTING_TOKEN_LENGTH. The initial value of this field is MQACT_NONE.

If altering an existing subscription using the MQSO_ALTER option, the value of *AccountingToken* in any future publication messages can be changed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current *AccountingToken* being used for the subscription.

*PubApplIdentityData (MQCHAR32)*

This is the value that is in the *ApplIdentityData* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. *ApplIdentityData* is part of the identity context of the message. For more information about message context, see Message context. For more information about the *ApplIdentityData* field in the MQMD, see “ApplIdentityData (MQCHAR32)” on page 406

If the option MQSO_SET_IDENTITY_CONTEXT is not specified, the *ApplIdentityData* which is set in each message published for this subscription is blanks, as default context information.

If the option MQSO_SET_IDENTITY_CONTEXT is specified, the *PubApplIdentityData* is being generated by the user and this field is an input field which contains the *ApplIdentityData* to be set in each publication for this subscription.

The length of this field is given by MQ_APPL_IDENTITY_DATA_LENGTH. The initial value of this field is the null string in C, and 32 blank characters in other programming languages.

If altering an existing subscription using the MQSO_ALTER option, the *ApplIdentityData* of any future publication messages can be changed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current *ApplIdentityData* being used for the subscription.

*PubPriority (MQLONG)*

This is the value that will be in the *Priority* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. For more information about the *Priority* field in the MQMD, see “Priority (MQLONG)” on page 431.

The value must be greater than or equal to zero; zero is the lowest priority. The following special values can also be used:

**MQPRI_PRIORITY_AS_Q_DEF**

When a subscription queue is provided in the *Hobj* field in the MQSUB call, and is not a managed handle, then the priority for the message is taken from the *DefPriority* attribute of this queue. If the queue is a cluster queue or there is more than one definition in the queue-name resolution path then the priority is determined when the publication message is put to the queue as described for “Priority (MQLONG)” on page 431.

If the MQSUB call uses a managed handle, the priority for the message is taken from the *DefPriority* attribute of the model queue associated with the topic subscribed to.

**MQPRI_PRIORITY_AS_PUBLISHED**

The priority for the message is the priority of the original publication. This is the initial value of the field.

If altering an existing subscription using the MQSO_ALTER option, the *Priority* of any future publication messages can be changed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current priority being used for the subscription.

*ResObjectString (MQCHARV)*
This is the long object name after the queue manager resolves the name provided in *ObjectName*.

If the long object name is provided in *ObjectString* and nothing is provided in *ObjectName*, then the value returned in this field is the same as provided in *ObjectString*.

If this field is omitted (that is ResObjectString.VSBufSize is zero) then the *ResObjectString* is not returned, but the length is returned in ResObjectString.VSLength. If the length is shorter than the full ResObjectString then it is truncated and returns as many of the rightmost characters as can fit in the provided length.

If *ResObjectString* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code MQRC_RES_OBJECT_STRING_ERROR.

*SelectionString (MQCHARV)*
This is the string used to provide the selection criteria used when subscribing for messages from a topic.

This variable length field will be returned on output from an MQSUB call using the MQSO_RESUME option, if a buffer is provided, and also there is a positive buffer length in VSBufSize. If no buffer is provided on the call, only the length of the selection string will be returned in the VSLength field of the MQCHARV. If the buffer provided is smaller than the space required to return the field, only VSBufSize bytes are returned in the provided buffer.

If *SelectionString* is specified incorrectly, according to the description of how to use the "MQCHARV - Variable Length String" on page 288 structure, or if it exceeds the maximum length, the call fails with reason code MQRC_SELECTION_STRING_ERROR.

SelectionString usage is described in Selectors.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQSD_STRUC_ID**
Identifier for Subscription Descriptor structure.

For the C programming language, the constant MQSD_STRUC_ID_ARRAY is also defined; this has the same value as MQSD_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQSD_STRUC_ID.

*SubCorrelId (MQBYTE24)*
This field contains a correlation identifier common to all publications matching this subscription.

**Attention:** a correlation identifier can only be passed between queue managers in a publish/subscribe cluster, not a hierarchy.

All publications sent to match this subscription contain this correlation identifier in the message descriptor. If multiple subscriptions get their publications from the same queue, using MQGET by correlation identifier allows only publications for a specific subscription to be obtained. This correlation identifier can either be generated by the queue manager or by the user.

If the option MQSO_SET_CORREL_ID is not specified, the correlation identifier is generated by the queue manager and this field is an output field containing the correlation identifier that will be set in each

message published for this subscription. The generated correlation identifier consists of a 4-byte product identifier (AMQX or CSQM in either ASCII or EBCDIC) followed by a product specific implementation of a unique string.

If the option MQSO_SET_CORREL_ID is specified, the correlation identifier is generated by the user and this field is an input field containing the correlation identifier to be set in each publication for this subscription. In this case, if the field contains MQCI_NONE, the correlation identifier that is set in each message published for this subscription is the correlation identifier created by the original put of the message.

If the option MQSO_GROUP_SUB is specified and the correlation identifier specified is the same as an existing grouped subscription using the same queue and an overlapping topic string, only the most significant subscription in the group is provided with a copy of the publication.

The length of this field is given by MQ_CORREL_ID_LENGTH. The initial value of this field is MQCI_NONE.

If you are altering an existing subscription using the MQSO_ALTER option, and this field is an input field, then the subscription correlation identifier can be changed, unless the subscription is a grouped subscription, that is, it has been created using the option MQSO_GROUP_SUB, in which case the subscription correlation identifier cannot be changed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current correlation identifier for the subscription.

*SubExpiry (MQLONG)*

This is the time expressed in tenths of a second after which the subscription expires. No more publications will match this subscription after this interval has passed. As soon as a subscription expires, publications are no longer sent to the queue. However, the publications that are already there are not affected in any way. *SubExpiry* has no effect on publication expiry.

The following special value is recognized:

**MQEI_UNLIMITED**
The subscription has an unlimited expiration time.

If altering an existing subscription using the MQSO_ALTER option, the expiry of the subscription can be changed.

On return from an MQSUB call using the MQSO_RESUME option this field is set to the original expiry of the subscription and not the remaining expiry time.

*SubLevel (MQLONG)*
This is the level associated with the subscription. Publications are only delivered to this subscription if it is in the set of subscriptions with the highest SubLevel value less than or equal to the PubLevel used at publication time. However, if a publication has been retained, it is no longer available to subscribers at higher levels because it is republished at PubLevel 1.

The value must be in the range zero to 9. Zero is the lowest level.

The initial value of this field is 1.

For more information see Intercepting publications.

If altering an existing subscription using the MQSO_ALTER option, then the SubLevel cannot be changed.

Combining a SubLevel with a value greater than 1 with the option MQSO_PUBLICATIONS_ON_REQUEST is not allowed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current level being used for the subscription.

*SubUserData (MQCHARV)*

This specifies the subscription user data. The data provided on the subscription in this field will be included as the MQSubUserData message property of every publication sent to this subscription.

The maximum length of *SubUserData* is 10240.

If *SubUserData* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code MQRC_SUB_USER_DATA_ERROR.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

If altering an existing subscription using the MQSO_ALTER option, the subscription user data can be changed.

This variable length field is returned on output from an MQSUB call using the MQSO_RESUME option, if a buffer is provided and there is a positive buffer length in *VSBufLen*. If no buffer is provided on the call, only the length of the subscription user date is returned in the *VSLength* field of the MQCHARV. If the buffer provided is smaller than the space required to return the field, only *VSBufLen* bytes are returned in the provided buffer.

*SubName (MQCHARV)*

This specifies the subscription name. This field is only required if *Options* specifies the option MQSO_DURABLE, but if provided will be used by the queue manager for MQSO_NON_DURABLE as well.

If specified, *SubName* must be unique within the queue manager, because it is the method used to identify the subscription.

The maximum length of *SubName* is 10240.

This field serves two purposes. For an MQSO_DURABLE subscription, you use this field to identify a subscription so you can resume it after it has been created if you have either closed the handle to the subscription (using the MQCO_KEEP_SUB option) or have been disconnected from the queue manager. This is done using the MQSUB call with the MQSO_RESUME option. It is also displayed in the administrative view of subscriptions in the SUBNAME field in DISPLAY SBSTATUS.

If *SubName* is specified incorrectly, according to the description of how to use the MQCHARV structure, is left out when it is required (that is *SubName*. *VSLength* is zero), or if it exceeds the maximum length, the call fails with reason code MQRC_SUB_NAME_ERROR.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

If altering an existing subscription using the MQSO_ALTER option, the subscription name cannot be changed, because it is the identifying field used to find the referenced subscription. It is not changed on output from an MQSUB call with the MQSO_RESUME option.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQSD_VERSION_1**
Version-1 Subscription Descriptor structure.

The following constant specifies the version number of the current version:

**MQSD_CURRENT_VERSION**
Current version of Subscription Descriptor structure.

This is always an input field. The initial value of this field is MQSD_VERSION_1.

### *Using topic strings*

A topic is constructed from the subtopic identified in a topic object, and a subtopic provided by an application. You can use either subtopic as the topic name, or combine them to form a new topic name.

In an MQI program the full topic name is created by MQOPEN. It is composed of two fields used in publish/subscribe MQI calls, in the order listed:

1. The **TOPICSTR** attribute of the topic object, named in the **ObjectName** field.
2. The **ObjectString** parameter defining the subtopic provided by the application.

The resulting topic string is returned in the **ResObjectString** parameter.

These fields are considered to be present if the first character of each field is not a blank or null character, and the field length is greater than zero. If only one of the fields is present, it is used unchanged as the topic name. If neither field has a value, the call fails with reason code MQRC_UNKNOWN_OBJECT_NAME, or MQRC_TOPIC_STRING_ERROR if the full topic name is not valid.

If both fields are present, a ' / ' character is inserted between the two elements of the resultant combined topic name.

Table 536 on page 560 shows examples of topic string concatenation:

*Table 536. Topic string concatenation examples*

| TOPICSTR | ObjectString | Full topic name | Comment |
|---|---|---|---|
| Football/Scores | ' ' | Football/Scores | The TOPICSTR is used alone |
| ' ' | Football/Scores | Football/Scores | The ObjectString is used alone |
| Football | Scores | Football/Scores | A '/' character is added at the concatenation point |
| Football | /Scores | Football//Scores | An 'empty node' is produced between the two strings |
| /Football | Scores | /Football/Scores | The topic starts with an 'empty node' |

The ' / ' character is considered as a special character, providing structure to the full topic name in Topic trees, and must not be used for any other reason as the structure of the topic tree is affected. The topic " /Football " is not the same as the topic " Football ".

The following wildcard characters are special characters:

- plus sign ' + '
- number sign ' # '
- asterisk ' * '
- question mark ' ? '

These characters are not considered as invalid, however you must ensure to understand how they are used. You might prefer not to use these characters in your topic strings when publishing. Publishing on a topic string with ' # ' or ' + ' mixed in with other characters (including themselves) within a topic level, can be subscribed to with either wildcard scheme. Publishing on a topic string with ' # ' or ' + ' as the only character between two ' / ' characters produces a topic string that cannot be subscribed to explicitly by an application using the wildcard scheme MQSO_WILDCARD_TOPIC. This situation results in the application getting more publications than expected.

**Example code snippet**

This code snippet, extracted from the example program Example 2: Publisher to a variable topic, combines a topic object with a variable topic string.

```
MQOD     td = {MQOD_DEFAULT};  /* Object Descriptor      */
td.ObjectType = MQOT_TOPIC;    /* Object is a topic           */
td.Version = MQOD_VERSION_4;   /* Descriptor needs to be V4    */
strncpy(td.ObjectName, topicName,  MQ_TOPIC_NAME_LENGTH);
td.ObjectString.VSPtr = topicString;
td.ObjectString.VSLength = (MQLONG)strlen(topicString);
td.ResObjectString.VSPtr = resTopicStr;
td.ResObjectString.VSBufSize = sizeof(resTopicStr)-1;
MQOPEN(Hconn, &td, MQOO_OUTPUT | MQOO_FAIL_IF_QUIESCING, &Hobj, &CompCode, &Reason);
```

## *Initial values and language declarations for MQSD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQSD_STRUC_ID | 'SD¬¬' |
| *Version* | MQSD_VERSION_1 | 1 |
| *Options* | MQSO_NON_DURABLE | 0 |
| *ObjectName* | None | Null string or blanks |
| *AlternateUserId* | None | Null string or blanks |
| *AlternateSecurityId* | MQSID_NONE | Nulls |
| *SubExpiry* | MQEI_UNLIMITED | -1 |
| *ObjectString* | None | Names and values as defined for MQCHARV |
| *SubName* | None | Names and values as defined for MQCHARV |
| *SubUserData* | None | Names and values as defined for MQCHARV |
| *SubCorrelId* | MQCI_NONE | Nulls |
| *PubPriority* | MQPRI_PRIORITY_AS_Q_DEF | -3 |
| *PubAccountingToken* | MQACT_NONE | Nulls |
| *PubApplIdentityData* | None | Null string or blanks |
| *SelectionString* | None | Names and values as defined for MQCHARV |
| *SubLevel* | None | 1 |
| *ResObjectString* | None | Names and values as defined for MQCHARV |

| Field name | Name of constant | Value of constant |
|---|---|---|

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQSD_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQSD MySD = {MQSD_DEFAULT};
```

*C declaration*

```
typedef struct tagMQSD MQSD;
struct tagMQSD {
  MQCHAR4   StrucId;              /* Structure identifier */
  MQLONG    Version;              /* Structure version number */
  MQLONG    Options;              /* Options associated with subscribing */
  MQCHAR48  ObjectName;           /* Object name */
  MQCHAR12  AlternateUserId;      /* Alternate user identifier */
  MQBYTE40  AlternateSecurityId;  /* Alternate security identifier */
  MQLONG    SubExpiry;            /* Expiry of Subscription */
  MQCHARV   ObjectString;         /* Object Long name */
  MQCHARV   SubName;              /* Subscription name */
  MQCHARV   SubUserData;          /* Subscription User data */
  MQBYTE24  SubCorrelId;          /* Correlation Id related to this subscription */
  MQLONG    PubPriority;          /* Priority set in publications */
  MQBYTE32  PubAccountingToken;   /* Accounting Token set in publications */
  MQCHAR32  PubApplIdentityData;  /* Appl Identity Data set in publications */
  MQCHARV   SelectionString;      /* Message selector structure */
  MQLONG    SubLevel;             /* Subscription level */
  MQCHARV   ResObjectString;      /* Resolved Long object name*/
  /* Ver:1 */
};
```

*COBOL declaration*

```
** Address of variable length string
   20  MQSD-OBJECTSTRING-VSPTR         POINTER.
** Offset of variable length string
   20  MQSD-OBJECTSTRING-VSOFFSET      PIC S9(9) BINARY.
** size of buffer
   20  MQSD-OBJECTSTRING-VSBUFSIZE      PIC S9(9) BINARY.
** Length of variable length string
   20  MQSD-OBJECTSTRING-VSLENGTH      PIC S9(9) BINARY.
** CCSID of variable length string
   20  MQSD-OBJECTSTRING-VSCCSID       PIC S9(9) BINARY.
** Subscription name
 15  MQSD-SUBNAME.
** Address of variable length string
   20  MQSD-SUBNAME-VSPTR              POINTER.
** Offset of variable length string
   20  MQSD-SUBNAME-VSOFFSET           PIC S9(9) BINARY.
** size of buffer
   20  MQSD-SUBNAME-VSBUFSIZE           PIC S9(9) BINARY.
** Length of variable length string
   20  MQSD-SUBNAME-VSLENGTH           PIC S9(9) BINARY.
** CCSID of variable length string
   20  MQSD-SUBNAME-VSCCSID            PIC S9(9) BINARY.
** Subscription User data
 15  MQSD-SUBUSERDATA.
** Address of variable length string
   20  MQSD-SUBUSERDATA-VSPTR          POINTER.
** Offset of variable length string
   20  MQSD-SUBUSERDATA-VSOFFSET       PIC S9(9) BINARY.
** size of buffer
   20  MQSD-SUBUSERDATA-VSBUFSIZE       PIC S9(9) BINARY.
** Length of variable length string
```

```
   20  MQSD-SUBUSERDATA-VSLENGTH       PIC S9(9) BINARY.
** CCSID of variable length string
   20  MQSD-SUBUSERDATA-VSCCSID        PIC S9(9) BINARY.
** Correlation Id related to this subscription
 15  MQSD-SUBCORRELID                  PIC X(24).
** Priority set in publications
 15  MQSD-PUBPRIORITY                  PIC S9(9) BINARY.
** Accounting Token set in publications
 15  MQSD-PUBACCOUNTINGTOKEN           PIC X(32).
** Appl Identity Data set in publications
 15  MQSD-PUBAPPLIDENTITYDATA          PIC X(32).
** Message Selector
 15 MQSD-SELECTIONSTRING.
** Address of variable length string
   20  MQSD-SELECTIONSTRING-VSPTR     POINTER.
** Offset of variable length string
   20  MQSD-SELECTIONSTRING-VSOFFSET       PIC S9(9) BINARY.
** size of buffer
   20  MQSD-SELECTIONSTRING-VSBUFSIZE      PIC S9(9) BINARY.
** Length of variable length string
   20  MQSD-SELECTIONSTRING-VSLENGTH       PIC S9(9) BINARY.
** CCSID of variable length string
   20  MQSD-SELECTIONSTRING-VSCCSID        PIC S9(9) BINARY.
** Selection criteria
   20  MQSD-SELECTIONSTRING-SUBLEVEL       PIC S9(9) BINARY.
** Long object name
   20  MQSD-SELECTIONSTRING-RESOBJSTRING   PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
1 MQSD based,
3 StrucId       char(4),    /* Structure identifier */
3 Version       fixed bin(31), /* Structure version number */
3 Options       fixed bin(31), /* Options associated with subscribing */
3 ObjectName     char(48),   /* Object name */
3 AlternateUserId   char(12),   /* Alternate user identifier */
3 AlternateSecurityId char(40),   /* Alternate security identifier */
3 SubExpiry      fixed bin(31), /* Expiry of Subscription */
3 ObjectString,           /* Object Long name */
5 VSPtr       pointer,    /* Address of variable length string */
5 VSOffset      fixed bin(31), /* Offset of variable length string */
5 VSBufSize     fixed bin(31), /* size of buffer */
5 VSLength      fixed bin(31), /* Length of variable length string */
5 VSCCSID      fixed bin(31); /* CCSID of variable length string */
3 SubName,              /* Subscription name */
5 VSPtr       pointer,    /* Address of variable length string */
5 VSOffset      fixed bin(31), /* Offset of variable length string */
5 VSBufSize     fixed bin(31), /* size of buffer */
5 VSLength      fixed bin(31), /* Length of variable length string */
5 VSCCSID      fixed bin(31); /* CCSID of variable length string */
3 SubUserData,            /* Subscription User data */
5 VSPtr       pointer,    /* Address of variable length string */
5 VSOffset      fixed bin(31), /* Offset of variable length string */
5 VSBufSize     fixed bin(31), /* size of buffer */
5 VSLength      fixed bin(31), /* Length of variable length string */
5 VSCCSID      fixed bin(31), /* CCSID of variable length string */
3 SubCorrelId     char(24),   /* Correlation Id related to this subscription */
3 PubPriority     fixed bin(31), /* Priority set in publications */
3 PubAccountingToken char(32),   /* Accounting Token set in publications */
3 PubApplIdentityData char(32),   /* Appl Identity Data set in publications */
3 SelectionString,          /* Message Selection */
5 VSPtr       pointer,    /* Address of variable length string */
5 VSOffset      fixed bin(31), /* Offset of variable length string */
5 VSBufSize     fixed bin(31), /* size of buffer */
5 VSLength      fixed bin(31), /* Length of variable length string */
5 VSCCSID      fixed bin(31), /* CCSID of variable length string */
3 SubLevel      fixed bin(31), /* Subscription level */
3 ResObjectString,          /* Resolved Long object name */
5 VSPtr       pointer,    /* Address of variable length string */
5 VSOffset      fixed bin(31), /* Offset of variable length string */
5 VSBufSize     fixed bin(31), /* size of buffer */
5 VSLength      fixed bin(31), /* Length of variable length string */
5 VSCCSID      fixed bin(31); /* CCSID of variable length string */
```

*High Level Assembler declaration*

```
MQSD              DSECT
MQSD_STRUCID          DS  CL4  Structure identifier
MQSD_VERSION          DS  F   Structure version number
MQSD-OPTIONS          DS  F   Options associated with subscribing
MQSD_OBJECTNAME        DS  CL48 Object name
MQSD_ALTERNATEUSERID      DS  CL12 Alternate user identifier
MQSD_ALTERNATESECURITYID    DS  CL40 Alternate security identifier
MQSD_SUBEXPIRY         DS  F   Expiry of Subscription
MQSD_OBJECTSTRING       DS  0F  Object Long name
MQSD_OBJECTSTRING_VSPTR    DS  F   Address of variable length string
MQSD_OBJECTSTRING_VSOFFSET   DS  F   Offset of variable length string
MQSD_OBJECTSTRING_VSBUFSIZE  DS  F   size of buffer
MQSD_OBJECTSTRING_VSLENGTH   DS  F   Length of variable length string
MQSD_OBJECTSTRING_VSCCSID   DS  F   CCSID of variable length string
MQSD_OBJECTSTRING_LENGTH    EQU  *-MQSD_OBJECTSTRING
ORG  MQSD_OBJECTSTRING
MQSD_OBJECTSTRING_AREA     DS  CL(MQSD_OBJECTSTRING_LENGTH)
*
MQSD_SUBNAME          DS  0F  Subscription name
MQSD_SUBNAME_VSPTR       DS  F   Address of variable length string
MQSD_SUBNAME_VSOFFSET     DS  F   Offset of variable length string
MQSD_SUBNAME_VSBUFSIZE     DS  F   size of buffer
MQSD_SUBNAME_VSLENGTH     DS  F   Length of variable length string
MQSD_SUBNAME_VSCCSID      DS  F   CCSID of variable length string
MQSD_SUBNAME_LENGTH      EQU  *-MQSD_SUBNAME
ORG  MQSD_SUBNAME
MQSD_SUBNAME_AREA       DS  CL(MQSD_SUBNAME_LENGTH)
*
MQSD_SUBUSERDATA        DS  0F  Subscription User data
MQSD_SUBUSERDATA_VSPTR     DS  F   Address of variable length string
MQSD_SUBUSERDATA_VSOFFSET   DS  F   Offset of variable length string
MQSD_SUBUSERDATA_VSBUFSIZE   DS  F   size of buffer
MQSD_SUBUSERDATA_VSLENGTH   DS  F   Length of variable length string
MQSD_SUBUSERDATA_VSCCSID    DS  F   CCSID of variable length string
MQSD_SUBUSERDATA_LENGTH    EQU  *-MQSD_SUBUSERDATA
ORG  MQSD_SUBUSERDATA
MQSD_SUBUSERDATA_AREA     DS  CL(MQSD_SUBUSERDATA_LENGTH)
*
MQSD_SUBCORRELID        DS  CL24 Correlation Id related to this subscription
MQSD_PUBPRIORITY        DS  F   Priority set in publications
MQSD_PUBACCOUNTINGTOKEN    DS  CL32 Accounting Token set in publications
MQSD_PUBAPPLIDENTITYDATA    DS  CL32 Appl Identity Data set in publications
*
MQSD_SELECTIONSTRING      DS  F   Message Selector
MQSD_SELECTIONSTRING_VSPTR   DS  F   Address of variable length string
MQSD_SELECTIONSTRING_VSOFFSET DS  F   Offset of variable length string
MQSD_SELECTIONSTRING_VSBUFSIZE DS  F   size of buffer
MQSD_SELECTIONSTRING_VSLENGTH DS  F   Length of variable length string
MQSD_SELECTIONSTRING_VSCCSID  DS  F   CCSID of variable length string
MQSD_SELECTIONSTRING_LENGTH  EQU *- MQSD_SELECTIONSTRING
ORG MQSD_SELECTIONSTRING
MQSD_SELECTIONSTRING_AREA   DS  CL(MQSD_SELECTIONSTRING_LENGTH)
*
MQSD-SUBLEVEL         DS  F   Subscription level
*
MQSD_RESOBJECTSTRING      DS  F   Resolved Long object name
MQSD_RESOBJECTSTRING_VSPTR   DS  F   Address of variable length string
MQSD_RESOBJECTSTRING_VSOFFSET DS  F   Offset of variable length string
MQSD_RESOBJECTSTRING_VSBUFSIZE DS  F   size of buffer
MQSD_RESOBJECTSTRING_VSLENGTH DS  F   Length of variable length string
MQSD_RESOBJECTSTRING_VSCCSID  DS  F   CCSID of variable length string
MQSD_RESOBJECTSTRING_LENGTH  EQU *- MQSD_RESOBJECTSTRING
ORG MQSD_RESOBJECTSTRING
MQSD_RESOBJECTSTRING_AREA   DS  CL(MQSD_RESOBJECTSTRING_LENGTH)
*
MQSD_LENGTH          EQU  *-MQSD
ORG  MQSD
MQSD_AREA           DS  CL(MQSD_LENGTH)
```

## MQSMPO - Set message property options

The following table summarizes the fields in the structure.

| *Table 537. Fields in MQSMPO* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |
| *ValueEncoding* | Property value encoding | ValueEncoding |
| *ValueCCSID* | Property value character set | ValueCCSID |

### *Overview for MQSMPO*

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The **MQSMPO** structure allows applications to specify options that control how properties of messages are set. The structure is an input parameter on the **MQSETMP** call.

**Character set and encoding**: Data in **MQSMPO** must be in the character set of the application and encoding of the application ( **MQENC_NATIVE** ).

### *Fields for MQSMPO*

The MQSMPO structure contains the following fields; the fields are described in **alphabetical order**:

*Options (MQLONG)*

**Location options:** The following options relate to the relative location of the property compared to the property cursor:

**MQSMPO_SET_FIRST**
Sets the value of the first property that matches the specified name, or if it does not exist, adds a new property after all other properties with a matching hierarchy.

**MQSMPO_SET_PROP_UNDER_CURSOR**
Sets the value of the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired using either the MQIMPO_INQ_FIRST or the MQIMPO_INQ_NEXT option.

The property cursor is reset when the message handle is reused on an MQGET call, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established or if the property pointer to by the property cursor has been deleted, the call fails with completion code MQCC_FAILED and reason code MQRC_PROPERTY_NOT_AVAILABLE.

**MQSMPO_SET_PROP_BEFORE_CURSOR**
Sets a new property before the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired using either the MQIMPO_INQ_FIRST or the MQIMPO_INQ_NEXT option.

The property cursor is reset when the message handle is reused on an MQGET call, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established or if the property pointer to by the property cursor has been deleted, the call fails with completion code MQCC_FAILED and reason code MQRC_PROPERTY_NOT_AVAILABLE.

**MQSMPO_SET_PROP_AFTER_CURSOR**
Sets a new property after the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired using either the MQIMPO_INQ_FIRST or the MQIMPO_INQ_NEXT option.

The property cursor is reset when the message handle is reused on an MQGET call, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established or if the property pointer to by the property cursor has been deleted, the call fails with completion code MQCC_FAILED and reason code MQRC_PROPERTY_NOT_AVAILABLE.

**MQSMPO_APPEND_PROPERTY**
Causes a new property to be added after all other properties with a matching hierarchy. If at least one property exists which matches the specified name, then a new property is added at the end after the end of that list of properties.

This option allows a list of properties with the same name to be created.

If you need none of the options described, use the following option:

**MQSMPO_NONE**
No options specified.

This is always an input field. The initial value of this field is MQSMPO_SET_FIRST.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQSMPO_STRUC_ID**

Identifier for set message property options structure.

For the C programming language, the constant **MQSMPO_STRUC_ID_ARRAY** is also defined; this has the same value as **MQSMPO_STRUC_ID**, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is **MQSMPO_STRUC_ID**.

*ValueCCSID (MQLONG)*

The character set of the property value to be set if the value is a character string.

This is always an input field. The initial value of this field is **MQCCSI_APPL**.

*ValueEncoding (MQLONG)*

The encoding of the property value to be set if the value is numeric.

This is always an input field. The initial value of this field is **MQENC_NATIVE**.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQSMPO_VERSION_1**
Version-1 set message property options structure.

The following constant specifies the version number of the current version:

**MQSMPO_CURRENT_VERSION**
Current version of set message property options structure.

This is always an input field. The initial value of this field is **MQSMPO_VERSION_1**.

## *Initial values and language declarations for MQSMPO*

*Table 538. Initial values of fields in MQSMPO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQSMPO_STRUC_ID | 'SMPO' |
| *Version* | MQSMPO_VERSION_1 | 1 |
| *Options* | MQSMPO_NONE | 0 |
| *ValueEncoding* | MQENC_NATIVE | Depends on environment |
| *ValueCCSID* | MQCCSI_APPL | -3 |

**Notes:**

1. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
2. In the C programming language, the macro variable MQSMPO_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQSMPO MySMPO = {MQSMPO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQSMPO MQSMPO;
struct tagMQSMPO {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    Options;         /* Options that control the action of MQSETMP */
  MQLONG    ValueEncoding;   /* Encoding of Value */
  MQLONG    ValueCCSID;      /* Character set identifier of Value */
};
```

*COBOL declaration*

```
**   MQSMPO structure
  10 MQSMPO.
**    Structure identifier
   15 MQSMPO-STRUCID       PIC X(4).
**    Structure version number
   15 MQSMPO-VERSION       PIC S9(9) BINARY.
**    Options that control the action of MQSETMP
   15 MQSMPO-OPTIONS       PIC S9(9) BINARY.
**    Encoding of VALUE
   15 MQSMPO-VALUEENCODING PIC S9(9) BINARY.
**    Character set identifier of VALUE
   15 MQSMPO-VALUECCSID    PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQSMPO based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
```

```
  3 Options        fixed bin(31), /* Options that control the action of MQSETMP */
  3 ValueEncoding  fixed bin(31), /* Encoding of Value */
  3 ValueCCSID     fixed bin(31), /* Character set identifier of Value */
```

*High Level Assembler declaration*

```
MQSMPO                DSECT
MQSMPO_STRUCID        DS   CL4   Structure identifier
MQSMPO_VERSION        DS   F     Structure version number
MQSMPO_OPTIONS        DS   F     Options that control the action of
*                                MQSETMP
MQSMPO_VALUEENCODING  DS   F     Encoding of VALUE
MQSMPO_VALUECCSID     DS   F     Character set identifier of VALUE
MQSMPO_LENGTH         EQU  *-MQSMPO
MQSMPO_AREA           DS   CL(MQSMPO_LENGTH)
```

## MQSRO - Subscription request options

This section describes subscription request options, what fields it contains, and initial values of those fields.

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *Options* | Options | Options |
| *NumPubs* | Number of publications | NumPubs |

### *Overview for MQSRO*

**Availability**: AIX, HP-UX, IBM i, Solaris, Linux, Windows, z/OS plus IBM MQ MQI clients connected to these systems.

**Purpose**: The MQSRO structure allows the application to specify options that control how a subscription request is made. The structure is an input/output parameter on the MQSUBRQ call.

**Version**: The current version of MQSRO is MQSRO_VERSION_1.

**Character set and encoding**: Data in MQSRO must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE. However, if the application is running as an MQ MQI client, the structure must be in the character set and encoding of the client.

### *Fields for MQSRO*

The MQSRO structure contains the following fields; the fields are described in alphabetical order:

*NumPubs (MQLONG)*

This is an output field, returned to the application to indicate the number of publications sent to the subscription queue as a result of this call. Although this number of publications have been sent as a result of this call, there is no guarantee that this many messages will be available for the application to get, especially if they are non-persistent messages.

There might be more than one publication if the topic subscribed to contained a wildcard. If no wildcards were present in the topic string when the subscription represented by *Hsub* was created, then at most one publication is sent as a result of this call.

*Options (MQLONG)*

One of the following options must be specified. Only one option can be specified.

**MQSRO_FAIL_IF_QUIESCING**

The MQSUBRQ call fails if the queue manager is in the quiescing state. On z/OS, for a CICS or IMS application, this option also forces the MQSUBRQ call to fail if the connection is in a quiescing state.

**Default option:** If the option described previously is not required, the following option must be used:

**MQSRO_NONE**

Use this value to indicate that no other options have been specified; all options assume their default values.

MQSRO_NONE helps program documentation. Although it is not intended that this option be used with any other, because its value is zero, this use cannot be detected.

*StrucId (MQCHAR4)*

This is the structure identifier; the value must be:

**MQSRO_STRUC_ID**
Identifier for Subscription Request Options structure.

For the C programming language, the constant MQSRO_STRUC_ID_ARRAY is also defined; this has the same value as MQSRO_STRUC_ID, but is an array of characters instead of a string.

This is always an input field. The initial value of this field is MQSRO_STRUC_ID.

*Version (MQLONG)*

This is the structure version number; the value must be:

**MQSRO_VERSION_1**
Version-1 Subscription Request Options structure.

The following constant specifies the version number of the current version:

**MQSRO_CURRENT_VERSION**
Current version of Subscription Request Options structure.

This is always an input field. The initial value of this field is MQSRO_VERSION_1.

## *Initial values and language declarations for MQSRO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQSRO_STRUC_ID | 'SRO¬' |
| *Version* | MQSRO_VERSION_1 | 1 |
| *Options* | MQSRO_NONE | 0 |
| *NumPubs* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQSRO_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQSRO MySRO = {MQSRO_DEFAULT};
```

*C declaration*

```
typedef struct tagMQSRO MQSRO;
struct tagMQSRO {
  MQCHAR4   StrucId;              /* Structure identifier */
  MQLONG    Version;              /* Structure version number */
  MQLONG    Options;              /* Options that control the action of MQSUBRQ */
  MQLONG    NumPubs;              /* Number of publications sent */
  /* Ver:1 */
};
```

*COBOL declaration*

```
** MQSRO structure
 10  MQSRO.
** Structure identifier
 15  MQSRO-STRUCID            PIC X(4).
** Structure version number
 15  MQSRO-VERSION            PIC S9(9) BINARY.
** Options that control the action of MQSUBRQ
 15  MQSRO-OPTIONS            PIC S9(9) BINARY.
** Number of publications sent
 15  MQSRO-NUMPUBS            PIC S9(9) BINARY.
```

*PL/I declaration*

```
dcl
 1 MQSRO based,
   3 StrucId        char(4),       /* Structure identifier */
   3 Version        fixed bin(31), /* Structure version number */
   3 Options        fixed bin(31), /* Options that control the action of MQSUBRQ */
   3 NumPubs        fixed bin(31); /* Number of publications sent */
```

*High Level Assembler declaration*

```
MQSRO                   DSECT
MQSRO_STRUCID           DS    CL4   Structure identifier
MQSRO_VERSION           DS    F     Structure version number
MQSRO_OPTIONS           DS    F     Options that control the action of MQSUBRQ
MQSRO_NUMPUBS           DS    F     Number of publications sent
*
MQSRO_LENGTH            EQU   *-MQSRO
                        ORG   MQSRO
MQSRO_AREA              DS    CL(MQSRO_LENGTH)
```

## MQSTS - Status reporting structure

The following table summarizes the fields in the structure.

*Table 539. Fields in MQSTS*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *CompCode* | Completion code of first error | CompCode |
| *Reason* | Reason code of first error | Reason |
| *PutSuccessCount* | Number of successful asynchronous put calls | SuccessCount |
| *PutWarningCount* | Number of asynchronous put calls which had warnings | WarningCount |

| Table 539. Fields in MQSTS (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *PutFailureCount* | Number of failed asynchronous put calls | FailureCount |
| *ObjectType* | Type of failing object | ObjectType |
| *ObjectName* | Name of failing object | ObjectName |
| *ObjectQMgrName* | Name of queue manager owning the failing object | ObjectQMgrName |
| *ResolvedObjectName* | Resolved name of destination queue | ResolvedObjectName |
| *ResolvedQMgrName* | Resolved name of destination queue manager | ResolvedQMgrName |
| **Note:** The remaining fields are ignored if Version is less than MQSTS_VERSION_2. | | |
| *ObjectString* | Long object name of failing object | ObjectString |
| *SubName* | Subscription name of failing subscription | SubName |
| *OpenOptions* | Open options associated with the failure | OpenOptions |
| *SubOptions* | Subscription options associated with the failure | SubOptions |

## *Overview for MQSTS*

**Purpose**: The MQSTS structure is an output parameter from the MQSTAT command.

**Character set and encoding**: Character data in MQSTS is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute. Numeric data in MQSTS is in the native machine encoding; this is given by *Encoding*.

**Usage**: The MQSTAT command is used to retrieve status information. This information is returned in an MQSTS structure. For information about MQSTAT, see "MQSTAT - Retrieve status information" on page 763.

## *Fields for MQSTS*

The MQSTS structure contains the following fields; the fields are described in **alphabetical order**:

*CompCode (MQLONG)*
The completion code of the operation being reported on.

The interpretation of CompCode depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

This is the completion code resulting from a previous asynchronous put operation on the object specified in ObjectName.

**MQSTAT_TYPE_RECONNECTION**

If the connection is reconnecting or failed to reconnect this is the completion code that caused the connection to begin reconnecting.

If the connection is currently connected the value is MQCC_OK.

**MQSTAT_TYPE_RECONNECTION_ERROR**

If the connection failed to reconnect this is the completion code that caused the reconnection to fail.

If the connection is currently connected, or reconnecting, the value is MQCC_OK.

CompCode is always an output field. Its initial value is MQCC_OK.

*ObjectName (MQCHAR48)*
The name of the object being reported on.

The interpretation of ObjectName depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

This is the name of the queue or topic used in the put operation, the failure of which is reported in the *CompCode* and *Reason* fields in the MQSTS structure.

**MQSTAT_TYPE_RECONNECTION**

If the connection is reconnecting, this is the name of the queue manager associated with the connection.

**MQSTAT_TYPE_RECONNECTION_ERROR**

If the connection failed to reconnect, this is the name of the object which caused reconnection to fail. The reason for the failure is reported in the *CompCode* and *Reason* fields in the MQSTS structure.

ObjectName is an output field. Its initial value is the null string in C, and 48 blank characters in other programming languages.

*ObjectQMgrName (MQCHAR48)*
The name of the queue manager being reported on.

The interpretation of ObjectQMgrName depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

This is the name of the queue manager on which the *ObjectName* object is defined. A name that is entirely blank up to the first null character or the end of the field denotes the queue manager to which the application is connected (the local queue manager).

**MQSTAT_TYPE_RECONNECTION**

Blank.

**MQSTAT_TYPE_RECONNECTION_ERROR**

If the connection failed to reconnect, this is the name of the object which caused reconnection to fail. The reason for the failure is reported in the *CompCode* and *Reason* fields in the MQSTS structure.

ObjectQMgrName is an output field. Its value is the null string in C, and 48 blank characters in other programming languages.

*ObjectString (MQCHARV)*
Long object name of failing object being reported on. Present only in Version 2 of MQSTS or higher.

The interpretation of ObjectString depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

This is the long object name of the queue or topic used in the MQPUT operation, which failed.

**MQSTAT_TYPE_RECONNECTION**

Zero length string

**MQSTAT_TYPE_RECONNECTION_ERROR**

This is the long object name of the object that caused the reconnection to fail.

ObjectString is an output field. Its initial value is a zero length string.

*ObjectType (MQLONG)*
The type of the object named in *ObjectName* being reported on.

Possible values of ObjectType are listed in "MQOT_* (Object Types and Extended Object Types)" on page 161.

ObjectType is an output field. Its initial value is MQOT_Q.

*OpenOptions (MQLONG)*
The OpenOptions used to open the object being reported upon. Present only in Version 2 of MQSTS or higher.

The value of OpenOptions depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

Zero.

**MQSTAT_TYPE_RECONNECTION**

Zero.

**MQSTAT_TYPE_RECONNECTION_ERROR**

The OpenOptions used when the failure occurred. The reason for the failure is reported in the *CompCode* and *Reason* fields in the MQSTS structure.

OpenOptions is an output field. Its initial value is zero.

*PutFailureCount (MQLONG)*
The number of asynchronous put operations that failed.

The value of PutFailureCount depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

The number of asynchronous put operations to the object named in the MQSTS structure that completed with MQCC_FAILED.

**MQSTAT_TYPE_RECONNECTION**

Zero.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Zero.

PutFailureCount is an output field. Its initial value is zero.

*PutSuccessCount (MQLONG)*
The number of asynchronous put operations that succeeded.

The value of PutSuccessCount depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

The number of asynchronous put operations to the object named in the MQSTS structure that completed with MQCC_OK.

**MQSTAT_TYPE_RECONNECTION**

Zero.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Zero.

PutSuccessCount is an output field. Its initial value is zero.

*PutWarningCount (MQLONG)*
The number of asynchronous put operations that ended with a warning.

The value of PutWarningCount depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

The number of asynchronous put operations to the object named in the MQSTS structure that completed with MQCC_WARNING.

**MQSTAT_TYPE_RECONNECTION**

Zero.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Zero.

PutWarningCount is an output field. Its initial value is zero.

*SubName (MQCHARV)*
The name of the failing subscription. Present only in Version 2 of MQSTS or higher.

The interpretation of SubName depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

Zero length string.

**MQSTAT_TYPE_RECONNECTION**

Zero length string.

**MQSTAT_TYPE_RECONNECTION_ERROR**

The name of the subscription that caused reconnection to fail. If no subscription name is available, or the failure is not related to a subscription, this is a zero-length string.

SubName is an output field. Its initial value is a zero length string.

*SubOptions (MQLONG)*
The SubOptions used to open the failing subscription. Present only in Version 2 of MQSTS or higher.

The interpretation of SubOptions depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

Zero.

**MQSTAT_TYPE_RECONNECTION**

Zero.

**MQSTAT_TYPE_RECONNECTION_ERROR**

The SubOptions used when the failure occurred. If the failure is not related to subscribing to a topic, the value returned is zero.

SubOptions is an output field. Its initial value is zero.

*Reason (MQLONG)*
The reason code of the operation being reported on.

The interpretation of Reason depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

This is the reason code resulting from a previous asynchronous put operation on the object specified in ObjectName.

**MQSTAT_TYPE_RECONNECTION**

If the connection is reconnecting or failed to reconnect this is the reason code that caused the reconnection to begin reconnecting.

If the connection is currently connected the value is MQRC_NONE.

**MQSTAT_TYPE_RECONNECTION_ERROR**

If the connection failed to reconnect this is the reason code that caused the reconnection to fail.

If the connection is currently connected, or reconnecting, the value is MQRC_NONE.

Reason is an output field. Its initial value is MQRC_NONE.

*ResolvedObjectName (MQCHAR48)*
The name of the object named in *ObjectName* after the local queue manager resolves the name.

The interpretation of ResolvedObjectName depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

ResolvedObjectName is the name of the object named in *ObjectName* after the local queue manager resolves the name. The name returned is the name of an object that exists on the queue manager identified by *ResolvedQMgrName*.

**MQSTAT_TYPE_RECONNECTION**

Blank.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Blank.

ResolvedObjectName is an output field. Its initial value is the null string in C, and 48 blank characters in other programming languages.

*ResolvedQMgrName (MQCHAR48)*
The name of the destination queue manager after the local queue manager resolves the name.

The interpretation of ResolvedQMgrName depends on the value of the MQSTAT Type parameter.

**MQSTAT_TYPE_ASYNC_ERROR**

ResolvedQMgrName is the name of the destination queue manager after the local queue manager resolves the name. The name returned is the name of the queue manager that owns the object identified by *ResolvedObjectName*. *ResolvedQMgrName* might be the name of the local queue manager.

**MQSTAT_TYPE_RECONNECTION**

Blank.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Blank.

ResolvedQMgrName is always an output field. Its initial value is the null string in C, and 48 blank characters in other programming languages.

*StrucId (MQCHAR4)*
The identifier for the status reporting structure, MQSTS.

StrucId is the structure identifier. The value must be:

**MQSTS_STRUC_ID**
Identifier for status reporting structure.

For the C programming language, the constant MQSTS_STRUC_ID_ARRAY is also defined; this has the same value as MQSTS_STRUC_ID, but is an array of characters instead of a string.

StrucId is always an input field. Its initial value is MQSTS_STRUC_ID.

*Version (MQLONG)*
The structure version number.

The value must be either:

**MQSTS_VERSION_1**
Version 1 status reporting structure.

**MQSTS_VERSION_2**
Version 2 status reporting structure.

The following constant specifies the version number of the current version:

**MQSTS_CURRENT_VERSION**
Current version of status reporting structure. The current version is MQSTS_VERSION_2.

Version is always an input field. Its initial value is MQSTS_VERSION_1.

## *Initial values and language declarations for MQSTS*

*Table 540. Initial values of fields in MQSTS*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQSTS_STRUC_ID | 'STAT¬' |
| *Version* | MQSTS_VERSION_1 | 1 |
| *CompCode* | MQCC_OK | 0 |
| *Reason* | MQRC_NONE | 0 |
| *PutSuccessCount* | None | 0 |
| *PutWarningCount* | None | 0 |
| *PutFailureCount* | None | 0 |
| *ObjectType* | MQOT_Q | 1 |
| *ObjectName* | None | Null string or blanks |
| *ObjectQMgrName* | None | Null string or blanks |
| *ResolvedObjectName* | None | Null string or blanks |
| *ResolvedQMgrName* | None | Null string or blanks |
| *ObjectString* | MQCHARV_DEFAULT | {NULL,0,0,0,-3} |
| *SubName* | MQCHARV_DEFAULT | {NULL,0,0,0,-3} |
| *OpenOptions* | None | 0 |
| *SubOptions* | None | 0 |

*Table 540. Initial values of fields in MQSTS (continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQSTS_DEFAULT contains the values that are listed in the table. It can be used in the following way to provide initial values for the fields in the structure:

```
MQSTS MySTS = {MQSTS_DEFAULT};
```

*C declaration*

```
typedef struct tagMQSTS MQSTS;
struct tagMQSTS {
 MQCHAR4   StrucId;            /* Structure identifier */
 MQLONG    Version;            /* Structure version number */
 MQLONG    CompCode;           /* Completion Code of first error */
 MQLONG    Reason;             /* Reason Code of first error */
 MQLONG    PutSuccessCount;    /* Number of Async calls succeeded */
 MQLONG    PutWarningCount;    /* Number of Async calls had warnings */
 MQLONG    PutFailureCount;    /* Number of Async calls had failures */
 MQLONG    ObjectType;         /* Failing object type */
 MQCHAR48  ObjectName;         /* Failing object name */
 MQCHAR48  ObjectQMgrName;     /* Failing object queue manager name */
 MQCHAR48  ResolvedObjectName; /* Resolved name of destination queue */
 MQCHAR48  ResolvedQMgrName;   /* Resolved name of destination qmgr */
/* Ver:1 */
 MQCHARV   ObjectString;       /* Failing object long name */
 MQCHARV   SubName;            /* Failing subscription name */
 MQLONG    OpenOptions;        /* Failing open options */
 MQLONG    SubOptions;         /* Failing subscription options */
/* Ver:2 */
};
```

*COBOL declaration*

```
      ** MQSTS structure
       10  MQSTS.
      ** Structure identifier
       15  MQSTS-STRUCID PIC X(4).
      ** Structure version number
       15  MQSTS-VERSION PIC S9(9) BINARY.
      ** Completion Code of first error
       15  MQSTS-COMPCODE PIC S9(9) BINARY.
      ** Reason Code of first error
       15  MQSTS-REASON PIC S9(9) BINARY.
      ** Number of Async put calls succeeded
       15  MQSTS-PUTSUCCESSCOUNT PIC S9(9) BINARY.
      ** Number of Async put calls had warnings
       15  MQSTS-PUTWARNINGCOUNT PIC S9(9) BINARY.
      ** Number of Async put calls had failures
       15  MQSTS-PUTFAILURECOUNT PIC S9(9) BINARY.
      ** Failing object type
       15  MQSTS-OBJECTTYPE PIC S9(9) BINARY.
      ** Failing object name
       15  MQSTS-OBJECTNAME PIC X(48).
      ** Failing object queue manager
       15  MQSTS-OBJECTQMGRNAME PIC X(48).
      ** Resolved name of destination queue
       15  MQSTS-RESOLVEDOBJECTNAME PIC X(48).
      ** Resolved name of destination qmgr
       15  MQSTS-RESOLVEDQMGRNAME PIC X(48).
      ** Ver:1 **
      ** Failing object long name
```

```
       15  MQSTS-OBJECTSTRING.
      ** Address of variable length string
       20  MQSTS-OBJECTSTRING-VSPTR POINTER.
      ** Offset of variable length string
       20  MQSTS-OBJECTSTRING-VSOFFSET PIC S9(9) BINARY.
      ** Size of buffer
       20  MQSTS-OBJECTSTRING-VSBUFSIZE PIC S9(9) BINARY.
      ** Length of variable length string
       20  MQSTS-OBJECTSTRING-VSLENGTH PIC S9(9) BINARY.
      ** CCSID of variable length string
       20  MQSTS-OBJECTSTRING-VSCCSID PIC S9(9) BINARY.
      ** Failing subscription name
       15  MQSTS-SUBNAME.
      ** Address of variable length string
       20  MQSTS-SUBNAME-VSPTR POINTER.
      ** Offset of variable length string
       20  MQSTS-SUBNAME-VSOFFSET PIC S9(9) BINARY.
      ** Size of buffer
       20  MQSTS-SUBNAME-VSBUFSIZE PIC S9(9) BINARY.
      ** Length of variable length string
       20  MQSTS-SUBNAME-VSLENGTH PIC S9(9) BINARY.
      ** CCSID of variable length string
       20  MQSTS-SUBNAME-VSCCSID PIC S9(9) BINARY.
      ** Failing open options
       15  MQSTS-OPENOPTIONS PIC S9(9) BINARY.
      ** Failing subscription options
       15  MQSTS-SUBOPTIONS PIC S9(9) BINARY.
      ** Ver:2 **
```

*PL/I declaration*

```
dcl
   1 MQSTS based,
     3 StrucId             char(4),       /* Structure identifier */
      3 Version            fixed bin(31), /* Structure version number */
      3 CompCode           fixed bin(31), /* Completion code */
      3 Reason             fixed bin(31), /* Reason code */
      3 PutSuccessCount    fixed bin(31), /* Put success count */
      3 PutWarningCount    fixed bin(31), /* Put warning count */
      3 PutFailureCount    fixed bin(31), /* Put failure count */
      3 ObjectType         fixed bin(31), /* Object type */
      3 ObjectName         char(48), /* Object name */
      3 ObjectQmgrName     char(48), /* Object queue manager */
      3 ResolvedObjectName char(48), /* Resolved Object name */
      3 ResolvedQmgrName   char(48); /* Resolved Object queue manager */
  /* Ver:1 */
      3 ObjectString,                /* Failing object long name */
         5 VSPtr pointer,            /* Address of variable length string */
         5 VSOffset fixed bin(31),   /* Offset of variable length string */
         5 VSBufSize fixed bin(31),  /* Size of buffer */
         5 VSLength fixed bin(31),   /* Length of variable length string */
         5 VSCCSID fixed bin(31);    /* CCSID of variable length string */
      3 SubName,                     /* Failing subscription name */
         5 VSPtr pointer,            /* Address of variable length string */
         5 VSOffset fixed bin(31),   /* Offset of variable length string */
         5 VSBufSize fixed bin(31),  /* Size of buffer */
         5 VSLength fixed bin(31),   /* Length of variable length string */
         5 VSCCSID fixed bin(31);    /* CCSID of variable length string */
     3 OpenOptions fixed bin(31),    /* Failing open options */
     3 SubOptions fixed bin(31);     /* Failing subscription options */
  /* Ver:2 */
```

*High Level Assembler declaration*

```
    MQSTS                         DSECT
    MQSTS_STRUCID                 DS    CL4   Structure identifier
    MQSTS_VERSION                 DS    F     Structure version number
    MQSTS_COMPCODE                DS    F     Completion code
    MQSTS_REASON                  DS    F     Reason code
    MQSTS_PUTSUCCESSCOUNT         DS    F     Success count
    MQSTS_PUTWARNINGCOUNT         DS    F     Warning count
    MQSTS_PUTFAILURECOUNT         DS    F     Failure count
    MQSTS_OBJTYPE                 DS    F     Object type
    MQSTS_OBJNAME                 DS    CL48  Object name
    MQSTS_OBJQMGR                 DS    CL48  Object queue manager
    MQSTS_ROBJNAME                DS    CL48  Resolved object name
```

```
MQSTS_ROBJQMGR                DS    CL48  Resolved object queue manager
MQSTS_OBJECTSTRING            DS    0F   Force fullword alignment
MQSTS_OBJECTSTRING_VSPTR      DS    A  Address of variable length string
MQSTS_OBJECTSTRING_VSOFFSET   DS    F  Offset of variable length string
MQSTS_OBJECTSTRING_VSBUFSIZE  DS    F  Size of buffer
MQSTS_OBJECTSTRING_VSLENGTH   DS    F  Length of variable length string
MQSTS_OBJECTSTRING_VSCCSID    DS    F  CCSID of variable length string
MQSTS_OBJECTSTRING_LENGTH     EQU   *-MQSTS_OBJECTSTRING
                                    ORG   MQSTS_OBJECTSTRING
MQSTS_OBJECTSTRING_AREA       DS    CL(MQSTS_OBJECTSTRING_LENGTH)
*
MQSTS_SUBNAME                 DS    0F Force fullword alignment
MQSTS_SUBNAME_VSPTR           DS    A  Address of variable length string
MQSTS_SUBNAME_VSOFFSET        DS    F  Offset of variable length string
MQSTS_SUBNAME_VSBUFSIZE       DS    F  Size of buffer
MQSTS_SUBNAME_VSLENGTH        DS    F  Length of variable length string
MQSTS_SUBNAME_VSCCSID         DS    F  CCSID of variable length string
MQSTS_SUBNAME_LENGTH          EQ    *-MQSTS_SUBNAME
                                    ORG   MQSTS_SUBNAME
MQSTS_SUBNAME_AREA            DS    CL(MQSTS_SUBNAME_LENGTH)
*
MQSTS_OPENOPTIONS             DS    F  Failing open options
MQSTS_SUBOPTIONS              DS    F  Failing subscription option
MQSTS_LENGTH                  EQU   *-MQSTS
                              ORG   MQSTS
MQSTS_AREA                    DS    CL(MQSTS_LENGTH)
```

## MQTM - Trigger message

The following table summarizes the fields in the structure.

*Table 541. Fields in MQTM*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *QName* | Name of triggered queue | QName |
| *ProcessName* | Name of process object | ProcessName |
| *TriggerData* | Trigger data | TriggerData |
| *ApplType* | Application type | ApplType |
| *ApplId* | Application identifier | ApplId |
| *EnvData* | Environment data | EnvData |
| *UserData* | User data | UserData |

### *Overview for MQTM*

**Purpose**: The MQTM structure describes the data in the trigger message that is sent by the queue manager to a trigger-monitor application when a trigger event occurs for a queue.

This structure is part of the IBM MQ Trigger Monitor Interface (TMI), which is one of the IBM MQ framework interfaces.

**Format name**: MQFMT_TRIGGER.

**Character set and encoding**: Character data in MQTM is in the character set of the queue manager that generates the MQTM. Numeric data in MQTM is in the machine encoding of the queue manager that generates the MQTM.

The character set and encoding of the MQTM are given by the *CodedCharSetId* and *Encoding* fields in:

- The MQMD (if the MQTM structure is at the start of the message data), or
- The header structure that precedes the MQTM structure (all other cases).

**Usage**: A trigger-monitor application might need to pass some or all of the information in the trigger message to the application that the trigger-monitor application starts. Information that might be needed by the started application includes *QName*, *TriggerData*, and *UserData*. The trigger-monitor application can pass the MQTM structure directly to the started application, or pass an MQTMC2 structure instead, depending on what is permitted by the environment and convenient for the started application. For information about MQTMC2, see "MQTMC2 - Trigger message 2 (character format)" on page 586.

- On z/OS, for an MQAT_CICS application that is started using the CKTI transaction, the entire trigger message structure MQTM is made available to the started transaction; the information can be retrieved by using the EXEC CICS RETRIEVE command.
- On IBM i, the trigger-monitor application provided with IBM MQ passes an MQTMC2 structure to the started application.

For information about using triggers, see Starting IBM MQ applications using triggers.

**MQMD for a trigger message**: The fields in the MQMD of a trigger message generated by the queue manager are set as follows:

| Field in MQMD | Value used |
|---|---|
| *StrucId* | MQMD_STRUC_ID |
| *Version* | MQMD_VERSION_1 |
| *Report* | MQRO_NONE |
| *MsgType* | MQMT_DATAGRAM |
| *Expiry* | MQEI_UNLIMITED |
| *Feedback* | MQFB_NONE |
| *Encoding* | MQENC_NATIVE |
| *CodedCharSetId* | Queue manager's *CodedCharSetId* attribute |
| *Format* | MQFMT_TRIGGER |
| *Priority* | Initiation queue's *DefPriority* attribute |
| *Persistence* | MQPER_NOT_PERSISTENT |
| *MsgId* | A unique value |
| *CorrelId* | MQCI_NONE |
| *BackoutCount* | 0 |
| *ReplyToQ* | Blanks |
| *ReplyToQMgr* | Name of queue manager |
| *UserIdentifier* | Blanks |
| *AccountingToken* | MQACT_NONE |
| *ApplIdentityData* | Blanks |
| *PutApplType* | MQAT_QMGR, or as appropriate for the message channel agent |
| *PutApplName* | First 28 bytes of the queue-manager name |
| *PutDate* | Date when trigger message is sent |
| *PutTime* | Time when trigger message is sent |
| *ApplOriginData* | Blanks |

An application that generates a trigger message is recommended to set similar values, except for the following:

- The *Priority* field can be set to MQPRI_PRIORITY_AS_Q_DEF (the queue manager will change this to the default priority for the initiation queue when the message is put).
- The *ReplyToQMgr* field can be set to blanks (the queue manager will change this to the name of the local queue manager when the message it put).
- Set the context fields as appropriate for the application.

## *Fields for MQTM*

The MQTM structure contains the following fields; the fields are described in **alphabetical order**:

*ApplId (MQCHAR256)*

This is a character string that identifies the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ApplId* attribute of the process object identified by the *ProcessName* field; see "Attributes for process definitions" on page 843 for details of this attribute. The content of this data is of no significance to the queue manager.

The meaning of *ApplId* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ requires *ApplId* to be the name of an executable program. The following notes apply to the environments indicated:

- On z/OS, *ApplId* is:
  - A CICS transaction identifier, for applications started using the CICS trigger-monitor transaction CKTI
  - An IMS transaction identifier, for applications started using the IMS trigger monitor CSQQTRMN
- On Windows systems, the program name can be prefixed with a drive and directory path.
- On IBM i, the program name can be prefixed with a library name and / character.
- On UNIX systems, the program name can be prefixed with a directory path.

The length of this field is given by MQ_PROCESS_APPL_ID_LENGTH. The initial value of this field is the null string in C, and 256 blank characters in other programming languages.

*ApplType (MQLONG)*

This identifies the nature of the program to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ApplType* attribute of the process object identified by the *ProcessName* field; see "Attributes for process definitions" on page 843 for details of this attribute. The content of this data is of no significance to the queue manager.

*ApplType* can have one of the following standard values. User-defined types can also be used, but should be restricted to values in the range MQAT_USER_FIRST through MQAT_USER_LAST:

**MQAT_AIX**
AIX application (same value as MQAT_UNIX).

**MQAT_BATCH**
Batch application

**MQAT_BROKER**
Broker application

**MQAT_CICS**
CICS transaction.

**MQAT_CICS_BRIDGE**
CICS bridge application.

**MQAT_CICS_VSE**
CICS/VSE transaction.

**MQAT_DOS**
IBM MQ MQI client application on PC DOS.

**MQAT_IMS**
IMS application.

**MQAT_IMS_BRIDGE**
IMS bridge application.

**MQAT_JAVA**
Java application.

**MQAT_MVS**
MVS or TSO application (same value as MQAT_ZOS).

**MQAT_NOTES_AGENT**
Lotus Notes Agent application.

**MQAT_NSK**
HP Integrity NonStop Server application.

**MQAT_OS390**
OS/390 application (same value as MQAT_ZOS).

**MQAT_OS400**
IBM i application.

**MQAT_RRS_BATCH**
RRS batch application.

**MQAT_UNIX**
UNIX application.

**MQAT_UNKNOWN**
Application of unknown type.

**MQAT_USER**
User-defined application type.

**MQAT_VOS**
Stratus VOS application.

**MQAT_WINDOWS**
16-bit Windows application.

**MQAT_WINDOWS_NT**
32-bit Windows application.

**MQAT_WLM**
z/OS workload manager application.

**MQAT_XCF**
XCF.

**MQAT_ZOS**
z/OS application.

**MQAT_USER_FIRST**
Lowest value for user-defined application type.

**MQAT_USER_LAST**
Highest value for user-defined application type.

The initial value of this field is `0`.

*EnvData (MQCHAR128)*

This is a character string that contains environment-related information pertaining to the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *EnvData* attribute of the process object identified by the *ProcessName* field; see “Attributes for process definitions” on page 843 for details of this attribute. The content of this data is of no significance to the queue manager.

On z/OS, for a CICS application started using the CKTI transaction, or an IMS application to be started using the CSQQTRMN transaction, this information is not used.

The length of this field is given by MQ_PROCESS_ENV_DATA_LENGTH. The initial value of this field is the null string in C, and 128 blank characters in other programming languages.

*ProcessName (MQCHAR48)*

This is the name of the queue-manager process object specified for the triggered queue, and can be used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ProcessName* attribute of the queue identified by the *QName* field; see“Attributes for queues” on page 810for details of this attribute.

Names that are shorter than the defined length of the field are always padded to the right with blanks; they are not ended prematurely by a null character.

The length of this field is given by MQ_PROCESS_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*QName (MQCHAR48)*

This is the name of the queue for which a trigger event occurred, and is used by the application started by the trigger-monitor application. The queue manager initializes this field with the value of the *QName* attribute of the triggered queue; see“Attributes for queues” on page 810for details of this attribute.

Names that are shorter than the defined length of the field are padded to the right with blanks; they are not ended prematurely by a null character.

The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQTM_STRUC_ID**
Identifier for trigger message structure.

For the C programming language, the constant MQTM_STRUC_ID_ARRAY is also defined; this has the same value as MQTM_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQTM_STRUC_ID.

*TriggerData (MQCHAR64)*

This is free-format data for use by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *TriggerData* attribute of the queue identified by the *QName* field; see “Attributes for queues” on page 810 for details of this attribute. The content of this data is of no significance to the queue manager.

On z/OS, for a CICS application started using the CKTI transaction, this information is not used.

The length of this field is given by MQ_TRIGGER_DATA_LENGTH. The initial value of this field is the null string in C, and 64 blank characters in other programming languages.

*UserData (MQCHAR128)*

This is a character string that contains user information relevant to the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *UserData* attribute of the process object identified by the *ProcessName* field; see “Attributes for process definitions” on page 843 for details of this attribute. The content of this data is of no significance to the queue manager.

For Microsoft Windows, the character string must not contain double quotation marks if the process definition is going to be passed to **runmqtrm**.

The length of this field is given by MQ_PROCESS_USER_DATA_LENGTH. The initial value of this field is the null string in C, and 128 blank characters in other programming languages.

*Version (MQLONG)*

This is the structure version number. The value must be:

**MQTM_VERSION_1**
Version number for trigger message structure.

The following constant specifies the version number of the current version:

**MQTM_CURRENT_VERSION**
Current version of trigger message structure.

The initial value of this field is MQTM_VERSION_1.

## *Initial values and language declarations for MQTM*

*Table 542. Initial values of fields in MQTM for MQTM*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQTM_STRUC_ID | 'TM¬¬' |
| *Version* | MQTM_VERSION_1 | 1 |
| *QName* | None | Null string or blanks |
| *ProcessName* | None | Null string or blanks |
| *TriggerData* | None | Null string or blanks |
| *ApplType* | None | 0 |
| *ApplId* | None | Null string or blanks |
| *EnvData* | None | Null string or blanks |
| *UserData* | None | Null string or blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQTM_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQTM MyTM = {MQTM_DEFAULT};
```

*C declaration*

```
typedef struct tagMQTM MQTM;
struct tagMQTM {
  MQCHAR4    StrucId;      /* Structure identifier */
  MQLONG     Version;      /* Structure version number */
  MQCHAR48   QName;        /* Name of triggered queue */
  MQCHAR48   ProcessName;  /* Name of process object */
  MQCHAR64   TriggerData;  /* Trigger data */
  MQLONG     ApplType;     /* Application type */
  MQCHAR256  ApplId;       /* Application identifier */
  MQCHAR128  EnvData;      /* Environment data */
  MQCHAR128  UserData;     /* User data */
};
```

*COBOL declaration*

```
**   MQTM structure
  10 MQTM.
**    Structure identifier
   15 MQTM-STRUCID     PIC X(4).
**    Structure version number
   15 MQTM-VERSION     PIC S9(9) BINARY.
**    Name of triggered queue
   15 MQTM-QNAME       PIC X(48).
**    Name of process object
   15 MQTM-PROCESSNAME PIC X(48).
**    Trigger data
   15 MQTM-TRIGGERDATA PIC X(64).
**    Application type
   15 MQTM-APPLTYPE    PIC S9(9) BINARY.
**    Application identifier
   15 MQTM-APPLID      PIC X(256).
**    Environment data
   15 MQTM-ENVDATA     PIC X(128).
**    User data
   15 MQTM-USERDATA    PIC X(128).
```

*PL/I declaration*

```
dcl
 1 MQTM based,
  3 StrucId     char(4),       /* Structure identifier */
  3 Version     fixed bin(31), /* Structure version number */
  3 QName       char(48),      /* Name of triggered queue */
  3 ProcessName char(48),      /* Name of process object */
  3 TriggerData char(64),      /* Trigger data */
  3 ApplType    fixed bin(31), /* Application type */
  3 ApplId      char(256),     /* Application identifier */
  3 EnvData     char(128),     /* Environment data */
  3 UserData    char(128);     /* User data */
```

*High Level Assembler declaration*

```
MQTM              DSECT
MQTM_STRUCID      DS   CL4    Structure identifier
MQTM_VERSION      DS   F      Structure version number
MQTM_QNAME        DS   CL48   Name of triggered queue
MQTM_PROCESSNAME  DS   CL48   Name of process object
MQTM_TRIGGERDATA  DS   CL64   Trigger data
MQTM_APPLTYPE     DS   F      Application type
MQTM_APPLID       DS   CL256  Application identifier
MQTM_ENVDATA      DS   CL128  Environment data
MQTM_USERDATA     DS   CL128  User data
*
MQTM_LENGTH       EQU  *-MQTM
                  ORG  MQTM
MQTM_AREA         DS   CL(MQTM_LENGTH)
```

*Visual Basic declaration*

```
Type MQTM
  StrucId     As String*4   'Structure identifier'
  Version     As Long       'Structure version number'
  QName       As String*48  'Name of triggered queue'
  ProcessName As String*48  'Name of process object'
  TriggerData As String*64  'Trigger data'
  ApplType    As Long       'Application type'
  ApplId      As String*256 'Application identifier'
  EnvData     As String*128 'Environment data'
  UserData    As String*128 'User data'
End Type
```

## MQTMC2 - Trigger message 2 (character format)

The following table summarizes the fields in the structure.

| *Table 543. Fields in MQTMC2* | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *QName* | Name of triggered queue | QName |
| *ProcessName* | Name of process object | ProcessName |
| *TriggerData* | Trigger data | TriggerData |
| *ApplType* | Application type | ApplType |
| *ApplId* | Application identifier | ApplId |
| *EnvData* | Environment data | EnvData |
| *UserData* | User data | UserData |
| *QMgrName* | Queue manager name | QMgrName |

### *Overview for MQTMC2*

**Purpose**: When a trigger-monitor application retrieves a trigger message (MQTM) from an initiation queue, the trigger monitor might need to pass some or all of the information in the trigger message to the application that the trigger monitor starts.

Information that the started application might need includes *QName*, *TriggerData*, and *UserData*. The trigger monitor application can pass the MQTM structure directly to the started application, or pass an MQTMC2 structure instead, depending on what is permitted by the environment and convenient for the started application.

This structure is part of the IBM MQ Trigger Monitor Interface (TMI), which is one of the IBM MQ framework interfaces.

**Character set and encoding**: Character data in MQTMC2 is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute.

**Usage**: The MQTMC2 structure is very similar to the format of the MQTM structure. The difference is that the non-character fields in MQTM are changed in MQTMC2 to character fields of the same length, and the queue manager name is added at the end of the structure.

- On z/OS, for an MQAT_IMS application that is started using the CSQQTRMN application, an MQTMC2 structure is made available to the started application.
- On IBM i, the trigger monitor application provided with IBM MQ passes an MQTMC2 structure to the started application.

### *Fields for MQTMC2*

The MQTMC2 structure contains the following fields; the fields are described in **alphabetical order**:

*ApplId (MQCHAR256)*

Application identifier.

See the *ApplId* field in the MQTM structure.

*ApplType (MQCHAR4)*
Application type.

This field always contains blanks, whatever the value in the *ApplType* field in the MQTM structure of the original trigger message.

*EnvData (MQCHAR128)*
Environment data.

See the *EnvData* field in the MQTM structure.

*ProcessName (MQCHAR48)*
Name of process object.

See the *ProcessName* field in the MQTM structure.

*QMgrName (MQCHAR48)*
Queue manager name.

This is the name of the queue manager at which the trigger event occurred.

*QName (MQCHAR48)*
Name of triggered queue.

See the *QName* field in the MQTM structure.

*StrucId (MQCHAR4)*
Structure identifier.

The value must be:

**MQTMC_STRUC_ID**
Identifier for trigger message (character format) structure.

For the C programming language, the constant MQTMC_STRUC_ID_ARRAY is also defined; this has the same value as MQTMC_STRUC_ID, but is an array of characters instead of a string.

*TriggerData (MQCHAR64)*
Trigger data.

See the *TriggerData* field in the MQTM structure.

*UserData (MQCHAR128)*
User data.

See the *UserData* field in the MQTM structure.

*Version (MQCHAR4)*
Structure version number.

The value must be:

**MQTMC_VERSION_2**
Version 2 trigger message (character format) structure.

For the C programming language, the constant MQTMC_VERSION_2_ARRAY is also defined; this has the same value as MQTMC_VERSION_2, but is an array of characters instead of a string.

The following constant specifies the version number of the current version:

**MQTMC_CURRENT_VERSION**
Current version of trigger message (character format) structure.

### *Initial values and language declarations for MQTMC2*

*Table 544. Initial values of fields in MQTMC2 for MQTMC2*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQTMC_STRUC_ID | 'TMC¬' |
| *Version* | MQTMC_VERSION_2 | '¬¬¬2' |
| *QName* | None | Null string or blanks |
| *ProcessName* | None | Null string or blanks |
| *TriggerData* | None | Null string or blanks |
| *ApplType* | None | Blanks |
| *ApplId* | None | Null string or blanks |
| *EnvData* | None | Null string or blanks |
| *UserData* | None | Null string or blanks |
| *QMgrName* | None | Null string or blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQTMC2_DEFAULT contains the values listed above. Use it in the following way to provide initial values for the fields in the structure:

```
MQTMC2 MyTMC = {MQTMC2_DEFAULT};
```

*C declaration*

```
typedef struct tagMQTMC2 MQTMC2;
struct tagMQTMC2 {
  MQCHAR4    StrucId;      /* Structure identifier */
  MQCHAR4    Version;      /* Structure version number */
  MQCHAR48   QName;        /* Name of triggered queue */
  MQCHAR48   ProcessName;  /* Name of process object */
  MQCHAR64   TriggerData;  /* Trigger data */
  MQCHAR4    ApplType;     /* Application type */
  MQCHAR256  ApplId;       /* Application identifier */
  MQCHAR128  EnvData;      /* Environment data */
  MQCHAR128  UserData;     /* User data */
  MQCHAR48   QMgrName;     /* Queue manager name */
};
```

*COBOL declaration*

```
**   MQTMC2 structure
  10 MQTMC2.
**    Structure identifier
   15 MQTMC2-STRUCID     PIC X(4).
**    Structure version number
   15 MQTMC2-VERSION     PIC X(4).
**    Name of triggered queue
   15 MQTMC2-QNAME       PIC X(48).
**    Name of process object
   15 MQTMC2-PROCESSNAME PIC X(48).
**    Trigger data
   15 MQTMC2-TRIGGERDATA PIC X(64).
**    Application type
```

```
   15 MQTMC2-APPLTYPE    PIC X(4).
**    Application identifier
   15 MQTMC2-APPLID      PIC X(256).
**    Environment data
   15 MQTMC2-ENVDATA     PIC X(128).
**    User data
   15 MQTMC2-USERDATA    PIC X(128).
**    Queue manager name
   15 MQTMC2-QMGRNAME    PIC X(48).
```

*PL/I declaration*

```
dcl
 1 MQTMC2 based,
  3 StrucId     char(4),   /* Structure identifier */
  3 Version     char(4),   /* Structure version number */
  3 QName       char(48),  /* Name of triggered queue */
  3 ProcessName char(48),  /* Name of process object */
  3 TriggerData char(64),  /* Trigger data */
  3 ApplType    char(4),   /* Application type */
  3 ApplId      char(256), /* Application identifier */
  3 EnvData     char(128), /* Environment data */
  3 UserData    char(128), /* User data */
  3 QMgrName    char(48);  /* Queue manager name */
```

*High Level Assembler declaration*

```
MQTMC              DSECT
MQTMC_STRUCID      DS   CL4    Structure identifier
MQTMC_VERSION      DS   CL4    Structure version number
MQTMC_QNAME        DS   CL48   Name of triggered queue
MQTMC_PROCESSNAME  DS   CL48   Name of process object
MQTMC_TRIGGERDATA  DS   CL64   Trigger data
MQTMC_APPLTYPE     DS   CL4    Application type
MQTMC_APPLID       DS   CL256  Application identifier
MQTMC_ENVDATA      DS   CL128  Environment data
MQTMC_USERDATA     DS   CL128  User data
MQTMC_QMGRNAME     DS   CL48   Queue manager name
*
MQTMC_LENGTH       EQU  *-MQTMC
                   ORG  MQTMC
MQTMC_AREA         DS   CL(MQTMC_LENGTH)
```

*Visual Basic declaration*

```
Type MQTMC2
  StrucId     As String*4   'Structure identifier'
  Version     As String*4   'Structure version number'
  QName       As String*48  'Name of triggered queue'
  ProcessName As String*48  'Name of process object'
  TriggerData As String*64  'Trigger data'
  ApplType    As String*4   'Application type'
  ApplId      As String*256 'Application identifier'
  EnvData     As String*128 'Environment data'
  UserData    As String*128 'User data'
  QMgrName    As String*48  'Queue manager name'
End Type
```

## MQWIH - Work information header

The following table summarizes the fields in the structure.

*Table 545. Fields in MQWIH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |

| Table 545. Fields in MQWIH (continued) | | |
|---|---|---|
| **Field** | **Description** | **Topic** |
| *StrucLength* | Length of MQWIH structure | StrucLength |
| *Encoding* | Numeric encoding of data that follows MQWIH | Encoding |
| *CodedCharSetId* | Character-set identifier of data that follows MQWIH | CodedCharSetId |
| *Format* | Format name of data that follows MQWIH | Format |
| *Flags* | Flags | Flags |
| *ServiceName* | Service name | ServiceName |
| *ServiceStep* | Service step name | ServiceStep |
| *MsgToken* | Message token | MsgToken |
| *Reserved* | Reserved | Reserved |

## *Overview for MQWIH*

The MQWIH structure describes the header information for a message sent to z/OS workload management (WLM). For any IBM MQ supported platform you can create and transmit a message that includes the MQWIH structure, but only an IBM MQ for z/OS queue manager can interact with WLM. Therefore, for the message to get to WLM from a non-z/OS queue manager, your queue manager network must include at least one z/OS queue manager through which the message can be routed.

**Availability**: All IBM MQ systems, plus IBM MQ clients connected to these systems.

**Purpose**: The MQWIH structure describes the information that must be present at the start of a message that is to be handled by the z/OS workload manager.

**Format name**: MQFMT_WORK_INFO_HEADER.

**Character set and encoding**: The fields in the MQWIH structure are in the character set and encoding given by the *CodedCharSetId* and *Encoding* fields in the header structure that precedes MQWIH, or by those fields in the MQMD structure if the MQWIH is at the start of the application message data.

The character set must be one that has single-byte characters for the characters that are valid in queue names.

**Usage**: If a message is to be processed by the z/OS workload manager, the message must begin with an MQWIH structure.

## *Fields for MQWIH*

The MQWIH structure contains the following fields; the fields are described in **alphabetical order**:

*CodedCharSetId (MQLONG)*

This specifies the character set identifier of the data that follows the MQWIH structure; it does not apply to character data in the MQWIH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. You can use the following special value:

**MQCCSI_INHERIT**
Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value MQCCSI_INHERIT is not returned by the MQGET call.

MQCCSI_INHERIT cannot be used if the value of the *PutApplType* field in MQMD is MQAT_BROKER.

The initial value of this field is MQCCSI_UNDEFINED.

*Encoding (MQLONG)*

This specifies the numeric encoding of the data that follows the MQWIH structure; it does not apply to numeric data in the MQWIH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is 0.

*Flags (MQLONG)*

The value must be:

**MQWIH_NONE**
No flags.

The initial value of this field is MQWIH_NONE.

*Format (MQCHAR8)*

This specifies the format name of the data that follows the MQWIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *Format* field in MQMD.

The length of this field is given by MQ_FORMAT_LENGTH. The initial value of this field is MQFMT_NONE.

*MsgToken (MQBYTE16)*

This is a message token that uniquely identifies the message.

For the MQPUT and MQPUT1 calls, this field is ignored. The length of this field is given by MQ_MSG_TOKEN_LENGTH. The initial value of this field is MQMTOK_NONE.

*Reserved (MQCHAR32)*

This is a reserved field; it must be blank.

*ServiceName (MQCHAR32)*

This is the name of the service that is to process the message.

The length of this field is given by MQ_SERVICE_NAME_LENGTH. The initial value of this field is 32 blank characters.

*ServiceStep (MQCHAR8)*

This is the name of the step of *ServiceName* to which the message relates.

The length of this field is given by MQ_SERVICE_STEP_LENGTH. The initial value of this field is 8 blank characters.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQWIH_STRUC_ID**
Identifier for work information header structure.

For the C programming language, the constant MQWIH_STRUC_ID_ARRAY is also defined; this has the same value as MQWIH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQWIH_STRUC_ID.

*StrucLength (MQLONG)*

This is the length of the MQWIH structure. The value must be:

**MQWIH_LENGTH_1**
Length of version-1 work information header structure.

The following constant specifies the length of the current version:

**MQWIH_CURRENT_LENGTH**
Length of current version of work information header structure.

The initial value of this field is MQWIH_LENGTH_1.

*Version (MQLONG)*

This is the structure version number. The value must be:

**MQWIH_VERSION_1**
Version-1 work information header structure.

The following constant specifies the version number of the current version:

**MQWIH_CURRENT_VERSION**
Current version of work information header structure.

The initial value of this field is MQWIH_VERSION_1.

## *Initial values and language declarations for MQWIH*

*Table 546. Initial values of fields in MQWIH for MQWIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQWIH_STRUC_ID | 'WIH¬' |
| *Version* | MQWIH_VERSION_1 | 1 |
| *StrucLength* | MQWIH_LENGTH_1 | 120 |
| *Encoding* | None | 0 |
| *CodedCharSetId* | MQCCSI_UNDEFINED | 0 |
| *Format* | MQFMT_NONE | Blanks |
| *Flags* | MQWIH_NONE | 0 |
| *ServiceName* | None | Blanks |
| *ServiceStep* | None | Blanks |
| *MsgToken* | MQMTOK_NONE | Nulls |
| *Reserved* | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQWIH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQWIH MyWIH = {MQWIH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQWIH MQWIH;
struct tagMQWIH {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQLONG    StrucLength;     /* Length of MQWIH structure */
```

```
  MQLONG    Encoding;        /* Numeric encoding of data that follows
                                MQWIH */
  MQLONG    CodedCharSetId;  /* Character-set identifier of data that
                                follows MQWIH */
  MQCHAR8   Format;          /* Format name of data that follows
                                MQWIH */
  MQLONG    Flags;           /* Flags */
  MQCHAR32  ServiceName;     /* Service name */
  MQCHAR8   ServiceStep;     /* Service step name */
  MQBYTE16  MsgToken;        /* Message token */
  MQCHAR32  Reserved;        /* Reserved */
};
```

*COBOL declaration*

```
**   MQWIH structure
  10 MQWIH.
**    Structure identifier
   15 MQWIH-STRUCID        PIC X(4).
**    Structure version number
   15 MQWIH-VERSION        PIC S9(9) BINARY.
**    Length of MQWIH structure
   15 MQWIH-STRUCLENGTH    PIC S9(9) BINARY.
**    Numeric encoding of data that follows MQWIH
   15 MQWIH-ENCODING       PIC S9(9) BINARY.
**    Character-set identifier of data that follows MQWIH
   15 MQWIH-CODEDCHARSETID PIC S9(9) BINARY.
**    Format name of data that follows MQWIH
   15 MQWIH-FORMAT         PIC X(8).
**    Flags
   15 MQWIH-FLAGS          PIC S9(9) BINARY.
**    Service name
   15 MQWIH-SERVICENAME    PIC X(32).
**    Service step name
   15 MQWIH-SERVICESTEP    PIC X(8).
**    Message token
   15 MQWIH-MSGTOKEN       PIC X(16).
**    Reserved
   15 MQWIH-RESERVED       PIC X(32).
```

*PL/I declaration*

```
dcl
 1 MQWIH based,
  3 StrucId        char(4),       /* Structure identifier */
  3 Version        fixed bin(31), /* Structure version number */
  3 StrucLength    fixed bin(31), /* Length of MQWIH structure */
  3 Encoding       fixed bin(31), /* Numeric encoding of data that
                                     follows MQWIH */
  3 CodedCharSetId fixed bin(31), /* Character-set identifier of data
                                     that follows MQWIH */
  3 Format         char(8),       /* Format name of data that follows
                                     MQWIH */
  3 Flags          fixed bin(31), /* Flags */
  3 ServiceName    char(32),      /* Service name */
  3 ServiceStep    char(8),       /* Service step name */
  3 MsgToken       char(16),      /* Message token */
  3 Reserved       char(32);      /* Reserved */
```

*High Level Assembler declaration*

```
MQWIH                DSECT
MQWIH_STRUCID        DS   CL4   Structure identifier
MQWIH_VERSION        DS   F     Structure version number
MQWIH_STRUCLENGTH    DS   F     Length of MQWIH structure
MQWIH_ENCODING       DS   F     Numeric encoding of data that follows
*                               MQWIH
MQWIH_CODEDCHARSETID DS   F     Character-set identifier of data that
*                               follows MQWIH
MQWIH_FORMAT         DS   CL8   Format name of data that follows MQWIH
MQWIH_FLAGS          DS   F     Flags
MQWIH_SERVICENAME    DS   CL32  Service name
MQWIH_SERVICESTEP    DS   CL8   Service step name
```

```
MQWIH_MSGTOKEN        DS   XL16  Message token
MQWIH_RESERVED        DS   CL32  Reserved
*
MQWIH_LENGTH          EQU  *-MQWIH
                      ORG  MQWIH
MQWIH_AREA            DS   CL(MQWIH_LENGTH)
```

*Visual Basic declaration*

```
Type MQWIH
  StrucId        As String*4  'Structure identifier'
  Version        As Long      'Structure version number'
  StrucLength    As Long      'Length of MQWIH structure'
  Encoding       As Long      'Numeric encoding of data that follows'
                              'MQWIH'
  CodedCharSetId As Long      'Character-set identifier of data that'
                              'follows MQWIH'
  Format         As String*8  'Format name of data that follows MQWIH'
  Flags          As Long      'Flags'
  ServiceName    As String*32 'Service name'
  ServiceStep    As String*8  'Service step name'
  MsgToken       As MQBYTE16  'Message token'
  Reserved       As String*32 'Reserved'
End Type
```

## MQXP - Exit parameter block

The following table summarizes the fields in the structure.

*Table 547. Fields in MQXP*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *ExitId* | Exit identifier | ExitId |
| *ExitReason* | Reason for invocation of exit | ExitReason |
| *ExitResponse* | Response from exit | ExitResponse |
| *ExitCommand* | API call code | ExitCommand |
| *ExitParmCount* | Parameter count | ExitParmCount |
| *ExitUserArea* | User area | ExitUserArea |

### z/OS *Overview for MQXP*

**Availability**: z/OS.

**Purpose**: The MQXP structure is used as an input/output parameter to the API-crossing exit. For more information about this exit, see The API-crossing exit.

**Character set and encoding**: Character data in MQXP is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute. Numeric data in MQXP is in the native machine encoding; this is given by MQENC_NATIVE.

### *Fields for MQXP*

The MQXP structure contains the following fields; the fields are described in **alphabetical order**:

*ExitCommand (MQLONG)*

This field is set on entry to the exit routine. It identifies the API call that caused the exit to be invoked:

**MQXC_CALLBACK**
The CALLBACK call.

**MQXC_MQBACK**
The MQBACK call.

**MQXC_MQCB**
The MQCB call.

**MQXC_MQCLOSE**
The MQCLOSE call.

**MQXC_MQCMIT**
The MQCMIT call.

**MQXC_MQCTL**
The MQCTL call.

**MQXC_MQGET**
The MQGET call.

**MQXC_MQINQ**
The MQINQ call.

**MQXC_MQOPEN**
The MQOPEN call.

**MQXC_MQPUT**
The MQPUT call.

**MQXC_MQPUT1**
The MQPUT1 call.

**MQXC_MQSET**
The MQSET call.

**MQXC_MQSTAT**
The MQSTAT call.

**MQXC_MQSUB**
The MQSUB call.

**MQXC_MQSUBRQ**
The MQSUBRQ call.

This is an input field to the exit.

*ExitId (MQLONG)*

This is set on entry to the exit routine, and indicates the type of exit:

**MQXT_API_CROSSING_EXIT**
API-crossing exit for CICS.

This is an input field to the exit.

*ExitParmCount (MQLONG)*

This field is set on entry to the exit routine. It contains the number of parameters that the MQ call takes. These are:

| Call name | Number of parameters |
|---|---|
| MQBACK | 3 |
| MQCLOSE | 5 |
| MQCMIT | 3 |
| MQGET | 9 |
| MQINQ | 10 |

| Call name | Number of parameters |
|---|---|
| MQOPEN | 6 |
| MQPUT | 8 |
| MQPUT1 | 8 |
| MQSET | 10 |

This is an input field to the exit.

*ExitReason (MQLONG)*

This is set on entry to the exit routine. For the API-crossing exit it indicates whether the routine is called before or after execution of the API call:

**MQXR_BEFORE**
Before API execution.

**MQXR_AFTER**
After API execution.

This is an input field to the exit.

*ExitResponse (MQLONG)*

The value is set by the exit to communicate with the caller. The following values are defined:

**MQXCC_OK**
Exit completed successfully.

**MQXCC_SUPPRESS_FUNCTION**
Suppress function.

When this value is set by an API-crossing exit called *before* the API call, the API call is not performed. The *CompCode* for the call is set to MQCC_FAILED, the *Reason* is set to MQRC_SUPPRESSED_BY_EXIT, and all other parameters remain as the exit left them.

When this value is set by an API-crossing exit called *after* the API call, it is ignored by the queue manager.

**MQXCC_SKIP_FUNCTION**
Skip function.

When this value is set by an API-crossing exit called *before* the API call, the API call is not performed; the *CompCode* and *Reason* and all other parameters remain as the exit left them.

When this value is set by an API-crossing exit called *after* the API call, it is ignored by the queue manager.

This is an output field from the exit.

*ExitUserArea (MQBYTE16)*

This is a field that is available for the exit to use. It is initialized to binary zero for the length of the field before the first invocation of the exit for the task, and thereafter any changes made to this field by the exit are preserved across invocations of the exit. The following value is defined:

**MQXUA_NONE**
No user information.

The value is binary zero for the length of the field.

For the C programming language, the constant MQXUA_NONE_ARRAY is also defined; this has the same value as MQXUA_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_EXIT_USER_AREA_LENGTH. This is an input/output field to the exit.

*Reserved (MQLONG)*

This is a reserved field. Its value is not significant to the exit.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQXP_STRUC_ID**
Identifier for exit parameter structure.

For the C programming language, the constant MQXP_STRUC_ID_ARRAY is also defined; this has the same value as MQXP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the exit.

*Version (MQLONG)*

This is the structure version number. The value must be:

**MQXP_VERSION_1**
Version number for exit parameter-block structure.

**Note:** When a new version of this structure is introduced, the layout of the existing part is not changed. The exit must therefore check that the version number is equal to or greater than the lowest version that contains the fields that the exit needs to use.

This is an input field to the exit.

## *Language declarations*

This structure is supported in the following programming languages.

*C declaration*

```
typedef struct tagMQXP MQXP;
struct tagMQXP {
  MQCHAR4   StrucId;        /* Structure identifier */
  MQLONG    Version;        /* Structure version number */
  MQLONG    ExitId;         /* Exit identifier */
  MQLONG    ExitReason;     /* Reason for invocation of exit */
  MQLONG    ExitResponse;   /* Response from exit */
  MQLONG    ExitCommand;    /* API call code */
  MQLONG    ExitParmCount;  /* Parameter count */
  MQLONG    Reserved;       /* Reserved */
  MQBYTE16  ExitUserArea;   /* User area */
};
```

*COBOL declaration*

```
**   MQXP structure
  10 MQXP.
**    Structure identifier
   15 MQXP-STRUCID       PIC X(4).
**    Structure version number
   15 MQXP-VERSION       PIC S9(9) BINARY.
**    Exit identifier
   15 MQXP-EXITID        PIC S9(9) BINARY.
**    Reason for invocation of exit
   15 MQXP-EXITREASON    PIC S9(9) BINARY.
**    Response from exit
   15 MQXP-EXITRESPONSE  PIC S9(9) BINARY.
**    API call code
   15 MQXP-EXITCOMMAND   PIC S9(9) BINARY.
**    Parameter count
   15 MQXP-EXITPARMCOUNT PIC S9(9) BINARY.
**    Reserved
   15 MQXP-RESERVED      PIC S9(9) BINARY.
**    User area
   15 MQXP-EXITUSERAREA  PIC X(16).
```

*PL/I declaration*

```
dcl
 1 MQXP based,
  3 StrucId       char(4),       /* Structure identifier */
  3 Version       fixed bin(31), /* Structure version number */
  3 ExitId        fixed bin(31), /* Exit identifier */
  3 ExitReason    fixed bin(31), /* Reason for invocation of exit */
  3 ExitResponse  fixed bin(31), /* Response from exit */
  3 ExitCommand   fixed bin(31), /* API call code */
  3 ExitParmCount fixed bin(31), /* Parameter count */
  3 Reserved      fixed bin(31), /* Reserved */
  3 ExitUserArea  char(16);      /* User area */
```

*High Level Assembler declaration*

```
MQXP                DSECT
MQXP_STRUCID        DS   CL4   Structure identifier
MQXP_VERSION        DS   F     Structure version number
MQXP_EXITID         DS   F     Exit identifier
MQXP_EXITREASON     DS   F     Reason for invocation of exit
MQXP_EXITRESPONSE   DS   F     Response from exit
MQXP_EXITCOMMAND    DS   F     API call code
MQXP_EXITPARMCOUNT  DS   F     Parameter count
MQXP_RESERVED       DS   F     Reserved
MQXP_EXITUSERAREA   DS   XL16  User area
*
MQXP_LENGTH         EQU  *-MQXP
                    ORG  MQXP
MQXP_AREA           DS   CL(MQXP_LENGTH)
```

## MQXQH - Transmission-queue header

The following table summarizes the fields in the structure.

*Table 548. Fields in MQXQH*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *RemoteQName* | Name of destination queue | RemoteQName |
| *RemoteQMgrName* | Name of destination queue manager | RemoteQMgrName |
| *MsgDesc* | Original message descriptor | MsgDesc |

### *Overview for MQXQH*

**Availability**: All IBM MQ systems and IBM MQ clients.

**Purpose**: The MQXQH structure describes the information that is prefixed to the application message data of messages when they are on transmission queues. A transmission queue is a special type of local queue that temporarily holds messages destined for remote queues (that is, destined for queues that do not belong to the local queue manager). A transmission queue is denoted by the *Usage* queue attribute having the value MQUS_TRANSMISSION.

**Format name**: MQFMT_XMIT_Q_HEADER.

**Character set and encoding**: Data in MQXOH must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by MQENC_NATIVE.

Set the character set and encoding of the MQXQH into the *CodedCharSetId* and *Encoding* fields in:

- The separate MQMD (if the MQXQH structure is at the start of the message data), or
- The header structure that precedes the MQXQH structure (all other cases).

**Usage**: A message that is on a transmission queue has *two* message descriptors:

- One message descriptor is stored separately from the message data; this is called the *separate message descriptor*, and is generated by the queue manager when the message is placed on the transmission queue. Some of the fields in the separate message descriptor are copied from the message descriptor provided by the application on the MQPUT or MQPUT1 call.

  The separate message descriptor is the one that is returned to the application in the *MsgDesc* parameter of the MQGET call when the message is removed from the transmission queue.
- A second message descriptor is stored within the MQXQH structure as part of the message data; this is called the *embedded message descriptor*, and is a copy of the message descriptor that was provided by the application on the MQPUT or MQPUT1 call (with minor variations).

  The embedded message descriptor is always a version-1 MQMD. If the message put by the application has nondefault values for one or more of the version-2 fields in the MQMD, an MQMDE structure follows the MQXQH, and is in turn followed by the application message data (if any). The MQMDE is either:

  – Generated by the queue manager (if the application uses a version-2 MQMD to put the message), or
  – Already present at the start of the application message data (if the application uses a version-1 MQMD to put the message).

  The embedded message descriptor is the one that is returned to the application in the *MsgDesc* parameter of the MQGET call when the message is removed from the final destination queue.

**Fields in the separate message descriptor**: The fields in the separate message descriptor are set by the queue manager as shown. If the queue manager does not support the version-2 MQMD, a version-1 MQMD is used without loss of function.

| Field in separate MQMD | Value used |
|---|---|
| *StrucId* | MQMD_STRUC_ID |
| *Version* | MQMD_VERSION_2 |
| *Report* | Copied from the embedded message descriptor, but with the bits identified by MQRO_ACCEPT_UNSUP_IF_XMIT_MASK set to zero. (This prevents a COA or COD report message being generated when a message is placed on or removed from a transmission queue.) |
| *MsgType* | Copied from the embedded message descriptor. |
| *Expiry* | Copied from the embedded message descriptor. |
| *Feedback* | Copied from the embedded message descriptor. |
| *Encoding* | MQENC_NATIVE (see note) |
| *CodedCharSetId* | Queue manager's *CodedCharSetId* attribute. |
| *Format* | MQFMT_XMIT_Q_HEADER |
| *Priority* | Copied from the embedded message descriptor. |
| *Persistence* | Copied from the embedded message descriptor. |
| *MsgId* | A new value is generated by the queue manager. This message identifier is different from the *MsgId* that the queue manager may have generated for the embedded message descriptor described previously. |
| *CorrelId* | The *MsgId* from the embedded message descriptor. For messages being put to the SYSTEM.CLUSTER.TRANSMIT.QUEUE, *CorrelId* is reserved for internal use. |
| *BackoutCount* | 0 |
| *ReplyToQ* | Copied from the embedded message descriptor. |

| Field in separate MQMD | Value used |
|---|---|
| *ReplyToQMgr* | Copied from the embedded message descriptor. |
| *UserIdentifier* | Copied from the embedded message descriptor. |
| *AccountingToken* | Copied from the embedded message descriptor. For messages being put to the SYSTEM.CLUSTER.TRANSMIT.QUEUE, *AccountingToken* is reserved for internal use. |
| *ApplIdentityData* | Copied from the embedded message descriptor. |
| *PutApplType* | MQAT_QMGR |
| *PutApplName* | First 28 bytes of the queue-manager name. |
| *PutDate* | Date when message was put on transmission queue. |
| *PutTime* | Time when message was put on transmission queue. |
| *ApplOriginData* | Blanks |
| *GroupId* | MQGI_NONE |
| *MsgSeqNumber* | 1 |
| *Offset* | 0 |
| *MsgFlags* | MQMF_NONE |
| *OriginalLength* | MQOL_UNDEFINED |

- On Windows, the value of MQENC_NATIVE for Micro Focus COBOL differs from the value for C. The value in the *Encoding* field in the separate message descriptor is always the value for C in these environments; this value is 546 in decimal. Also, the integer fields in the MQXQH structure are in the encoding that corresponds to this value (the native Intel encoding).

**Fields in the embedded message descriptor**: The fields in the embedded message descriptor have the same values as those in the *MsgDesc* parameter of the MQPUT or MQPUT1 call, except for the following:

- The *Version* field always has the value MQMD_VERSION_1.
- If the *Priority* field has the value MQPRI_PRIORITY_AS_Q_DEF, it is replaced by the value of the queue's *DefPriority* attribute.
- If the *Persistence* field has the value MQPER_PERSISTENCE_AS_Q_DEF, it is replaced by the value of the queue's *DefPersistence* attribute.
- If the *MsgId* field has the value MQMI_NONE, or the MQPMO_NEW_MSG_ID option was specified, or the message is a distribution-list message, *MsgId* is replaced by a new message identifier generated by the queue manager.

  When a distribution-list message is split into smaller distribution-list messages placed on different transmission queues, the *MsgId* field in each of the new embedded message descriptors is the same as that in the original distribution-list message.
- If the MQPMO_NEW_CORREL_ID option was specified, *CorrelId* is replaced by a new correlation identifier generated by the queue manager.
- The context fields are set as indicated by the MQPMO_*_CONTEXT options specified in the *PutMsgOpts* parameter; the context fields are:
  - *AccountingToken*
  - *ApplIdentityData*
  - *ApplOriginData*
  - *PutApplName*
  - *PutApplType*
  - *PutDate*

  - *PutTime*
  - *UserIdentifier*
- The version-2 fields (if they were present) are removed from the MQMD, and moved into an MQMDE structure, if one or more of the version-2 fields has a nondefault value.

**Putting messages on remote queues**: When an application puts a message on a remote queue (either by specifying the name of the remote queue directly, or by using a local definition of the remote queue), the local queue manager:

- Creates an MQXQH structure containing the embedded message descriptor
- Appends an MQMDE if one is needed and is not already present
- Appends the application message data
- Places the message on an appropriate transmission queue

**Putting messages directly on transmission queues**: An application can also put a message directly on a transmission queue. In this case the application must prefix the application message data with an MQXQH structure, and initialize the fields with appropriate values. In addition, the *Format* field in the *MsgDesc* parameter of the MQPUT or MQPUT1 call must have the value MQFMT_XMIT_Q_HEADER.

Character data in the MQXQH structure created by the application must be in the character set of the local queue manager (defined by the *CodedCharSetId* queue-manager attribute), and integer data must be in the native machine encoding. In addition, character data in the MQXQH structure must be padded with blanks to the defined length of the field; the data must not be ended prematurely by using a null character, because the queue manager does not convert the null and subsequent characters to blanks in the MQXQH structure.

However, the queue manager does not check that an MQXQH structure is present, or that valid values have been specified for the fields.

Applications should not put their messages directly to the SYSTEM.CLUSTER.TRANSMIT.QUEUE.

**Getting messages from transmission queues**: Applications that get messages from a transmission queue must process the information in the MQXQH structure in an appropriate fashion. The presence of the MQXQH structure at the beginning of the application message data is indicated by the value MQFMT_XMIT_Q_HEADER being returned in the *Format* field in the *MsgDesc* parameter of the MQGET call. The values returned in the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter indicate the character set and encoding of the character and integer data in the MQXQH structure. The character set and encoding of the application message data are defined by the *CodedCharSetId* and *Encoding* fields in the embedded message descriptor.

## *Fields for MQXQH*

The MQXQH structure contains the following fields; the fields are described in **alphabetical order**:

*MsgDesc (MQMD1)*

This is the embedded message descriptor, and is a close copy of the message descriptor MQMD that was specified as the *MsgDesc* parameter on the MQPUT or MQPUT1 call when the message was originally put to the remote queue.

**Note:** This is a version-1 MQMD.

The initial values of the fields in this structure are the same as those in the MQMD structure.

*RemoteQMgrName (MQCHAR48)*

This is the name of the queue manager or queue-sharing group that owns the queue that is the apparent eventual destination for the message.

If the message is a distribution-list message, *RemoteQMgrName* is blank.

The length of this field is given by MQ_Q_MGR_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*RemoteQName (MQCHAR48)*

This is the name of the message queue that is the apparent eventual destination for the message (this might prove not to be the eventual destination if, for example, this queue is defined at *RemoteQMgrName* to be a local definition of another remote queue).

If the message is a distribution-list message (that is, the *Format* field in the embedded message descriptor is MQFMT_DIST_HEADER), *RemoteQName* is blank.

The length of this field is given by MQ_Q_NAME_LENGTH. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

*StrucId (MQCHAR4)*

This is the structure identifier. The value must be:

**MQXQH_STRUC_ID**
Identifier for transmission-queue header structure.

For the C programming language, the constant MQXQH_STRUC_ID_ARRAY is also defined; this has the same value as MQXQH_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQXQH_STRUC_ID.

*Version (MQLONG)*

This is the structure version number. The value must be:

**MQXQH_VERSION_1**
Version number for transmission-queue header structure.

The following constant specifies the version number of the current version:

**MQXQH_CURRENT_VERSION**
Current version of transmission-queue header structure.

The initial value of this field is MQXQH_VERSION_1.

## *Initial values and language declarations for MQXQH*

*Table 549. Initial values of fields in MQXQH for MQXQH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQXQH_STRUC_ID | 'XQH¬' |
| *Version* | MQXQH_VERSION_1 | 1 |
| *RemoteQName* | None | Null string or blanks |
| *RemoteQMgrName* | None | Null string or blanks |
| *MsgDesc* | Same names and values as MQMD; see Table 504 on page 448 | - |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.
3. In the C programming language, the macro variable MQXQH_DEFAULT contains the values that are listed in the table. Use it in the following way to provide initial values for the fields in the structure:

```
MQXQH MyXQH = {MQXQH_DEFAULT};
```

*C declaration*

```
typedef struct tagMQXQH MQXQH;
struct tagMQXQH {
  MQCHAR4   StrucId;         /* Structure identifier */
  MQLONG    Version;         /* Structure version number */
  MQCHAR48  RemoteQName;     /* Name of destination queue */
  MQCHAR48  RemoteQMgrName;  /* Name of destination queue manager */
  MQMD1     MsgDesc;         /* Original message descriptor */
};
```

*COBOL declaration*

```
**   MQXQH structure
  10 MQXQH.
**    Structure identifier
   15 MQXQH-STRUCID                  PIC X(4).
**    Structure version number
   15 MQXQH-VERSION                  PIC S9(9) BINARY.
**    Name of destination queue
   15 MQXQH-REMOTEQNAME              PIC X(48).
**    Name of destination queue manager
   15 MQXQH-REMOTEQMGRNAME           PIC X(48).
**    Original message descriptor
   15 MQXQH-MSGDESC.
**     Structure identifier
    20 MQXQH-MSGDESC-STRUCID          PIC X(4).
**     Structure version number
    20 MQXQH-MSGDESC-VERSION          PIC S9(9) BINARY.
**     Report options
    20 MQXQH-MSGDESC-REPORT           PIC S9(9) BINARY.
**     Message type
    20 MQXQH-MSGDESC-MSGTYPE          PIC S9(9) BINARY.
**     Expiry time
    20 MQXQH-MSGDESC-EXPIRY           PIC S9(9) BINARY.
**     Feedback or reason code
    20 MQXQH-MSGDESC-FEEDBACK         PIC S9(9) BINARY.
**     Numeric encoding of message data
    20 MQXQH-MSGDESC-ENCODING         PIC S9(9) BINARY.
**     Character set identifier of message data
    20 MQXQH-MSGDESC-CODEDCHARSETID   PIC S9(9) BINARY.
**     Format name of message data
    20 MQXQH-MSGDESC-FORMAT           PIC X(8).
**     Message priority
    20 MQXQH-MSGDESC-PRIORITY         PIC S9(9) BINARY.
**     Message persistence
    20 MQXQH-MSGDESC-PERSISTENCE      PIC S9(9) BINARY.
**     Message identifier
    20 MQXQH-MSGDESC-MSGID            PIC X(24).
**     Correlation identifier
    20 MQXQH-MSGDESC-CORRELID         PIC X(24).
**     Backout counter
    20 MQXQH-MSGDESC-BACKOUTCOUNT     PIC S9(9) BINARY.
**     Name of reply-to queue
    20 MQXQH-MSGDESC-REPLYTOQ         PIC X(48).
**     Name of reply queue manager
    20 MQXQH-MSGDESC-REPLYTOQMGR      PIC X(48).
**     User identifier
    20 MQXQH-MSGDESC-USERIDENTIFIER   PIC X(12).
**     Accounting token
    20 MQXQH-MSGDESC-ACCOUNTINGTOKEN  PIC X(32).
**     Application data relating to identity
    20 MQXQH-MSGDESC-APPLIDENTITYDATA PIC X(32).
**     Type of application that put the message
    20 MQXQH-MSGDESC-PUTAPPLTYPE      PIC S9(9) BINARY.
**     Name of application that put the message
    20 MQXQH-MSGDESC-PUTAPPLNAME      PIC X(28).
**     Date when message was put
    20 MQXQH-MSGDESC-PUTDATE          PIC X(8).
**     Time when message was put
    20 MQXQH-MSGDESC-PUTTIME          PIC X(8).
**     Application data relating to origin
    20 MQXQH-MSGDESC-APPLORIGINDATA   PIC X(4).
```

*PL/I declaration*

```
dcl
 1 MQXQH based,
  3 StrucId           char(4),       /* Structure identifier */
  3 Version           fixed bin(31), /* Structure version number */
  3 RemoteQName       char(48),      /* Name of destination queue */
  3 RemoteQMgrName    char(48),      /* Name of destination queue
                                        manager */
  3 MsgDesc,                         /* Original message descriptor */
   5 StrucId          char(4),       /* Structure identifier */
   5 Version          fixed bin(31), /* Structure version number */
   5 Report           fixed bin(31), /* Report options */
   5 MsgType          fixed bin(31), /* Message type */
   5 Expiry           fixed bin(31), /* Expiry time */
   5 Feedback         fixed bin(31), /* Feedback or reason code */
   5 Encoding         fixed bin(31), /* Numeric encoding of message
                                        data */
   5 CodedCharSetId   fixed bin(31), /* Character set identifier of
                                        message data */
   5 Format           char(8),       /* Format name of message data */
   5 Priority         fixed bin(31), /* Message priority */
   5 Persistence      fixed bin(31), /* Message persistence */
   5 MsgId            char(24),      /* Message identifier */
   5 CorrelId         char(24),      /* Correlation identifier */
   5 BackoutCount     fixed bin(31), /* Backout counter */
   5 ReplyToQ         char(48),      /* Name of reply-to queue */
   5 ReplyToQMgr      char(48),      /* Name of reply queue manager */
   5 UserIdentifier   char(12),      /* User identifier */
   5 AccountingToken  char(32),      /* Accounting token */
   5 ApplIdentityData char(32),      /* Application data relating to
                                        identity */
   5 PutApplType      fixed bin(31), /* Type of application that put the
                                        message */
   5 PutApplName      char(28),      /* Name of application that put the
                                        message */
   5 PutDate          char(8),       /* Date when message was put */
   5 PutTime          char(8),       /* Time when message was put */
   5 ApplOriginData   char(4);       /* Application data relating to
                                        origin */
```

*High Level Assembler declaration*

```
MQXQH                          DSECT
MQXQH_STRUCID                  DS   CL4   Structure identifier
MQXQH_VERSION                  DS   F     Structure version number
MQXQH_REMOTEQNAME              DS   CL48  Name of destination queue
MQXQH_REMOTEQMGRNAME           DS   CL48  Name of destination queue
*                                         manager
MQXQH_MSGDESC                  DS   0F    Force fullword alignment
MQXQH_MSGDESC_STRUCID          DS   CL4   Structure identifier
MQXQH_MSGDESC_VERSION          DS   F     Structure version number
MQXQH_MSGDESC_REPORT           DS   F     Report options
MQXQH_MSGDESC_MSGTYPE          DS   F     Message type
MQXQH_MSGDESC_EXPIRY           DS   F     Expiry time
MQXQH_MSGDESC_FEEDBACK         DS   F     Feedback or reason code
MQXQH_MSGDESC_ENCODING         DS   F     Numeric encoding of message
*                                         data
MQXQH_MSGDESC_CODEDCHARSETID   DS   F     Character set identifier of
*                                         message data
MQXQH_MSGDESC_FORMAT           DS   CL8   Format name of message data
MQXQH_MSGDESC_PRIORITY         DS   F     Message priority
MQXQH_MSGDESC_PERSISTENCE      DS   F     Message persistence
MQXQH_MSGDESC_MSGID            DS   XL24  Message identifier
MQXQH_MSGDESC_CORRELID         DS   XL24  Correlation identifier
MQXQH_MSGDESC_BACKOUTCOUNT     DS   F     Backout counter
MQXQH_MSGDESC_REPLYTOQ         DS   CL48  Name of reply-to queue
MQXQH_MSGDESC_REPLYTOQMGR      DS   CL48  Name of reply queue manager
MQXQH_MSGDESC_USERIDENTIFIER   DS   CL12  User identifier
MQXQH_MSGDESC_ACCOUNTINGTOKEN  DS   XL32  Accounting token
MQXQH_MSGDESC_APPLIDENTITYDATA DS   CL32  Application data relating to
*                                         identity
MQXQH_MSGDESC_PUTAPPLTYPE      DS   F     Type of application that put
*                                         the message
MQXQH_MSGDESC_PUTAPPLNAME      DS   CL28  Name of application that put
*                                         the message
MQXQH_MSGDESC_PUTDATE          DS   CL8   Date when message was put
```

```
MQXQH_MSGDESC_PUTTIME           DS   CL8   Time when message was put
MQXQH_MSGDESC_APPLORIGINDATA    DS   CL4   Application data relating to
*                                          origin
MQXQH_MSGDESC_LENGTH            EQU  *-MQXQH_MSGDESC
                                ORG  MQXQH_MSGDESC
MQXQH_MSGDESC_AREA              DS   CL(MQXQH_MSGDESC_LENGTH)
*
MQXQH_LENGTH                    EQU  *-MQXQH
                                ORG  MQXQH
MQXQH_AREA                      DS   CL(MQXQH_LENGTH)
```

*Visual Basic declaration*

```
Type MQXQH
  StrucId        As String*4  'Structure identifier'
  Version        As Long      'Structure version number'
  RemoteQName    As String*48 'Name of destination queue'
  RemoteQMgrName As String*48 'Name of destination queue manager'
  MsgDesc        As MQMD1     'Original message descriptor'
End Type
```

# Function calls

This section gives information on all of the MQI calls that are possible. Descriptions, syntax, parameter information, usage notes, and language invocations for each possible language are given for each of the different calls.

## Call descriptions

This section describes MQI calls.


- “MQBACK - Back out changes” on page 607
- “MQBEGIN - Begin unit of work” on page 611
- “MQBUFMH - Convert buffer into message handle” on page 614
- “MQCB - Manage callback” on page 618
- “MQCB_FUNCTION - Callback function” on page 628
- “MQCLOSE - Close object” on page 629
- “MQCMIT - Commit changes” on page 637
- “MQCONN - Connect queue manager” on page 641
- “MQCONNX - Connect queue manager (extended)” on page 649
- “MQCRTMH - Create message handle” on page 654
- “MQCTL - Control callbacks” on page 658
- “MQDISC - Disconnect queue manager” on page 664
- “MQDLTMH - Delete message handle” on page 668
- “MQDLTMP - Delete message property” on page 670
- “MQGET - Get message” on page 673
- “MQINQ - Inquire object attributes” on page 685
- “MQINQMP - Inquire message property” on page 702
- “MQMHBUF - Convert message handle into buffer” on page 707
- “MQOPEN - Open object” on page 711
- “MQPUT - Put message” on page 729
- “MQPUT1 - Put one message” on page 742
- “MQSET - Set object attributes” on page 752
- “MQSETMP - Set message property” on page 758

- “MQSTAT - Retrieve status information” on page 763
- “MQMHBUF - Convert message handle into buffer” on page 707
- “MQSUB - Register subscription” on page 767
- “MQSUBRQ - Subscription request” on page 773

Online help on the UNIX platforms, in the form of *man* pages, is available for these calls.

**Note:** The calls associated with data conversion, MQXCNVC and MQ_DATA_CONV_EXIT, are in “Data-conversion exit” on page 879.

## *Conventions used in the call descriptions*

For each call, this collection of topics gives a description of the parameters and usage of the call in a format that is independent of programming language. This is followed by typical invocations of the call, and typical declarations of its parameters, in each of the supported programming languages.

**Important:** When coding IBM MQ API calls you must ensure that all relevant parameters (as described in the following sections) are provided. Failure to do so can produce unpredictable results.

The description of each call contains the following sections:

**Call name**
The call name, followed by a brief description of the purpose of the call.

**Parameters**
For each parameter, the name is followed by its data type in parentheses ( ) and one of the following:

**input**
You supply information in the parameter when you make the call.

**output**
The queue manager returns information in the parameter when the call completes or fails.

**input/output**
You supply information in the parameter when you make the call, and the queue manager changes the information when the call completes or fails.

For example:

*Compcode* (MQLONG) - output

In some cases, the data type is a structure. In all cases, there is more information about the data type or structure in “Elementary data types” on page 232.

The last two parameters in each call are a completion code and a reason code. The completion code indicates whether the call completed successfully, partially, or not at all. Further information about the partial success or the failure of the call is given in the reason code. For more information about each completion and reason code, see “Return codes” on page 847.

**Usage notes**
Additional information about the call, describing how to use it and any restrictions on its use.

**Assembler language invocation**
Typical invocation of the call, and declaration of its parameters, in assembler language.

**C invocation**
Typical invocation of the call, and declaration of its parameters, in C.

**COBOL invocation**
Typical invocation of the call, and declaration of its parameters, in COBOL.

**PL/I invocation**
Typical invocation of the call, and declaration of its parameters, in PL/I.

All parameters are passed by reference.

**Visual Basic invocation**
Typical invocation of the call, and declaration of its parameters, in Visual Basic.

Other notation conventions are:

**Constants**
Names of constants are shown in uppercase; for example, MQOO_OUTPUT. A set of constants having the same prefix is shown as follows: MQIA_*. See “Constants” on page 61 for the value of a constant.

**Arrays**
In some calls, parameters are arrays of character strings that do not have fixed sizes. In the descriptions of these parameters, a lowercase n represents a numeric constant. When you code the declaration for that parameter, replace the n with the numeric value that you require.

### *Using the calls in the C language*

Parameters that are *input only* and of type MQHCONN, MQHOBJ, MQHMSG, or MQLONG are passed by value. For all other parameters, the *address* of the parameter is passed by value.

You do not need to specify all parameters that are passed by address every time that you invoke a function. Where you do not need a particular parameter, specify a null pointer as the parameter on the function invocation, in place of the address of parameter data. Parameters for which this is possible are identified in the call descriptions.

No parameter is returned as the value of the call; in C terminology, this means that all calls return `void` .

*Declaring the Buffer parameter*

The `MQGET` , `MQPUT` , and `MQPUT1` calls each have one parameter that has an undefined data type: the *Buffer* parameter. Use this parameter to send and receive the application's message data.

Parameters of this sort are shown in the C examples as arrays of MQBYTE. You can declare the parameters in this way, but it is usually more convenient to declare them as the particular structure that describes the layout of the data in the message. The function prototype declares the parameter as a pointer-to-void, so that you can specify the address of any sort of data as the parameter on the call invocation.

Pointer-to-void is a pointer to data of undefined format. It is defined as:

```
typedef void *PMQVOID;
```

## MQBACK - Back out changes

The MQBACK call indicates to the queue manager that all the message gets and puts that have occurred since the last sync point are to be backed out.

Messages put as part of a unit of work are deleted; messages retrieved as part of a unit of work are reinstated on the queue.

- On z/OS, this call is used only by batch programs (including IMS batch DL/I programs).
- On IBM i, this call is not supported for applications running in compatibility mode.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

### Syntax

MQBACK (*Hconn*, *Compcode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

***Compcode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_OUTCOME_PENDING**
(2124, X'84C') Result of back-out operation is pending.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_ENVIRONMENT_ERROR**
(2012, X'7DC') Call not valid in environment.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OUTCOME_MIXED**
(2123, X'84B') Result of commit or back-out operation is mixed.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes

## Usage notes

1. You can use this call only when the queue manager itself coordinates the unit of work. This can be:
   - A local unit of work, where the changes affect only MQ resources.
   - A global unit of work, where the changes can affect resources belonging to other resource managers, as well as affecting MQ resources.

   For further details about local and global units of work, see "MQBEGIN - Begin unit of work" on page 611.
2. In environments where the queue manager does not coordinate the unit of work, use the appropriate back-out call instead of MQBACK. The environment might also support an implicit back out caused by the application terminating abnormally.
   - On z/OS, use the following calls:
     - Batch programs (including IMS batch DL/I programs) can use the MQBACK call if the unit of work affects only MQ resources. However, if the unit of work affects both MQ resources and resources belonging to other resource managers (for example, Db2®), use the SRRBACK call provided by the z/OS Recoverable Resource Service (RRS). The SRRBACK call backs out changes to resources belonging to the resource managers that have been enabled for RRS coordination.
     - CICS applications must use the `EXEC CICS SYNCPOINT ROLLBACK` command to back out the unit of work. Do not use the MQBACK call for CICS applications.
     - IMS applications (other than batch DL/I programs) must use IMS calls such as `ROLB` to back out the unit of work. Do not use the MQBACK call for IMS applications (other than batch DL/I programs).
   - On IBM i, use this call for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the `STRCMTCTL` command with the `CMTSCOPE(*JOB)` parameter must not have been issued for the job.
3. If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 664 for further details.
4. When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
   - The values of the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* fields in MQMD.
   - Whether the message is part of a unit of work.
   - For the MQPUT call: whether the message is persistent or nonpersistent.

   The queue manager keeps *three* sets of group and segment information, one set for each of the following:
   - The last successful MQPUT call (this can be part of a unit of work).
   - The last successful MQGET call that removed a message from the queue (this can be part of a unit of work).
   - The last successful MQGET call that browsed a message on the queue (this *cannot* be part of a unit of work).
5. The information associated with the MQGET call is restored to the value that it had before the first successful MQGET call for that queue handle in the current unit of work.

Queues that were updated by the application after the unit of work started, but outside the scope of the unit of work, do not have their group and segment information restored if the unit of work is backed out.

Restoring the group and segment information to its previous value when a unit of work is backed out allows the application to spread a large message group or large logical message consisting of many segments across several units of work, and to restart at the correct point in the message group or logical message if one of the units of work fails.

Using several units of work might be advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to be able to restart putting or getting messages at the correct point if a system failure occurs.

For details of how to restart at the correct point after a system failure, see the MQPMO_LOGICAL_ORDER option described in "MQPMO - Put-message options" on page 480, and the MQGMO_LOGICAL_ORDER option described in "MQGMO - Get-message options" on page 355.

The remaining usage notes apply only when the queue manager coordinates the units of work.

6. A unit of work has the same scope as a connection handle. All MQ calls that affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See the *Hconn* parameter described in "MQCONN - Connect queue manager" on page 641 for information about the scope of connection handles.
7. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
8. A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but that never issues a commit or backout call, can fill queues with messages that are not available to other applications. To guard against this possibility, the administrator must set the *MaxUncommittedMsgs* queue-manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.

## C invocation

```
MQBACK (Hconn, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQBACK' USING HCONN, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQBACK (Hconn, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQBACK,(HCONN,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS  F  Connection handle
COMPCODE  DS  F  Completion code
REASON    DS  F  Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQBACK Hconn, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn    As Long 'Connection handle'
Dim CompCode As Long 'Completion code'
Dim Reason   As Long 'Reason code qualifying CompCode'
```

## MQBEGIN - Begin unit of work

The MQBEGIN call begins a unit of work that is coordinated by the queue manager, and that can involve external resource managers.

### Syntax

MQBEGIN (*Hconn*, *BeginOptions*, *Compcode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

*Hconn* must be a nonshared connection handle. If a shared connection handle is specified, the call fails with reason code MQRC_HCONN_ERROR. See the description of the MQCNO_HANDLE_SHARE_* options in “MQCNO - Connect options” on page 310 for more information about shared and nonshared handles.

***BeginOptions***

Type: MQBO - input/output

These are options that control the action of MQBEGIN, as described in “MQBO - Begin options” on page 273.

If no options are required, programs written in C or S/390 assembler can specify a null parameter address, instead of specifying the address of an MQBO structure.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_NO_EXTERNAL_PARTICIPANTS**
(2121, X'849') No participating resource managers registered.

**MQRC_PARTICIPANT_NOT_AVAILABLE**
(2122, X'84A') Participating resource manager not available.

If *CompCode* is MQCC_FAILED:

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_BO_ERROR**
(2134, X'856') Begin-options structure not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_ENVIRONMENT_ERROR**
(2012, X'7DC') Call not valid in environment.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UOW_IN_PROGRESS**
(2128, X'850') Unit of work already started.

For more information about these reason codes, see Messages and reason codes.

## Usage notes

1. Use the MQBEGIN call to start a unit of work that is coordinated by the queue manager and that might involve changes to resources owned by other resource managers. The queue manager supports three types of unit-of-work:
   - **Queue-manager-coordinated local unit of work**: A unit of work in which the queue manager is the only resource manager participating, and so the queue manager acts as the unit-of-work coordinator.
     - To start this type of unit of work, specify the MQPMO_SYNCPOINT or MQGMO_SYNCPOINT option on the first MQPUT, MQPUT1, or MQGET call in the unit of work.
     - To commit or back out this type of unit of work, use the MQCMIT or MQBACK call.
   - **Queue-manager-coordinated global unit of work**: A unit of work in which the queue manager acts as the unit-of-work coordinator, both for MQ resources *and* for resources belonging to other resource managers. Those resource managers cooperate with the queue manager to ensure that all changes to resources in the unit of work are committed or backed out together.
     - To start this type of unit of work, use the MQBEGIN call.
     - To commit or back out this type of unit of work, use the MQCMIT and MQBACK calls.
   - **Externally-coordinated global unit of work**: A unit of work in which the queue manager is a participant, but the queue manager does not act as the unit-of-work coordinator. Instead, there is an external unit-of-work coordinator with which the queue manager cooperates.
     - To start this type of unit of work, use the relevant call provided by the external unit-of-work coordinator.

       If the MQBEGIN call is used to try to start the unit of work, the call fails with reason code MQRC_ENVIRONMENT_ERROR.
     - To commit or back out this type of unit of work, use the commit and back-out calls provided by the external unit-of-work coordinator.

       If you use the MQCMIT or MQBACK call to commit or back out the unit of work, the call fails with reason code MQRC_ENVIRONMENT_ERROR.
2. If the application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 664 for further details.
3. An application can participate in only one unit of work at a time. The MQBEGIN call fails with reason code MQRC_UOW_IN_PROGRESS if there is already a unit of work in existence for the application, regardless of which type of unit of work it is.
4. The MQBEGIN call is not valid in an MQ MQI client environment. An attempt to use the call fails with reason code MQRC_ENVIRONMENT_ERROR.
5. When the queue manager is acting as the unit-of-work coordinator for global units of work, the resource managers that can participate in the unit of work are defined in the queue manager configuration file.
6. On IBM i, the three types of unit of work are supported as follows:
   - **Queue-manager-coordinated local unit of work** can be used only when a commitment definition does not exist at the job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must not have been issued for the job.
   - **Queue-manager-coordinated global unit of work** is not supported.
   - **Externally-coordinated global unit of work** can be used only when a commitment definition exists at job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must have been issued for the job. If this has been done, the IBM i COMMIT and ROLLBACK operations apply to MQ resources as well as to resources belonging to other participating resource managers.

### C invocation

```
MQBEGIN (Hconn, &BeginOptions, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQBO     BeginOptions;  /* Options that control the action of MQBEGIN */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

### COBOL invocation

```
CALL 'MQBEGIN' USING HCONN, BEGINOPTIONS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Options that control the action of MQBEGIN
 01  BEGINOPTIONS.
     COPY CMQBOV.
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQBEGIN (Hconn, BeginOptions, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn         fixed bin(31);  /* Connection handle */
dcl BeginOptions  like MQBO;      /* Options that control the action of
                                     MQBEGIN */
dcl CompCode      fixed bin(31);  /* Completion code */
dcl Reason        fixed bin(31);  /* Reason code qualifying CompCode */
```

### Visual Basic invocation

```
MQBEGIN Hconn, BeginOptions, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn        As Long 'Connection handle'
Dim BeginOptions As MQBO 'Options that control the action of MQBEGIN'
Dim CompCode     As Long 'Completion code'
Dim Reason       As Long 'Reason code qualifying CompCode'
```

## MQBUFMH - Convert buffer into message handle

The MQBUFMH function call converts a buffer into a message handle and is the inverse of the MQMHBUF call.

This call takes a message descriptor and MQRFH2 properties in the buffer and makes them available through a message handle. The MQRFH2 properties in the message data are, optionally, removed. The

*Encoding*, *CodedCharSetId*, and *Format* fields of the message descriptor are updated, if necessary, to correctly describe the contents of the buffer after the properties have been removed.

## Syntax

MQBUFMH (*Hconn*, *Hmsg*, *BufMsgHOpts*, *MsgDesc*, *BufferLength*, *Buffer*, *DataLength*, *Compcode*, *Reason*)

## Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using MQHC_UNASSOCIATED_HCONN, a valid connection must be established on the thread converting a buffer into a message handle. If a valid connection is not established, the call fails with MQRC_CONNECTION_BROKEN.

***Hmsg***
Type: MQHMQSG - input

This is the message handle for which a buffer is required. The value was returned by a previous MQCRTMH call.

***BufMsgHOpts***
Type: MQBMHO - input

The MQBMHO structure allows applications to specify options that control how message handles are produced from buffers.

See "MQBMHO - Buffer to message handle options" on page 271 for details.

***MsgDesc***
Type: MQMD - input/output

The *MsgDesc* structure contains the message descriptor properties and describes the contents of the buffer area.

On output from the call, the properties are optionally removed from the buffer area and, in this case, the message descriptor is updated to correctly describe the buffer area.

Data in this structure must be in the character set and encoding of the application.

***BufferLength***
Type: MQLONG - input

*BufferLength* is the length of the Buffer area, in bytes.

A *BufferLength* of zero bytes is valid, and indicates that the buffer area contains no data.

***Buffer***
Type: MQBYTExBufferLength - input/output

These are options that control the action of MQBEGIN, as described in "MQBEGIN - Begin unit of work" on page 611.

*Buffer* defines the area containing the message buffer. For most data, you should align the buffer on a 4-byte boundary.

If *Buffer* contains character or numeric data, set the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter to the values appropriate to the data; this enables the data to be converted, if necessary.

If properties are found in the message buffer they are optionally removed; they later become available from the message handle on return from the call.

In the C programming language, the parameter is declared as a pointer-to-void, which means the address of any type of data can be specified as the parameter.

If the *BufferLength* parameter is zero, *Buffer* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler can be null.

***DataLength***
Type: MQLONG - output

The length, in bytes, of the buffer which might have the properties removed.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BMHO_ERROR**
(2489, X'09B9') Buffer to message handle options structure not valid.

**MQRC_BUFFER_ERROR**
(2004, X'07D4') Buffer parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'07D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CONNECTION_BROKEN**
(2009, X'07D9') Connection to queue manager lost.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle not valid.

**MQRC_MD_ERROR**
(2026, X'07EA') Message descriptor not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_RFH_ERROR**
(2334, X'091E') MQRFH2 structure not valid.

**MQRC_RFH_FORMAT_ERROR**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

MQBUFMH calls cannot be intercepted by API exits - a buffer is converted into a message handle in the application space; the call does not reach the queue manager.

## C invocation

```
MQBUFMH (Hconn, Hmsg, &BufMsgHOpts, &MsgDesc, BufferLength, Buffer,
         &DataLength, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN Hconn;        /* Connection handle */
MQHMSG  Hmsg;         /* Message handle */
MQBMHO  BufMsgHOpts;  /* Options that control the action of MQBUFMH */
MQMD    MsgDesc;      /* Message descriptor */
MQLONG  BufferLength; /* Length in bytes of the Buffer area */
MQBYTE  Buffer[n];    /* Area to contain the message buffer */
MQLONG  DataLength;   /* Length of the output buffer */
MQLONG  CompCode;     /* Completion code */
MQLONG  Reason;       /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQBUFMH' USING HCONN, HMSG, BUFMSGHOPTS, MSGDESC, BUFFERLENGTH,
                           BUFFER, DATALENGTH, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Message handle
 01  HMSG          PIC S9(18) BINARY.
**   Options that control the action of MQBUFMH
 01  BUFMSGHOPTS.
     COPY CMQBMHOV.
**   Message descriptor
 01  MSGDESC.
     COPY CMQMD.
**   Length in bytes of the Buffer area
 01  BUFFERLENGTH  PIC S9(9) BINARY.
**   Area to contain the message buffer
 01  BUFFER        PIC X(n).
**   Length of the output buffer
 01  DATALENGTH    PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQBUFMH (Hconn, Hmsg, BufMsgHOpts, MsgDesc, BufferLength, Buffer,
DataLength, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn        fixed bin(31); /* Connection handle */
dcl Hmsg         fixed bin(63); /* Message handle */
dcl BufMsgHOpts  like MQBMHO;   /* Options that control the action of
                                   MQBUFMH */
dcl MsgDesc      like MQMD;     /* Message descriptor */
dcl BufferLength fixed bin(31); /* Length in bytes of the Buffer area */
dcl Buffer       char(n);       /* Area to contain the message buffer */
dcl DataLength   fixed bin(31); /* Length of the output buffer */
dcl CompCode     fixed bin(31); /* Completion code */
dcl Reason       fixed bin(31); /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQBUFMH,(HCONN,HMSG,BUFMSGHOPTS,MSGDESC,BUFFERLENGTH,BUFFER,
               DATALENGTH,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN        DS       F      Connection handle
HMSG         DS       D      Message handle
BUFMSGHOPTS  CMQBMHOA ,      Options that control the action of MQBUFMH
MSGDESC      CMQMDA   ,      Message descriptor
BUFFERLENGTH DS       F      Length in bytes of the BUFFER area
BUFFER       DS       CL(n)  Area to contain the properties
DATALENGTH   DS       F      Length of the output buffer
COMPCODE     DS       F      Completion code
REASON       DS       F      Reason code qualifying COMPCODE
```

## MQCB - Manage callback

The MQCB call registers a callback for the specified object handle and controls activation and changes to the callback.

A callback is a piece of code (specified as either the name of a function that can be dynamically linked or as function pointer) that is called by IBM MQ when certain events occur.

To use MQCB and MQCTL on a client you must be connected to a server where the negotiated **SHARECNV** parameter of the channel has agreed a non-zero value.

The types of callback that can be defined are:

**Message consumer**
A message consumer callback function is called when a message, meeting the selection criteria specified, is available on an object handle.

Only one callback function can be registered against each object handle. If a single queue is to be read with multiple selection criteria then the queue must be opened multiple times and a consumer function registered on each handle.

**Event handler**
The event handler is called for conditions that affect the whole callback environment.

The function is called when an event condition occurs, for example, a queue manager or connection stopping or quiescing.

The function is not called for conditions that are specific to a single message consumer, for example MQRC_GET_INHIBITED; it is called however if a callback function does not end normally.

### Syntax

MQCB (*Hconn*, *Operation*, *CallbackDesc*, *Hobj*, *MsgDesc*, *GetMsgOpts*, *CompCode*, *Reason*)

## Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, you can specify the following special value for *MQHC_DEF_HCONN* to use the connection handle associated with this execution unit.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Operation***

Type: MQLONG - input

The operation being processed on the callback defined for the specified object handle. You must specify one of the following options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**MQOP_REGISTER**

Define the callback function for the specified object handle. This operation defines the function to be called and the selection criteria to be used.

If a callback function is already defined for the object handle the definition is replaced. If an error is detected while replacing the callback, the function is deregistered.

If a callback is registered in the same callback function in which it was previously deregistered, this is treated as a replace operation; any initial or final calls are not invoked.

You can use MQOP_REGISTER with MQOP_SUSPEND or MQOP_RESUME.

**MQOP_DEREGISTER**

Stop the consuming of messages for the object handle and removes the handle from those eligible for a callback.

A callback is automatically deregistered if the associated handle is closed.

If MQOP_DEREGISTER is called from within a consumer, and the callback has a stop call defined, it is invoked upon return from the consumer.

If this operation is issued against an *Hobj* with no registered consumer, the call returns with MQRC_CALLBACK_NOT_REGISTERED.

**MQOP_SUSPEND**

Suspends the consuming of messages for the object handle.

If this operation is applied to an event handler, the event handler does not get events while suspended, and any events missed while in the suspended state are not provided to the operation when it is resumed.

While suspended, the consumer function continues to get the control type callbacks.

**MQOP_RESUME**

Resume the consuming of messages for the object handle.

If this operation is applied to an event handler, the event handler does not get events while suspended, and any events missed while in the suspended state are not provided to the operation when it is resumed.

***CallbackDesc***

Type: MQCBD - input

This is a structure that identifies the callback function that is being registered by the application and the options used when registering it.

See MQCBD for details of the structure.

Callback descriptor is required only for the MQOP_REGISTER option; if the descriptor is not required, the parameter address passed can be null.

***Hobj***

Type: MQHOBJ - input

This handle represents the access that has been established to the object from which a message is to be consumed. This is a handle that has been returned from a previous MQOPEN or MQSUB call (in the *Hobj* parameter).

*Hobj* is not required when defining an event handler routine (MQCBT_EVENT_HANDLER) and should be specified as MQHO_NONE.

If *Hobj* has been returned from an MQOPEN call, the queue must have been opened with one or more of the following options:

- MQOO_INPUT_SHARED
- MQOO_INPUT_EXCLUSIVE
- MQOO_INPUT_AS_Q_DEF
- MQOO_BROWSE

***MsgDesc***

Type: MQMD - input

This structure describes the attributes of the message required, and the attributes of the message retrieved.

The *MsgDesc* parameter defines the attributes of the messages required by the consumer, and the version of the MQMD to be passed to the message consumer.

The *MsgId*, *CorrelId*, *GroupId*, *MsgSeqNumber*, and *Offset* in the MQMD are used for message selection, depending on the options specified in the *GetMsgOpts* parameter.

The *Encoding* and *CodedCharSetId* are used for message conversion if you specify the MQGMO_CONVERT option.

See MQMD for details.

*MsgDesc* is used for MQOP_REGISTER and if you require values other than the default for any fields. *MsgDesc* is not used for an event handler.

If the descriptor is not required the parameter address passed can be null.

Note, that if multiple consumers are registered against the same queue with overlapping selectors, the chosen consumer for each message is undefined.

***GetMsgOpts***

Type: MQGMO - input

The *GetMsgOpts* parameter controls how the message consumer gets messages. All options of this parameter have meanings as described in "MQGMO - Get-message options" on page 355, when used on an MQGET call, except:

**MQGMO_SET_SIGNAL**
This option is not permitted.

**MQGMO_BROWSE_FIRST, MQGMO_BROWSE_NEXT, MQGMO_MARK_***
The order of messages delivered to a browsing consumer is dictated by the combinations of these options. Significant combinations are:

**MQGMO_BROWSE_FIRST**
The first message on the queue is delivered repeatedly to the consumer. This is useful when the consumer destructively consumes the message in the callback. Use this option with care.

**MQGMO_BROWSE_NEXT**
The consumer is given each message on the queue, from the current cursor position until the end of the queue is reached.

**MQGMO_BROWSE_FIRST + MQGMO_BROWSE_NEXT**
The cursor is reset to the start of the queue. The consumer is then given each message until the cursor reaches the end of the queue.

**MQGMO_BROWSE_FIRST + MQGMO_MARK_***
Starting at the beginning of the queue, the consumer is given the first nonmarked message on the queue, which is then marked for this consumer. This combination ensures that the consumer can receive new messages added behind the current cursor point.

**MQGMO_BROWSE_NEXT + MQGMO_MARK_***
Starting at the cursor position, the consumer is given the next nonmarked message on the queue, which is then marked for this consumer. Use this combination with care because messages can be added to the queue behind the current cursor position.

**MQGMO_BROWSE_FIRST + MQGMO_BROWSE_NEXT + MQGMO_MARK_***
This combination is not permitted. If used the call returns MQRC_OPTIONS_ERROR.

**MQGMO_NO_WAIT, MQGMO_WAIT, and WaitInterval**
These options control how the consumer is invoked.

**MQGMO_NO_WAIT**
The consumer is never called with MQRC_NO_MSG_AVAILABLE. The consumer is only called for messages and events.

**MQGMO_WAIT with a zero WaitInterval**
The MQRC_NO_MSG_AVAILABLE code is passed to the consumer when there are no messages available and either the consumer has been started or the consumer has been delivered at least one message since the last "no messages" reason code.

This prevents the consumer from polling in a busy loop when a zero wait interval is specified.

**MQGMO_WAIT and a positive WaitInterval**
The consumer is called after the specified wait interval with reason code MQRC_NO_MSG_AVAILABLE. This call is made regardless of whether any messages have been delivered to the consumer. This allows the user to perform heartbeat or batch type processing.

**MQGMO_WAIT and WaitInterval of MQWI_UNLIMITED**
This specifies an infinite wait before returning MQRC_NO_MSG_AVAILABLE. The consumer is never called with MQRC_NO_MSG_AVAILABLE.

*GetMsgOpts* is used only for MQOP_REGISTER and if you require values other than the default for any fields. *GetMsgOpts* is not used for an event handler.

If the *GetMsgOpts* are not required, the parameter address passed can be null. Using this parameter is the same as specifying MQGMO_DEFAULT together with MQGMO_FAIL_IF_QUIESCING.

If a message properties handle is provided in the MQGMO structure, a copy is provided in the MQGMO structure that is passed into the consumer callback. On return from the MQCB call, the application can delete the message properties handle.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason codes in the following list are the ones that the queue manager can return for the *Reason* parameter.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_CONV_LOAD_ERROR**
(2133, X'855') Unable to load data conversion services modules.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CALLBACK_LINK_ERROR**
(2487, X'9B7') Incorrect callback type field.

**MQRC_CALLBACK_NOT_REGISTERED**
(2448, X'990') Unable to unregister, suspend, or resume because there is no registered callback.

**MQRC_CALLBACK_ROUTINE_ERROR**
(2486, X'9B6') Either *CallbackFunction* or *CallbackName* must be specified but not both.

**MQRC_CALLBACK_TYPE_ERROR**
(2483, X'9B3') Incorrect callback type field.

**MQRC_CBD_OPTIONS_ERROR**
(2484, X'9B4') Incorrect MQCBD options field.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CORREL_ID_ERROR**
(2207, X'89F') Correlation-identifier error.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'7DA') Data length parameter not valid.

**MQRC_FUNCTION_NOT_SUPPORTED**
(2298, X'8FA') The function requested is not available in the current environment.

**MQRC_GET_INHIBITED**
(2016, X'7E0') Gets inhibited for the queue.

**MQRC_GLOBAL_UOW_CONFLICT**
(2351, X'92F') Global units of work conflict.

**MQRC_GMO_ERROR**
(2186, X'88A') Get-message options structure not valid.

**MQRC_HANDLE_IN_USE_FOR_UOW**
(2353, X'931') Handle in use for global unit of work.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_INCONSISTENT_BROWSE**
(2259, X'8D3') Inconsistent browse specification.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_INVALID_MSG_UNDER_CURSOR**
(2246, X'8C6') Message under cursor not valid for retrieval.

**MQRC_LOCAL_UOW_CONFLICT**
(2352, X'930') Global unit of work conflicts with local unit of work.

**MQRC_MATCH_OPTIONS_ERROR**
(2247, X'8C7') Match options not valid.

**MQRC_MAX_MSG_LENGTH_ERROR**
(2485, X'9B4') Incorrect *MaxMsgLength* field.

**MQRC_MD_ERROR**
(2026, X'7EA') Message descriptor not valid.

**MQRC_MODULE_ENTRY_NOT_FOUND**
(2497, X'9C1') The specified function entry point could not be found in the module.

**MQRC_MODULE_INVALID**
(2496, X'9C0') Module found, however it is of the wrong type; not 32 bit, 64 bit, or a valid dynamic link library.

**MQRC_MODULE_NOT_FOUND**
(2495, X'9BF') Module not found in the search path or not authorized to load.

**MQRC_MSG_SEQ_NUMBER_ERROR**
(2250, X'8CA') Message sequence number not valid.

**MQRC_MSG_TOKEN_ERROR**
(2331, X'91B') Use of message token not valid.

**MQRC_NO_MSG_AVAILABLE**
(2033, X'7F1') No message available.

**MQRC_NO_MSG_UNDER_CURSOR**
(2034, X'7F2') Browse cursor not positioned on message.

**MQRC_NOT_OPEN_FOR_BROWSE**
(2036, X'7F4') Queue not open for browse.

**MQRC_NOT_OPEN_FOR_INPUT**
(2037, X'7F5') Queue not open for input.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OPERATION_ERROR**
(2206, X'89E') Incorrect operation code on API Call.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_INDEX_TYPE_ERROR**
(2394, X'95A') Queue has wrong index type.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SIGNAL_OUTSTANDING**
(2069, X'815') Signal outstanding for this handle.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_SYNCPOINT_LIMIT_REACHED**
(2024, X'7E8') No more messages can be handled within current unit of work.

**MQRC_SYNCPOINT_NOT_AVAILABLE**
(2072, X'818') Sync point support not available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UOW_ENLISTMENT_ERROR**
(2354, X'932') Enlistment in global unit of work failed.

**MQRC_UOW_MIX_NOT_SUPPORTED**
(2355, X'933') Mixture of unit-of-work calls not supported.

**MQRC_UOW_NOT_AVAILABLE**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**MQRC_WAIT_INTERVAL_ERROR**
(2090, X'82A') Wait interval in MQGMO not valid.

**MQRC_WRONG_GMO_VERSION**
(2256, X'8D0') Wrong version of MQGMO supplied.

**MQRC_WRONG_MD_VERSION**
(2257, X'8D1') Wrong version of MQMD supplied.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. MQCB is used to define the action to be invoked for each message, matching the specified criteria, available on the queue. When the action is processed, either the message is removed from the queue and passed to the defined message consumer, or a message token is provided, which is used to retrieve the message.
2. MQCB can be used to define callback routines before starting consumption with MQCTL or it can be used from within a callback routine.
3. To use MQCB from outside of a callback routine, you must first suspend message consumption by using MQCTL and resume consumption afterward.
4. MQCB is not supported within the IMS adapter.

## Message consumer callback sequence

You can configure a consumer to invoke callback at key points during the lifecycle of the consumer. For example:

- when the consumer is first registered,
- when the connection is started,
- when the connection is stopped and
- when the consumer is deregistered, either explicitly, or implicitly by an MQCLOSE.

*Table 550. MQCTL verb definitions*

| **Verb** | **Meaning** |
|---|---|
| MQCTL(START) | MQCTL call using the MQOP_START Operation |
| MQCTL(STOP) | MQCTL call using the MQOP_STOP Operation |
| MQCTL(WAIT) | MQCTL call using the MQOP_START_WAIT Operation |

This allows the consumer to maintain state associated with the consumer. When a callback is requested by an application, the rules for consumer invocation are as follows:

**REGISTER**
Is always the first type of invocation of the callback.

Is always called on the same thread, as the MQCB(REGISTER) call.

**START**
Is always called synchronously with the MQCTL(START) verb.

- All START callbacks are completed before the MQCTL(START) verb returns.

Is on the same thread as the message delivery if THREAD_AFFINITY is requested.

The call with start is not guaranteed if, for example, a previous callback issues MQCTL(STOP) during the MQCTL(START).

**STOP**
No further messages or events are delivered after this call until the connection is restarted.

A STOP is guaranteed if the application was previously called for START, or a message, or an event.

**DEREGISTER**
Is always the last type of invocation of the callback.

Ensure that your application performs thread-based initialization and cleanup in the START and STOP callbacks. You can do non-thread based initialization and cleanup with REGISTER and DEREGISTER callbacks.

Do not make any assumptions about the life and availability of the thread other than what is stated. For example, do not rely on a thread staying alive beyond the last call to DEREGISTER. Similarly, when you have chosen not to use THREAD_AFFINITY, do not assume that the thread exists whenever the connection is started.

If your application has particular requirements for thread characteristics, it can always create a thread accordingly, then use MQCTL(WAIT). This has the effect of 'donating' the thread to IBM MQ for asynchronous message delivery.

## Message consumer connection usage

You can configure a consumer to invoke callback at key points during the lifecycle of the consumer. For example:

- when the consumer is first registered,
- when the connection is started,
- when the connection is stopped and
- when the consumer is deregistered, either explicitly, or implicitly by an MQCLOSE.

*Table 551. MQCTL verb definitions*

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| MQCTL(WAIT) | MQCTL call using the MQOP_START_WAIT Operation |

This allows the consumer to maintain state associated with the consumer. When a callback is requested by an application, the rules for consumer invocation are as follows:

**REGISTER**
Is always the first type of invocation of the callback.

Is always called on the same thread, as the MQCB(REGISTER) call.

**START**
Is always called synchronously with the MQCTL(START) verb.

- All START callbacks are completed before the MQCTL(START) verb returns.

Is on the same thread as the message delivery if THREAD_AFFINITY is requested.

The call with start is not guaranteed if, for example, a previous callback issues MQCTL(STOP) during the MQCTL(START).

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No further messages or events are delivered after this call until the connection is restarted.

A STOP is guaranteed if the application was previously called for START, or a message, or an event.

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Is always the last type of invocation of the callback.

Ensure that your application performs thread-based initialization and cleanup in the START and STOP callbacks. You can do non-thread based initialization and cleanup with REGISTER and DEREGISTER callbacks.

Do not make any assumptions about the life and availability of the thread other than what is stated. For example, do not rely on a thread staying alive beyond the last call to DEREGISTER. Similarly, when you have chosen not to use THREAD_AFFINITY, do not assume that the thread exists whenever the connection is started.

If your application has particular requirements for thread characteristics, it can always create a thread accordingly, then use MQCTL(WAIT). This has the effect of 'donating' the thread to IBM MQ for asynchronous message delivery.

## C invocation

```
MQCB (Hconn, Operation, CallbackDesc, Hobj, MsgDesc,
GetMsgOpts, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQLONG   Operation;     /* Operation being processed */
MQCBD    CallbackDesc;  /* Callback descriptor */
MQHOBJ   HObj           /* Object handle */
MQMD     MsgDesc        /* Message descriptor attributes */
MQGMO    GetMsgOpts     /* Message options */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQCB' USING HCONN, OPERATION, CBDESC, HOBJ, MSGDESC,
           GETMSGOPTS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN    PIC S9(9) BINARY.
**   Operation
 01  OPERATION PIC S9(9) BINARY.
**   Callback Descriptior
 01  CBDESC.
     COPY CMQCBDV.
01  HOBJ     PIC S9(9) BINARY.
**   Message Descriptior
 01  MSGDESC.
     COPY CMQMDV.
**   Get Message Options
 01  GETMSGOPTS.
     COPY CMQGMOV.
**   Completion code
 01  COMPCODE PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON   PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQCB(Hconn, Operation, CallbackDesc, Hobj, MsgDesc, GetMsgOpts,
          CompCode, Reason)
```

Declare the parameters as follows:

```
dcl Hconn        fixed bin(31); /* Connection handle */
dcl Operation    fixed bin(31); /* Operation */
dcl CallbackDesc like MQCBD;    /* Callback Descriptor */
dcl Hobj         fixed bin(31); /* Object Handle */
dcl MsgDesc      like MQMD;     /* Message Descriptor */
dcl GetMsgOpts   like MQGMO;    /* Get Message Options */
dcl CompCode     fixed bin(31); /* Completion code */
dcl Reason       fixed bin(31); /* Reason code qualifying CompCode */
```

## MQCB_FUNCTION - Callback function

The MQCB_FUNCTION function call is the callback function for event handling and asynchronous message consumption.

The MQCB_FUNCTION call definition is provided solely to describe the parameters that are passed to the callback function. No entry point called MQCB_FUNCTION is provided by the queue manager.

The specification of the actual function to be called is an input to the MQCB call and is passed in through the MQCBD structure.

### Syntax

MQCB_FUNCTION (*Hconn*, *MsgDesc*, *GetMsgOpts*, *Buffer*, *Context*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call. On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for Hconn:

**MQHC_DEF_CONN**

Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***MsgDesc***

Type: MQMD - input

This structure describes the attributes of the message retrieved.

See “MQMD - Message descriptor” on page 402 for details.

The version of MQMD passed is the same version as passed on the MQCB call that defined the consumer function.

The address of the MQMD is passed as null characters if a version 4 MQGMO was used to request that a Message Handle be returned instead of an MQMD.

This is an input field to the message consumer function; it is not relevant to an event handler function.

***GetMsgOpts***

Type: MQGMO - input

Options used to control the actions of the message consumer. This parameter also contains additional information about the message returned.

See MQGMO for details.

The version of MQGMO passed is the latest version supported.

This is an input field to the message consumer function; it is not relevant to an event handler function.

***Buffer***

Type: MQBYTExBufferLength - input

This is the area containing the message data.

If no message is available for this call, or if the message contains no message data, the address of the *Buffer* is passed as nulls.

This is an input field to the message consumer function; it is not relevant to an event handler function.

***Context***
Type: MQCBC - input/output

This structure provides context information to the callback functions. See "MQCBC - Callback context" on page 275 for details.

### Usage notes

1. Be aware that if your callback routines use services that could delay or block the thread, for example, MQGET with wait, could delay the dispatch of other callbacks.
2. A separate unit of work is not automatically established for each invocation of a callback routine, so routines can either issue a commit call, or defer committing, until a logical batch of work has been processed. When the batch of work is committed, it commits the messages for all callback functions that have been invoked since the last sync point.
3. Programs invoked by CICS LINK or CICS START retrieve parameters using CICS services through named objects known as channel containers. The container names are the same as the parameter names. For more information, see your CICS documentation.
4. Callback routines can issue an MQDISC call, but not for their own connection. For example, if a callback routine has created a connection, then it can also disconnect the connection.
5. A callback routine should not, in general, rely on being invoked from the same thread each time. If required, use the MQCTLO_THREAD_AFFINITY when the connection is started.
6. When a callback routine receives a nonzero reason code, it must take appropriate action.
7. MQCB_FUNCTION is not supported within the IMS adapter.

## MQCLOSE - Close object

The MQCLOSE call relinquishes access to an object, and is the inverse of the MQOPEN and MQSUB calls.

### Syntax

MQCLOSE (*Hconn*, *Hobj*, *Options*, *CompCode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, you can omit the MQCONN call, and specify the following value for *Hconn*:

**MQHC_DEF_HCONN**
Default connection handle.

***Hobj***
Type: MQHOBJ - input/output

This handle represents the object that is being closed. The object can be of any type. The value of *Hobj* was returned by a previous MQOPEN call.

On successful completion of the call, the queue manager sets this parameter to a value that is not a valid handle for the environment. This value is:

**MQHO_UNUSABLE_HOBJ**
Unusable object handle.

On z/OS, *Hobj* is set to a value that is undefined.

***Options***

Type: MQLONG - input

This parameter controls how the object is closed.

Only permanent dynamic queues and subscriptions can be closed in more than one way, because they must be either retained or deleted; these are queues with the *DefinitionType* attribute that has the value MQQDT_PERMANENT_DYNAMIC (see the *DefinitionType* attribute described in "Attributes for queues" on page 810 ). The close options are summarized in this topic.

Durable subscriptions can either be kept or removed; these are created using the MQSUB call with the MQSO_DURABLE option.

When closing the handle to a managed destination (that is the *Hobj* parameter returned on an MQSUB call which used the MQSO_MANAGED option) the queue manager cleans up any publications that have not been retrieved when the associated subscription has also been removed. The subscription is removed using the MQCO_REMOVE_SUB option on the *Hsub* parameter returned on an MQSUB call. Note MQCO_REMOVE_SUB is the default behavior on MQCLOSE for a non-durable subscription.

When closing a handle to a non-managed destination you are responsible for cleaning up the queue where publications are sent. Close the subscription using MQCO_REMOVE_SUB first and then process messages off the queue until none remain.

You must specify one option only from the following:

**Dynamic queue options:** These options control how permanent dynamic queues are closed.

**MQCO_DELETE**

The queue is deleted if either of the following is true:

- It is a permanent dynamic queue, created by a previous MQOPEN call, and there are no messages on the queue and no uncommitted get or put requests outstanding for the queue (either for the current task or any other task).
- It is the temporary dynamic queue that was created by the MQOPEN call that returned *Hobj*. In this case, all the messages on the queue are purged.

In all other cases, including the case where the *Hobj* was returned on an MQSUB call, the call fails with reason code MQRC_OPTION_NOT_VALID_FOR_TYPE, and the object is not deleted.

On z/OS, if the queue is a dynamic queue that has been logically deleted, and this is the last handle for it, the queue is physically deleted. See "Usage notes" on page 634 for further details.

**MQCO_DELETE_PURGE**

The queue is deleted, and any messages on it purged, if either of the following is true:

- It is a permanent dynamic queue, created by a previous MQOPEN call, and there are no uncommitted get or put requests outstanding for the queue (either for the current task or any other task).
- It is the temporary dynamic queue that was created by the MQOPEN call that returned *Hobj*.

In all other cases, including the case where the *Hobj* was returned on an MQSUB call, the call fails with reason code MQRC_OPTION_NOT_VALID_FOR_TYPE, and the object is not deleted.

The table shows which close options are valid, and whether the object is retained or deleted.

| Type of object or queue | MQCO_NONE | MQCO_DELETE | MQCO_DELETE_PURGE |
|---|---|---|---|
| Object other than a queue | Retained | Not valid | Not valid |
| Predefined queue | Retained | Not valid | Not valid |
| Permanent dynamic queue | Retained | Deleted if empty and no pending updates | Messages deleted; queue deleted if no pending updates |

| The table shows which close options are valid, and whether the object is retained or deleted. *(continued)* | | | |
|---|---|---|---|
| **Type of object or queue** | **MQCO_NONE** | **MQCO_DELETE** | **MQCO_DELETE_PURGE** |
| Temporary dynamic queue (call issued by creator of queue) | Deleted | Deleted | Deleted |
| Temporary dynamic queue (call not issued by creator of queue) | Retained | Not valid | Not valid |
| Distribution list | Retained | Not valid | Not valid |
| Managed subscription destination | Retained | Not valid | Not valid |
| Distribution list (subscription has been removed) | Messages deleted; queue deleted | Not valid | Not valid |

**Subscription closure options:** These options control whether durable subscriptions are removed when the handle is closed, and whether publications still waiting to be read by the application are cleaned up. These options are only valid for use with an object handle returned in the *Hsub* parameter of an MQSUB call.

**MQCO_KEEP_SUB**
The handle to the subscription is closed but the subscription made is kept. Publications continue to be sent to the destination specified in the subscription. This option is only valid if the subscription was made with the option MQSO_DURABLE.

MQCO_KEEP_SUB is the default if the subscription is durable

**MQCO_REMOVE_SUB**
The subscription is removed and the handle to the subscription is closed.

The *Hobj* parameter of the MQSUB call is not invalidated by closure of the *Hsub* parameter and might continue to be used for MQGET or MQCB to receive the remaining publications. When the *Hobj* parameter of the MQSUB call is also closed, if it was a managed destination any unretrieved publications are removed.

MQCO_REMOVE_SUB is the default if the subscription is non-durable.

Successful completion of MQCO_REMOVE_SUB does not mean that the action completed. To check that this call has completed, see the DELETE SUB step in Checking that async commands for distributed networks have finished.

These subscription closure options are summarized in the following tables.

To close a durable subscription handle but retain the subscription, use the following subscription closure options:

| **Task** | **Subscription closure option** |
|---|---|
| Keep publications on an MQOPENed handle | MQCO_KEEP_SUB |
| Remove publications on an MQOPENed handle | Action not allowed |
| Keep publications on an MQSO_MANAGED handle | MQCO_KEEP_SUB |
| Remove publications on an MQSO_MANAGED handle | Action not allowed |

To unsubscribe, either by closing a durable subscription handle and unsubscribing it or closing a non-durable subscription handle, use the following subscription closure options:

| Task | Subscription closure option |
|---|---|
| Keep publications on an MQOPENed handle | MQCO_REMOVE_SUB |
| Remove publications on an MQOPENed handle | Action not allowed |
| Keep publications on an MQSO_MANAGED handle | MQCO_REMOVE_SUB |

**Read ahead options**: The following options control what happens to non-persistent messages which have been sent to the client before an application requested them and have not yet been consumed by the application. These messages are stored in the client read ahead buffer waiting to be requested by the application and can either be discarded or consumed from the queue before the MQCLOSE is completed.

**MQCO_IMMEDIATE**
The object is closed immediately and any messages which have been sent to the client before an application requested them are discarded and are not available to be consumed by any application. This is the default value.

**MQCO_QUIESCE**
A request to close the object is made, but if any messages which have been sent to the client before an application requested them, still reside in the client read ahead buffer, the MQCLOSE call returns with a warning of MQRC_READ_AHEAD_MSGS and the object handle remains valid.

The application can then continue to use the object handle to retrieve messages until no more are available, and then close the object again. No more messages are sent to the client ahead of an application requesting them, read ahead is now turned off.

Applications are advised to use MQCO_QUIESCE rather than trying to reach a point where there are no more messages in the client read ahead buffer, because a message could arrive between the last MQGET call and the following MQCLOSE which would be discarded if MQCO_IMMEDIATE was used.

If an MQCLOSE with MQCO_QUIESCE is issued from within an asynchronous callback function, the same behavior of reading ahead messages applies. If the warning MQRC_READ_AHEAD_MSGS is returned, then the callback function is called at least one more time. When the last remaining message that was read ahead has been passed to the callback function the MQCBC ConsumerFlags field is set to MQCBCF_READA_BUFFER_EMPTY.

**Default option:** If you require none of the options described previously, you can use the following option:

**MQCO_NONE**
No optional close processing required.

This *must* be specified for:

- Objects other than queues
- Predefined queues
- Temporary dynamic queues (but only in those cases where *Hobj* is *not* the handle returned by the MQOPEN call that created the queue).
- Distribution lists

In all the above cases, the object is retained and not deleted.

If this option is specified for a temporary dynamic queue:

- The queue is deleted, if it was created by the MQOPEN call that returned *Hobj* ; any messages that are on the queue are purged.
- In all other cases the queue (and any messages on it) are retained.

If this option is specified for a permanent dynamic queue, the queue is retained and not deleted.

On z/OS, if the queue is a dynamic queue that has been logically deleted, and this is the last handle for it, the queue is physically deleted. See "Usage notes" on page 634 for further details.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason codes listed are the ones that the queue manager can return for the *Reason* parameter.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_INCOMPLETE_GROUP**
(2241, X'8C1') Message group not complete.

**MQRC_INCOMPLETE_MSG**
(2242, X'8C2') Logical message not complete.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') Coupling facility not available.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_DB2_NOT_AVAILABLE**
(2342, X'926') Db2 subsystem not available.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OPTION_NOT_VALID_FOR_TYPE**
(2045, X'7FD') On an MQOPEN or MQCLOSE call: option not valid for object type.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_Q_NOT_EMPTY**
(2055, X'807') Queue contains one or more messages or uncommitted put or get requests.

**MQRC_READ_AHEAD_MSGS**
(nnnn, X'xxx') The client has read ahead messages that have not yet been consumed by the application.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SECURITY_ERROR**
(2063, X'80F') Security error occurred.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. When an application issues the MQDISC call, or ends either normally or abnormally, any objects that were opened by the application and are still open are closed automatically with the MQCO_NONE option.
2. The following points apply if the object being closed is a *queue*:

- If operations on the queue are performed as part of a unit of work, the queue can be closed before or after the sync point occurs without affecting the outcome of the sync point. If the queue is triggered, performing a rollback before closing the queue can cause a trigger message to be issued. For more information about trigger messages, see Properties of trigger messages.
- If the queue was opened with the MQOO_BROWSE option, the browse cursor is destroyed. If the queue is then reopened with the MQOO_BROWSE option, a new browse cursor is created (see MQOO_BROWSE ).
- If a message is currently locked for this handle at the time of the MQCLOSE call, the lock is released (see MQGMO_LOCK ).
- On z/OS, if there is an MQGET request with the MQGMO_SET_SIGNAL option outstanding against the queue handle being closed, the request is canceled (see MQGMO_SET_SIGNAL ). Signal requests for the same queue but lodged against different handles (*Hobj*) are not affected (unless a dynamic queue is being deleted, in which case they are also canceled).

3. The following points apply if the object being closed is a *dynamic queue* (either permanent or temporary):
   - For a dynamic queue, you can specify the MQCO_DELETE and MQCO_DELETE_PURGE options regardless of the options specified on the corresponding MQOPEN call.
   - When a dynamic queue is deleted, all MQGET calls with the MQGMO_WAIT option that are outstanding against the queue are canceled and reason code MQRC_Q_DELETED is returned. See MQGMO_WAIT.

     Although applications cannot access a deleted queue, the queue is not removed from the system, and associated resources are not freed, until all handles that reference the queue have been closed, and all units of work that affect the queue have been either committed or backed out.

     On z/OS, a queue that has been logically deleted but not yet removed from the system prevents the creation of a new queue with the same name as the deleted queue; the MQOPEN call fails with reason code MQRC_NAME_IN_USE in this case. Also, such a queue can still be displayed using MQSC commands, even though it cannot be accessed by applications.
   - When a permanent dynamic queue is deleted, if the *Hobj* handle specified on the MQCLOSE call is *not* the one that was returned by the MQOPEN call that created the queue, a check is made that the user identifier that was used to validate the MQOPEN call is authorized to delete the queue. If the MQOO_ALTERNATE_USER_AUTHORITY option was specified on the MQOPEN call, the user identifier checked is the *AlternateUserId*.

     This check is not performed if:

     – The handle specified is the one returned by the MQOPEN call that created the queue.

     – The queue being deleted is a temporary dynamic queue.
   - When a temporary dynamic queue is closed, if the *Hobj* handle specified on the MQCLOSE call is the one that was returned by the MQOPEN call that created the queue, the queue is deleted. This occurs regardless of the close options specified on the MQCLOSE call. If there are messages on the queue, they are discarded; no report messages are generated.

     If there are uncommitted units of work that affect the queue, the queue and its messages are still deleted, but the units of work do not fail. However, as described previously, the resources associated with the units of work are not freed until each of the units of work has been either committed or backed out.

4. The following points apply if the object being closed is a *distribution list*:
   - The only valid close option for a distribution list is MQCO_NONE; the call fails with reason code MQRC_OPTIONS_ERROR or MQRC_OPTION_NOT_VALID_FOR_TYPE if any other options are specified.
   - When a distribution list is closed, individual completion codes and reason codes are not returned for the queues in the list; only the *CompCode* and *Reason* parameters of the call are available for diagnostic purposes.

If a failure occurs closing one of the queues, the queue manager continues processing and attempts to close the remaining queues in the distribution list. The *CompCode* and *Reason* parameters of the call are set to return information describing the failure. It is possible for the completion code to be MQCC_FAILED, even though most of the queues were closed successfully. The queue that encountered the error is not identified.

If there is a failure on more than one queue, it is not defined which failure is reported in the *CompCode* and *Reason* parameters.

5. On IBM i, if the application was connected implicitly when the first MQOPEN call was issued, an implicit MQDISC occurs when the last MQCLOSE is issued.

   Only applications running in compatibility mode can be connected implicitly; other applications must issue the MQCONN or MQCONNX call to connect to the queue manager explicitly.

   **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

## C invocation

```
MQCLOSE (Hconn, &Hobj, Options, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQHOBJ   Hobj;      /* Object handle */
MQLONG   Options;   /* Options that control the action of MQCLOSE */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
     CALL 'MQCLOSE' USING HCONN, HOBJ, OPTIONS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Object handle
 01  HOBJ      PIC S9(9) BINARY.
**   Options that control the action of MQCLOSE
 01  OPTIONS   PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQCLOSE (Hconn, Hobj, Options, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl Hobj      fixed bin(31);  /* Object handle */
dcl Options   fixed bin(31);  /* Options that control the action of
                                 MQCLOSE */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQCLOSE,(HCONN,HOBJ,OPTIONS,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS  F  Connection handle
HOBJ      DS  F  Object handle
OPTIONS   DS  F  Options that control the action of MQCLOSE
COMPCODE  DS  F  Completion code
REASON    DS  F  Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQCLOSE Hconn, Hobj, Options, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn    As Long 'Connection handle'
Dim Hobj     As Long 'Object handle'
Dim Options  As Long 'Options that control the action of MQCLOSE'
Dim CompCode As Long 'Completion code'
Dim Reason   As Long 'Reason code qualifying CompCode'
```

## MQCMIT - Commit changes

The MQCMIT call indicates to the queue manager that the application has reached a sync point, and that all the message gets and puts that have occurred since the last sync point are to be made permanent.

Messages put as part of a unit of work are made available to other applications; messages retrieved as part of a unit of work are deleted.

- z/OS On z/OS, the call is used only by batch programs (including IMS batch DL/I programs).
- IBM i On IBM i, this call is not supported for applications running in compatibility mode.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

### Syntax

MQCMIT (*Hconn*, *CompCode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason codes listed are the ones that the queue manager can return for the *Reason* parameter.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_BACKED_OUT**
(2003, X'7D3') Unit of work backed out.

**MQRC_OUTCOME_PENDING**
(2124, X'84C') Result of commit operation is pending.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CALL_INTERRUPTED**
(2549, X'9F5') MQPUT or MQCMIT was interrupted and reconnection processing cannot reestablish a definite outcome.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_ENVIRONMENT_ERROR**
(2012, X'7DC') Call not valid in environment.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OUTCOME_MIXED**
(2123, X'84B') Result of commit or back-out operation is mixed.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RECONNECT_FAILED**
(2548, X'9F4') After reconnecting, an error occurred reinstating the handles for a reconnectable connection.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. Use this call only when the queue manager itself coordinates the unit of work. This can be:
   - A local unit of work, where the changes affect only IBM MQ resources.
   - A global unit of work, where the changes can affect resources belonging to other resource managers, as well as affecting IBM MQ resources.

   For further details about local and global units of work, see "MQBEGIN - Begin unit of work" on page 611.
2. In environments where the queue manager does not coordinate the unit of work, the appropriate commit call must be used instead of MQCMIT. The environment might also support an implicit commit caused by the application terminating normally.
   - On z/OS, use the following calls:
     - Batch programs (including IMS batch DL/I programs) can use the MQCMIT call if the unit of work affects only IBM MQ resources. However, if the unit of work affects both IBM MQ resources and resources belonging to other resource managers (for example, Db2 ), use the SRRCMIT call provided by the z/OS Recoverable Resource Service (RRS). The SRRCMIT call commits changes to resources belonging to the resource managers that have been enabled for RRS coordination.
     - CICS applications must use the `EXEC CICS SYNCPOINT` command to commit the unit of work explicitly. Alternatively, ending the transaction results in an implicit commit of the unit of work. The MQCMIT call cannot be used for CICS applications.
     - IMS applications (other than batch DL/I programs) must use IMS calls such as `GU` and `CHKP` to commit the unit of work. The MQCMIT call cannot be used for IMS applications (other than batch DL/I programs).
   - On IBM i, use this call for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the `STRCMTCTL` command with the `CMTSCOPE(*JOB)` parameter must not have been issued for the job.
3. If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See MQDISC usage notes for further details.
4. When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
   - The values of the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* fields in MQMD.
   - Whether the message is part of a unit of work.
   - For the MQPUT call: whether the message is persistent or nonpersistent.

   When a unit of work is committed, the queue manager retains the group and segment information, and the application can continue putting or getting messages in the current message group or logical message.

   Retaining the group and segment information when a unit of work is committed allows the application to spread a large message group or large logical message consisting of many segments across several units of work. Using several units of work is advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to restart putting or getting messages at the correct point if a system failure occurs. For details of how to restart at the correct point after a system failure, see MQPMO_LOGICAL_ORDER and MQGMO_LOGICAL_ORDER.

   The remaining usage notes apply only when the queue manager coordinates the units of work:

5. A unit of work has the same scope as a connection handle; all IBM MQ calls that affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See the *Hconn* parameter described in MQCONN for information about the scope of connection handles.
6. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
7. A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but that never issues a commit or back-out call, can fill queues with messages that are not available to other applications. To guard against this, the administrator must set the *MaxUncommittedMsgs* queue-manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.
8. On UNIX and Windows systems, if the *Reason* parameter is MQRC_CONNECTION_BROKEN (with a *CompCode* of MQCC_FAILED), or MQRC_UNEXPECTED_ERROR it is possible that the unit of work was successfully committed.

## C invocation

```
MQCMIT (Hconn, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQCMIT' USING HCONN, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQCMIT (Hconn, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
CALL MQCMIT,(HCONN,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS  F  Connection handle
COMPCODE  DS  F  Completion code
REASON    DS  F  Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQCMIT Hconn, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn    As Long 'Connection handle'
Dim CompCode As Long 'Completion code'
Dim Reason   As Long 'Reason code qualifying CompCode'
```

## MQCONN - Connect queue manager

The MQCONN call connects an application program to a queue manager.

It provides a queue manager connection handle, which the application uses on subsequent message queuing calls.

- On z/OS, CICS applications do not have to issue this call. These applications are connected automatically to the queue manager to which the CICS system is connected. However, the MQCONN and MQDISC calls are still accepted from CICS applications.
- On IBM i, applications running in compatibility mode do not have to issue this call. These applications are connected automatically to the queue manager when they issue the first MQOPEN call. However, the MQCONN and MQDISC calls are still accepted from IBM i applications.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

  Other applications (that is, applications not running in compatibility mode) must use the MQCONN or MQCONNX call to connect to the queue manager, and the MQDISC call to disconnect from the queue manager. This is the recommended style of programming.

A client connection cannot be made on a server only installation, and a local connection cannot be made on a client only installation.

### Syntax

MQCONN (*QMgrName*, *Hconn*, *CompCode*, *Reason*)

### Parameters

***QMgrName***

Type: MQCHAR48 - input

This is the name of the queue manager to which the application wants to connect. The name can contain the following characters:

- Uppercase alphabetic characters (A through Z)
- Lowercase alphabetic characters (a through z)
- Numeric digits (0 through 9)
- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but can contain trailing blanks. A null character can be used to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply in the environments indicated:

- On systems that use EBCDIC Katakana, lowercase characters cannot be used.
- On z/OS, names that begin or end with an underscore cannot be processed by the operations and control panels. For this reason, avoid such names.
- On IBM i, enclose names containing lowercase characters, forward slash, or percent in quotation marks when specified on commands. Do not specify these quotation marks in the *QMgrName* parameter.

If the name consists entirely of blanks, the name of the *default* queue manager is used. However, note the use of blank queue manager names described in the section on IBM MQ MQI client applications.

The name specified for *QMgrName* must be the name of a *connectable* queue manager or, if queue manager groups are being used, the name of the queue manager group..

On z/OS, the queue managers to which it is possible to connect are determined by the environment:

- For CICS, you can use only the queue manager to which the CICS system is connected. The *QMgrName* parameter must still be specified, but its value is ignored; blank characters are a suitable option.
- For IMS, only queue managers that are listed in the subsystem definition table (CSQQDEFV), *and* listed in the SSM table in IMS, are connectable (see usage note 6 ).
- For z/OS batch and TSO, only queue managers that reside on the same system as the application are connectable (see usage note 6 ).

**Queue-sharing groups**: On systems where several queue managers exist and are configured to form a queue-sharing group, the name of the queue-sharing group can be specified for *QMgrName* in place of the name of a queue manager. This allows the application to connect to *any* queue manager that is available in the queue-sharing group and that is on the same z/OS image as the application. The system can also be configured so that using a blank *QMgrName* connects to the queue-sharing group instead of to the default queue manager.

If *QMgrName* specifies the name of the queue-sharing group, but there is also a queue manager with that name on the system, connection is made to the latter in preference to the former. Only if that connection fails is connection to one of the queue managers in the queue-sharing group attempted.

If the connection is successful, you can use the handle returned by the MQCONN or MQCONNX call to access *all* the resources (both shared and nonshared) that belong to the queue manager to which connection has been made. Access to these resources is subject to the typical authorization controls.

If the application issues two MQCONN or MQCONNX calls to establish concurrent connections, and one or both calls specifies the name of the queue-sharing group, the second call returns completion code MQCC_WARNING and reason code MQRC_ALREADY_CONNECTED when it connects to the same queue manager as the first call.

Queue-sharing groups are supported only on z/OS. Connection to a queue-sharing group is supported only in the batch, RRS batch, CICS, and TSO environments. For CICS, you can use only the queue sharing group to which the CICS system is connected. You must still specify the **QMgrName** parameter, but its value is ignored; blank characters are a suitable option.

**Attention:** IMS is unable to connect to a queue sharing group.

**IBM MQ MQI client applications**: For IBM MQ MQI client applications, a connection is attempted for each client-connection channel definition with the specified queue-manager name, until one is successful. The queue manager, however, must have the same name as the specified name. If an all-blank name is specified, each client-connection channel with an all-blank queue-manager name is tried until one is successful; in this case there is no check against the actual name of the queue manager.

IBM MQ client applications are not supported in z/OS, but z/OS can act as an IBM MQ server, to which IBM MQ client applications can connect.

**IBM MQ MQI client queue-manager groups**: If the specified name starts with an asterisk (*), the queue manager to which connection is made might have a different name from that specified by the

application. The specified name (without the asterisk) defines a *group* of queue managers that are eligible for connection. The implementation selects one from the group by trying each one in turn until one is found to which a connection can be made. The order in which connections are attempted is influenced by the client channel weight and connection affinity values of the candidate channels. If none of the queue managers in the group is available for connection, the call fails. Each queue manager is tried once only. If an asterisk alone is specified for the name, an implementation-defined default queue-manager group is used.

Queue-manager groups are supported only for applications running in an MQ-client environment; the call fails if a non-client application specifies a queue-manager name beginning with an asterisk. A group is defined by providing several client connection channel definitions with the same queue-manager name (the specified name without the asterisk), to communicate with each of the queue managers in the group. The default group is defined by providing one or more client connection channel definitions, each with a blank queue-manager name (specifying an all-blank name therefore has the same effect as specifying a single asterisk for the name for a client application).

After connecting to one queue manager of a group, an application can specify blanks in the typical way in the queue-manager name fields in the message and object descriptors to mean the name of the queue manager to which the application has connected (the *local queue manager* ). If the application needs to know this name, use the MQINQ call to inquire the *QMgrName* queue-manager attribute.

Prefixing an asterisk to the connection name implies that the application does not depend on connecting to a particular queue manager in the group. Suitable applications are:

- Applications that put messages but do not get messages.
- Applications that put request messages and then get the reply messages from a *temporary dynamic* queue.

Unsuitable applications are ones that need to get messages from a particular queue at a particular queue manager; such applications must not prefix the name with an asterisk.

If you specify an asterisk, the maximum length of the remainder of the name is 47 characters.

The length of this parameter is given by MQ_Q_MGR_NAME_LENGTH.

***Hconn***

Type: MQHCONN - output

This handle represents the connection to the queue manager. Specify it on all subsequent message queuing calls issued by the application. It ceases to be valid when the MQDISC call is issued, or when the unit of processing that defines the scope of the handle terminates.

IBM MQ now supplies the mqm library with client packages as well as server packages. This means that when an MQI call that is found in the mqm library is made, the connection type is checked to see if it is a client or server connection, and then the correct underlying call is made. Therefore an exit which is passed an *Hconn* can now be linked against the mqm library, but used on a client installation.

*Handle scope*: The scope of the handle returned depends on the call used to connect to the queue manager (MQCONN or MQCONNX). If the call used is MQCONNX, the scope of the handle also depends on the MQCNO_HANDLE_SHARE_* option specified in the *Options* field of the MQCNO structure.

- If the call is MQCONN, or the MQCNO_HANDLE_SHARE_NONE option is specified, the handle returned is a *nonshared* handle.

  The scope of a nonshared handle is the smallest unit of parallel processing supported by the platform on which the application is running (see Table 552 on page 644 for details); the handle is not valid outside the unit of parallel processing from which the call was issued.
- If you specify the MQCNO_HANDLE_SHARE_BLOCK or MQCNO_HANDLE_SHARE_NO_BLOCK option, the handle returned is a *shared* handle.

The scope of a shared handle is the process that owns the thread from which the call was issued; the handle can be used from any thread that belongs to that process. Not all platforms support threads.

- If the MQCONN or MQCONNX call fails with completion code equal to MQCC_FAILED, then the Hconn value is undefined.

*Table 552. Scope of nonshared handles on various platforms*

| Platform | Scope of nonshared handle |
|---|---|
| z/OS | • CICS: the CICS task<br>• IMS: the task, up to the next sync point (excluding subtasks of the task)<br>• z/OS batch and TSO: the task (excluding subtasks of the task) |
| IBM i | Job |
| UNIX systems | Thread |
| 16 bit Windows applications | Process |
| 32 bit Windows applications | Thread |

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the value returned is:

**MQHC_DEF_HCONN**
Default connection handle.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_ALREADY_CONNECTED**
(2002, X'7D2') Application already connected.

**MQRC_CLUSTER_EXIT_LOAD_ERROR**
(2267, X'8DB') Unable to load cluster workload exit.

**MQRC_SSL_ALREADY_INITIALIZED**
(2391, X'957') SSL already initialized.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_CONN_LOAD_ERROR**
(2129, X'851') Unable to load adapter connection module.

**MQRC_ADAPTER_DEFS_ERROR**
(2131, X'853') Adapter subsystem definition module not valid.

**MQRC_ADAPTER_DEFS_LOAD_ERROR**
(2132, X'854') Unable to load adapter subsystem definition module.

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ADAPTER_STORAGE_SHORTAGE**
(2127, X'84F') Insufficient storage for adapter.

**MQRC_ANOTHER_Q_MGR_CONNECTED**
(2103, X'837') Another queue manager already connected.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_INIT_ERROR**
(2375, X'947') API exit initialization failed.

**MQRC_API_EXIT_TERM_ERROR**
(2376, X'948') API exit termination failed.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CONN_ID_IN_USE**
(2160, X'870') Connection identifier already in use.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_ERROR**
(2273, X'8E1') Error processing MQCONN call.

**MQRC_CONNECTION_NOT_AVAILABLE**
(2568, X'A08') Occurs on an MQCONN or MQCONNX call when the queue manager is unable to provide a connection of the requested connection type on the current installation. A client connection cannot be made on a server only installation. A local connection cannot be made on a client only installation.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CRYPTO_HARDWARE_ERROR**
(2382, X'94E') Cryptographic hardware configuration error.

**MQRC_DUPLICATE_RECOV_COORD**
(2163, X'873') Recovery coordinator exists.

**MQRC_ENVIRONMENT_ERROR**
(2012, X'7DC') Call not valid in environment.

Additionally, on the MQCONNX call, passing the “MQCSP - Security parameters” on page 325 control block from a CICS or IMS application.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOST_NOT_AVAILABLE**
(2538, X'9EA') An MQCONN call was issued from a client to connect to a queue manager but the attempt to allocate a conversation to the remote system failed.

**MQRC_INSTALLATION_MISMATCH**
(2583, X'A17') Mismatch between queue manager installation and selected library.

**MQRC_KEY_REPOSITORY_ERROR**
(2381, X'94D') Key repository not valid.

**MQRC_MAX_CONNS_LIMIT_REACHED**
(2025, X'7E9') Maximum number of connections reached.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_OPEN_FAILED**
(2137, X'859') Object not opened successfully.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SECURITY_ERROR**
(2063, X'80F') Security error occurred.

**MQRC_SSL_INITIALIZATION_ERROR**
(2393, X'959') SSL initialization error.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. The queue manager to which connection is made using the MQCONN call is called the *local queue manager*.
2. Queues that are owned by the local queue manager appear to the application as local queues. It is possible to put messages on and get messages from these queues.

   Shared queues that are owned by the queue-sharing group to which the local queue manager belongs appear to the application as local queues. It is possible to put messages on and get messages from these queues.

   Queues that are owned by remote queue managers appear as remote queues. It is possible to put messages on these queues, but not to get messages from these queues.
3. If the queue manager fails while an application is running, the application must issue the MQCONN call again to obtain a new connection handle to use on subsequent IBM MQ calls. The application can issue the MQCONN call periodically until the call succeeds.

   If an application is not sure whether it is connected to the queue manager, the application can safely issue an MQCONN call to obtain a connection handle. If the application is already connected, the

handle returned is the same as that returned by the previous MQCONN call, but with completion code MQCC_WARNING and reason code MQRC_ALREADY_CONNECTED.

4. When the application has finished using IBM MQ calls, the application must use the MQDISC call to disconnect from the queue manager.
5. If the MQCONN call fails with completion code equal to MQCC_FAILED, then the Hconn value is undefined.
6. On z/OS:
   - Batch, TSO, and IMS applications must issue the MQCONN call to use the other IBM MQ calls. These applications can connect to more than one queue manager concurrently.

     If the queue manager fails, the application must issue the call again after the queue manager has restarted to obtain a new connection handle.

     Although IMS applications can issue the MQCONN call repeatedly, even when already connected, this is not recommended for online message processing programs (MPPs).
   - CICS applications do not have to issue the MQCONN call to use the other IBM MQ calls, but can do so if they want; both the MQCONN call and the MQDISC call are accepted. However, it is not possible to connect to more than one queue manager concurrently.

     If the queue manager fails, these applications are automatically reconnected when the queue manager restarts, and so do not need to issue the MQCONN call.
7. On z/OS, to define the available queue managers:
   - For batch applications, system programmers can use the CSQBDEF macro to create a module (CSQBDEFV) that defines the default queue-manager name, or queue-sharing group name.
   - For IMS applications, system programmers can use the CSQQDEFX macro to create a module (CSQQDEFV) that defines the names of the available queue managers and specifies the default queue manager.

     In addition, each queue manager must be defined to the IMS control region and to each dependent region accessing that queue manager. To do this, you must create a subsystem member in the IMS.PROCLIB library and identify the subsystem member to the applicable IMS regions. If an application attempts to connect to a queue manager that is not defined in the subsystem member for its IMS region, the application abends.

   z/OS For more information about using these macros, see Macros intended for customer use.
8. On IBM i, applications written for previous releases of the queue manager can run without recompiling. This is called *compatibility mode*. This mode of operation provides a compatible runtime environment for applications. It comprises the following:
   - The service program AMQZSTUB residing in the library QMQM.

     AMQZSTUB provides the same public interface as previous releases, and has the same signature. Use this service program to access the MQI through bound procedure calls.
   - The program QMQM residing in the library QMQM.

     QMQM provides a means of accessing the MQI through dynamic program calls.
   - Programs MQCLOSE, MQCONN, MQDISC, MQGET, MQINQ, MQOPEN, MQPUT, MQPUT1, and MQSET residing in the library QMQM.

     These programs also provide a means of accessing the MQI through dynamic program calls, but with a parameter list that corresponds to the standard descriptions of the IBM MQ calls.

   These three interfaces do not include capabilities that were introduced in IBM MQ Version 5.1. For example, the MQBACK, MQCMIT, and MQCONNX calls are not supported. The support provided by these interfaces is for single-threaded applications only.

   Support for the new IBM MQ calls in single-threaded applications, and for all IBM MQ calls in multi-threaded applications, is provided through the service programs LIBMQM and LIBMQM_R.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

9. On IBM i, programs that end abnormally are not automatically disconnected from the queue manager. Write applications to allow for the possibility of the MQCONN or MQCONNX call returning completion code MQCC_WARNING and reason code MQRC_ALREADY_CONNECTED. Use the connection handle returned in this situation as normal.

## C invocation

```
MQCONN (QMgrName, &Hconn, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQCHAR48  QMgrName;  /* Name of queue manager */
MQHCONN   Hconn;     /* Connection handle */
MQLONG    CompCode;  /* Completion code */
MQLONG    Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQCONN' USING QMGRNAME, HCONN, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Name of queue manager
 01  QMGRNAME  PIC X(48).
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQCONN (QMgrName, Hconn, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl QMgrName  char(48);       /* Name of queue manager */
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
CALL MQCONN,(QMGRNAME,HCONN,COMPCODE,REASON)
```

Declare the parameters as follows:

```
QMGRNAME  DS  CL48  Name of queue manager
HCONN     DS  F     Connection handle
COMPCODE  DS  F     Completion code
REASON    DS  F     Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQCONN QMgrName, Hconn, CompCode, Reason
```

Declare the parameters as follows:

```
Dim QMgrName As String*48 'Name of queue manager'
Dim Hconn    As Long      'Connection handle'
Dim CompCode As Long      'Completion code'
Dim Reason   As Long      'Reason code qualifying CompCode'
```

## MQCONNX - Connect queue manager (extended)

The MQCONNX call connects an application program to a queue manager. It provides a queue manager connection handle, which is used by the application on subsequent IBM MQ calls.

The MQCONNX call is like the MQCONN call, except that MQCONNX allows options to be specified to control the way that the call works.

- This call is supported on all IBM MQ systems, and IBM MQ clients connected to these systems.
- On IBM i, this call is not supported for applications running in compatibility mode.

A client connection cannot be made on a server only installation, and a local connection cannot be made on a client only installation.

### Syntax

MQCONNX (*QMgrName*, *ConnectOpts*, *Hconn*, *CompCode*, *Reason*)

### Parameters

***QMgrName***
Type: MQCHAR48 - input

See the *QMgrName* parameter described in “MQCONN - Connect queue manager” on page 641 for details.

***ConnectOpts***
Type: MQCNO - input/output

See “MQCNO - Connect options” on page 310 for details.

***Hconn***
Type: MQHCONN - output

This handle represents the connection to the queue manager. Specify it on all subsequent message queuing calls issued by the application. It ceases to be valid when the MQDISC call is issued, or when the unit of processing that defines the scope of the handle terminates.

IBM MQ now supplies the mqm library with client packages as well as server packages. This means that when an MQI call that is found in the mqm library is made, the connection type is checked to see if it is a client or server connection, and then the correct underlying call is made. Therefore an exit which is passed an *Hconn* can now be linked against the mqm library, but used on a client installation.

*Handle scope*: The scope of the handle returned depends on the call used to connect to the queue manager (MQCONN or MQCONNX). If the call used is MQCONNX, the scope of the handle also depends on the MQCNO_HANDLE_SHARE_* option specified in the *Options* field of the MQCNO structure.

- If the call is MQCONN, or the MQCNO_HANDLE_SHARE_NONE option is specified, the handle returned is a *nonshared* handle.

The scope of a nonshared handle is the smallest unit of parallel processing supported by the platform on which the application is running (see Table 553 on page 650 for details); the handle is not valid outside the unit of parallel processing from which the call was issued.

- If you specify the MQCNO_HANDLE_SHARE_BLOCK or MQCNO_HANDLE_SHARE_NO_BLOCK option, the handle returned is a *shared* handle.

  The scope of a shared handle is the process that owns the thread from which the call was issued; the handle can be used from any thread that belongs to that process. Not all platforms support threads.

- If the MQCONN or MQCONNX call fails with completion code equal to MQCC_FAILED, then the Hconn value is undefined.

*Table 553. Scope of nonshared handles on various platforms*

| Platform | Scope of nonshared handle |
|---|---|
| z/OS | • CICS: the CICS task<br>• IMS: the task, up to the next sync point (excluding subtasks of the task)<br>• z/OS batch and TSO: the task (excluding subtasks of the task) |
| IBM i | Job |
| UNIX systems | Thread |
| 16 bit Windows applications | Process |
| 32 bit Windows applications | Thread |

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the value returned is:

**MQHC_DEF_HCONN**
Default connection handle.

***CompCode***
Type: MQLONG - output

See the *CompCode* parameter described in "MQCONN - Connect queue manager" on page 641 for details.

***Reason***
Type: MQLONG - output

The following codes can be returned by the MQCONN and MQCONNX calls. For a list of additional codes that can be returned by the MQCONNX call, see the following codes.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_ALREADY_CONNECTED**
(2002, X'7D2') Application already connected.

**MQRC_CLUSTER_EXIT_LOAD_ERROR**
(2267, X'8DB') Unable to load cluster workload exit.

**MQRC_SSL_ALREADY_INITIALIZED**
(2391, X'957') SSL already initialized.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_CONN_LOAD_ERROR**
(2129, X'851') Unable to load adapter connection module.

**MQRC_ADAPTER_DEFS_ERROR**
(2131, X'853') Adapter subsystem definition module not valid.

**MQRC_ADAPTER_DEFS_LOAD_ERROR**
(2132, X'854') Unable to load adapter subsystem definition module.

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ADAPTER_STORAGE_SHORTAGE**
(2127, X'84F') Insufficient storage for adapter.

**MQRC_ANOTHER_Q_MGR_CONNECTED**
(2103, X'837') Another queue manager already connected.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_INIT_ERROR**
(2375, X'947') API exit initialization failed.

**MQRC_API_EXIT_TERM_ERROR**
(2376, X'948') API exit termination failed.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CONN_ID_IN_USE**
(2160, X'870') Connection identifier already in use.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_ERROR**
(2273, X'8E1') Error processing MQCONN call.

**MQRC_CONNECTION_NOT_AVAILABLE**
(2568, X'A08') Occurs on an MQCONN or MQCONNX call when the queue manager is unable to provide a connection of the requested connection type on the current installation. A client connection cannot be made on a server only installation. A local connection cannot be made on a client only installation.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CRYPTO_HARDWARE_ERROR**
(2382, X'94E') Cryptographic hardware configuration error.

**MQRC_DUPLICATE_RECOV_COORD**
(2163, X'873') Recovery coordinator exists.

**MQRC_ENVIRONMENT_ERROR**
(2012, X'7DC') Call not valid in environment.

Additionally, on the MQCONNX call, passing the "MQCSP - Security parameters" on page 325 control block from a CICS or IMS application.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOST_NOT_AVAILABLE**
(2538, X'9EA') An MQCONN call was issued from a client to connect to a queue manager but the attempt to allocate a conversation to the remote system failed.

**MQRC_INSTALLATION_MISMATCH**
(2583, X'A17') Mismatch between queue manager installation and selected library.

**MQRC_KEY_REPOSITORY_ERROR**
(2381, X'94D') Key repository not valid.

**MQRC_MAX_CONNS_LIMIT_REACHED**
(2025, X'7E9') Maximum number of connections reached.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_OPEN_FAILED**
(2137, X'859') Object not opened successfully.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SECURITY_ERROR**
(2063, X'80F') Security error occurred.

**MQRC_SSL_INITIALIZATION_ERROR**
(2393, X'959') SSL initialization error.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

The following additional reason codes can be returned by the MQCONNX call:

If *CompCode* is MQCC_FAILED:

**MQRC_AIR_ERROR**
(2385, X'951') Authentication information record not valid.

**MQRC_AUTH_INFO_CONN_NAME_ERROR**
(2387, X'953') Authentication information connection name not valid.

**MQRC_AUTH_INFO_REC_COUNT_ERROR**
(2383, X'94F') Authentication information record count not valid.

**MQRC_AUTH_INFO_REC_ERROR**
(2384, X'950') Authentication information record fields not valid.

**MQRC_AUTH_INFO_TYPE_ERROR**
(2386, X'952') Authentication information type not valid.

**MQRC_CD_ERROR**
(2277, X'8E5') Channel definition not valid.

**MQRC_CLIENT_CONN_ERROR**
(2278, X'8E6') Client connection fields not valid.

**MQRC_CNO_ERROR**
(2139, X'85B') Connect-options structure not valid.

**MQRC_CONN_TAG_IN_USE**
(2271, X'8DF') Connection tag in use.

**MQRC_CONN_TAG_NOT_USABLE**
(2350, X'92E') Connection tag not usable.

**MQRC_LDAP_PASSWORD_ERROR**
(2390, X'956') LDAP password not valid.

**MQRC_LDAP_USER_NAME_ERROR**
(2388, X'954') LDAP user name fields not valid.

**MQRC_LDAP_USER_NAME_LENGTH_ERR**
(2389, X'955') LDAP user name length not valid.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_SCO_ERROR**
(2380, X'94C') SSL configuration options structure not valid.

**MQRC_SSL_CONFIG_ERROR**
(2392, X'958') SSL configuration error.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

For the Visual Basic programming language, the following point applies:

- The *ConnectOpts* parameter is declared as being of type MQCNO. If the application is running as an IBM MQ MQI client, and you want to specify the parameters of the client-connection channel, declare the *ConnectOpts* parameter as being of type Any, so that the application can specify an MQCNOCD structure on the call in place of an MQCNO structure. However, this means that the *ConnectOpts* parameter cannot be checked to ensure that it is the correct data type.

## C invocation

```
MQCONNX (QMgrName, &ConnectOpts, &Hconn, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQCHAR48  QMgrName;     /* Name of queue manager */
MQCNO     ConnectOpts;  /* Options that control the action of MQCONNX */
MQHCONN   Hconn;        /* Connection handle */
MQLONG    CompCode;     /* Completion code */
MQLONG    Reason;       /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQCONNX' USING QMGRNAME, CONNECTOPTS, HCONN, COMPCODE,
REASON.
```

Declare the parameters as follows:

```
**   Name of queue manager
 01  QMGRNAME     PIC X(48).
**   Options that control the action of MQCONNX
 01  CONNECTOPTS.
     COPY CMQCNOV.
**   Connection handle
```

```
 01  HCONN        PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE     PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON       PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQCONNX (QMgrName, ConnectOpts, Hconn, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl QMgrName     char(48);       /* Name of queue manager */
dcl ConnectOpts  like MQCNO;     /* Options that control the action of
                                    MQCONNX */
dcl Hconn        fixed bin(31);  /* Connection handle */
dcl CompCode     fixed bin(31);  /* Completion code */
dcl Reason       fixed bin(31);  /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQCONNX,(QMGRNAME,CONNECTOPTS,HCONN,COMPCODE,REASON)
```

Declare the parameters as follows:

```
QMGRNAME     DS       CL48  Name of queue manager
CONNECTOPTS  CMQCNOA  ,     Options that control the action of MQCONNX
HCONN        DS       F     Connection handle
COMPCODE     DS       F     Completion code
REASON       DS       F     Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQCONNX QMgrName, ConnectOpts, Hconn, CompCode, Reason
```

Declare the parameters as follows:

```
Dim QMgrName    As String*48 'Name of queue manager'
Dim ConnectOpts As MQCNO     'Options that control the action of'
                             'MQCONNX'
Dim Hconn       As Long      'Connection handle'
Dim CompCode    As Long      'Completion code'
Dim Reason      As Long      'Reason code qualifying CompCode'
```

## MQCRTMH - Create message handle

The MQCRTMH call returns a message handle.

An application can use the MQCRTMH call on subsequent message queuing calls:

- Use the MQSETMP call to set a property of the message handle.
- Use the MQINQMP call to inquire on the value of a property of the message handle.
- Use the MQDLTMP call to delete a property of the message handle.

The message handle can be used on the MQPUT and MQPUT1 calls to associate the properties of the message handle with those of the message being put. Similarly by specifying a message handle on the MQGET call, the properties of the message being retrieved can be accessed using the message handle when the MQGET call completes.

Use MQDLTMH to delete the message handle.

## Syntax

MQCRTMH (*Hconn*, *CrtMsgHOpts*, *Hmsg*, *CompCode*, *Reason*)

## Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call. If the connection to the queue manager ceases to be valid and no IBM MQ call is operating on the message handle, MQDLTMH is implicitly called to delete the message.

Alternatively, you can specify the following value:

**MQHC_UNASSOCIATED_HCONN**
The connection handle does not represent a connection to any particular queue manager.

When this value is used, the message handle must be deleted with an explicit call to MQDLTMH in order to release any storage allocated to it; IBM MQ never implicitly deletes the message handle.

There must be at least one valid connection to a queue manager established on the thread creating the message handle, otherwise the call fails with MQRC_HCONN_ERROR.

In an environment with multiple installations on a single system, the MQHC_UNASSOCIATED_HCONN value is limited to use with the first installation loaded into the process. The reason code MQRC_HMSG_NOT_AVAILABLE is returned if the message handle is supplied to a different installation.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and you can specify the following value for *Hconn* :

**MQHC_DEF_CONN**
Default connection handle

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***CrtMsgHOpts***

Type: MQCMHO - input

The options that control the action of MQCRTMH. See MQCMHO for details.

***Hmsg***

Type: MQHMSG - output

On output a message handle is returned that can be used to set, inquire, and delete properties of the message handle. Initially the message handle contains no properties.

A message handle also has an associated message descriptor. Initially this contains the default values. The values of the associated message descriptor fields can be set and inquired using the MQSETMP and MQINQMP calls. The MQDLTMP call resets a field of the message descriptor back to its default value.

If the *Hconn* parameter is specified as the value MQHC_UNASSOCIATED_HCONN then the returned message handle can be used on MQGET, MQPUT, or MQPUT1 calls with any connection within the unit of processing, but can only be in use by one IBM MQ call at a time. If the handle is in use when a second IBM MQ call attempts to use the same message handle, the second IBM MQ call fails with reason code MQRC_MSG_HANDLE_IN_USE.

If the *Hconn* parameter is not MQHC_UNASSOCIATED_HCONN then the returned message handle can only be used on the specified connection.

The same *Hconn* parameter value must be used on the subsequent MQI calls where this message handle is used:

- MQDLTMH
- MQSETMP
- MQINQMP
- MQDLTMP
- MQMHBUF
- MQBUFMH

The returned message handle ceases to be valid when the MQDLTMH call is issued for the message handle, or when the unit of processing that defines the scope of the handle terminates. MQDLTMH is called implicitly if a specific connection is supplied when the message handle is created and the connection to the queue manager ceases to be valid, for example, if MQDBC is called.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CMHO_ERROR**
(2461, X'099D') Create message handle options structure not valid.

**MQRC_CONNECTION_BROKEN**
(2273, X'7D9') Connection to queue manager lost.

**MQRC_HANDLE_NOT_AVAILABLE**
(2017, X'07E1') No more handles available.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle pointer not valid.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C

```
MQCRTMH (Hconn, &CrtMsgHOpts, &Hmsg, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;       /* Connection handle */
MQCMHO   CrtMsgHOpts; /* Options that control the action of MQCRTMH */
MQHMSG   Hmsg;        /* Message handle */
MQLONG   CompCode;    /* Completion code */
MQLONG   Reason;      /* Reason code qualifying CompCode */
```

## COBOL

```
CALL 'MQCRTMH' USING HCONN, CRTMSGOPTS, HMSG, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Options that control the action of MQCRTMH
 01  CRTMSGHOPTS.
     COPY CMQCMHOV.
**   Message handle
 01  HMSG    PIC S9(18) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I

```
call MQCRTMH (Hconn, CrtMsgHOpts, Hmsg, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31);  /* Connection handle */
dcl CrtMsgHOpts like MQCMHO;    /* Options that control the action of MQCRTMH */
dcl Hmsg        fixed bin(63);  /* Message handle */
dcl CompCode    fixed bin(31);  /* Completion code */
dcl Reason      fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler

```
CALL MQCRTMH,(HCONN,CRTMSGHOPTS,HMSG,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN          DS        F  Connection handle
CRTMSGHOPTS    CMQCMHOA  ,  Options that control the action of MQCRTMH
```

```
HMSG            DS        D  Message handle
COMPCODE        DS        F  Completion code
REASON          DS        F  Reason code qualifying COMPCODE
```

## MQCTL - Control callbacks

The MQCTL call performs controlling actions on callbacks and the object handles opened for a connection.

### Syntax

MQCTL (*Hconn*, *Operation*, *ControlOpts*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and you can specify the following special value for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Operation***

Type: MQLONG - input

The operation being processed on the callback defined for the specified object handle. You must specify one, and one only, of the following options:

**MQOP_START**

Start the consuming of messages for all defined message consumer functions for the specified connection handle.

Callbacks run on a thread started by the system, which is different from any of the application threads.

This operation gives control of the provided connection handle to system. The only MQI calls which can be issued by a thread other than the consumer thread are:

- MQCTL with Operation MQOP_STOP
- MQCTL with Operation MQOP_SUSPEND
- MQDISC - Performs MQCTL with Operation MQOP_STOP before disconnection the HConn.

MQRC_HCONN_ASYNC_ACTIVE is returned if an IBM MQ API call is issued while the connection handle is started, and the call does not originate from a message consumer function.

If a message consumer stops the connection during the MQCBCT_START_CALL then the MQCTL call returns with a failure reason code of MQRC_CONNECTION_STOPPED.

This can be issued in a consumer function. For the same connection as the callback routine, its only purpose is to cancel a previously issued MQOP_STOP operation.

This option is not supported in the following environments: CICS on z/OS or if the application is bound with a nonthreaded IBM MQ library.

**MQOP_START_WAIT**
Start the consuming of messages for all defined message consumer functions for the specified connection handle.

Message consumers run on the same thread and control is not returned to the caller of MQCTL until:

- Released by the use of the MQCTL MQOP_STOP or MQOP_SUSPEND operations, or
- All consumer routines have been deregistered or suspended.

If all consumers are deregistered or suspended, an implicit MQOP_STOP operation is issued.

This option cannot be used from within a callback routine, either for the current connection handle or any other connection handle. If the call is attempted it returns with MQRC_ENVIRONMENT_ERROR.

If, at any time during an MQOP_START_WAIT operation there are no registered, non-suspended consumers the call fails with a reason code of MQRC_NO_CALLBACKS_ACTIVE.

If, during an MQOP_START_WAIT operation, the connection is suspended, the MQCTL call returns a warning reason code of MQRC_CONNECTION_SUSPENDED; the connection remains 'started'.

The application can choose to issue MQOP_STOP or MQOP_RESUME. In this instance, the MQOP_RESUME operation blocks.

This option is not supported in a single threaded client.

**MQOP_STOP**
Stop the consuming of messages, and wait for all consumers to complete their operations before this option completes. This operation releases the connection handle.

If issued from within a callback routine, this option does not take effect until the routine exits. No more message consumer routines are called after the consumer routines for messages already read have completed, and after stop calls (if requested) to callback routines have been made.

If issued outside a callback routine, control does not return to the caller until the consumer routines for messages already read have completed, and after stop calls (if requested) to callbacks have been made. The callbacks themselves, however, remain registered.

This function has no effect on read ahead messages. You must ensure that consumers run MQCLOSE(MQCO_QUIESCE), from within the callback function, to determine whether there are any further messages available to be delivered.

**MQOP_SUSPEND**
Pause the consuming of messages. This operation releases the connection handle.

This does not have any effect on the reading ahead of messages for the application. If you intend to stop consuming messages for a long time, consider closing the queue and reopening it when consumption continues.

If issued from within a callback routine, it does not take effect until the routine exits. No more message consumer routines will be called after the current routine exits.

If issued outside a callback, control does not return to the caller until the current consumer routine has completed and no more are called.

**MQOP_RESUME**
Resume the consuming of messages.

This option is normally issued from the main application thread, but it can also be used from within a callback routine to cancel an earlier suspension request issued in the same routine.

If the MQOP_RESUME is used to resume an MQOP_START_WAIT then the operation blocks.

***ControlOpts***
Type: MQCTLO - input

Options that control the action of MQCTL

See MQCTLO for details of the structure.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_CONV_LOAD_ERROR**
(2133, X'855') Unable to load data conversion services modules.

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALLBACK_LINK_ERROR**
(2487, X'9B7') Unable to call the callback routine

**MQRC_CALLBACK_NOT_ REGISTERED**
(2448, X'990') Unable to Deregister, Suspend, or Resume because there is no registered callback

**MQRC_CALLBACK_ROUTINE_ERROR**
(2486, X'9B6') Either, both CallbackFunction and CallbackName have been specified on an MQOP_REGISTER call.

Or either CallbackFunction or CallbackName have been specified but does not match the currently registered callback function.

**MQRC_CALLBACK_TYPE_ERROR**
(2483, X'9B3') Incorrect CallBackType field.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CBD_ERROR**
(2444, X'98C') Option block is incorrect.

**MQRC_CBD_OPTIONS_ERROR**
(2484, X'9B4') Incorrect MQCBD options field.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CORREL_ID_ERROR**
(2207, X'89F') Correlation-identifier error.

**MQRC_FUNCTION_NOT_SUPPORTED**
(2298, X'8FA') The function requested is not available in the current environment.

**MQRC_GET_INHIBITED**
(2016, X'7E0') Gets inhibited for the queue.

**MQRC_GLOBAL_UOW_CONFLICT**
(2351, X'92F') Global units of work conflict.

**MQRC_GMO_ERROR**
(2186, X'88A') Get-message options structure not valid.

**MQRC_HANDLE_IN_USE_FOR_UOW**
(2353, X'931') Handle in use for global unit of work.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_INCONSISTENT_BROWSE**
(2259, X'8D3') Inconsistent browse specification.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_INVALID_MSG_UNDER_CURSOR**
(2246, X'8C6') Message under cursor not valid for retrieval.

**MQRC_LOCAL_UOW_CONFLICT**
(2352, X'930') Global unit of work conflicts with local unit of work.

**MQRC_MATCH_OPTIONS_ERROR**
(2247, X'8C7') Match options not valid.

**MQRC_MAX_MSG_LENGTH_ERROR**
(2485, X'9B5') Incorrect MaxMsgLength field

**MQRC_MD_ERROR**
(2026, X'7EA') Message descriptor not valid.

**MQRC_MODULE_ENTRY_NOT_FOUND**
(2497, X'9C1')The specified function entry point could not be found in the module.

**MQRC_MODULE_INVALID**
(2496, X'9C0') Module is found but is of the wrong type (32 bit/64 bit) or is not a valid dll.

**MQRC_MODULE_NOT_FOUND**
(2495, X'9BF') Module not found in the search path or not authorized to load.

**MQRC_MSG_ID_ERROR**
(2206, X'89E') Message-identifier error.

**MQRC_MSG_SEQ_NUMBER_ERROR**
(2250, X'8CA') Message sequence number not valid.

**MQRC_MSG_TOKEN_ERROR**
(2331, X'91B') Use of message token not valid.

**MQRC_NOT_OPEN_FOR_BROWSE**
(2036, X'7F4') Queue not open for browse.

**MQRC_NOT_OPEN_FOR_INPUT**
(2037, X'7F5') Queue not open for input.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OPERATION_ERROR**
(2488, X'9B8') Incorrect Operation code on API Call

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_INDEX_TYPE_ERROR**
(2394, X'95A') Queue has wrong index type.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SIGNAL_OUTSTANDING**
(2069, X'815') Signal outstanding for this handle.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_SYNCPOINT_NOT_AVAILABLE**
(2072, X'818') Syncpoint support not available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UOW_ENLISTMENT_ERROR**
(2354, X'932') Enlistment in global unit of work failed.

**MQRC_UOW_MIX_NOT_SUPPORTED**
(2355, X'933') Mixture of unit-of-work calls not supported.

**MQRC_UOW_NOT_AVAILABLE**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**MQRC_WAIT_INTERVAL_ERROR**
(2090, X'82A') Wait interval in MQGMO not valid.

**MQRC_WRONG_GMO_VERSION**
(2256, X'8D0') Wrong version of MQGMO supplied.

**MQRC_WRONG_MD_VERSION**
(2257, X'8D1') Wrong version of MQMD supplied.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. Callback routines must check the responses from all services they invoke, and if the routine detects a condition that cannot be resolved, it must issue an MQCB MQOP_DEREGISTER command to prevent repeated calls to the callback routine.
2. If you are using asynchronous consume in an application where an XA Transaction Manager is managing global transactions, including updates to IBM MQ, you need to consider the following additional points:
   a. It is not valid to call MQCTL(MQOP_START) for an **HConn**, after it has been created, after calling **xa_open**.

      The reason is, that the **HConn** has become attached to an XA context, and so cannot then be accessed on the separate thread, or threads, in use by the asynchronous consume mechanism.
   b. If you call MQCTL(MQOP_START) in that scenario the call fails with reason code MQRC_ASYNC_XA_CONFLICT (2350).
   c. It is valid to call MQCTL(MQOP_START_WAIT) for an **HConn**, after it has been created, after calling **xa_open**.

      The reason is, that this method of starting the asynchronous consume mechanism causes all further callbacks for the **HConn** to run on the thread where the MQCTL call is made. Therefore, the link between the **HConn** and the thread is not lost.
3. z/OS On z/OS, when Operation is MQOP_START:
   - Programs which use asynchronous callback routines must be authorized to use z/OS UNIX System Services (USS).
   - Language Environment (LE) programs which use asynchronous callback routines must use the LE runtime option POSIX(ON).
   - Non-LE programs which use asynchronous callback routines must not use the USS pthread_create interface (callable service BPX1PTC).
4. z/OS MQCTL is not supported within the IMS adapter.

**Note:** In CICS, MQOP_START is not supported. Instead, use the MQOP_START_WAIT function call.

## C invocation

```
MQCTL (Hconn, Operation, &ControlOpts, &CompCode, &Reason)
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQLONG   Operation;     /* Operation being processed */
MQCTLO   ControlOpts    /* Options that control the action of MQCTL */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQCTL' USING HCONN, OPERATION, CTLOPTS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN    PIC S9(9) BINARY.
**   Operation
 01  OPERATION PIC S9(9) BINARY.
**   Control Options
 01  CTLOPTS.
     COPY CMQCTLOV.
**   Completion code
 01  COMPCODE PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON   PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQCTL(Hconn, Operation, CtlOpts, CompCode, Reason)
```

Declare the parameters as follows:

```
dcl Hconn        fixed bin(31); /* Connection handle */
dcl Operation    fixed bin(31); /* Operation */
dcl CtlOpts like MQCTLO;        /* Options that control the action of MQCTL */
dcl CompCode     fixed bin(31); /* Completion code */
dcl Reason       fixed bin(31); /* Reason code qualifying CompCode */
```

## MQDISC - Disconnect queue manager

The MQDISC call breaks the connection between the queue manager and the application program, and is the inverse of the MQCONN or MQCONNX call.

- On z/OS, all applications that use asynchronous message consumption, event handling or callback, the main control thread must issue an MQDISC call before ending. See Asynchronous consumption of IBM MQ messages for more details.
- On z/OS, CICS applications do not need to issue this call to disconnect from the queue manager.

  If a CICS application does make this call it has no effect unless an earlier MQCONNX call was made, specifying one of the:

  MQCNO_SERIALIZE_CONN_TAG_Q_MGR
  MQCNO_SERIALIZE_CONN_TAG_QSG
  MQCNO_RESTRICT_CONN_TAG_Q_MGR or
  MQCNO_RESTRICT_CONN_TAG_QSG

  options, in which case all currently open object handles are closed.
- On IBM i, applications running in compatibility mode do not need to issue this call. See "MQCONN - Connect queue manager" on page 641 for more information.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

### Syntax

MQDISC (*Hconn*, *CompCode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input/output

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, you can omit the MQCONN call, and specify the following value for *Hconn*:

**MQHC_DEF_HCONN**
Default connection handle.

On successful completion of the call, the queue manager sets *Hconn* to a value that is not a valid handle for the environment. This value is:

**MQHC_UNUSABLE_HCONN**
Unusable connection handle.

On z/OS, *Hconn* is set to a value that is undefined.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following codes:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_BACKED_OUT**
(2003, X'7D3') Unit of work backed out.

**MQRC_CONN_TAG_NOT_RELEASED**
(2344, X'928') Connection tag not released.

**MQRC_OUTCOME_PENDING**
(2124, X'84C') Result of commit operation is pending.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_DISC_LOAD_ERROR**
(2138, X'85A') Unable to load adapter disconnection module.

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_INIT_ERROR**
(2375, X'947') API exit initialization failed.

**MQRC_API_EXIT_TERM_ERROR**
(2376, X'948') API exit termination failed.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_OUTCOME_MIXED**
(2123, X'84B') Result of commit or back-out operation is mixed.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. If an MQDISC call is issued when the connection still has objects open under that connection, the queue manager closes those objects, with the close options set to MQCO_NONE.
2. If the application ends with uncommitted changes in a unit of work, the disposition of those changes depends on how the application ends:
   a. If the application issues the MQDISC call before ending:
      - For a queue-manager-coordinated unit of work, the queue manager issues the MQCMIT call on behalf of the application. The unit of work is committed if possible, and backed out if not.
      - For an externally coordinated unit of work, there is no change in the status of the unit of work; however, the queue manager typically indicates that the unit of work must be committed when asked by the unit-of-work coordinator.

        On z/OS, CICS, IMS (other than batch DL/1 programs), and RRS applications are like this.

   b. If the application ends normally but without issuing the MQDISC call, the action taken depends on the environment:
      - On z/OS, except for MQ Java or MQ JMS applications, the actions described in note 2a occur.
      - In all other cases, the actions described in note 2c occur.

      Because of the differences between environments, ensure that applications that you want to port either commit or back out the unit of work before they end.
   c. If the application ends *abnormally* without issuing the MQDISC call, the unit of work is backed out.
3. On z/OS, the following points apply:
   - CICS applications do not have to issue the MQDISC call to disconnect from the queue manager, because the CICS system itself connects to the queue manager, and the MQDISC call has no effect on this connection.

- CICS, IMS (other than batch DL/1 programs), and RRS applications use units of work that are coordinated by an external unit-of-work coordinator. As a result, the MQDISC call does not affect the status of the unit of work (if any) that exists when the call is issued.

  However the MQDISC call *does* indicate the end of use of the connection tag *ConnTag* that was associated with the connection by an earlier MQCONNX call issued by the application. If there is an active unit of work that references the connection tag when the MQDISC call is issued, the call completes with completion code MQCC_WARNING and reason code MQRC_CONN_TAG_NOT_RELEASED. The connection tag does not become available for reuse until the external unit-of-work coordinator has resolved the unit of work.

4. On IBM i, applications running in compatibility mode do not have to issue this call; see the MQCONN call for more details.

**Note:** In CICS, MQOP_START is not supported. Instead, use the MQOP_START_WAIT function call.

## C invocation

```
MQDISC (&Hconn, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQDISC' USING HCONN, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQDISC (Hconn, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

## System/390 assembler invocation

```
CALL MQDISC,(HCONN,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS  F  Connection handle
```

```
COMPCODE  DS  F  Completion code
REASON    DS  F  Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQDISC Hconn, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn    As Long 'Connection handle'
Dim CompCode As Long 'Completion code'
Dim Reason   As Long 'Reason code qualifying CompCode'
```

## MQDLTMH - Delete message handle

The MQDLTMH call deletes a message handle and is the inverse of the MQCRTMH call.

### Syntax

MQDLTMH (*Hconn*, *Hmsg*, *DltMsgHOpts*, *CompCode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager.

The value must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using MQHC_UNASSOCIATED_HCONN then a valid connection must be established on the thread deleting the message handle, otherwise the call fails with MQRC_CONNECTION_BROKEN.

***Hmsg***
Type: MQHMSG - input/output

This is the message handle to be deleted. The value was returned by a previous MQCRTMH call.

On successful completion of the call, the handle is set to an invalid value for the environment. This value is:

**MQHM_UNUSABLE_HMSG**
Unusable message handle.

The message handle cannot be deleted if another IBM MQ call is in progress that was passed the same message handle.

***DltMsgHOpts***
Type: MQDMHO - input

See MQDMHO for details.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CONNECTION_BROKEN**
(2009, X'07D9') Connection to queue manager lost.

**MQRC_DMHO_ERROR**
(2462, X'099E') Delete message handle options structure not valid.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle pointer not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C invocation

```
MQDLTMH (Hconn, &Hmsg, &DltMsgHOpts, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;       /* Connection handle */
MQHMSG   Hmsg;        /* Message handle */
MQDMHO   DltMsgHOpts; /* Options that control the action of MQDLTMH */
MQLONG   CompCode;    /* Completion code */
MQLONG   Reason;      /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQDLTMH' USING HCONN, HMSG, DLTMSGOPTS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**  Connection handle
01   HCONN   PIC S9(9) BINARY.
```

```
**  Options that control the action of MQDLTMH
01   DLTMSGHOPTS.
COPY CMQDLMHOV.

**  Completion code
01  COMPCODE   PIC S9(9) BINARY.

** Reason code qualifying COMPCODE
01   REASON      PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQDLTMH (Hconn, Hmsg, DltMsgHOpts, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn          /* Connection handle */
dcl Hmsg           /* Message handle */
dcl DltMsgHOpts like MQDMHO;    /* Options that control the action of MQDLTMH */
dcl CompCode       /* Completion code */
dcl Reason         /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQDLTMH,(HCONN,HMSG,DLTMSGHOPTS,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN          DS        F  Connection handle
HMSG           DS        D  Message handle
DLTMSGHOPTS    CMQDMHOA  ,  Options that control the action of MQDLTMH
COMPCODE       DS        F  Completion code
REASON         DS        F  Reason code qualifying COMPCODE
```

## MQDLTMP - Delete message property

The MQDLTMP call deletes a property from a message handle and is the inverse of the MQSETMP call.

### Syntax

MQDLTMP (*Hconn*, *Hmsg*, *DltPropOpts*, *Name*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using MQHC_UNASSOCIATED_HCONN then a valid connection must be established on the thread deleting the message handle otherwise the call fails with MQRC_CONNECTION_BROKEN.

***Hmsg***

Type: MQHMSG - input

This is the message handle containing the property to be deleted. The value was returned by a previous MQCRTMH call.

***DltPropOpts***

Type: MQDMPO - input

See the MQDMPO data type for details.

***Name***
Type: MQCHARV - input

The name of the property to delete. See Property names for further information about property names.

Wildcards are not allowed in the property name.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_PROPERTY_NOT_AVAILABLE**
(2471, X'09A7') Property not available.

**MQRC_RFH_FORMAT_ERROR**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'0852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'086D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CONNECTION_BROKEN**
(2009, X'07D9') Connection to queue manager lost.

**MQRC_DMPO_ERROR**
(2481, X'09B1') Delete message property options structure not valid.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_PROPERTY_NAME_ERROR**
(2442, X'098A') Invalid property name.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'083F') Property name coded character set identifier not valid.

**MQRC_UNEXPECTED_ERROR**
(2195, X'0893') Unexpected error occurred.

For detailed information about these codes, see:

- Messages and reason codes for IBM MQ for z/OS
- API completion and reason codes for other IBM MQ platforms

.

## C invocation

```
MQDLTMP (Hconn, Hmsg, &DltPropOpts, &Name, &CompCode, &Reason)
```

Declare the parameters as follows:

```
MQHCONN Hconn;       /* Connection handle */
MQHMSG  Hmsg;        /* Message handle */
MQDMPO  DltPropOpts; /* Options that control the action of MQDLTMP */
MQCHARV Name;        /* Property name */
MQLONG  CompCode;    /* Completion code */
MQLONG  Reason;      /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQDLTMP' USING HCONN, HMSG, DLTPROPOPTS, NAME, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN    PIC S9(9) BINARY.
**   Message handle
 01  HMSG         PIC S9(18) BINARY.
**   Options that control the action of MQDLTMP
 01  DLTPROPOPTS.
     COPY CMQDMPOV.
**   Property name
 01  NAME
     COPY CMQCHRVV.
**   Completion code
 01  COMPCODE PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON   PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQDLTMP (Hconn, Hmsg, DltPropOpts, Name, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31); /* Connection handle */
dcl Hmsg        fixed bin(63); /* Message handle */
dcl DltPropOpts like MQDMPO;   /* Options that control the action of MQDLTMP */
dcl Name        like MQCHARV;  /* Property name */
dcl CompCode    fixed bin(31); /* Completion code */
dcl Reason      fixed bin(31); /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQDLTMP,(HCONN,HMSG,DLTPROPOPTS,NAME,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN        DS         F     Connection handle
HMSG         DS         D     Message handle
DLTPROPOPTS  CMQDMPOA   ,     Options that control the action of MQDLTMP
NAME         CMQCHRVA   ,     Property name
COMPCODE     DS         F     Completion code
REASON       DS         F     Reason code qualifying COMPCODE
```

## MQGET - Get message

The MQGET call retrieves a message from a local queue that has been opened using the MQOPEN call.

### Syntax

MQGET (*Hconn*, *Hobj*, *MsgDesc*, *GetMsgOpts*, *BufferLength*, *Buffer*, *DataLength*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Hobj***

Type: MQHOBJ - input

This handle represents the queue from which a message is to be retrieved. The value of *Hobj* was returned by a previous MQOPEN call. The queue must have been opened with one or more of the following options (see “MQOPEN - Open object” on page 711 for details):

- MQOO_INPUT_SHARED
- MQOO_INPUT_EXCLUSIVE
- MQOO_INPUT_AS_Q_DEF
- MQOO_BROWSE

***MsgDesc***

Type: MQMD - input/output

This structure describes the attributes of the message required, and the attributes of the message retrieved. See “MQMD - Message descriptor” on page 402 for details.

If *BufferLength* is less than the message length, *MsgDesc* is filled by the queue manager, whether MQGMO_ACCEPT_TRUNCATED_MSG is specified on the *GetMsgOpts* parameter (see MQGMO - Options field ).

If the application provides a version-1 MQMD, the message returned has an MQMDE prefixed to the application message data, but *only* if one or more of the fields in the MQMDE has a nondefault value. If all the fields in the MQMDE have default values, the MQMDE is omitted. A format name of MQFMT_MD_EXTENSION in the *Format* field in MQMD indicates that an MQMDE is present.

The application does not need to provide an MQMD structure if a valid message handle is supplied in the *MsgHandle* field. If nothing is provided in this field, the descriptor of the message is taken from the descriptor associated with the message handles.

If the application provides a message handle rather than an MQMD structure, and specifies MQGMO_PROPERTIES_FORCE_MQRFH2, the call fails with reason code MQRC_MD_ERROR. The call also fails, with reason code MQRC_MD_ERROR, if the application does not provide an MQMD structure and specifies MQGMO_PROPERTIES_AS_Q_DEF, and the *PropertyControl* queue attribute is MQPROP_FORCE_MQRFH2.

If match options are specified and the message descriptor associated with the message handle is being used, the input fields used for matching come from the message handle.

***GetMsgOpts***
Type: MQGMO - input/output

See "MQGMO - Get-message options" on page 355 for details.

***BufferLength***
Type: MQLONG - input

This is the length in bytes of the *Buffer* area. Specify zero for messages that have no data, or if the message is to be removed from the queue and the data discarded (you must specify MQGMO_ACCEPT_TRUNCATED_MSG in this case).

**Note:** The length of the longest message that it is possible to read from the queue is given by the *MaxMsgLength* queue attribute; see "Attributes for queues" on page 810.

***Buffer***
Type: MQBYTExBufferLength - output

This is the area to contain the message data. Align the buffer on a boundary appropriate to the nature of the data in the message. 4 byte alignment is suitable for most messages (including messages containing IBM MQ header structures), but some messages might require more stringent alignment. For example, a message containing a 64 bit binary integer might require 8-byte alignment.

If *BufferLength* is less than the message length, as much of the message as possible is moved into *Buffer* ; this happens whether MQGMO_ACCEPT_TRUNCATED_MSG is specified on the *GetMsgOpts* parameter (see MQGMO - Options field for more information).

The character set and encoding of the data in *Buffer* are given by the *CodedCharSetId* and *Encoding* fields returned in the *MsgDesc* parameter. If these values are different from the values required by the receiver, the receiver must convert the application message data to the character set and encoding required. The MQGMO_CONVERT option can be used (with a user-written exit if necessary) to convert the message data; see "MQGMO - Get-message options" on page 355 for details of this option.

**Note:** All the other parameters on the MQGET call are in the character set and encoding of the local queue manager (given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE).

If the call fails, the contents of the buffer might still have changed.

In the C programming language, the parameter is declared as a pointer-to-void: the address of any type of data can be specified as the parameter.

If the *BufferLength* parameter is zero, *Buffer* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler can be null.

***DataLength***
Type: MQLONG - output

This is the length in bytes of the application data *in the message*. If this value is greater than *BufferLength*, only *BufferLength* bytes are returned in the *Buffer* parameter (that is, the message is truncated). If the value is zero, the message contains no application data.

If *BufferLength* is less than the message length, *DataLength* is still completed by the queue manager, whether MQGMO_ACCEPT_TRUNCATED_MSG is specified on the *GetMsgOpts* parameter (see MQGMO - Options field for more information). This allows the application to determine the size of the buffer required to accommodate the message data, and then reissue the call with a buffer of the appropriate size.

However, if the MQGMO_CONVERT option is specified, and the converted message data is too long to fit in *Buffer*, the value returned for *DataLength* is:

- The length of the *unconverted* data, for queue-manager defined formats.

  In this case, if the nature of the data causes it to expand during conversion, the application must allocate a buffer bigger than the value returned by the queue manager for *DataLength*.
- The value returned by the data-conversion exit, for application-defined formats.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason codes listed are the ones that the queue manager can return for the *Reason* parameter. If the application specifies the MQGMO_CONVERT option, and a user-written exit is invoked to convert some or all the message data, the exit decides what value is returned for the *Reason* parameter. As a result, values other than those values documented are possible.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_CONVERTED_MSG_TOO_BIG**
(2120, X'848') Converted data too large for buffer.

**MQRC_CONVERTED_STRING_TOO_BIG**
(2190, X'88E') Converted string too large for field.

**MQRC_DBCS_ERROR**
(2150, X'866') DBCS string not valid.

**MQRC_FORMAT_ERROR**
(2110, X'83E') Message format not valid.

**MQRC_INCOMPLETE_GROUP**
(2241, X'8C1') Message group not complete.

**MQRC_INCOMPLETE_MSG**
(2242, X'8C2') Logical message not complete.

**MQRC_INCONSISTENT_CCSIDS**
(2243, X'8C3') Message segments have differing CCSIDs.

**MQRC_INCONSISTENT_ENCODINGS**
(2244, X'8C4') Message segments have differing encodings.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_MSG_TOKEN_ERROR**
(2331, X'91B') Invalid use of message token.

**MQRC_NO_MSG_LOCKED**
(2209, X'8A1') No message locked.

**MQRC_NOT_CONVERTED**
(2119, X'847') Message data not converted.

**MQRC_OPTIONS_CHANGED**
(nnnn, X'xxx') Options that were required to be consistent have been changed.

**MQRC_PARTIALLY_CONVERTED**
(2272, X'8E0') Message data partially converted.

**MQRC_SIGNAL_REQUEST_ACCEPTED**
(2070, X'816') No message returned (but signal request accepted).

**MQRC_SOURCE_BUFFER_ERROR**
(2145, X'861') Source buffer parameter not valid.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'83F') Source coded character set identifier not valid.

**MQRC_SOURCE_DECIMAL_ENC_ERROR**
(2113, X'841') Packed-decimal encoding in message not recognized.

**MQRC_SOURCE_FLOAT_ENC_ERROR**
(2114, X'842') Floating-point encoding in message not recognized.

**MQRC_SOURCE_INTEGER_ENC_ERROR**
(2112, X'840') Source integer encoding not recognized.

**MQRC_SOURCE_LENGTH_ERROR**
(2143, X'85F') Source length parameter not valid.

**MQRC_TARGET_BUFFER_ERROR**
(2146, X'862') Target buffer parameter not valid.

**MQRC_TARGET_CCSID_ERROR**
(2115, X'843') Target coded character set identifier not valid.

**MQRC_TARGET_DECIMAL_ENC_ERROR**
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.

**MQRC_TARGET_FLOAT_ENC_ERROR**
(2118, X'846') Floating-point encoding specified by receiver not recognized.

**MQRC_TARGET_INTEGER_ENC_ERROR**
(2116, X'844') Target integer encoding not recognized.

**MQRC_TRUNCATED_MSG_ACCEPTED**
(2079, X'81F') Truncated message returned (processing completed).

**MQRC_TRUNCATED_MSG_FAILED**
(2080, X'820') Truncated message returned (processing not completed).

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_CONV_LOAD_ERROR**
(2133, X'855') Unable to load data conversion services modules.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BACKED_OUT**
(2003, X'7D3') Unit of work backed out.

**MQRC_BUFFER_ERROR**
(2004, X'7D4') Buffer parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') Coupling facility not available.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CF_STRUC_LIST_HDR_IN_USE**
(2347, X'92B') Coupling-facility structure list-header in use.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CORREL_ID_ERROR**
(2207, X'89F') Correlation-identifier error.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'7DA') Data length parameter not valid.

**MQRC_DB2_NOT_AVAILABLE**
(2342, X'926') Db2 subsystem not available.

**MQRC_GET_INHIBITED**
(2016, X'7E0') Gets inhibited for the queue.

**MQRC_GLOBAL_UOW_CONFLICT**
(2351, X'92F') Global units of work conflict.

**MQRC_GMO_ERROR**
(2186, X'88A') Get-message options structure not valid.

**MQRC_HANDLE_IN_USE_FOR_UOW**
(2353, X'931') Handle in use for global unit of work.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_INCONSISTENT_BROWSE**
(2259, X'8D3') Inconsistent browse specification.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_INVALID_MSG_UNDER_CURSOR**
(2246, X'8C6') Message under cursor not valid for retrieval.

**MQRC_LOCAL_UOW_CONFLICT**
(2352, X'930') Global unit of work conflicts with local unit of work.

**MQRC_MATCH_OPTIONS_ERROR**
(2247, X'8C7') Match options not valid.

**MQRC_MD_ERROR**
(2026, X'7EA') Message descriptor not valid.

**MQRC_MSG_ID_ERROR**
(2206, X'89E') Message-identifier error.

**MQRC_MSG_SEQ_NUMBER_ERROR**
(2250, X'8CA') Message sequence number not valid.

**MQRC_MSG_TOKEN_ERROR**
(2331, X'91B') Use of message token not valid.

**MQRC_NO_MSG_AVAILABLE**
(2033, X'7F1') No message available.

**MQRC_NO_MSG_UNDER_CURSOR**
(2034, X'7F2') Browse cursor not positioned on message.

**MQRC_NOT_OPEN_FOR_BROWSE**
(2036, X'7F4') Queue not open for browse.

**MQRC_NOT_OPEN_FOR_INPUT**
(2037, X'7F5') Queue not open for input.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_INDEX_TYPE_ERROR**
(2394, X'95A') Queue has wrong index type.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SECOND_MARK_NOT_ALLOWED**
(2062, X'80E') A message is already marked.

**MQRC_SIGNAL_OUTSTANDING**
(2069, X'815') Signal outstanding for this handle.

**MQRC_SIGNAL1_ERROR**
(2099, X'833') Signal field not valid.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_SYNCPOINT_LIMIT_REACHED**
(2024, X'7E8') No more messages can be handled within current unit of work.

**MQRC_SYNCPOINT_NOT_AVAILABLE**
(2072, X'818') sync point support not available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UOW_ENLISTMENT_ERROR**
(2354, X'932') Enlistment in global unit of work failed.

**MQRC_UOW_MIX_NOT_SUPPORTED**
(2355, X'933') Mixture of unit-of-work calls not supported.

**MQRC_UOW_NOT_AVAILABLE**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**MQRC_WAIT_INTERVAL_ERROR**
(2090, X'82A') Wait interval in MQGMO not valid.

**MQRC_WRONG_GMO_VERSION**
(2256, X'8D0') Wrong version of MQGMO supplied.

**MQRC_WRONG_MD_VERSION**
(2257, X'8D1') Wrong version of MQMD supplied.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. The message retrieved is normally deleted from the queue. This deletion can occur as part of the MQGET call itself, or as part of a sync point.

   The browse options are: MQGMO_BROWSE_FIRST, MQGMO_BROWSE_NEXT, and MQGMO_BROWSE_MSG_UNDER_CURSOR.

2. If the MQGMO_LOCK option is specified with one of the browse options, the browsed message is locked so that it is visible only to this handle.

   If the MQGMO_UNLOCK option is specified, a previously locked message is unlocked. No message is retrieved in this case, and the *MsgDesc*, *BufferLength*, *Buffer*, and *DataLength* parameters are not checked or altered.

3. For applications issuing an MQGET call, the message retrieved can be lost if the application terminates abnormally or the connection is severed while processing the call. This issue arises because the surrogate running on the same platform as the queue manager that issues the MQGET call on behalf of the application cannot detect the loss of the application until the surrogate is about to return the message to the application, *after* the message has been removed from the queue. This issue can occur for both persistent messages and nonpersistent messages.

   To eliminate the risk of losing messages in this way, always retrieve messages within units of work. That is, by specifying the MQGMO_SYNCPOINT option on the MQGET call, and using the MQCMIT or MQBACK calls to commit or back out the unit of work when message processing is complete. If MQGMO_SYNCPOINT is specified, and the client terminates abnormally or the connection is severed,

the surrogate backs out the unit of work on the queue manager and the message is reinstated on the queue. For more information about sync points, see Syncpoint considerations in IBM MQ applications.

This situation can arise with IBM MQ clients as well as with applications that are running on the same platform as the queue-manager.

4. If an application puts a sequence of messages on a particular queue within a single unit of work, and then commits that unit of work successfully, the messages become available for retrieval as follows:
   - If the queue is a *nonshared* queue (that is, a local queue), all messages within the unit of work become available at the same time.
   - If the queue is a *shared* queue, messages within the unit of work become available in the order in which they were put, but not all at the same time. When the system is heavily laden, it is possible for the first message in the unit of work to be retrieved successfully, but for the MQGET call for the second or subsequent message in the unit of work to fail with MQRC_NO_MSG_AVAILABLE. If this issue occurs, the application must wait a short while and then try the operation again.
5. If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if certain conditions are satisfied. See MQPUT usage notes for details. If the conditions are satisfied, the messages are presented to the receiving application in the order in which they were sent, if:
   - Only one receiver is getting messages from the queue.

     If there are two or more applications getting messages from the queue, they must agree with the sender the mechanism to be used to identify messages that belong to a sequence. For example, the sender might set all the *CorrelId* fields in the messages in a sequence to a value that was unique to that sequence of messages.
   - The receiver does not deliberately change the order of retrieval, for example by specifying a particular *MsgId* or *CorrelId*.

   If the sending application puts the messages as a message group, the messages are presented to the receiving application in the correct order if the receiving application specifies the MQGMO_LOGICAL_ORDER option on the MQGET call. For more information about message groups, see:
   - MQMD - MsgFlags field
   - MQPMO_LOGICAL_ORDER
   - MQGMO_LOGICAL_ORDER

   If the user is getting messages in a group under sync point, they must ensure that the complete group is processed before attempting to finish the transaction.
6. Applications must test for the feedback code MQFB_QUIT in the *Feedback* field of the *MsgDesc* parameter, and end if they find this value. See MQMD - Feedback field for more information.
7. If the queue identified by *Hobj* was opened with the MQOO_SAVE_ALL_CONTEXT option, and the completion code from the MQGET call is MQCC_OK or MQCC_WARNING, the context associated with the queue handle *Hobj* is set to the context of the message that has been retrieved (unless the MQGMO_BROWSE_FIRST, MQGMO_BROWSE_NEXT, or MQGMO_BROWSE_MSG_UNDER_CURSOR option is set, in which case the context is marked as not available).

   You can use the saved context on a subsequent MQPUT or MQPUT1 call by specifying the MQPMO_PASS_IDENTITY_CONTEXT or MQPMO_PASS_ALL_CONTEXT options. This enables the context of the message received to be transferred in whole or in part to another message (for example, when the message is forwarded to another queue). For more information about message context, see Message context.
8. If you include the MQGMO_CONVERT option in the *GetMsgOpts* parameter, the application message data is converted to the representation requested by the receiving application, before the data is placed in the *Buffer* parameter:

- The *Format* field in the control information in the message identifies the structure of the application data, and the *CodedCharSetId* and *Encoding* fields in the control information in the message specify its character-set identifier and encoding.
- The application issuing the MQGET call specifies in the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter the character-set identifier and encoding to which to convert the application message data.

When conversion of the message data is necessary, the conversion is performed either by the queue manager itself or by a user-written exit, depending on the value of the *Format* field in the control information in the message:

- The following format names are formats that are converted by the queue manager; these formats are called "built-in" formats:
  - MQFMT_ADMIN
  - MQFMT_CICS ( z/OS only)
  - MQFMT_COMMAND_1
  - MQFMT_COMMAND_2
  - MQFMT_DEAD_LETTER_HEADER
  - MQFMT_DIST_HEADER
  - MQFMT_EVENT version 1
  - MQFMT_EVENT version 2 ( z/OS only)
  - MQFMT_IMS
  - MQFMT_IMS_VAR_STRING
  - MQFMT_MD_EXTENSION
  - MQFMT_PCF
  - MQFMT_REF_MSG_HEADER
  - MQFMT_RF_HEADER
  - MQFMT_RF_HEADER_2
  - MQFMT_STRING
  - MQFMT_TRIGGER
  - MQFMT_WORK_INFO_HEADER ( z/OS only)
  - MQFMT_XMIT_Q_HEADER
- The format name MQFMT_NONE is a special value that indicates that the nature of the data in the message is undefined. As a consequence, the queue manager does not attempt conversion when the message is retrieved from the queue.

  **Note:** If MQGMO_CONVERT is specified on the MQGET call for a message that has a format name of MQFMT_NONE, and the character set or encoding of the message differs from that specified in the *MsgDesc* parameter, the message is returned in the *Buffer* parameter (assuming no other errors), but the call completes with completion code MQCC_WARNING and reason code MQRC_FORMAT_ERROR.

  You can use MQFMT_NONE either when the nature of the message data means that it does not require conversion, or when the sending and receiving applications have agreed between themselves the form in which to send the message data.
- All other format names pass the message to a user-written exit for conversion. The exit has the same name as the format, apart from environment-specific additions. User-specified format names must not begin with the letters IBM MQ.

  See "Data-conversion exit" on page 879 for details of the data-conversion exit.

User data in the message can be converted between any supported character sets and encodings. However, be aware that, if the message contains one or more IBM MQ header

structures, the message cannot be converted from or to a character set that has double-byte or multi-byte characters for any of the characters that are valid in queue names. Reason code MQRC_SOURCE_CCSID_ERROR or MQRC_TARGET_CCSID_ERROR results if this is attempted, and the message is returned unconverted. Unicode character set UCS-2 is an example of such a character set.

On return from MQGET, the following reason code indicates that the message was converted successfully:

- MQRC_NONE

The following reason code indicates that the message *might* have been converted successfully; the application must check the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter to find out:

- MQRC_TRUNCATED_MSG_ACCEPTED

All other reason codes indicate that the message was not converted.

**Note:** The interpretation of this reason code is true for conversions performed by a user-written exit *only* if the exit conforms to the processing guidelines described in "Data-conversion exit" on page 879.

9. When using the object-oriented interface to get messages, you can choose not to specify a buffer to hold the message data for an MQGET call. However, in versions of IBM MQ, prior to version 7, it was possible for MQGET to fail with reason code MQRC_CONVERTED_MSG_TO_BIG, even when a buffer was not specified. From IBM MQ Version 7, when you get a message using an object-oriented application without restricting the size of the receive message buffer, the application does not fail with MQRC_CONVERTED_MSG_TOO_BIG, and receives the converted message. This is true of the following environments:

   - .NET, including fully managed applications
   - C++
   - Java ( IBM MQ classes for Java )

   **Note:** For all clients, if the value of *sharingConversations* is zero, the channel operates as it did before IBM WebSphere MQ 7.0, and message handling reverts to Version 6 behavior. In this situation, if the buffer is too small to receive the converted message, the unconverted message is returned, with reason code MQRC_CONVERTED_MSG_TOO_BIG. For more information about *sharingConversations*, see Using sharing conversations in a client application.

10. For the built-in formats, the queue manager can perform *default conversion* of character strings in the message when the MQGMO_CONVERT option is specified. Default conversion allows the queue manager to use an installation-specified default character set that approximates the actual character set, when converting string data. As a result, the MQGET call can succeed with completion code MQCC_OK, instead of completing with MQCC_WARNING and reason code MQRC_SOURCE_CCSID_ERROR or MQRC_TARGET_CCSID_ERROR.

    **Note:** The result of using an approximate character set to convert string data is that some characters might be converted incorrectly. To avoid this, use characters in the string that are common to both the actual character set and the default character set.

    Default conversion applies both to the application message data and to character fields in the MQMD and MQMDE structures:

    - Default conversion of the application message data occurs only when *all* the following are true:
      - The application specifies MQGMO_CONVERT.
      - The message contains data that must be converted either from or to a character set that is not supported.
      - Default conversion was enabled when the queue manager was installed or restarted.

- Default conversion of the character fields in the MQMD and MQMDE structures occurs as necessary, if default conversion is enabled for the queue manager. The conversion is performed even if the MQGMO_CONVERT option is not specified by the application on the MQGET call.

11. For the Visual Basic programming language, the following points apply:
    - If the size of the *Buffer* parameter is less than the length specified by the *BufferLength* parameter, the call fails with reason code MQRC_STORAGE_NOT_AVAILABLE.
    - The *Buffer* parameter is declared as being of type `String`. If the data to be retrieved from the queue is not of type `String`, use the MQGETAny call in place of MQGET.

      The MQGETAny call has the same parameters as the MQGET call, except that the *Buffer* parameter is declared as being of type `Any`, allowing any type of data to be retrieved. However, this means that *Buffer* cannot be checked to ensure that it is at least *BufferLength* bytes in size.
12. Not all MQGET options are supported when read ahead is enabled. The following table indicated which options are allowed and whether they can be altered between MQGET calls.

*Table 554. MQGET options permitted when read ahead is enabled*

| | **Permitted when read ahead is enabled and can be altered between MQGET calls** | **Permitted when read ahead is enabled but cannot be altered between MQGET calls** [a] | **MQGET options that are not permitted when read ahead is enabled** [b] |
|---|---|---|---|
| MQGET MD values | MsgId [c]<br>CorrelId [c] | Encoding<br>CodedCharSetId | |
| MQGET MQGMO options | MQGMO_WAIT<br>MQGMO_NO_WAIT<br>MQGMO_FAIL_IF_QUIESCING<br>MQGMO_BROWSE_FIRST [d]<br>MQGMO_BROWSE_NEXT [d]<br>MQGMO_BROWSE_MESSAGE<br>_UNDER_CURSOR [d] | MQGMO_SYNCPOINT_IF_PERSISTENT<br>MQGMO_NO_SYNCPOINT<br>MQGMO_ACCEPT_TRUNCATED_MSG<br>MQGMO_CONVERT<br>MQGMO_LOGICAL_ORDER<br>MQGMO_COMPLETE_MSG<br>MQGMO_ALL_MSGS_AVAILABLE<br>MQGMO_ALL_SEGMENTS_AVAILABLE<br>MQGMO_MARK_BROWSE_HANDLE<br>MQGMO_MARK_BROWSE_CO_OP<br>MQGMO_UNMARK_BROWSE_CO_OP<br>MQGMO_UNMARK_BROWSE_HANDLE<br>MQGMO_UNMARKED_BROWSE_MSG<br>MQGMO_PROPERTIES_FORCE_MQRFH2<br>MQGMO_NO_PROPERTIES<br>MQGMO_PROPERTIES_IN_HANDLE<br>MQGMO_PROPERTIES_COMPATIBILITY | MQGMO_SET_SIGNAL<br>MQGMO_SYNCPOINT<br>MQGMO_MARK_SKIP<br>_BACKOUT<br>MQGMO_MSG_UNDER<br>_CURSOR [d]<br>MQGMO_LOCK<br>MQGMO_UNLOCK |
| MQGMO values | | MsgHandle | |

    a. If these options are altered between MQGET calls an MQRC_OPTIONS_CHANGED reason code is returned.

    b. If these options are specified on the first MQGET call then read ahead is disabled. If these options are specified on a subsequent MQGET call a reason code MQRC_OPTIONS_ERROR is returned.

    c. The client applications need to be aware that if the MsgId and CorrelId values are altered between MQGET calls messages with the previous values might have already been sent to the client and remain in the client read ahead buffer until consumed (or automatically purged).

    d. The first MQGET call determines whether messages are to be browsed or got from a queue when read ahead is enabled. If the application attempts to use a combination of browse and get an MQRC_OPTIONS_CHANGED reason code is returned.

    e. MQGMO_MSG_UNDER_CURSOR is not possible with read ahead. Messages can be browsed or got when read ahead is enabled but not a combination of both.

13. Applications can destructively get uncommitted messages only if those messages are put in the same local unit of work as the get. Applications cannot get uncommitted messages nondestructively.
14. Messages under a browse cursor can be retrieved in a unit of work. It is not possible to retrieve an uncommitted message in this way.

## C invocation

```
MQGET (Hconn, Hobj, &MsgDesc, &GetMsgOpts, BufferLength, Buffer,
      &DataLength, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQHOBJ   Hobj;          /* Object handle */
MQMD     MsgDesc;       /* Message descriptor */
MQGMO    GetMsgOpts;    /* Options that control the action of MQGET */
MQLONG   BufferLength;  /* Length in bytes of the Buffer area */
MQBYTE   Buffer[n];     /* Area to contain the message data */
MQLONG   DataLength;    /* Length of the message */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQGET' USING HCONN, HOBJ, MSGDESC, GETMSGOPTS, BUFFERLENGTH,
BUFFER, DATALENGTH, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Object handle
 01  HOBJ          PIC S9(9) BINARY.
**   Message descriptor
 01  MSGDESC.
     COPY CMQMDV.
**   Options that control the action of MQGET
 01  GETMSGOPTS.
     COPY CMQGMOV.
**   Length in bytes of the BUFFER area
 01  BUFFERLENGTH  PIC S9(9) BINARY.
**   Area to contain the message data
 01  BUFFER        PIC X(n).
**   Length of the message
 01  DATALENGTH    PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQGET (Hconn, Hobj, MsgDesc, GetMsgOpts, BufferLength, Buffer,
           DataLength, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn         fixed bin(31);  /* Connection handle */
dcl Hobj          fixed bin(31);  /* Object handle */
dcl MsgDesc       like MQMD;      /* Message descriptor */
dcl GetMsgOpts    like MQGMO;     /* Options that control the action of
                                     MQGET */
dcl BufferLength  fixed bin(31);  /* Length in bytes of the Buffer
                                     area */
dcl Buffer        char(n);        /* Area to contain the message data */
dcl DataLength    fixed bin(31);  /* Length of the message */
dcl CompCode      fixed bin(31);  /* Completion code */
dcl Reason        fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
         CALL MQGET,(HCONN,HOBJ,MSGDESC,GETMSGOPTS,BUFFERLENGTH,
               BUFFER,DATALENGTH,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN         DS       F      Connection handle
HOBJ          DS       F      Object handle
MSGDESC       CMQMDA   ,      Message descriptor
GETMSGOPTS    CMQGMOA  ,      Options that control the action of MQGET
BUFFERLENGTH  DS       F      Length in bytes of the BUFFER area
BUFFER        DS       CL(n)  Area to contain the message data
DATALENGTH    DS       F      Length of the message
COMPCODE      DS       F      Completion code
REASON        DS       F      Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQGET Hconn, Hobj, MsgDesc, GetMsgOpts, BufferLength, Buffer,
DataLength, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn        As Long   'Connection handle'
Dim Hobj         As Long   'Object handle'
Dim MsgDesc      As MQMD   'Message descriptor'
Dim GetMsgOpts   As MQGMO  'Options that control the action of MQGET'
Dim BufferLength As Long   'Length in bytes of the Buffer area'
Dim Buffer       As String 'Area to contain the message data'
Dim DataLength   As Long   'Length of the message'
Dim CompCode     As Long   'Completion code'
Dim Reason       As Long   'Reason code qualifying CompCode'
```

## MQINQ - Inquire object attributes

The MQINQ call returns an array of integers and a set of character strings containing the attributes of an object.

The following types of object are valid:

- Queue manager
- Queue
- Namelist
- Process definition

### Syntax

MQINQ (*Hconn*, *Hobj*, *SelectorCount*, *Selectors*, *IntAttrCount*, *IntAttrs*, *CharAttrLength*, *CharAttrs*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Hobj***

Type: MQHOBJ - input

This handle represents the object (of any type) with attributes that are required. The handle must be returned by a previous MQOPEN call that specified the MQOO_INQUIRE option.

***SelectorCount***

Type: MQLONG - input

This is the count of selectors that are supplied in the *Selectors* array. It is the number of attributes that are to be returned. Zero is a valid value. The maximum number allowed is 256.

***Selectors***

Type: MQLONG x *SelectorCount* - input

This is an array of *SelectorCount* attribute selectors; each selector identifies an attribute (integer or character) with a value that is required.

Each selector must be valid for the type of object that *Hobj* represents, otherwise the call fails with completion code MQCC_FAILED and reason code MQRC_SELECTOR_ERROR.

In the special case of queues:

- If the selector is not valid for queues of any type, the call fails with completion code MQCC_FAILED and reason code MQRC_SELECTOR_ERROR.
- If the selector applies only to queues of types other than the type of the object, the call succeeds with completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE.
- If the queue being inquired is a cluster queue, the selectors that are valid depend on how the queue was resolved; see "Usage notes" on page 699 for further details.

You can specify selectors in any order. Attribute values that correspond to integer attribute selectors ( MQIA_* selectors) are returned in *IntAttrs* in the same order in which these selectors occur in *Selectors*. Attribute values that correspond to character attribute selectors ( MQCA_* selectors) are returned in *CharAttrs* in the same order in which those selectors occur. MQIA_* selectors can be interleaved with the MQCA_* selectors; only the relative order within each type is important.

**Note:**

1. The integer and character attribute selectors are allocated within two different ranges; the MQIA_* selectors reside within the range MQIA_FIRST through MQIA_LAST, and the MQCA_* selectors within the range MQCA_FIRST through MQCA_LAST.

   For each range, the constants MQIA_LAST_USED and MQCA_LAST_USED define the highest value that the queue manager accepts.
2. If all the MQIA_* selectors occur first, the same element numbers can be used to address corresponding elements in the *Selectors* and *IntAttrs* arrays.
3. If the *SelectorCount* parameter is zero, *Selectors* is not referred to. In this case, the parameter address passed by programs written in C or S/390 assembler might be null.

The attributes that can be inquired are listed in the following tables. For the MQCA_* selectors, the constant that defines the length in bytes of the resulting string in *CharAttrs* is provided in parentheses.

The tables that follow list the selectors, by object, in alphabetical order, as follows:

- Table 555 on page 687 MQINQ attribute selectors for queues
- Table 556 on page 689 MQINQ attribute selectors for namelists
- Table 557 on page 689 MQINQ attribute selectors for process definitions
- Table 558 on page 690 MQINQ attribute selectors for the queue manager

All selectors are supported on all IBM MQ platforms, except where indicated in the **Note** column as follows:

**Not z/OS**
Supported on all platforms **except** z/OS

**z/OS**
Supported **only** on z/OS

*Table 555. MQINQ attribute selectors for queues*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQCA_ALTERATION_DATE | MQ_DATE_LENGTH | Date of most-recent alteration | |
| MQCA_ALTERATION_TIME | MQ_TIME_LENGTH | Time of most-recent alteration | |
| MQCA_BACKOUT_REQ_Q_NAME | MQ_Q_NAME_LENGTH | Excessive backout requeue name | |
| MQCA_BASE_Q_NAME | MQ_Q_NAME_LENGTH | Name of queue that alias resolves to | |
| MQCA_CF_STRUC_NAME | MQ_CF_STRUC_NAME_LENGTH | Coupling-facility structure name | z/OS |
| MQCA_CLUS_CHL_NAME | MQ_CHANNEL_NAME_LENGTH | Name of the cluster-sender channel that uses this queue as a transmission queue. | |
| MQCA_CLUSTER_NAME | MQ_CLUSTER_NAME_LENGTH | Cluster name | |
| MQCA_CLUSTER_NAMELIST | MQ_NAMELIST_NAME_LENGTH | Cluster namelist | |
| MQCA_CREATION_DATE | MQ_CREATION_DATE_LENGTH | Queue creation date | |
| MQCA_CREATION_TIME | MQ_CREATION_TIME_LENGTH | Queue creation time | |
| MQCA_CUSTOM | MQ_CUSTOM_LENGTH | The custom attribute for new features | |
| MQCA_INITIATION_Q_NAME | MQ_Q_NAME_LENGTH | Initiation queue name | |
| MQCA_PROCESS_NAME | MQ_PROCESS_NAME_LENGTH | Name of process definition | |
| MQCA_Q_DESC | MQ_Q_DESC_LENGTH | Queue description | |
| MQCA_Q_NAME | MQ_Q_NAME_LENGTH | Queue name | |
| MQCA_REMOTE_Q_MGR_NAME | MQ_Q_MGR_NAME_LENGTH | Name of remote queue manager | |
| MQCA_REMOTE_Q_NAME | MQ_Q_NAME_LENGTH | Name of remote queue as known on remote queue manager | |
| MQCA_STORAGE_CLASS | MQ_STORAGE_CLASS_LENGTH | Name of storage class | z/OS |
| MQCA_TRIGGER_DATA | MQ_TRIGGER_DATA_LENGTH | Trigger data | |
| MQCA_XMIT_Q_NAME | MQ_Q_NAME_LENGTH | Transmission queue name | |
| MQIA_ACCOUNTING_Q | MQLONG | Controls collection of accounting data for queue | Not z/OS |
| MQIA_BACKOUT_THRESHOLD | MQLONG | Backout threshold | |

*Table 555. MQINQ attribute selectors for queues (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQIA_CLWL_Q_PRIORITY | MQLONG | Priority of queue | |
| MQIA_CLWL_Q_RANK | MQLONG | Rank of queue | |
| MQIA_CLWL_USEQ | MQLONG | Use remote queues | |
| MQIA_CURRENT_Q_DEPTH | MQLONG | Number of messages on queue | |
| MQIA_DEF_BIND | MQLONG | Default binding | |
| MQIA_DEF_INPUT_OPEN_OPTION | MQLONG | Default open-for-input option | |
| MQIA_DEF_PERSISTENCE | MQLONG | Default message persistence | |
| MQIA_DEF_PRIORITY | MQLONG | Default message priority | |
| MQIA_DEFINITION_TYPE | MQLONG | Queue definition type | |
| MQIA_DIST_LISTS | MQLONG | Distribution list support | Not z/OS |
| MQIA_HARDEN_GET_BACKOUT | MQLONG | Whether to harden backout count | |
| MQIA_INDEX_TYPE | MQLONG | Type of index maintained for queue | z/OS |
| MQIA_INHIBIT_GET | MQLONG | Whether get operations are allowed | |
| MQIA_INHIBIT_PUT | MQLONG | Whether put operations are allowed | |
| MQIA_MAX_MSG_LENGTH | MQLONG | Maximum message length | |
| MQIA_MAX_Q_DEPTH | MQLONG | Maximum number of messages allowed on queue | |
| MQIA_MSG_DELIVERY_SEQUENCE | MQLONG | Whether message priority is relevant | |
| MQIA_NPM_CLASS | MQLONG | Level of reliability for nonpersistent messages | |
| MQIA_OPEN_INPUT_COUNT | MQLONG | Number of MQOPEN calls that have the queue open for input | |
| MQIA_OPEN_OUTPUT_COUNT | MQLONG | Number of MQOPEN calls that have the queue open for output | |
| MQIA_PROPERTY_CONTROL | MQLONG | Property control attribute | |
| MQIA_Q_DEPTH_HIGH_EVENT | MQLONG | Control attribute for queue depth high events | Not z/OS |
| MQIA_Q_DEPTH_HIGH_LIMIT | MQLONG | High limit for queue depth | Not z/OS |
| MQIA_Q_DEPTH_LOW_EVENT | MQLONG | Control attribute for queue depth low events | Not z/OS |
| MQIA_Q_DEPTH_LOW_LIMIT | MQLONG | Low limit for queue depth | Not z/OS |
| MQIA_Q_DEPTH_MAX_EVENT | MQLONG | Control attribute for queue depth max events | Not z/OS |

| *Table 555. MQINQ attribute selectors for queues (continued)* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQIA_Q_SERVICE_INTERVAL | MQLONG | Limit for queue service interval | Not z/OS |
| MQIA_Q_SERVICE_INTERVAL_EVENT | MQLONG | Control attribute for queue service interval events | Not z/OS |
| MQIA_Q_TYPE | MQLONG | Queue type | |
| MQIA_QSG_DISP | MQLONG | Queue-sharing group disposition | z/OS |
| MQIA_RETENTION_INTERVAL | MQLONG | Queue retention interval | |
| MQIA_SCOPE | MQLONG | Queue definition scope | Not z/OS |
| MQIA_SHAREABILITY | MQLONG | Whether queue can be shared for input | |
| MQIA_STATISTICS_Q | MQLONG | Controls collection of statistics data for queue | Not z/OS |
| MQIA_TRIGGER_CONTROL | MQLONG | Trigger control | |
| MQIA_TRIGGER_DEPTH | MQLONG | Trigger depth | |
| MQIA_TRIGGER_MSG_PRIORITY | MQLONG | Threshold message priority for triggers | |
| MQIA_TRIGGER_TYPE | MQLONG | Trigger type | |
| MQIA_USAGE | MQLONG | Usage | |

| *Table 556. MQINQ attribute selectors for namelists* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQCA_ALTERATION_DATE | MQ_DATE_LENGTH | Date of most-recent alteration | |
| MQCA_ALTERATION_TIME | MQ_TIME_LENGTH | Time of most-recent alteration | |
| MQCA_NAMELIST_DESC | MQ_NAMELIST_DESC_LENGTH | Namelist description | |
| MQCA_NAMELIST_NAME | MQ_NAMELIST_NAME_LENGTH | Name of namelist object | |
| MQIA_NAMELIST_TYPE | MQLONG | Namelist type | z/OS |
| MQCA_NAMES | MQ_Q_NAME_LENGTH x *Number of names in the list* | Names in the namelist | |
| MQIA_NAME_COUNT | MQLONG | Number of names in the namelist | |
| MQIA_QSG_DISP | MQLONG | Queue-sharing group disposition | z/OS |

| *Table 557. MQINQ attribute selectors for process definitions* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQCA_ALTERATION_DATE | MQ_DATE_LENGTH | Date of most-recent alteration | |
| MQCA_ALTERATION_TIME | MQ_TIME_LENGTH | Time of most-recent alteration | |

| *Table 557. MQINQ attribute selectors for process definitions (continued)* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQCA_APPL_ID | MQ_PROCESS_APPL_ID_LENGTH | Application identifier | |
| MQCA_ENV_DATA | MQ_PROCESS_ENV_DATA_LENGTH | Environment data | |
| MQCA_PROCESS_DESC | MQ_PROCESS_DESC_LENGTH | Description of process definition | |
| MQCA_PROCESS_NAME | MQ_PROCESS_NAME_LENGTH | Name of process definition | |
| MQCA_USER_DATA | MQ_PROCESS_USER_DATA_LENGTH | User data | |
| MQIA_APPL_TYPE | MQLONG | Application type | |
| MQIA_QSG_DISP | MQLONG | Queue-sharing group disposition | z/OS |

| *Table 558. MQINQ attribute selectors for the queue manager* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQCA_ALTERATION_DATE | MQ_DATE_LENGTH | Date of most-recent alteration | |
| MQCA_ALTERATION_TIME | MQ_TIME_LENGTH | Time of most-recent alteration | |
| MQCA_CHANNEL_AUTO_DEF_EXIT | MQ_EXIT_NAME_LENGTH | Automatic channel definition exit name | |
| MQCA_CHINIT_SERVICE_PARM | | Reserved for use by IBM | |
| MQCA_CLUSTER_WORKLOAD_DATA | MQ_EXIT_DATA_LENGTH | Data passed to cluster workload exit | |
| MQCA_CLUSTER_WORKLOAD_EXIT | MQ_EXIT_NAME_LENGTH | Name of cluster workload exit | |
| MQCA_COMMAND_INPUT_Q_NAME | MQ_Q_NAME_LENGTH | System command input queue name | |
| MQCA_CUSTOM | MQ_CUSTOM_LENGTH | The custom attribute for new features | |
| MQCA_DEAD_LETTER_Q_NAME | MQ_Q_NAME_LENGTH | Name of dead-letter queue | |
| MQCA_DEF_XMIT_Q_NAME | MQ_Q_NAME_LENGTH | Default transmission queue name | |
| MQCA_DNS_GROUP | MQ_DNS_GROUP_NAME_LENGTH | Name of the group for the TCP listener that handles inbound transmissions for the queue-sharing group to join. The name applies when using Workload Manager Dynamic Domain Name Services. | z/OS |
| MQCA_IGQ_USER_ID | MQ_USER_ID_LENGTH | Intra-group queuing user identifier | z/OS |
| MQCA_INSTALLATION_DESC | MQ_INSTALLATION_DESC_LENGTH | Description of the associated installation | Not z/OS. Not IBM i |

*Table 558. MQINQ attribute selectors for the queue manager (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQCA_INSTALLATION_NAME | MQ_INSTALLATION_NAME_LENGTH | Name of the installation associated with the queue manager | Not z/OS. Not IBM i |
| MQCA_INSTALLATION_PATH | MQ_INSTALLATION_PATH_LENGTH | Path where the associated IBM MQ is installed | Not z/OS. Not IBM i |
| MQCA_LU_GROUP_NAME | MQ_LU_NAME_LENGTH | Generic LU name for the LU 6.2 listener that handles inbound transmissions for the queue-sharing group to use | z/OS |
| MQCA_LU_NAME | MQ_LU_NAME_LENGTH | Name of the LU to use for outbound LU 6.2 transmissions. Set this name to the same LU that the listener uses for inbound transmissions | z/OS |
| MQCA_LU62_ARM_SUFFIX | MQ_ARM_SUFFIX_LENGTH | Suffix of the SYS1.PARMLIB member APPCPM *xx* , that nominates the LUADD for this channel initiator | z/OS |
| MQCA_PARENT | MQ_Q_MGR_NAME_LENGTH | Name of a hierarchically connected queue manager that is nominated as the parent of this queue manager | |
| MQCA_Q_MGR_DESC | MQ_Q_MGR_DESC_LENGTH | Queue manager description | |
| MQCA_Q_MGR_IDENTIFIER | MQ_Q_MGR_IDENTIFIER_LENGT | Queue-manager identifier (H) | |
| MQCA_Q_MGR_NAME | MQ_Q_MGR_NAME_LENGTH | Name of local queue manager | |
| MQCA_QSG_NAME | MQ_QSG_NAME_LENGTH | Queue-sharing group name | z/OS |
| MQCA_REPOSITORY_NAME | MQ_CLUSTER_NAME_LENGTH | Name of cluster for which queue manager provides repository services | |
| MQCA_REPOSITORY_NAMELIST | MQ_NAMELIST_NAME_LENGTH | Name of namelist object containing names of clusters for which queue manager provides repository services | |
| MQCA_TCP_NAME | MQ_TCP_NAME_LENGTH | Name of the TCP/IP system that you are using | z/OS |
| MQIA_ACCOUNTING_CONN_OVERRIDE | MQLONG | Override accounting settings | Not z/OS |
| MQIA_ACCOUNTING_INTERVAL | MQLONG | How often to write intermediate accounting records | Not z/OS |
| MQIA_ACCOUNTING_MQI | MQLONG | Controls collection of accounting information for MQI data | Not z/OS |
| MQIA_ACCOUNTING_Q | MQLONG | Controls collection of accounting information for queues | Not z/OS |
| MQIA_ACTIVE_CHANNELS | MQLONG | Maximum number of channels that can be active at any time | z/OS |

*Table 558. MQINQ attribute selectors for the queue manager (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQIA_ADOPTNEWMCA_CHECK | MQLONG | Elements that are checked to determine whether to adopt an MCA. The check is performed when a new inbound channel is detected that has the same name as an MCA that is already active. | z/OS |
| MQIA_ADOPTNEWMCA_INTERVAL | MQLONG | Amount of time, in seconds, that the new channel waits for the orphaned channel to end | Not z/OS |
| MQIA_ADOPTNEWMCA_TYPE | MQLONG | Whether to restart an orphaned instance of an MCA of a particular channel type automatically when a new inbound channel request matching the AdoptNewMCACheck parameters is detected | z/OS |
| MQIA_AUTHORITY_EVENT | MQLONG | Control attribute for authority events | Not z/OS |
| MQIA_BRIDGE_EVENT | MQLONG | Control attribute for IMS bridge events | z/OS |
| MQIA_CHANNEL_AUTO_DEF | MQLONG | Control attribute for automatic channel definition | Not z/OS |
| MQIA_CHANNEL_AUTO_DEF_EVENT | MQLONG | Control attribute for automatic channel definition events | Not z/OS |
| MQIA_CHANNEL_EVENT | MQLONG | Control attribute for channel events | |
| MQIA_CHINIT_ADAPTERS | MQLONG | Number of adapter subtasks to use for processing IBM MQ calls | z/OS |
| MQIA_CHINIT_DISPATCHERS | MQLONG | Number of dispatchers to use for the channel initiator | z/OS |
| MQIA_CHINIT_TRACE_AUTO_START | MQLONG | Whether to start channel initiator trace automatically | z/OS |
| MQIA_CHINIT_TRACE_TABLE_SIZE | MQLONG | Size of the trace data space (in MB) of the channel initiator | z/OS |
| MQIA_CLUSTER_WORKLOAD_LENGTH | MQLONG | Cluster workload length. | |
| MQIA_CLWL_MRU_CHANNELS | MQLONG | Number of most recently used channels for cluster workload balancing | |
| MQIA_CLWL_USEQ | MQLONG | Use remote queues | |
| MQIA_CODED_CHAR_SET_ID | MQLONG | Coded character set identifier | |
| MQIA_COMMAND_EVENT | MQLONG | Control attribute for command events | |
| MQIA_COMMAND_LEVEL | MQLONG | Command level supported by queue manager | |
| MQIA_CONFIGURATION_EVENT | MQLONG | Control attribute for configuration events | Not z/OS |

*Table 558. MQINQ attribute selectors for the queue manager (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQIA_DEF_CLUSTER_XMIT_Q_TYPE | MQLONG | Default transmission queue type to be used for cluster-sender channels. | |
| MQIA_DIST_LISTS | MQLONG | Distribution list support | Not z/OS |
| MQIA_DNS_WLM | MQLONG | Whether the TCP listener that handles inbound transmissions for the queue-sharing group registers with Workload Manager for Dynamic Domain Name Services | z/OS |
| MQIA_EXPIRY_INTERVAL | MQLONG | Interval between scans for expired messages | z/OS |
| MQIA_GROUP_UR | MQLONG | Control attribute for whether GROUP units of recovery are enabled for this queue manager. The GROUP unit of recovery disposition is only available if the queue manager is a member of a queue-sharing group | z/OS |
| MQIA_IGQ_PUT_AUTHORITY | MQLONG | Intra-group queuing put authority | z/OS |
| MQIA_INHIBIT_EVENT | MQLONG | Control attribute for inhibit events | Not z/OS |
| MQIA_INTRA_GROUP_queuing | MQLONG | Intra-group queuing support | z/OS |
| MQIA_LISTENER_TIMER | MQLONG | Time interval (in seconds) between IBM MQ attempts to restart the listener if APPC or TCP/IP failed. | z/OS |
| MQIA_LOCAL_EVENT | MQLONG | Control attribute for local events | Not z/OS |
| MQIA_LOGGER_EVENT | MQLONG | Control attribute for inhibit events | Not z/OS |
| MQIA_LU62_CHANNELS | MQLONG | Maximum number of channels that can be current, or clients that can be connected, using the LU 6.2 transmission protocol | z/OS |
| MQIA_MSG_MARK_BROWSE_INTERVAL | MQLONG | Time interval (in milliseconds) after which the queue manager can automatically remove a mark from browse messages.<br>**Attention:** You should not set this value below the default of 5000. | |
| MQIA_MAX_CHANNELS | MQLONG | Maximum number of channels that can be current (including server-connection channels with connected clients) | z/OS |
| MQIA_MAX_HANDLES | MQLONG | Maximum number of handles | |

*Table 558. MQINQ attribute selectors for the queue manager (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQIA_MAX_MSG_LENGTH | MQLONG | Maximum message length | |
| MQIA_MAX_PRIORITY | MQLONG | Maximum priority | |
| MQIA_MAX_UNCOMMITTED_MSGS | MQLONG | Maximum number of uncommitted messages within a unit of work | |
| MQIA_OUTBOUND_PORT_MAX | MQLONG | With MQIA_OUTBOUND_PORT_MIN, defines range of port numbers to use when binding outgoing channels | z/OS |
| MQIA_OUTBOUND_PORT_MIN | MQLONG | With MQIA_OUTBOUND_PORT_MAX, defines range of port numbers to use when binding outgoing channels | z/OS |
| MQIA_PERFORMANCE_EVENT | MQLONG | Control attribute for performance events | Not z/OS |
| MQIA_PLATFORM | MQLONG | Platform on which the queue manager resides | |
| MQIA_PROT_POLICY_CAPABILITY | MQLONG | Indicates whether security capabilities of IBM MQ Advanced Message Security are available for a queue manager. | |
| MQIA_PUBSUB_MAXMSG_RETRY_COUNT | MQLONG | The number of attempts to reprocess a failed command message under sync point | |
| MQIA_PUBSUB_MODE | MQLONG | Whether the publish/subscribe engine and the queued publish/subscribe interface are running. Applications to publish or subscribe using the application programming interface require the publish/subscribe engine. Queues that are monitored by the queued publish/subscribe interface require the queued publish/subscribe interface to be running. | |
| MQIA_PUBSUB_NP_MSG | MQLONG | Whether to discard (or keep) an undelivered input message | |
| MQIA_PUBSUB_NP_RESP | MQLONG | Controls the behavior of undelivered response messages | |
| MQIA_PUBSUB_SYNC_PT | MQLONG | Whether only persistent (or all) messages are processed under sync point | |
| MQIA_QMGR_CFCONLOS | MQLONG | Specifies the action to be taken when the queue manager loses connectivity to the administration structure or any CF structures with CFCONLOS set to ASQMGR | z/OS |

*Table 558. MQINQ attribute selectors for the queue manager (continued)*

| Selector | Length of field | Description | Note |
|---|---|---|---|
| MQIA_RECEIVE_TIMEOUT | MQLONG | Approximately how long a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state. The value is numeric, qualified by MQIA_RECEIVE_TIMEOUT_TYPE. | z/OS |
| MQIA_RECEIVE_TIMEOUT_MIN | MQLONG | Minimum time that a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state | z/OS |
| MQIA_RECEIVE_TIMEOUT_TYPE | MQLONG | Approximately how long a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state. MQIA_RECEIVE_TIMEOUT_TYPE is the qualifier applied to MQIA_RECEIVE_TIMEOUT. | z/OS |
| MQIA_REMOTE_EVENT | MQLONG | Control attribute for remote events | Not z/OS |
| MQIA_SECURITY_CASE | MQLONG | Case of security profiles | z/OS |
| MQIA_SSL_EVENT | MQLONG | Control attribute for channel events | |
| MQIA_SSL_FIPS_REQUIRED | MQLONG | Use only FIPS-certified algorithms for cryptography | |
| MQIA_SSL_RESET_COUNT | MQLONG | SSL key reset count | |
| MQIA_START_STOP_EVENT | MQLONG | Control attribute for start stop events | Not z/OS |
| MQIA_STATISTICS_AUTO_CLUSSDR | MQLONG | Controls collection of statistics monitoring information for cluster sender channels | |
| MQIA_STATISTICS_CHANNEL | MQLONG | Controls collection of statistics data for channels | |
| MQIA_STATISTICS_INTERVAL | MQLONG | How often to write statistics monitoring data | Not z/OS |
| MQIA_STATISTICS_MQI | MQLONG | Controls collection of statistics monitoring information for queue manager | Not z/OS |
| MQIA_STATISTICS_Q | MQLONG | Controls collection of statistics data for queues | Not z/OS |
| MQIA_SYNCPOINT | MQLONG | sync point availability | |
| MQIA_TCP_CHANNELS | MQLONG | Maximum number of channels that can be current, or clients that can be connected, using the TCP/IP transmission protocol | z/OS |

| *Table 558. MQINQ attribute selectors for the queue manager (continued)* | | | |
|---|---|---|---|
| **Selector** | **Length of field** | **Description** | **Note** |
| MQIA_TCP_KEEP_ALIVE | MQLONG | Whether to use the TCP KEEPALIVE facility to check that the other end of the connection is still available | z/OS |
| MQIA_TCP_STACK_TYPE | MQLONG | Whether the channel initiator can use only the TCP/IP address space specified in TCPNAME, or can optionally bind to any selected TCP/IP address | z/OS |
| MQIA_TRACE_ROUTE_RECORDING | MQLONG | Controls recording of trace-route information | z/OS |
| MQIA_TREE_LIFE_TIME | MQLONG | Lifetime of unused non-administrative topics | |
| MQIA_TRIGGER_INTERVAL | MQLONG | Trigger interval | |

***IntAttrCount***
Type: MQLONG - input

This is the number of elements in the *IntAttrs* array. Zero is a valid value.

If IntAttrCount is at least the number of MQIA_* selectors in the *Selectors* parameter, all integer attributes requested are returned.

***IntAttrs***
Type: MQLONG x *IntAttrCount* - output

This is an array of *IntAttrCount* integer attribute values.

Integer attribute values are returned in the same order as the MQIA_* selectors in the *Selectors* parameter. If the array contains more elements than the number of MQIA_* selectors, the excess elements are unchanged.

If *Hobj* represents a queue, but an attribute selector does not apply to that type of queue, the specific value MQIAV_NOT_APPLICABLE is returned. It is returned for the corresponding element in the *IntAttrs* array.

If the *IntAttrCount* or *SelectorCount* parameter is zero, *IntAttrs* is not referred to. In this case, the parameter address passed by programs written in C or S/390 assembler might be null.

***CharAttrLength***
Type: MQLONG - input

This is the length in bytes of the *CharAttrs* parameter.

CharAttrLength must be at least the sum of the lengths of the requested character attributes (see Selectors ). Zero is a valid value.

***CharAttrs***
Type: MQCHAR x *CharAttrLength* - output

This is the buffer in which the character attributes are returned, concatenated together. The length of the buffer is given by the *CharAttrLength* parameter.

Character attributes are returned in the same order as the MQCA_* selectors in the *Selectors* parameter. The length of each attribute string is fixed for each attribute (see Selectors ), and the value in it is padded to the right with blanks if necessary. You can provider a buffer larger than needed to contain all the requested character attributes and padding. The bytes beyond the last attribute value returned are unchanged.

If *Hobj* represents a queue, but an attribute selector does not apply to that type of queue, a character string consisting entirely of asterisks (*) is returned. The asterisk is returned as the value of that attribute in *CharAttrs*.

If the *CharAttrLength* or *SelectorCount* parameter is zero, *CharAttrs* is not referred to. In this case, the parameter address passed by programs written in C or S/390 assembler might be null.

***CompCode***
Type: MQLONG - output

The completion code:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_CHAR_ATTRS_TOO_SHORT**
(2008, X'7D8') Not enough space allowed for character attributes.

**MQRC_INT_ATTR_COUNT_TOO_SMALL**
(2022, X'7E6') Not enough space allowed for integer attributes.

**MQRC_SELECTOR_NOT_FOR_TYPE**
(2068, X'814') Selector not applicable to queue type.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CHAR_ATTR_LENGTH_ERROR**
(2006, X'7D6') Length of character attributes not valid.

**MQRC_CHAR_ATTRS_ERROR**
(2007, X'7D7') Character attributes string not valid.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_INT_ATTR_COUNT_ERROR**
(2021, X'7E5') Count of integer attributes not valid.

**MQRC_INT_ATTRS_ARRAY_ERROR**
(2023, X'7E7') Integer attributes array not valid.

**MQRC_NOT_OPEN_FOR_INQUIRE**
(2038, X'7F6') Queue not open for inquire.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_DELETED**
(2052, X'804') Queue deleted.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SELECTOR_COUNT_ERROR**
(2065, X'811') Count of selectors not valid.

**MQRC_SELECTOR_ERROR**
(2067, X'813') Attribute selector not valid.

**MQRC_SELECTOR_LIMIT_EXCEEDED**
(2066, X'812') Count of selectors too large.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes; see Messages and reason codes

## Usage notes

1. The values returned are a snapshot of the selected attributes. There is no guarantee that the attributes remain the same before the application can act upon the returned values.
2. When you open a model queue, a dynamic local queue is created. A dynamic local queue is created even if you open the model queue to inquire about its attributes.

   The attributes of the dynamic queue are largely the same as the attributes of the model queue at the time that the dynamic queue is created. If you then use the MQINQ call on this queue, the queue manager returns the attributes of the dynamic queue, and not the attributes of the model queue. See Table 561 on page 812 for details of which attributes of the model queue are inherited by the dynamic queue.
3. If the object being inquired is an alias queue, the attribute values returned by the MQINQ call are the attributes of the alias queue. The are not the attributes of the base queue or topic to which the alias resolves.
4. If the object being inquired is a cluster queue, the attributes that can be inquired depend on how the queue is opened:

   - You can open a cluster queue for inquire plus one or more of the input, browse, or set operations. To do so, there must be a local instance of the cluster queue for the open to succeed. In this case, the attributes that can be inquired are the attributes that are valid for local queues.

     If the cluster queue is open for inquire without input, browse, or set specified, the call returns completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE (2068) if you attempt to inquire attributes which are valid only for local queues, and not cluster queues.
   - You can open a cluster queue for inquire while passing the base queue manager name of the connected queue manager.

     To do so, there must be a local instance of the cluster queue for the open to succeed. If the base queue manager is not passed, the call returns completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE (2068) if you attempt to inquire attributes which are valid only for local queues, and not cluster queues
   - If the cluster queue is opened for inquire alone, or inquire and output, only the attributes listed can be inquired. The **QType** attribute has the value MQQT_CLUSTER in this case:
     - MQCA_Q_DESC
     - MQCA_Q_NAME
     - MQIA_DEF_BIND
     - MQIA_DEF_PERSISTENCE
     - MQIA_DEF_PRIORITY
     - MQIA_INHIBIT_PUT
     - MQIA_Q_TYPE

     You can open the cluster queue with no fixed binding. You can open it with MQOO_BIND_NOT_FIXED specified on the MQOPEN call. Alternatively, specify MQOO_BIND_AS_Q_DEF, and set the **DefBind** attribute of the queue to MQBND_BIND_NOT_FIXED. If you open a cluster queue with no fixed binding, successive MQINQ calls for the queue might inquire different instances of the cluster queue. However, it is typical for all the instances have the same attribute values.
   - An alias queue object can be defined for a cluster. Because TARGTYPE and TARGET are not cluster attributes, the process performing an MQOPEN process on the alias queue is not aware of the object to which the alias resolves.

     During the initial MQOPEN, the alias queue resolves to a queue manager and a queue in the cluster. Name resolution takes place again at the remote queue manager and it is here that the TARGTPYE of the alias queue is resolved.

     If the alias queue resolves to a topic alias, then publication of messages put to the alias queue takes place at this remote queue manager.

See Cluster queues

5. You might want to inquire a number of attributes, and then set some of them using the MQSET call. To program inquire and set efficiently, position the attributes to be set at the beginning of the selector arrays. If you do so, the same arrays with reduced counts can be used for MQSET.
6. If more than one of the warning situations arise (see the *CompCode* parameter), the reason code returned is the first one in the following list that applies:
   a. MQRC_SELECTOR_NOT_FOR_TYPE
   b. MQRC_INT_ATTR_COUNT_TOO_SMALL
   c. MQRC_CHAR_ATTRS_TOO_SHORT
7. The following topic have information about object attributes:
   - "Attributes for queues" on page 810
   - "Attributes for namelists" on page 841
   - "Attributes for process definitions" on page 843
   - "Attributes for the queue manager" on page 777

## C invocation

```
MQINQ (Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs,
      CharAttrLength, CharAttrs, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;           /* Connection handle */
MQHOBJ   Hobj;            /* Object handle */
MQLONG   SelectorCount;   /* Count of selectors */
MQLONG   Selectors[n];    /* Array of attribute selectors */
MQLONG   IntAttrCount;    /* Count of integer attributes */
MQLONG   IntAttrs[n];     /* Array of integer attributes */
MQLONG   CharAttrLength;  /* Length of character attributes buffer */
MQCHAR   CharAttrs[n];    /* Character attributes */
MQLONG   CompCode;        /* Completion code */
MQLONG   Reason;          /* Reason code qualifying CompCode */
```

## COBOL invocation

```
     CALL 'MQINQ' USING HCONN, HOBJ, SELECTORCOUNT, SELECTORS-TABLE,
                        INTATTRCOUNT, INTATTRS-TABLE, CHARATTRLENGTH,
                        CHARATTRS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN            PIC S9(9) BINARY.
**   Object handle
 01  HOBJ             PIC S9(9) BINARY.
**   Count of selectors
 01  SELECTORCOUNT    PIC S9(9) BINARY.
**   Array of attribute selectors
 01  SELECTORS-TABLE.
  02  SELECTORS        PIC S9(9) BINARY OCCURS n TIMES.
**   Count of integer attributes
 01  INTATTRCOUNT     PIC S9(9) BINARY.
**   Array of integer attributes
 01  INTATTRS-TABLE.
  02  INTATTRS         PIC S9(9) BINARY OCCURS n TIMES.
**   Length of character attributes buffer
 01  CHARATTRLENGTH   PIC S9(9) BINARY.
**   Character attributes
 01  CHARATTRS        PIC X(n).
**   Completion code
```

```
 01  COMPCODE         PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON           PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQINQ (Hconn, Hobj, SelectorCount, Selectors, IntAttrCount,
           IntAttrs, CharAttrLength, CharAttrs, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn           fixed bin(31);  /* Connection handle */
dcl Hobj            fixed bin(31);  /* Object handle */
dcl SelectorCount   fixed bin(31);  /* Count of selectors */
dcl Selectors(n)    fixed bin(31);  /* Array of attribute selectors */
dcl IntAttrCount    fixed bin(31);  /* Count of integer attributes */
dcl IntAttrs(n)     fixed bin(31);  /* Array of integer attributes */
dcl CharAttrLength  fixed bin(31);  /* Length of character attributes
                                       buffer */
dcl CharAttrs       char(n);        /* Character attributes */
dcl CompCode        fixed bin(31);  /* Completion code */
dcl Reason          fixed bin(31);  /* Reason code qualifying
                                       CompCode */
```

## High Level Assembler invocation

```
         CALL MQINQ,(HCONN,HOBJ,SELECTORCOUNT,SELECTORS,INTATTRCOUNT,  X
               INTATTRS,CHARATTRLENGTH,CHARATTRS,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN           DS  F      Connection handle
HOBJ            DS  F      Object handle
SELECTORCOUNT   DS  F      Count of selectors
SELECTORS       DS  (n)F   Array of attribute selectors
INTATTRCOUNT    DS  F      Count of integer attributes
INTATTRS        DS  (n)F   Array of integer attributes
CHARATTRLENGTH  DS  F      Length of character attributes buffer
CHARATTRS       DS  CL(n)  Character attributes
COMPCODE        DS  F      Completion code
REASON          DS  F      Reason code qualifying COMPCODE
```

## Visual Basic invocation

```
MQINQ Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs,
      CharAttrLength, CharAttrs, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn          As Long   'Connection handle'
Dim Hobj           As Long   'Object handle'
Dim SelectorCount  As Long   'Count of selectors'
Dim Selectors      As Long   'Array of attribute selectors'
Dim IntAttrCount   As Long   'Count of integer attributes'
Dim IntAttrs       As Long   'Array of integer attributes'
Dim CharAttrLength As Long   'Length of character attributes buffer'
Dim CharAttrs      As String 'Character attributes'
Dim CompCode       As Long   'Completion code'
Dim Reason         As Long   'Reason code qualifying CompCode'
```

## MQINQMP - Inquire message property

The MQINQMP call returns the value of a property of a message.

### Syntax

MQINQMP (*Hconn*, *Hmsg*, *InqPropOpts*, *Name*, *PropDesc*, *Type*, *ValueLength*, *Value*, *DataLength*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using MQHC_UNASSOCIATED_HCONN then a valid connection must be established on the thread inquiring a property of the message handle otherwise the call fails with MQRC_CONNECTION_BROKEN.

***Hmsg***

Type: MQHMSG - input

This is the message handle to be inquired. The value was returned by a previous **MQCRTMH** call.

***InqPropOpts***

Type: MQIMPO - input/output

See the MQIMPO data type for details.

***Name***

Type: MQCHARV - input/output

The name of the property to inquire.

If no property with this name can be found, the call fails with reason MQRC_PROPERTY_NOT_AVAILABLE.

You can use the wildcard character percent sign (%) at the end of the property name. The wildcard matches zero or more characters, including the period (.) character. This allows an application to inquire the value of many properties. Call MQINQMP with option MQIMPO_INQ_FIRST to get the first matching property and again with the option MQIMPO_INQ_NEXT to get the next matching property. When no more matching properties are available, the call fails with MQRC_PROPERTY_NOT_AVAILABLE. If the *ReturnedName* field of the InqPropOpts structure is initialized with an address or offset for the returned name of the property, this is completed on return from MQINQMP with the name of the property that has been matched. If the *VSBufSize* field of the *ReturnedName* in the InqPropOpts structure is less than the length of the returned property name the completion code is set MQCC_FAILED with reason MQRC_PROPERTY_NAME_TOO_BIG.

Properties that have known synonyms are returned as follows:

1. Properties with the prefix "mqps." are returned as the IBM MQ property name. For example, "MQTopicString" is the returned name rather than "mqps.Top"
2. Properties with the prefix "jms." or "mcd." are returned as the JMS header field name, for example, "JMSExpiration" is the returned name rather than "jms.Exp".
3. Properties with the prefix "usr." are returned without that prefix, for example, "Color" is returned rather than "usr.Color".

Properties with synonyms are only returned once.

In the C programming language, the following macro variables are defined for inquiring on all properties and then all properties that begin "usr.":

**MQPROP_INQUIRE_ALL**
Inquire on all properties of the message.

MQPROP_INQUIRE_ALL can be used in the following way:

```
MQCHARV Name = {MQPROP_INQUIRE_ALL};
```

**MQPROP_INQUIRE_ALL_USR**
Inquire on all properties of the message that start "usr.". The returned name is returned without the "usr." prefix.

If MQIMP_INQ_NEXT is specified but Name has changed since the previous call or this is the first call, then MQIMPO_INQ_FIRST is implied.

See Property names and Property name restrictions for further information about the use of property names.

***PropDesc***
Type: MQPD - output

This structure is used to define the attributes of a property, including what happens if the property is not supported, what message context the property belongs to, and what messages the property should be copied into. See MQPD for details of this structure.

***Type***
Type: MQLONG - input/output

On return from the MQINQMP call this parameter is set to the data type of *Value*. The data type can be any of the following:

**MQTYPE_BOOLEAN**
A boolean.

**MQTYPE_BYTE_STRING**
a byte string.

**MQTYPE_INT8**
An 8-bit signed integer.

**MQTYPE_INT16**
A 16-bit signed integer.

**MQTYPE_INT32**
A 32-bit signed integer.

**MQTYPE_INT64**
A 64-bit signed integer.

**MQTYPE_FLOAT32**
A 32-bit floating-point number.

**MQTYPE_FLOAT64**
A 64-bit floating-point number.

**MQTYPE_STRING**
A character string.

**MQTYPE_NULL**
The property exists but has a null value.

If the data type of the property value is not recognized then MQTYPE_STRING is returned and a string representation of the value is placed into the *Value* area. A string representation of the data type can be found in the *TypeString* field of the *InqPropOpts* parameter. A warning completion code is returned with reason MQRC_PROP_TYPE_NOT_SUPPORTED.

Additionally, if the option MQIMPO_CONVERT_TYPE is specified, conversion of the property value is requested. Use *Type* as an input to specify the data type that you want the property to be returned

as. See the description of the MQIMPO_CONVERT_TYPE option of the MQIMPO structure for details of data type conversion.

If you do not request type conversion, you can use the following value on input:

**MQTYPE_AS_SET**
The value of the property is returned without converting its data type.

***ValueLength***
Type: MQLONG - input

The length in bytes of the Value area. Specify zero for properties that you do not require the value returned for. These could be properties which are designed by an application to have a null value or an empty string. Also specify zero if the MQIMPO_QUERY_LENGTH option has been specified; in this case no value is returned.

***Value***
Type: MQBYTEx *ValueLength* - output

This is the area to contain the inquired property value. The buffer should be aligned on a boundary appropriate for the value being returned. Failure to do so can result in an error when the value is later accessed.

If *ValueLength* is less than the length of the property value, as much of the property value as possible is moved into *Value* and the call fails with completion code MQCC_FAILED and reason MQRC_PROPERTY_VALUE_TOO_BIG.

The character set of the data in *Value* is given by the ReturnedCCSID field in the InqPropOpts parameter. The encoding of the data in *Value* is given by the ReturnedEncoding field in the InqPropOpts parameter.

In the C programming language, the parameter is declared as a pointer-to-void; the address of any type of data can be specified as the parameter.

If the *ValueLength* parameter is zero, *Value* is not referred to and its value passed by programs written in C or System/390 assembler can be null.

***DataLength***
Type: MQLONG - output

This is the length in bytes of the actual property value as returned in the *Value* area.

If *DataLength* is less than the property value length, *DataLength* is still filled in on return from the MQINQMP call. This allows the application to determine the size of the buffer required to accommodate the property value, and then reissue the call with a buffer of the appropriate size.

The following values can also be returned.

If the *Type* parameter is set to MQTYPE_STRING or MQTYPE_BYTE_STRING:

**MQVL_EMPTY_STRING**
The property exists but contains no characters or bytes.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_PROP_NAME_NOT_CONVERTED**
(2492, X'09BC') Returned property name not converted.

**MQRC_PROP_VALUE_NOT_CONVERTED**
(2466, X'09A2') Property value not converted.

**MQRC_PROP_TYPE_NOT_SUPPORTED**
(2467, X'09A3') Property data type is not supported.

**MQRC_RFH_FORMAT_ERROR**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'0852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'086D') Primary and home ASIDs differ.

**MQRC_BUFFER_ERROR**
(2004, X'07D4') Value parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'07D5') Value length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CONNECTION_BROKEN**
(2009, X'07D9') Connection to queue manager lost.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'07DA') Data length parameter not valid.

**MQRC_IMPO_ERROR**
(2464, X'09A0') Inquire message property options structure not valid.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07F8') Options not valid or not consistent.

**MQRC_PD_ERROR**
(2482, X'09B2') Property descriptor structure not valid.

**MQRC_PROP_CONV_NOT_SUPPORTED**
(2470, X'09A6') Conversion from the actual to requested data type not supported.

**MQRC_PROPERTY_NAME_ERROR**
(2442, X'098A') Invalid property name.

**MQRC_PROPERTY_NAME_TOO_BIG**
(2465, X'09A1') Property name too large for returned name buffer.

**MQRC_PROPERTY_NOT_AVAILABLE**
(2471, X'09A7) Property not available.

**MQRC_PROPERTY_VALUE_TOO_BIG**
(2469, X'09A5') Property value too large for the Value area.

**MQRC_PROP_NUMBER_FORMAT_ERROR**
(2472, X'09A8') Number format error encountered in value data.

**MQRC_PROPERTY_TYPE_ERROR**
(2473, X'09A9') Invalid requested property type.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'083F') Property name coded character set identifier not valid.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'0871') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'0893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C invocation

```
MQINQMP (Hconn, Hmsg, &InqPropOpts, &Name, &PropDesc, &Type,
ValueLength, Value, &DataLength, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN Hconn;       /* Connection handle */
MQHMSG  Hmsg;        /* Message handle */
MQIMPO  InqPropOpts; /* Options that control the action of MQINQMP */
MQCHARV Name;        /* Property name */
MQPD    PropDesc;    /* Property descriptor */
MQLONG  Type;        /* Property data type */
MQLONG  ValueLength; /* Length in bytes of the Value area */
MQBYTE  Value[n];    /* Area to contain the property value */
MQLONG  DataLength;  /* Length of the property value */
MQLONG  CompCode;    /* Completion code */
MQLONG  Reason;      /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQINQMP' USING HCONN, HMSG, INQMSGOPTS, NAME, PROPDESC, TYPE,
VALUELENGTH, VALUE, DATALENGTH, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN       PIC S9(9) BINARY.
**   Message handle
 01  HMSG            PIC S9(18) BINARY.
**   Options that control the action of MQINQMP
 01  INQMSGOPTS.
     COPY CMQIMPOV.
**   Property name
 01  NAME.
     COPY CMQCHRVV.
**   Property descriptor
 01  PROPDESC.
     COPY CMQPDV.
**   Property data type
 01  TYPE        PIC S9(9) BINARY.
**   Length in bytes of the VALUE area
 01  VALUELENGTH PIC S9(9) BINARY.
**   Area to contain the property value
 01  VALUE       PIC X(n).
**   Length of the property value
 01  DATALENGTH  PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE    PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON      PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQINQMP (Hconn, Hmsg, InqPropOpts, Name, PropDesc, Type,
ValueLength, Value, DataLength, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31);  /* Connection handle */
dcl Hmsg        fixed bin(63);  /* Message handle */
dcl InqPropOpts like MQIMPO;    /* Options that control the action of MQINQMP */
dcl Name        like MQCHARV;   /* Property name */
dcl PropDesc    like MQPD;      /* Property descriptor */
dcl Type        fixed bin (31); /* Property data type */
dcl ValueLength fixed bin (31); /* Length in bytes of the Value area */
dcl Value       char (n);       /* Area to contain the property value */
dcl DataLength  fixed bin (31); /* Length of the property value */
dcl CompCode    fixed bin (31); /* Completion code */
dcl Reason      fixed bin (31); /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQINQMP,(HCONN,HMSG,INQMSGOPTS,NAME,PROPDESC,TYPE,
VALUELENGTH,VALUE,DATALENGTH,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN        DS         F     Connection handle
HMSG         DS         D     Message handle
INQMSGOPTS   CMQIMPOA   ,     Options that control the action of MQINQMP
NAME         CMQCHRVA   ,     Property name
PROPDESC     CMQPDA     ,     Property descriptor
TYPE         DS         F     Property data type
VALUELENGTH  DS         F     Length in bytes of the VALUE area
VALUE        DS         CL(n) Area to contain the property value
DATALENGTH   DS         F     Length of the property value
COMPCODE     DS         F     Completion code
REASON       DS         F     Reason code qualifying COMPCODE
```

## MQMHBUF - Convert message handle into buffer

The MQMHBUF call converts a message handle into a buffer and is the inverse of the MQBUFMH call.

### Syntax

MQMHBUF (*Hconn*, *Hmsg*, *MsgHBufOpts*, *Name*, *MsgDesc*, *BufferLength*, *Buffer*, *DataLength*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using MQHC_UNASSOCIATED_HCONN, a valid connection must be established on the thread deleting the message handle. If a valid connection is not established, the call fails with MQRC_CONNECTION_BROKEN.

***Hmsg***

Type: MQHMSG - input

This is the message handle for which a buffer is required. The value was returned by a previous MQCRTMH call.

***MsgHBufOpts***
Type: MQMHBO - input

The MQMHBO structure allows applications to specify options that control how buffers are produced from message handles.

See "MQMHBO - Message handle to buffer options" on page 458 for details.

***Name***
Type: MQCHARV - input

The name of the property or properties to put into the buffer.

If no property matching the name can be found, the call fails with MQRC_PROPERTY_NOT_AVAILABLE.

You can use a wildcard to put more than one property into the buffer. To do this, use the wildcard character '%' at the end of the property name. This wildcard matches zero or more characters, including the '.' character.

In the C programming language, the following macro variables are defined for inquiring on all properties and all properties that begin 'usr':

**MQPROP_INQUIRE_ALL**
Put all properties of the message into the buffer

**MQPROP_INQUIRE_ALL_USR**
Put all properties of the message that start with the characters 'usr.' into the buffer.

See Property names and Property name restrictions for further information about the use of property names.

***MsgDesc***
Type: MQMD - input/output

The *MsgDesc* structure describes the contents of the buffer area.

On output, the *Encoding*, *CodedCharSetId* and *Format* fields are set to correctly describe the encoding, character set identifier, and format of the data in the buffer area as written by the call.

Data in this structure is in the character set and encoding of the application.

***BufferLength***
Type: MQLONG - input

*BufferLength* is the length of the Buffer area, in bytes.

***Buffer***
Type: MQBYTExBufferLength - output

*Buffer* defines the area to contain the message properties. You must align the buffer on a 4-byte boundary.

If *BufferLength* is less than the length required to store the properties in *Buffer*, MQMHBUF fails with MQRC_PROPERTY_VALUE_TOO_BIG.

The contents of the buffer can change even if the call fails.

***DataLength***
Type: MQLONG - output

*DataLength* is the length, in bytes, of the returned properties in the buffer. If the value is zero, no properties matched the value given in *Name* and the call fails with reason code MQRC_PROPERTY_NOT_AVAILABLE.

If *BufferLength* is less than the length required to store the properties in the buffer, the MQMHBUF call fails with MQRC_PROPERTY_VALUE_TOO_BIG, but a value is still entered into *DataLength*. This

allows the application to determine the size of the buffer required to accommodate the properties, and then reissue the call with the required *BufferLength*.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_MHBO_ERROR**
(2501, X'095C') Message handle to buffer options structure not valid.

**MQRC_BUFFER_ERROR**
(2004, X'07D4') Buffer parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'07D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_CONNECTION_BROKEN**
(2009, X'07D9') Connection to queue manager lost.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'07DA') Data length parameter not valid.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle not valid.

**MQRC_MD_ERROR**
(2026, X'07EA') Message descriptor not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_PROPERTY_NAME_ERROR**
(2442, X'098A') Property name is not valid.

**MQRC_PROPERTY_NOT_AVAILABLE**
(2471, X'09A7') Property not available.

**MQRC_PROPERTY_VALUE_TOO_BIG**
(2469, X'09A5') BufferLength value is too small to contain specified properties.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C invocation

```
MQMHBUF (Hconn, Hmsg, &MsgHBufOpts, &Name, &MsgDesc, BufferLength, Buffer,
         &DataLength, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN Hconn;        /* Connection handle */
MQHMSG  Hmsg;         /* Message handle */
MQMHBO  MsgHBufOpts;  /* Options that control the action of MQMHBUF */
MQCHARV Name;         /* Property name */
MQMD    MsgDesc;      /* Message descriptor */
MQLONG  BufferLength; /* Length in bytes of the Buffer area */
MQBYTE  Buffer[n];    /* Area to contain the properties */
MQLONG  DataLength;   /* Length of the properties */
MQLONG  CompCode;     /* Completion code */
MQLONG  Reason;       /* Reason code qualifying CompCode */
```

## Usage notes

MQMHBUF converts a message handle into a buffer.

You can use it with an MQGET API exit to access certain properties, using the message property APIs, and then pass these in a buffer back to an application designed to use MQRFH2 headers rather than message handles.

This call is the inverse of the MQBUFMH call, which you can use to parse message properties from a buffer into a message handle.

## COBOL invocation

```
     CALL 'MQMHBUF' USING HCONN, HMSG, MSGHBUFOPTS, NAME, MSGDESC,
                          BUFFERLENGTH, BUFFER, DATALENGTH, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Message handle
 01  HMSG          PIC S9(18) BINARY.
**   Options that control the action of MQMHBUF
 01  MSGHBUFOPTS.
     COPY CMQMHBOV.
**   Property name
 01  NAME
     COPY CMQCHRVV.
**   Message descriptor
 01  MSGDESC
     COPY CMQMDV.
**   Length in bytes of the Buffer area */
 01  BUFFERLENGTH  PIC S9(9) BINARY.
**   Area to contain the properties
 01  BUFFER        PIC X(n).
**   Length of the properties
 01  DATALENGTH    PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQMHBUF (Hconn, Hmsg, MsgHBufOpts, Name, MsgDesc, BufferLength, Buffer,
DataLength, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn        fixed bin(31); /* Connection handle */
dcl Hmsg         fixed bin(63); /* Message handle */
dcl MsgHBufOpts  like MQMHBO;   /* Options that control the action of MQMHBUF */
dcl Name         like MQCHARV;  /* Property name */
dcl MsgDesc      like MQMD;     /* Message descriptor */
dcl BufferLength fixed bin(31); /* Length in bytes of the Buffer area */
dcl Buffer       char(n);       /* Area to contain the properties */
dcl DataLength   fixed bin(31); /* Length of the properties */
dcl CompCode     fixed bin(31); /* Completion code */
dcl Reason       fixed bin(31); /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQMHBUF,(HCONN,HMSG,MSGHBUFOPTS,NAME,MSGDESC,BUFFERLENGTH,
               BUFFER,DATALENGTH,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN        DS       F      Connection handle
HMSG         DS       D      Message handle
MSGHBUFOPTS  CMQMHBOA ,      Options that control the action of MQMHBUF
NAME         CMQCHRVA ,      Property name
MSGDESC      CMQMDA   ,      Message descriptor
BUFFERLENGTH DS       F      Length in bytes of the BUFFER area
BUFFER       DS       CL(n)  Area to contain the properties
DATALENGTH   DS       F      Length of the properties
COMPCODE     DS       F      Completion code
REASON       DS       F      Reason code qualifying COMPCODE
```

## MQOPEN - Open object

The MQOPEN call establishes access to an object.

The following types of object are valid:

- Queue (including distribution lists)
- Namelist
- Process definition
- Queue manager
- Topic

### Syntax

MQOPEN (*Hconn*, *ObjDesc*, *Options*, *Hobj*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***ObjDesc***
Type: MQOD - input/output

This is a structure that identifies the object to be opened; see "MQOD - Object descriptor" on page 460 for details.

If the *ObjectName* field in the *ObjDesc* parameter is the name of a model queue, a dynamic local queue is created with the attributes of the model queue; this happens whatever options you specify on the *Options* parameter. Subsequent operations using the *Hobj* returned by the MQOPEN call are performed on the new dynamic queue, and not on the model queue. This is true even for the MQINQ and MQSET calls. The name of the model queue in the *ObjDesc* parameter is replaced with the name of the dynamic queue created. The type of the dynamic queue is determined by the value of the *DefinitionType* attribute of the model queue (see "Attributes for queues" on page 810 ). For information about the close options applicable to dynamic queues, see the description of the MQCLOSE call.

***Options***
Type: MQLONG - input

You must specify at least one of the following options:

- MQOO_BROWSE
- MQOO_INPUT_* (only one of these)
- MQOO_INQUIRE
- MQOO_OUTPUT
- MQOO_SET
- MQOO_BIND_* (only one of these)

See the following table for details of these options; other options can be specified as required. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations). Combinations that are not valid are noted; all other combinations are valid. Only options that are applicable to the type of object specified by *ObjDesc* are allowed. The following table shows valid MQOPEN options for queries and topics.

| Option | Alias [1] | Local and Model | Remote | Nonlocal Cluster | Distribution list | Topic |
|---|---|---|---|---|---|---|
| MQOO_INPUT_AS_Q_DEF | Yes | Yes | No | No | No | No |
| MQOO_INPUT_SHARED | Yes | Yes | No | No | No | No |
| MQOO_INPUT_EXCLUSIVE | Yes | Yes | No | No | No | No |
| MQOO_OUTPUT | Yes | Yes | Yes | Yes | Yes | Yes |
| MQOO_BROWSE | Yes | Yes | No | No | No | No |
| MQOO_CO_OP | Yes | Yes | No | No | No | No |
| MQOO_INQUIRE | Yes | Yes | [2] | Yes | No | No |
| MQOO_SET | Yes | Yes | [2] | No | No | No |
| MQOO_BIND_ON_OPEN [3] | Yes | Yes | Yes | Yes | Yes | No |

| Option | Alias [1] | Local and Model | Remote | Nonlocal Cluster | Distribution list | Topic |
|---|---|---|---|---|---|---|
| MQOO_BIND_NOT_FIXED [3] | Yes | Yes | Yes | Yes | Yes | No |
| MQOO_BIND_ON_GROUP [3] | Yes | Yes | Yes | Yes | Yes | No |
| MQOO_BIND_AS_Q_DEF [3] | Yes | Yes | Yes | Yes | Yes | No |
| MQOO_SAVE_ALL_CONTEXT | Yes | Yes | No | No | No | No |
| MQOO_PASS_IDENTITY_CONTEXT | Yes | Yes | Yes | Yes | Yes | [4] |
| MQOO_PASS_ALL_CONTEXT | Yes | Yes | Yes | Yes | Yes | Yes |
| MQOO_SET_IDENTITY_CONTEXT | Yes | Yes | Yes | Yes | Yes | [4] |
| MQOO_SET_ALL_CONTEXT | Yes | Yes | Yes | Yes | Yes | Yes |
| MQOO_NO_READ_AHEAD | Yes | Yes | No | No | No | No |
| MQOO_READ_AHEAD | Yes | Yes | No | No | No | No |
| MQOO_READ_AHEAD_AS_Q_DEF | Yes | Yes | No | No | No | No |
| MQOO_ALTERNATE_USER_AUTHORITY | Yes | Yes | Yes | Yes | Yes | Yes |
| MQOO_FAIL_IF_QUIESCING | Yes | Yes | Yes | Yes | Yes | Yes |
| MQOO_RESOLVE_LOCAL_Q | Yes | Yes | Yes | Yes | No | No |
| MQOO_RESOLVE_LOCAL_TOPIC | No | No | No | No | No | Yes |
| MQOO_NO_MULTICAST | No | No | No | No | No | Yes |

**Notes:**

1. The validity of options for aliases depends on the validity of the option for the queue to which the alias resolves.
2. This option is valid only for the local definition of a remote queue.
3. This option can be specified for any queue type, but is ignored if the queue is not a cluster queue. However, the *DefBind* queue attribute overrides the base queue even when the alias queue is not in a cluster.
4. These attributes can be used with a topic, but affect only the context set for the retained message, not the context fields sent to any subscriber.

**Access options**: The following options control the type of operations that can be performed on the object:

**MQOO_INPUT_AS_Q_DEF**
Open queue to get messages using queue-defined default.

The queue is opened for use with subsequent MQGET calls. The type of access is either shared or exclusive, depending on the value of the *DefInputOpenOption* queue attribute; see "Attributes for queues" on page 810 for details.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**MQOO_INPUT_SHARED**
Open queue to get messages with shared access.

The queue is opened for use with subsequent MQGET calls. The call can succeed if the queue is currently open by this or another application with MQOO_INPUT_SHARED, but fails with reason code MQRC_OBJECT_IN_USE if the queue is currently open with MQOO_INPUT_EXCLUSIVE.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**MQOO_INPUT_EXCLUSIVE**
Open queue to get messages with exclusive access.

The queue is opened for use with subsequent MQGET calls. The call fails with reason code MQRC_OBJECT_IN_USE if the queue is currently open by this or another application for input of any type (MQOO_INPUT_SHARED or MQOO_INPUT_EXCLUSIVE).

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**MQOO_OUTPUT**

Open queue to put messages, or a topic or topic string to publish messages.

The queue or topic is opened for use with subsequent MQPUT calls.

An MQOPEN call with this option can succeed even if the *InhibitPut* queue attribute is set to MQQA_PUT_INHIBITED (although subsequent MQPUT calls fail while the attribute is set to this value).

This option is valid for all types of queue, including distribution lists, and topics.

The following notes apply to these options:

- Only one of these options can be specified.
- An MQOPEN call with one of these options can succeed even if the *InhibitGet* queue attribute is set to MQQA_GET_INHIBITED (although subsequent MQGET calls fail while the attribute is set to this value).
- If the queue is defined as not being shareable (that is, the *Shareability* queue attribute has the value MQQA_NOT_SHAREABLE), attempts to open the queue for shared access are treated as attempts to open the queue with exclusive access.
- If an alias queue is opened with one of these options, the test for exclusive use (or for whether another application has exclusive use) is against the base queue to which the alias resolves.
- These options are not valid if *ObjectQMgrName* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue-manager aliasing is the name of the local queue manager.

**MQOO_BROWSE**

Open queue to browse messages.

The queue is opened for use with subsequent MQGET calls with one of the following options:

- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_NEXT
- MQGMO_BROWSE_MSG_UNDER_CURSOR

This is allowed even if the queue is currently open for MQOO_INPUT_EXCLUSIVE. An MQOPEN call with the MQOO_BROWSE option establishes a browse cursor, and positions it logically before the first message on the queue; see MQGMO - Options field for further information.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues. It is also not valid if *ObjectQMgrName* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue-manager aliasing is the name of the local queue manager.

**MQOO_CO_OP**

Open as a cooperating member of the set of handles.

This option is valid only with the MQOO_BROWSE option. If it is specified without MQOO_BROWSE, MQOPEN returns with MQRC_OPTIONS_ERROR.

The handle returned is considered to be a member of a cooperating set of handles for subsequent MQGET calls with one of the following options:

- MQGMO_MARK_BROWSE_CO_OP
- MQGMO_UNMARKED_BROWSE_MSG

- MQGMO_UNMARK_BROWSE_CO_OP

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**MQOO_INQUIRE**
Open object to inquire attributes.

The queue, namelist, process definition, or queue manager is opened for use with subsequent MQINQ calls.

This option is valid for all types of object other than distribution lists. It is not valid if *ObjectQMgrName* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue-manager aliasing is the name of the local queue manager.

**MQOO_SET**
Open queue to set attributes.

The queue is opened for use with subsequent MQSET calls.

This option is valid for all types of queue other than distribution lists. It is not valid if *ObjectQMgrName* is the name of a local definition of a remote queue; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue-manager aliasing is the name of the local queue manager.

**Binding options**: The following options apply when the object being opened is a cluster queue; these options control the binding of the queue handle to an instance of the cluster queue:

**MQOO_BIND_ON_OPEN**
The local queue manager binds the queue handle to an instance of the destination queue when the queue is opened. As a result, all messages put using this handle are sent to the same instance of the destination queue, and by the same route.

This option is valid only for queues, and affects only cluster queues. If specified for a queue that is not a cluster queue, the option is ignored.

**MQOO_BIND_NOT_FIXED**
This stops the local queue manager binding the queue handle to an instance of the destination queue. As a result, successive MQPUT calls using this handle send the messages to *different* instances of the destination queue, or to the same instance but by different routes. It also allows the instance selected to be changed later by the local queue manager, by a remote queue manager, or by a message channel agent (MCA), according to network conditions.

**Note:** Client and server applications that need to exchange a *series* of messages to complete a transaction must not use MQOO_BIND_NOT_FIXED (or MQOO_BIND_AS_Q_DEF when *DefBind* has the value MQBND_BIND_NOT_FIXED), because successive messages in the series might be sent to different instances of the server application.

If MQOO_BROWSE or one of the MQOO_INPUT_* options is specified for a cluster queue, the queue manager is forced to select the local instance of the cluster queue. As a result, the binding of the queue handle is fixed, even if MQOO_BIND_NOT_FIXED is specified.

If MQOO_INQUIRE is specified with MQOO_BIND_NOT_FIXED, successive MQINQ calls using that handle might inquire different instances of the cluster queue, although typically all the instances have the same attribute values.

MQOO_BIND_NOT_FIXED is valid only for queues, and affects only cluster queues. If specified for a queue that is not a cluster queue, the option is ignored.

**MQOO_BIND_ON_GROUP**
Allows an application to request that a group of messages are all allocated to the same destination instance.

This option is valid only for queues, and affects only cluster queues. If specified for a queue that is not a cluster queue, the option is ignored.

**MQOO_BIND_AS_Q_DEF**
The local queue manager binds the queue handle in the way defined by the *DefBind* queue attribute. The value of this attribute is either MQBND_BIND_ON_OPEN, MQBND_BIND_NOT_FIXED, or MQBND_BIND_ON_GROUP.

MQOO_BIND_AS_Q_DEF is the default when MQOO_BIND_ON_OPEN, MQOO_BIND_NOT_FIXED, or MQOO_BIND_ON_GROUP is not specified.

MQOO_BIND_AS_Q_DEF aids program documentation. It is not intended that this option is used with either of the other two bind options, but because its value is zero such use cannot be detected.

**Context options**: The following options control the processing of message context:

**MQOO_SAVE_ALL_CONTEXT**
Context information is associated with this queue handle. This information is set from the context of any message retrieved using this handle. For more information about message context, see Message context and Controlling context information.

This context information can be passed to a message that is then put on a queue using the MQPUT or MQPUT1 calls. See the MQPMO_PASS_IDENTITY_CONTEXT and MQPMO_PASS_ALL_CONTEXT options described in "MQPMO - Put-message options" on page 480.

Until a message has been successfully retrieved, context cannot be passed to a message being put on a queue.

A message retrieved using one of the MQGMO_BROWSE_* browse options does not have its context information saved (although the context fields in the *MsgDesc* parameter are set after a browse).

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues. One of the MQOO_INPUT_* options must be specified.

**MQOO_PASS_IDENTITY_CONTEXT**
This allows the MQPMO_PASS_IDENTITY_CONTEXT option to be specified in the *PutMsgOpts* parameter when a message is put on a queue; this gives the message the identity context information from an input queue that was opened with the MQOO_SAVE_ALL_CONTEXT option. For more information about message context, see Message context and Controlling context information.

The MQOO_OUTPUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**MQOO_PASS_ALL_CONTEXT**
This allows the MQPMO_PASS_ALL_CONTEXT option to be specified in the *PutMsgOpts* parameter when a message is put on a queue; this gives the message the identity and origin context information from an input queue that was opened with the MQOO_SAVE_ALL_CONTEXT option. For more information about message context, see Message context and Controlling context information.

This option implies MQOO_PASS_IDENTITY_CONTEXT, which need not therefore be specified. The MQOO_OUTPUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**MQOO_SET_IDENTITY_CONTEXT**
This allows the MQPMO_SET_IDENTITY_CONTEXT option to be specified in the *PutMsgOpts* parameter when a message is put on a queue; this gives the message the identity context information contained in the *MsgDesc* parameter specified on the MQPUT or MQPUT1 call. For more information about message context, see Message context and Controlling context information.

This option implies MQOO_PASS_IDENTITY_CONTEXT, which need not therefore be specified. The MQOO_OUTPUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**MQOO_SET_ALL_CONTEXT**
This allows the MQPMO_SET_ALL_CONTEXT option to be specified in the *PutMsgOpts* parameter when a message is put on a queue; this gives the message the identity and origin context information contained in the *MsgDesc* parameter specified on the MQPUT or MQPUT1 call. For more information about message context, see Message context and Controlling context information.

This option implies the following options, which need not therefore be specified:

- MQOO_PASS_IDENTITY_CONTEXT
- MQOO_PASS_ALL_CONTEXT
- MQOO_SET_IDENTITY_CONTEXT

The MQOO_OUTPUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**Read ahead options**:

When you call MQOPEN with MQOO_READ_AHEAD, the IBM MQ client only enables read-ahead if certain conditions are met. These conditions include:

- Both the client and remote queue manager must be at WebSphere MQ Version 7 or later.
- The client application must be compiled and linked against the threaded IBM MQ MQI client libraries.
- The client channel must be using TCP/IP protocol
- The channel must have a non-zero SharingConversations (SHARECNV) setting in both the client and server channel definitions.

The following options control whether non-persistent messages are sent to the client before an application requests them. The following notes apply to the read ahead options:

- Only one of these options can be specified.
- These options are valid only for local, alias, and model queues. They are not valid for remote queues, distribution lists, topics or queue managers.
- These options are only applicable when one of MQOO_BROWSE, MQOO_INPUT_SHARED and MQOO_INPUT_EXCLUSIVE are also specified although it is not an error to specify these options with MQOO_INQUIRE or MQOO_SET.
- If the application is not running as an IBM MQ client, these options are ignored.

**MQOO_NO_READ_AHEAD**
Non-persistent messages are not sent the client before an application requests them.

**MQOO_READ_AHEAD**
Non-persistent messages are sent to the client before an application requests them.

**MQOO_READ_AHEAD_AS_Q_DEF**
Read ahead behavior is determined by the default read ahead attribute of the queue being opened. This is the default value.

**Other options**: The following options control authorization checking, what happens when the queue manager is quiescing, whether to resolve the local queue name, and multicast:

**MQOO_ALTERNATE_USER_AUTHORITY**
The *AlternateUserId* field in the *ObjDesc* parameter contains a user identifier to use to validate this MQOPEN call. The call can succeed only if this *AlternateUserId* is authorized to open the object with the specified access options, regardless of whether the user identifier under which the application is running is authorized to do so. This does not apply to any context

options specified, however, which are always checked against the user identifier under which the application is running.

This option is valid for all types of object.

**MQOO_FAIL_IF_QUIESCING**
The MQOPEN call fails if the queue manager is in quiescing state.

On z/OS, for a CICS or IMS application, this option also forces the MQOPEN call to fail if the connection is in quiescing state.

This option is valid for all types of object.

For information about client channels see Overview of IBM MQ MQI clients.

**MQOO_RESOLVE_LOCAL_Q**
Fill the ResolvedQName in the MQOD structure with the name of the local queue that was opened. Similarly, the ResolvedQMgrName is filled with the name of the local queue manager hosting the local queue. If the MQOD structure is less than Version 3, MQOO_RESOLVE_LOCAL_Q is ignored with no error being returned.

The local queue is always returned when either a local, alias, or model queue is opened, but this is not the case when, for example, a remote queue or a non-local cluster queue is opened without the MQOO_RESOLVE_LOCAL_Q option; the ResolvedQName and ResolvedQMgrName are filled with the RemoteQName and RemoteQMgrName found in the remote queue definition, or similarly with the chosen remote cluster queue.

If you specify MQOO_RESOLVE_LOCAL_Q when opening, for example, a remote queue, ResolvedQName is the transmission queue to which messages are put. The ResolvedQMgrName is filled with the name of the local queue manager hosting the transmission queue.

If you are authorized for browse, input, or output on a queue, you have the required authority to specify this flag on the MQOPEN call. No special authority is needed.

This option is valid only for queues and queue managers.

**MQOO_RESOLVE_LOCAL_TOPIC**
Fill the ResolvedQName in the MQOD structure with the name of the administrative topic opened.

**MQOO_NO_MULTICAST**
Publication messages are not sent using multicast.

This option is valid only with the MQOO_OUTPUT option. If it is specified without MQOO_OUTPUT, MQOPEN returns with MQRC_OPTIONS_ERROR.

This option is valid only for a topic.

***Hobj***
Type: MQHOBJ - output

This handle represents the access that has been established to the object. It must be specified on subsequent IBM MQ calls that operate on the object. It ceases to be valid when the MQCLOSE call is issued, or when the unit of processing that defines the scope of the handle terminates.

The scope of the object handle returned is the same as the scope of the connection handle specified on the call. See MQCONN - Hconn parameter for information about handle scope.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ALIAS_BASE_Q_TYPE_ERROR**
(2001, X'7D1') Alias base queue not a valid type.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') Coupling facility not available.

**MQRC_CF_STRUC_AUTH_FAILED**
(2348, X'92C') Coupling-facility structure authorization check failed.

**MQRC_CF_STRUC_ERROR**
(2349, X'92D') Coupling-facility structure not valid.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CF_STRUC_LIST_HDR_IN_USE**
(2347, X'92B') Coupling-facility structure list-header in use.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CLUSTER_EXIT_ERROR**
(2266, X'8DA') Cluster workload exit failed.

**MQRC_CLUSTER_PUT_INHIBITED**
(2268, X'8DC') Put calls inhibited for all queues in cluster.

**MQRC_CLUSTER_RESOLUTION_ERROR**
(2189, X'88D') Cluster name resolution failed.

**MQRC_CLUSTER_RESOURCE_ERROR**
(2269, X'8DD') Cluster resource error.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_DB2_NOT_AVAILABLE**
(2342, X'926') Db2 subsystem not available.

**MQRC_DEF_XMIT_Q_TYPE_ERROR**
(2198, X'896') Default transmission queue not local.

**MQRC_DEF_XMIT_Q_USAGE_ERROR**
(2199, X'897') Default transmission queue usage error.

**MQRC_DYNAMIC_Q_NAME_ERROR**
(2011, X'7DB') Name of dynamic queue not valid.

**MQRC_HANDLE_NOT_AVAILABLE**
(2017, X'7E1') No more handles available.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

**MQRC_NAME_IN_USE**
(2201, X'899') Name in use.

**MQRC_NAME_NOT_VALID_FOR_TYPE**
(2194, X'892') Object name not valid for object type.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_OBJECT_ALREADY_EXISTS**
(2100, X'834') Object exists.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OBJECT_IN_USE**
(2042, X'7FA') Object already open with conflicting options.

**MQRC_OBJECT_LEVEL_INCOMPATIBLE**
(2360, X'938') Object level not compatible.

**MQRC_OBJECT_NAME_ERROR**
(2152, X'868') Object name not valid.

**MQRC_OBJECT_NOT_UNIQUE**
(2343, X'927') Object not unique.

**MQRC_OBJECT_Q_MGR_NAME_ERROR**
(2153, X'869') Object queue-manager name not valid.

**MQRC_OBJECT_RECORDS_ERROR**
(2155, X'86B') Object records not valid.

**MQRC_OBJECT_STRING_ERROR**
(2441, X'0989') Objectstring field not valid

**MQRC_OBJECT_TYPE_ERROR**
(2043, X'7FB') Object type not valid.

**MQRC_OD_ERROR**
(2044, X'7FC') Object descriptor structure not valid.

**MQRC_OPTION_NOT_VALID_FOR_TYPE**
(2045, X'7FD') Option not valid for object type.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_PAGESET_FULL**
(2192, X'890') External storage medium is full.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_Q_TYPE_ERROR**
(2057, X'809') Queue type not valid.

**MQRC_RECS_PRESENT_ERROR**
(2154, X'86A') Number of records present not valid.

**MQRC_REMOTE_Q_NAME_ERROR**
(2184, X'888') Remote queue name not valid.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_RESPONSE_RECORDS_ERROR**
(2156, X'86C') Response records not valid.

**MQRC_SECURITY_ERROR**
(2063, X'80F') Security error occurred.

**MQRC_SELECTOR_SYNTAX_ERROR**
2459 (X'099B') An MQOPEN, MQPUT1 or MQSUB call was issued but a selection string was specified which contained a syntax error.

**MQRC_STOPPED_BY_CLUSTER_EXIT**
(2188, X'88C') Call rejected by cluster workload exit.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UNKNOWN_ALIAS_BASE_Q**
(2082, X'822') Unknown alias base queue.

**MQRC_UNKNOWN_DEF_XMIT_Q**
(2197, X'895') Unknown default transmission queue.

**MQRC_UNKNOWN_OBJECT_NAME**
(2085, X'825') Unknown object name.

**MQRC_UNKNOWN_OBJECT_Q_MGR**
(2086, X'826') Unknown object queue manager.

**MQRC_UNKNOWN_REMOTE_Q_MGR**
(2087, X'827') Unknown remote queue manager.

**MQRC_UNKNOWN_XMIT_Q**
(2196, X'894') Unknown transmission queue.

**MQRC_WRONG_CF_LEVEL**
(2366, X'93E') Coupling-facility structure is wrong level.

**MQRC_XMIT_Q_TYPE_ERROR**
(2091, X'82B') Transmission queue not local.

**MQRC_XMIT_Q_USAGE_ERROR**
(2092, X'82C') Transmission queue with wrong usage.

For detailed information about these codes, see:

- z/OS IBM MQ for z/OS messages, completion, and reason codes for IBM MQ for z/OS.
- Messages and reason codes for all other IBM MQ platforms except z/OS.

## General usage notes

1. The object opened is one of the following:
   - A queue to:
     - Get or browse messages (using the MQGET call)
     - Put messages (using the MQPUT call)
     - Inquire about the attributes of the queue (using the MQINQ call)
     - Set the attributes of the queue (using the MQSET call)

     If the queue named is a model queue, a dynamic local queue is created. See the *ObjDesc* parameter described in "MQOPEN - Open object" on page 711.

     A distribution list is a special type of queue object that contains a list of queues. It can be opened to put messages, but not to get or browse messages, or to inquire or set attributes. See usage note 8 for further details.

     A queue that has QSGDISP(GROUP) is a special type of queue definition that cannot be used with the MQOPEN or MQPUT1 calls.
   - A namelist to inquire about the names of the queues in the list (using the MQINQ call).
   - A process definition to inquire about the process attributes (using the MQINQ call).
   - The queue manager to inquire about the attributes of the local queue manager (using the MQINQ call).
   - A topic to publish a message (using the MQPUT call)
2. An application can open the same object more than once. A different object handle is returned for each open. Each handle that is returned can be used for the functions for which the corresponding open was performed.
3. If the object being opened is a queue other than a cluster queue, all name resolution within the local queue manager takes place at the time of the MQOPEN call. This can include:
   - Resolution of the name of a local definition of a remote queue to the name of the remote queue manager, and the name by which the queue is known at the remote queue manager
   - Resolution of the remote queue-manager name to the name of a local transmission queue

- ( z/OS only) Resolution of the remote queue-manager name to the name of the shared transmission queue used by the IGQ agent (applies only if the local and remote queue managers belong to the same queue-sharing group)
- Alias resolution to the name of a base queue or a topic object.

However, be aware that subsequent MQINQ or MQSET calls for the handle relate solely to the name that has been opened, and not to the object resulting after name resolution has occurred. For example, if the object opened is an alias, the attributes returned by the MQINQ call are the attributes of the alias, not the attributes of the base queue or a topic object to which the alias resolves.

If the object being opened is a cluster queue, name resolution can occur at the time of the MQOPEN call, or be deferred until later. The point at which resolution occurs is controlled by the MQOO_BIND_* options specified on the MQOPEN call:

- MQOO_BIND_ON_OPEN
- MQOO_BIND_NOT_FIXED
- MQOO_BIND_AS_Q_DEF
- MQOO_BIND_ON_GROUP

See Name resolution for more information about name resolution for cluster queues.

4. An MQOPEN call with the MQOO_BROWSE option establishes a browse cursor, for use with MQGET calls that specify the object handle and one of the browse options. This allows the queue to be scanned without altering its contents. A message that has been found by browsing can be removed from the queue by using the MQGMO_MSG_UNDER_CURSOR option.

   Multiple browse cursors can be active for a single application by issuing several MQOPEN requests for the same queue.
5. Applications started by a trigger monitor are passed the name of the queue that is associated with the application when the application is started. This queue name can be specified in the *ObjDesc* parameter to open the queue. See “MQTMC2 - Trigger message 2 (character format)” on page 586 for further details.
6. On IBM i, applications running in compatibility mode are connected automatically to the queue manager by the first MQOPEN call issued by the application (if the application has not already connected to the queue manager by using the MQCONN call).

   Applications not running in compatibility mode must issue the MQCONN or MQCONNX call to connect to the queue manager explicitly, before using the MQOPEN call to open an object.

   **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

## Read ahead options

When you call MQOPEN with MQOO_READ_AHEAD, the IBM MQ client only enables read-ahead if certain conditions are met. These conditions include:

- Both the client and remote queue manager must be at WebSphere MQ Version 7 or later.
- The client application must be compiled and linked against the threaded IBM MQ MQI client libraries.
- The client channel must be using TCP/IP protocol
- The channel must have a non-zero SharingConversations (SHARECNV) setting in both the client and server channel definitions.

The following notes apply to the use of read ahead options.

1. The read ahead options are applicable only when one, and only one, of the MQOO_BROWSE, MQOO_INPUT_SHARED and MQOO_INPUT_EXCLUSIVE options are also specified. An error is not thrown if a read ahead options are specified with the MQOO_ INQUIRE or MQOO_SET options.

2. Read ahead is not enabled when requested if the options used on the first MQGET call are not supported for use with read ahead. Also, read ahead is disabled when the client is connecting to a queue manager that does not support read ahead.
3. If the application is not running as an IBM MQ client, read ahead options are ignored.

## Cluster queues

The following notes apply to the use of cluster queues.

1. When a cluster queue is opened for the first time, and the local queue manager is not a full repository queue manager, the local queue manager obtains information about the cluster queue from a full repository queue manager. When the network is busy, it can take several seconds for the local queue manager to receive the needed information from the repository queue manager. As a result, the application issuing the MQOPEN call might have to wait for up to 10 seconds before control returns from the MQOPEN call. If the local queue manager does not receive the needed information about the cluster queue within this time, the call fails with reason code MQRC_CLUSTER_RESOLUTION_ERROR.
2. When a cluster queue is opened and there are multiple instances of the queue in the cluster, the instance opened depends on the options specified on the MQOPEN call:
   - If the options specified include any of the following:
     - MQOO_BROWSE
     - MQOO_INPUT_AS_Q_DEF
     - MQOO_INPUT_EXCLUSIVE
     - MQOO_INPUT_SHARED
     - MQOO_SET

     the instance of the cluster queue opened must be the local instance. If there is no local instance of the queue, the MQOPEN call fails.
   - If the options specified include none of the options described previously, but include one or both of the following:
     - MQOO_INQUIRE
     - MQOO_OUTPUT

     the instance opened is the local instance if there is one, and a remote instance otherwise (if using the CLWLUSEQ defaults). The instance chosen by the queue manager can, however, be altered by a cluster workload exit (if there is one).
3. If there is a subscription for the queue, but it is not acknowledged by a full repository, the object is not present in the cluster and the call fails with reason code MQRC_OBJECT_NAME.

For more information about cluster queues, see Cluster queues.

## Distribution lists

The following notes apply to the use of distribution lists.

Distribution lists are supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

1. Fields in the MQOD structure must be set as follows when opening a distribution list:
   - *Version* must be MQOD_VERSION_2 or greater.
   - *ObjectType* must be MQOT_Q.
   - *ObjectName* must be blank or the null string.
   - *ObjectQMgrName* must be blank or the null string.
   - *RecsPresent* must be greater than zero.
   - One of *ObjectRecOffset* and *ObjectRecPtr* must be zero and the other nonzero.

- No more than one of *ResponseRecOffset* and *ResponseRecPtr* can be nonzero.
- There must be *RecsPresent* object records, addressed by either *ObjectRecOffset* or *ObjectRecPtr*. The object records must be set to the names of the destination queues to be opened.
- If one of *ResponseRecOffset* and *ResponseRecPtr* is nonzero, there must be *RecsPresent* response records present. They are set by the queue manager if the call completes with reason code MQRC_MULTIPLE_REASONS.

A version-2 MQOD can also be used to open a single queue that is not in a distribution list, by ensuring that *RecsPresent* is zero.

2. Only the following open options are valid in the *Options* parameter:
   - MQOO_OUTPUT
   - MQOO_PASS_*_CONTEXT
   - MQOO_SET_*_CONTEXT
   - MQOO_ALTERNATE_USER_AUTHORITY
   - MQOO_FAIL_IF_QUIESCING
3. The destination queues in the distribution list can be local, alias, or remote queues, but they cannot be model queues. If a model queue is specified, that queue fails to open, with reason code MQRC_Q_TYPE_ERROR. However, this does not prevent other queues in the list being opened successfully.
4. The completion code and reason code parameters are set as follows:
   - If the open operations for the queues in the distribution list all succeed or fail in the same way, the completion code and reason code parameters are set to describe the common result. The MQRR response records (if provided by the application) are not set in this case.

     For example, if every open succeeds, the completion code is set to MQCC_OK and the reason code is set to MQRC_NONE; if every open fails because none of the queues exists, the parameters are set to MQCC_FAILED and MQRC_UNKNOWN_OBJECT_NAME.
   - If the open operations for the queues in the distribution list do not all succeed or fail in the same way:
     - The completion code parameter is set to MQCC_WARNING if at least one open succeeded, and to MQCC_FAILED if all failed.
     - The reason code parameter is set to MQRC_MULTIPLE_REASONS.
     - The response records (if provided by the application) are set to the individual completion codes and reason codes for the queues in the distribution list.
5. When a distribution list has been opened successfully, the handle *Hobj* returned by the call can be used on subsequent MQPUT calls to put messages to queues in the distribution list, and on an MQCLOSE call to relinquish access to the distribution list. The only valid close option for a distribution list is MQCO_NONE.

   The MQPUT1 call can also be used to put a message to a distribution list; the MQOD structure defining the queues in the list is specified as a parameter on that call.
6. Each successfully opened destination in the distribution list counts as a separate handle when checking whether the application has exceeded the permitted maximum number of handles (see the *MaxHandles* queue-manager attribute). This is true even when two or more of the destinations in the distribution list resolve to the same physical queue. If the MQOPEN or MQPUT1 call for a distribution list would cause the number of handles in use by the application to exceed *MaxHandles*, the call fails with reason code MQRC_HANDLE_NOT_AVAILABLE.
7. Each destination that is opened successfully has the value of its *OpenOutputCount* attribute incremented by one. If two or more of the destinations in the distribution list resolve to the same physical queue, that queue has its *OpenOutputCount* attribute incremented by the number of destinations in the distribution list that resolve to that queue.

8. Any change to the queue definitions that would have caused a handle to become invalid had the queues been opened individually (for example, a change in the resolution path), does not cause the distribution-list handle to become invalid. However, it does result in a failure for that particular queue when the distribution-list handle is used on a subsequent MQPUT call.
9. A distribution list can contain only one destination.

## Remote queues

The following notes apply to the use of remote queues.

A remote queue can be specified in one of two ways in the *ObjDesc* parameter of this call.

- By specifying for *ObjectName* the name of a local definition of the remote queue. In this case, *ObjectQMgrName* refers to the local queue manager, and can be specified as blanks or (in the C programming language) a null string.

  The security validation performed by the local queue manager verifies that the user is authorized to open the local definition of the remote queue.
- By specifying for *ObjectName* the name of the remote queue as known to the remote queue manager. In this case, *ObjectQMgrName* is the name of the remote queue manager.

  The security validation performed by the local queue manager verifies that the user is authorized to send messages to the transmission queue resulting from the name resolution process.

In either case:

- No messages are sent by the local queue manager to the remote queue manager to check that the user is authorized to put messages on the queue.
- When a message arrives at the remote queue manager, the remote queue manager might reject it because the user originating the message is not authorized.

See the *ObjectName* and *ObjectQMgrName* fields described in "MQOD - Object descriptor" on page 460 for more information.

## Objects

## Security

The following notes relate to the security aspects of using MQOPEN.

The queue manager performs security checks when an MQOPEN call is issued, to verify that the user identifier under which the application is running has the appropriate level of authority before access is permitted. The authority check is made on the name of the object being opened, and not on the name, or names, resulting after a name has been resolved.

If the object being opened is an alias queue which points at a topic object, the queue manager performs a security check on the alias queue name, before performing a security check for the topic as if the topic object had been used directly.

If the object being opened is a topic object, whether with *ObjectName* alone or by using the *ObjectString* (with or without a basing *ObjectName*), the queue manager performs the security check by using the resultant topic string, taken from within the topic object specified in *ObjectName*, and if required concatenating it with that provided in *ObjectString*, and then finding the closest topic object at or above that point in the topic tree to perform the security check against. This might not be the same topic object that was specified in *ObjectName*.

If the object being opened is a model queue, the queue manager performs a full security check against both the name of the model queue and the name of the dynamic queue that is created. If the resulting dynamic queue is then opened explicitly, a further resource security check is performed against the name of the dynamic queue.

On z/OS, the queue manager performs security checks only if security is enabled. For more information about security checking, see Setting up security on z/OS .

## Attributes

The following notes relate to attributes.

The attributes of an object can change while an application has the object open. In many cases, the application does not notice this, but for certain attributes the queue manager marks the handle as no longer valid. These attributes are:

- Any attribute that affects the name resolution of the object. This applies regardless of the open options used, and includes the following:
  - A change to the *BaseQName* attribute of an alias queue that is open.
  - A change to the *TargetType* attribute of an alias queue that is open.
  - A change to the *RemoteQName* or *RemoteQMgrName* queue attributes, for any handle that is open for this queue, or for a queue that resolves through this definition as a queue-manager alias.
  - Any change that causes a currently open handle for a remote queue to resolve to a different transmission queue, or to fail to resolve to one at all. For example, this can include:
    - A change to the *XmitQName* attribute of the local definition of a remote queue, whether the definition is being used for a queue, or for a queue-manager alias.
    - ( z/OS only) A change to the value of the *IntraGroupqueuing* queue-manager attribute, or a change in the definition of the shared transmission queue (SYSTEM.QSG.TRANSMIT.QUEUE) used by the IGQ agent.

    There is one exception to this: the creation of a new transmission queue. A handle that would have resolved to this queue had it been present when the handle was opened, but instead resolved to the default transmission queue, is not made invalid.
  - A change to the *DefXmitQName* queue-manager attribute. In this case all open handles that resolved to the previously named queue (that resolved to it only because it was the default transmission queue) are marked as invalid. Handles that resolved to this queue for other reasons are not affected.
- The *Shareability* queue attribute, if there are two or more handles that are currently providing MQOO_INPUT_SHARED access for this queue, or for a queue that resolves to this queue. If so, *all* handles that are open for this queue, or for a queue that resolves to this queue, are marked as invalid, regardless of the open options.

  On z/OS, the handles previously described are marked as invalid if one or more handles is currently providing MQOO_INPUT_SHARED or MQOO_INPUT_EXCLUSIVE access to the queue.
- The *Usage* queue attribute, for all handles that are open for this queue, or for a queue that resolves to this queue, regardless of the open options.

When a handle is marked as invalid, all subsequent calls (other than MQCLOSE) using this handle fail with reason code MQRC_OBJECT_CHANGED. The application must issue an MQCLOSE call (using the original handle) and then reopen the queue. Any uncommitted updates against the old handle from previous successful calls can still be committed or backed out, as required by the application logic.

If changing an attribute causes this to happen, use a special force version of the call.

## C invocation

```
MQOPEN (Hconn, &ObjDesc, Options, &Hobj, &CompCode,
       &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQOD     ObjDesc;   /* Object descriptor */
```

```
MQLONG   Options;   /* Options that control the action of MQOPEN */
MQHOBJ   Hobj;      /* Object handle */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQOPEN' USING HCONN, OBJDESC, OPTIONS, HOBJ, COMPCODE, REASON
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Object descriptor
 01  OBJDESC.
     COPY CMQODV.
**   Options that control the action of MQOPEN
 01  OPTIONS   PIC S9(9) BINARY.
**   Object handle
 01  HOBJ      PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQOPEN (Hconn, ObjDesc, Options, Hobj, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn     fixed bin(31);  /* Connection handle */
dcl ObjDesc   like MQOD;      /* Object descriptor */
dcl Options   fixed bin(31);  /* Options that control the action of
                                 MQOPEN */
dcl Hobj      fixed bin(31);  /* Object handle */
dcl CompCode  fixed bin(31);  /* Completion code */
dcl Reason    fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
CALL MQOPEN,(HCONN,OBJDESC,OPTIONS,HOBJ,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS      F  Connection handle
OBJDESC   CMQODA  ,  Object descriptor
OPTIONS   DS      F  Options that control the action of MQOPEN
HOBJ      DS      F  Object handle
COMPCODE  DS      F  Completion code
REASON    DS      F  Reason code qualifying COMPCODE
```

## Visual Basic invocation

```
MQOPEN Hconn, ObjDesc, Options, Hobj, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn    As Long 'Connection handle'
```

```
Dim ObjDesc  As MQOD 'Object descriptor'
Dim Options  As Long 'Options that control the action of MQOPEN'
Dim Hobj     As Long 'Object handle'
Dim CompCode As Long 'Completion code'
Dim Reason   As Long 'Reason code qualifying CompCode'
```

## MQPUT - Put message

The MQPUT call puts a message on a queue or distribution list, or to a topic. The queue, distribution list, or topic must already be open.

### Syntax

MQPUT (*Hconn*, *Hobj*, *MsgDesc*, *PutMsgOpts*, *BufferLength*, *Buffer*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Hobj***

Type: MQHOBJ - input

This handle represents the queue to which the message is added, or the topic to which the message is published. The value of *Hobj* was returned by a previous MQOPEN call that specified the MQOO_OUTPUT option.

***MsgDesc***

Type: MQMD - input/output

This structure describes the attributes of the message being sent, and receives information about the message after the put request is complete. See “MQMD - Message descriptor” on page 402 for details.

If the application provides a version-1 MQMD, the message data can be prefixed with an MQMDE structure to specify values for the fields that exist in the version-2 MQMD but not the version-1. The *Format* field in the MQMD must be set to MQFMT_MD_EXTENSION to indicate that an MQMDE is present. See “MQMDE - Message descriptor extension” on page 452 for more details.

The application does not need to provide an MQMD structure if a valid message handle is supplied in the *OriginalMsgHandle* or *NewMsgHandle* fields of the MQPMO structure. If nothing is provided in one of these fields, the descriptor of the message is taken from the descriptor associated with the message handles.

If you use, or plan to use, API exits then we recommend that you explicitly supply an MQMD structure and do not use the message descriptors associated with the message handles. This is because the API Exit associated with MQPUT or MQPUT1 call is unable to ascertain which MQMD values are used by the queue manager to complete the MQPUT or MQPUT1 request.

***PutMsgOpts***

Type: MQPMO - input/output

See “MQPMO - Put-message options” on page 480 for details.

***BufferLength***

Type: MQLONG - input

The length of the message in *Buffer*. Zero is valid, and indicates that the message contains no application data. The upper limit for *BufferLength* depends on various factors:

- If the destination is a local queue or resolves to a local queue, the upper limit depends on whether:
  - The local queue manager supports segmentation.
  - The sending application specifies the flag that allows the queue manager to segment the message. This flag is MQMF_SEGMENTATION_ALLOWED, and can be specified either in a version-2 MQMD, or in an MQMDE used with a version-1 MQMD.

  If both of these conditions are satisfied, *BufferLength* cannot exceed 999 999 999 minus the value of the *Offset* field in MQMD. The longest logical message that can be put is therefore 999 999 999 bytes (when *Offset* is zero). However, resource constraints imposed by the operating system or environment in which the application is running might result in a lower limit.

  If one or both of the previous conditions is not satisfied, *BufferLength* cannot exceed the smaller of the queue's *MaxMsgLength* attribute and queue-manager's *MaxMsgLength* attribute.
- If the destination is a remote queue or resolves to a remote queue, the conditions for local queues apply, *but at each queue manager through which the message must pass in order to reach the destination queue* ; in particular:
  1. The local transmission queue used to store the message temporarily at the local queue manager
  2. Intermediate transmission queues (if any) used to store the message at queue managers on the route between the local and destination queue managers
  3. The destination queue at the destination queue manager

  The longest message that can be put is therefore governed by the most restrictive of these queues and queue managers.

  When a message is on a transmission queue, additional information resides with the message data, and this reduces the amount of application data that can be carried. In this situation, subtract MQ_MSG_HEADER_LENGTH bytes from the *MaxMsgLength* values of the transmission queues when determining the limit for *BufferLength*.

  **Note:** Only failure to comply with condition 1 can be diagnosed synchronously (with reason code MQRC_MSG_TOO_BIG_FOR_Q or MQRC_MSG_TOO_BIG_FOR_Q_MGR) when the message is put. If conditions 2 or 3 are not satisfied, the message is redirected to a dead-letter (undelivered-message) queue, either at an intermediate queue manager or at the destination queue manager. If this happens, a report message is generated if one was requested by the sender.

***Buffer***

Type: MQBYTExBufferLength - input

This is a buffer containing the application data to be sent. The buffer must be aligned on a boundary appropriate to the nature of the data in the message. 4-byte alignment is suitable for most messages (including messages containing IBM MQ header structures), but some messages might require more stringent alignment. For example, a message containing a 64-bit binary integer might require 8-byte alignment.

If *Buffer* contains character or numeric data, set the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter to the values appropriate to the data; this enables the receiver of the message to convert the data (if necessary) to the character set and encoding used by the receiver.

**Note:** All the other parameters on the MQPUT call must be in the character set and encoding of the local queue manager (given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE).

In the C programming language, the parameter is declared as a pointer-to-void; the address of any type of data can be specified as the parameter.

If the *BufferLength* parameter is zero, *Buffer* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler can be null.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_INCOMPLETE_GROUP**
(2241, X'8C1') Message group not complete.

**MQRC_INCOMPLETE_MSG**
(2242, X'8C2') Logical message not complete.

**MQRC_INCONSISTENT_PERSISTENCE**
(2185, X'889') Inconsistent persistence specification.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

**MQRC_PRIORITY_EXCEEDS_MAXIMUM**
(2049, X'801') Message Priority exceeds maximum value supported.

**MQRC_UNKNOWN_REPORT_OPTION**
(2104, X'838') Report option(s) in message descriptor not recognized.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ALIAS_TARGTYPE_CHANGED**
(2480, X'09B0') Subscription target type has changed from queue to topic object.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BACKED_OUT**
(2003, X'7D3') Unit of work backed out.

**MQRC_BUFFER_ERROR**
(2004, X'7D4') Buffer parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CALL_INTERRUPTED**
(2549, X'9F5') MQPUT or MQCMIT was interrupted and reconnection processing cannot reestablish a definite outcome.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') Coupling facility not available.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CFGR_ERROR**
(2416, X'970') PCF group parameter structure MQCFGR in the message data is not valid.

**MQRC_CFH_ERROR**
(2235, X'8BB') PCF header structure not valid.

**MQRC_CFIF_ERROR**
(2414, X'96E') PCF integer filter parameter structure in the message data is not valid.

**MQRC_CFIL_ERROR**
(2236, X'8BC') PCF integer list parameter structure or PCIF*64 integer list parameter structure not valid.

**MQRC_CFIN_ERROR**
(2237, X'8BD') PCF integer parameter structure or PCIF*64 integer parameter structure not valid.

**MQRC_CFSF_ERROR**
(2415, X'96F') PCF string filter parameter structure in the message data is not valid.

**MQRC_CFSL_ERROR**
(2238, X'8BE') PCF string list parameter structure not valid.

**MQRC_CFST_ERROR**
(2239, X'8BF') PCF string parameter structure not valid.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CLUSTER_EXIT_ERROR**
(2266, X'8DA') Cluster workload exit failed.

**MQRC_CLUSTER_RESOLUTION_ERROR**
(2189, X'88D') Cluster name resolution failed.

**MQRC_CLUSTER_RESOURCE_ERROR**
(2269, X'8DD') Cluster resource error.

**MQRC_COD_NOT_VALID_FOR_XCF_Q**
(2106, X'83A') COD report option not valid for XCF queue.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CONTENT_ERROR**
2554 (X'09FA') Message content could not be parsed to determine whether the message should be delivered to a subscriber with an extended message selector.

**MQRC_CONTEXT_HANDLE_ERROR**
(2097, X'831') Queue handle referred to does not save context.

**MQRC_CONTEXT_NOT_AVAILABLE**
(2098, X'832') Context not available for queue handle referred to.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'7DA') Data length parameter not valid.

**MQRC_DH_ERROR**
(2135, X'857') Distribution header structure not valid.

**MQRC_DLH_ERROR**
(2141, X'85D') Dead letter header structure not valid.

**MQRC_EPH_ERROR**
(2420, X'974') Embedded PCF structure not valid.

**MQRC_EXPIRY_ERROR**
(2013, X'7DD') Expiry time not valid.

**MQRC_FEEDBACK_ERROR**
(2014, X'7DE') Feedback code not valid.

**MQRC_GLOBAL_UOW_CONFLICT**
(2351, X'92F') Global units of work conflict.

**MQRC_GROUP_ID_ERROR**
(2258, X'8D2') Group identifier not valid.

**MQRC_HANDLE_IN_USE_FOR_UOW**
(2353, X'931') Handle in use for global unit of work.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HEADER_ERROR**
(2142, X'85E') MQ header structure not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_IIH_ERROR**
(2148, X'864') IMS information header structure not valid.

**MQRC_INCOMPLETE_GROUP**
(2241, X'8C1') Message group not complete.

**MQRC_INCOMPLETE_MSG**
(2242, X'8C2') Logical message not complete.

**MQRC_INCONSISTENT_PERSISTENCE**
(2185, X'889') Inconsistent persistence specification.

**MQRC_INCONSISTENT_UOW**
(2245, X'8C5') Inconsistent unit-of-work specification.

**MQRC_LOCAL_UOW_CONFLICT**
(2352, X'930') Global unit of work conflicts with local unit of work.

**MQRC_MD_ERROR**
(2026, X'7EA') Message descriptor not valid.

**MQRC_MDE_ERROR**
(2248, X'8C8') Message descriptor extension not valid.

**MQRC_MISSING_REPLY_TO_Q**
(2027, X'7EB') Missing reply-to queue or MQPMO_SUPPRESS_REPLYTO was used

**MQRC_MISSING_WIH**
(2332, X'91C') Message data does not begin with MQWIH.

**MQRC_MSG_FLAGS_ERROR**
(2249, X'8C9') Message flags not valid.

**MQRC_MSG_SEQ_NUMBER_ERROR**
(2250, X'8CA') Message sequence number not valid.

**MQRC_MSG_TOO_BIG_FOR_Q**
(2030, X'7EE') Message length greater than maximum for queue.

**MQRC_MSG_TOO_BIG_FOR_Q_MGR**
(2031, X'7EF') Message length greater than maximum for queue manager.

**MQRC_MSG_TYPE_ERROR**
(2029, X'7ED') Message type in message descriptor not valid.

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

**MQRC_NO_DESTINATIONS_AVAILABLE**
(2270, X'8DE') No destination queues available.

**MQRC_NOT_OPEN_FOR_OUTPUT**
(2039, X'7F7') Queue not open for output.

**MQRC_NOT_OPEN_FOR_PASS_ALL**
(2093, X'82D') Queue not open for pass all context.

**MQRC_NOT_OPEN_FOR_PASS_IDENT**
(2094, X'82E') Queue not open for pass identity context.

**MQRC_NOT_OPEN_FOR_SET_ALL**
(2095, X'82F') Queue not open for set all context.

**MQRC_NOT_OPEN_FOR_SET_IDENT**
(2096, X'830') Queue not open for set identity context.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OFFSET_ERROR**
(2251, X'8CB') Message segment offset not valid.

**MQRC_OPEN_FAILED**
(2137, X'859') Object not opened successfully.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_ORIGINAL_LENGTH_ERROR**
(2252, X'8CC') Original length not valid.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_PAGESET_FULL**
(2192, X'890') External storage medium is full.

**MQRC_PCF_ERROR**
(2149, X'865') PCF structures not valid.

**MQRC_PERSISTENCE_ERROR**
(2047, X'7FF') Persistence not valid.

**MQRC_PERSISTENT_NOT_ALLOWED**
(2048, X'800') Queue does not support persistent messages.

**MQRC_PMO_ERROR**
(2173, X'87D') Put-message options structure not valid.

**MQRC_PMO_RECORD_FLAGS_ERROR**
(2158, X'86E') Put message record flags not valid.

**MQRC_PRIORITY_ERROR**
(2050, X'802') Message priority not valid.

**MQRC_PUBLICATION_FAILURE**
(2502, X'9C6') The publication has not been delivered to any of the subscribers.

**MQRC_PUT_INHIBITED**
(2051, X'803') Put calls inhibited for the queue, for the queue to which this queue resolves, or the topic.

**MQRC_PUT_MSG_RECORDS_ERROR**
(2159, X'86F') Put message records not valid.

**MQRC_PUT_NOT_RETAINED**
(2479, X'09AF') Publication could not be retained

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_FULL**
(2053, X'805') Queue already contains maximum number of messages.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_Q_SPACE_NOT_AVAILABLE**
(2056, X'808') No space available on disk for queue.

**MQRC_RECONNECT_FAILED**
(2548, X'9F4') After reconnecting, an error occurred reinstating the handles for a reconnectable connection.

**MQRC_RECS_PRESENT_ERROR**
(2154, X'86A') Number of records present not valid.

**MQRC_REPORT_OPTIONS_ERROR**
(2061, X'80D') Report options in message descriptor not valid.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_RESPONSE_RECORDS_ERROR**
(2156, X'86C') Response records not valid.

**MQRC_RFH_ERROR**
(2334, X'91E') MQRFH or MQRFH2 structure not valid.

**MQRC_RMH_ERROR**
(2220, X'8AC') Reference message header structure not valid.

**MQRC_SEGMENT_LENGTH_ZERO**
(2253, X'8CD') Length of data in message segment is zero.

**MQRC_SEGMENTS_NOT_SUPPORTED**
(2365, X'93D') Segments not supported.

**MQRC_SELECTION_NOT_AVAILABLE**
2551 (X'09F7') A possible subscriber for the publication exists, but the queue manager cannot check whether to send the publication to the subscriber.

**MQRC_STOPPED_BY_CLUSTER_EXIT**
(2188, X'88C') Call rejected by cluster workload exit.

**MQRC_STORAGE_CLASS_ERROR**
(2105, X'839') Storage class error.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_SYNCPOINT_LIMIT_REACHED**
(2024, X'7E8') No more messages can be handled within current unit of work.

**MQRC_SYNCPOINT_NOT_AVAILABLE**
(2072, X'818') Syncpoint support not available.

**MQRC_TM_ERROR**
(2265, X'8D9') Trigger message structure not valid.

**MQRC_TMC_ERROR**
(2191, X'88F') Character trigger message structure not valid.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UOW_ENLISTMENT_ERROR**
(2354, X'932') Enlistment in global unit of work failed.

**MQRC_UOW_MIX_NOT_SUPPORTED**
(2355, X'933') Mixture of unit-of-work calls not supported.

**MQRC_UOW_NOT_AVAILABLE**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**MQRC_WIH_ERROR**
(2333, X'91D') MQWIH structure not valid.

**MQRC_WRONG_MD_VERSION**
(2257, X'8D1') Wrong version of MQMD supplied.

**MQRC_XQH_ERROR**
(2260, X'8D4') Transmission queue header structure not valid.

For detailed information about these codes, see Messages and reason codes.

## Topic usage notes

1. The following notes apply to the use of topics:

   a. When using MQPUT to publish messages on a topic, where one or more subscribers to that topic cannot be given the publication due to a problem with their subscriber queue (for example it is full), the Reason code returned to the MQPUT call and the delivery behavior is dependent on the setting of the PMSGDLV or NPMSGDLV attributes on the TOPIC. Note delivery of a publication to the dead letter queue when MQRO_DEAD_LETTER_Q is specified, or discarding the message when MQRO_DISCARD_MSG is specified, is considered as a successful delivery of the message. If none of the publications are delivered, the MQPUT returns with MQRC_PUBLICATION_FAILURE. This can happen in the following cases:

   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALL and any subscription (durable or not) has a queue which cannot receive the publication.
   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLDUR and a durable subscription has a queue which cannot receive the publication.

The MQPUT can return with MQRC_NONE even though publications could not be delivered to some subscribers in the following cases:

- A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLAVAIL and any subscription, durable or not, has a queue which cannot receive the publication.
- A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLDUR and a non-durable subscription has a queue which cannot receive the publication.

You can use the USEDLQ topic attribute to determine whether the dead-letter queue is used when publication messages cannot be delivered to their correct subscriber queue. For more information about the use of USEDLQ, see DEFINE TOPIC.

b. If there are no subscribers to the topic being used, the message published is not sent to any queue and is discarded. It does not matter whether the message is persistent or non-persistent, or whether it has unlimited expiry or has an expiry time, it is still discarded if there are no subscribers. The exception to this is if the message is to be retained, in which case, although it is not sent to any subscribers' queues, it is stored against the topic to be delivered to any new subscriptions or to any subscribers that ask for retained publications using MQSUBRQ.

## MQPUT and MQPUT1

You can use both the MQPUT and MQPUT1 calls to put messages on a queue; which call to use depends on the circumstances

- Use the MQPUT call to place multiple messages on the *same* queue.

  An MQOPEN call specifying the MQOO_OUTPUT option is issued first, followed by one or more MQPUT requests to add messages to the queue; finally the queue is closed with an MQCLOSE call. This gives better performance than repeated use of the MQPUT1 call.
- Use the MQPUT1 call to put only *one* message on a queue.

  This call encapsulates the MQOPEN, MQPUT, and MQCLOSE calls into a single call, minimizing the number of calls that must be issued.

## Destination Queues

The following notes apply to the use of destination queues:

1. If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if the conditions detailed are satisfied. Some conditions apply to both local and remote destination queues; other conditions apply only to remote destination queues.

   **Conditions that apply to local and remote destination queues**

   - All the MQPUT calls are within the same unit of work, or none of them is within a unit of work.

     Be aware that when messages are put onto a particular queue within a single unit of work, messages from other applications might be interspersed with the sequence of messages on the queue.
   - All the MQPUT calls are made using the same object handle *Hobj*.

     In some environments, message sequence is also preserved when different object handles are used, if the calls are made from the same application. The meaning of *same application* is determined by the environment:

     – On z/OS, the application is:

       - For CICS, the CICS task
       - For IMS, the task
       - For z/OS batch, the task

     – On IBM i, the application is the job.

– On Windows and UNIX systems, the application is the thread.

- The messages all have the same priority.
- The messages are not put to a cluster queue with MQOO_BIND_NOT_FIXED specified (or with MQOO_BIND_AS_Q_DEF in effect when the DefBind queue attribute has the value MQBND_BIND_NOT_FIXED).

**Additional conditions that apply to remote destination queues**

- There is only one path from the sending queue manager to the destination queue manager.

  If some messages in the sequence might go on a different path (for example, because of reconfiguration, traffic balancing, or path selection based on message size), the order of the messages at the destination queue manager cannot be guaranteed.
- Messages are not placed temporarily on dead-letter queues at the sending, intermediate, or destination queue managers.

  If one or more of the messages is put temporarily on a dead-letter queue (for example, because a transmission queue or the destination queue is temporarily full), the messages can arrive on the destination queue out of sequence.
- The messages are either all persistent or all nonpersistent.

  If a channel on the route between the sending and destination queue managers has its *NonPersistentMsgSpeed* attribute set to MQNPMS_FAST, nonpersistent messages can jump ahead of persistent messages, resulting in the order of persistent messages relative to nonpersistent messages not being preserved. However, the order of persistent messages relative to each other, and of nonpersistent messages relative to each other, is preserved.

If these conditions are not satisfied, you can use message groups to preserve message order, but this requires both the sending and receiving applications to use the message-grouping support. For more information about message groups, see:

- MQMD - MsgFlags field
- MQPMO_LOGICAL_ORDER
- MQGMO_LOGICAL_ORDER

## Distribution Lists

The following notes apply to the use of distribution lists.

Distribution lists are supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

1. You can put messages to a distribution list using either a version-1 or a version-2 MQPMO. If you use a version-1 MQPMO (or a version-2 MQPMO with *RecsPresent* equal to zero), the application can provide no put message records or response records. You cannot identify the queues that encounter errors if the message is sent successfully to some queues in the distribution list and not others.

   If the application provides put message records or response records, set the *Version* field to MQPMO_VERSION_2.

   You can also use a version-2 MQPMO to send messages to a single queue that is not in a distribution list, by ensuring that *RecsPresent* is zero.
2. The completion code and reason code parameters are set as follows:

   - If the puts to the queues in the distribution list all succeed or fail in the same way, the completion code and reason code parameters are set to describe the common result. The MQRR response records (if provided by the application) are not set in this case.

     For example, if every put succeeds, the completion code and reason code are set to MQCC_OK and MQRC_NONE; if every put fails because all the queues are inhibited for puts, the parameters are set to MQCC_FAILED and MQRC_PUT_INHIBITED.

- If the puts to the queues in the distribution list do not all succeed or fail in the same way:
  - The completion code parameter is set to MQCC_WARNING if at least one put succeeded, and to MQCC_FAILED if all failed.
  - The reason code parameter is set to MQRC_MULTIPLE_REASONS.
  - The response records (if provided by the application) are set to the individual completion codes and reason codes for the queues in the distribution list.

  If the put to a destination fails because the open for that destination failed, the fields in the response record are set to MQCC_FAILED and MQRC_OPEN_FAILED; that destination is included in *InvalidDestCount*.

3. If a destination in the distribution list resolves to a local queue, the message is placed on that queue in normal form (that is, not as a distribution-list message). If more than one destination resolves to the same local queue, one message is placed on the queue for each such destination.

   If a destination in the distribution list resolves to a remote queue, a message is placed on the appropriate transmission queue. Where several destinations resolve to the same transmission queue, a single distribution-list message containing those destinations can be placed on the transmission queue, even if those destinations were not adjacent in the list of destinations provided by the application. However, this can be done only if the transmission queue supports distribution-list messages (see DistLists ).

   If the transmission queue does not support distribution lists, one copy of the message in normal form is placed on the transmission queue for each destination that uses that transmission queue.

   If a distribution list with the application message data is too large for a transmission queue, the distribution list message is split into smaller distribution-list messages, each containing fewer destinations. If the application message data only just fits on the queue, distribution-list messages cannot be used at all, and the queue manager generates one copy of the message in normal form for each destination that uses that transmission queue.

   If different destinations have different message priority or message persistence (this can occur when the application specifies MQPRI_PRIORITY_AS_Q_DEF or MQPER_PERSISTENCE_AS_Q_DEF), the messages are not held in the same distribution-list message. Instead, the queue manager generates as many distribution-list messages as are necessary to accommodate the differing priority and persistence values.

4. A put to a distribution list can result in:
   - A single distribution-list message, or
   - A number of smaller distribution-list messages, or
   - A mixture of distribution list messages and normal messages, or
   - Normal messages only.

   Which of the above occurs depends on whether:
   - The destinations in the list are local, remote, or a mixture.
   - The destinations have the same message priority and message persistence.
   - The transmission queues can hold distribution-list messages.
   - The transmission queues' maximum message lengths are large enough to accommodate the message in distribution-list form.

   However, regardless of which of the above occurs, each *physical* message resulting (that is, each normal message or distribution-list message resulting from the put) counts as only *one* message when:
   - Checking whether the application has exceeded the permitted maximum number of messages in a unit of work (see the *MaxUncommittedMsgs* queue-manager attribute).
   - Checking whether the triggering conditions are satisfied.
   - Incrementing queue depths and checking whether the queues' maximum queue depth would be exceeded.

5. Any change to the queue definitions that would have caused a handle to become invalid had the queues been opened individually (for example, a change in the resolution path), does not cause the distribution-list handle to become invalid. However, it does result in a failure for that particular queue when the distribution-list handle is used on a subsequent MQPUT call.

## Headers

If a message is put with one or more IBM MQ header structures at the beginning of the application message data, the queue manager performs certain checks on the header structures to verify that they are valid. If the queue manager detects an error, the call fails with an appropriate reason code. The checks performed vary according to the particular structures that are present:

- Checks are performed only if a version-2 or later MQMD is used on the MQPUT or MQPUT1 call. Checks are not performed if a version-1 MQMD is used, even if an MQMDE is present at the start of the message data.
- Structures that are not supported by the local queue manager, and structures following the first MQDLH in the message, are not validated.
- The MQDH and MQMDE structures are validated completely by the queue manager.
- Other structures are validated partially by the queue manager (not all fields are checked).

General checks performed by the queue manager include the following:

- The *StrucId* field must be valid.
- The *Version* field must be valid.
- The *StrucLength* field must specify a value that is large enough to include the structure plus any variable-length data that forms part of the structure.
- The *CodedCharSetId* field must not be zero, or a negative value that is not valid (MQCCSI_DEFAULT, MQCCSI_EMBEDDED, MQCCSI_Q_MGR, and MQCCSI_UNDEFINED are *not* valid in most IBM MQ header structures).
- The *BufferLength* parameter of the call must specify a value that is large enough to include the structure (the structure must not extend beyond the end of the message).

In addition to general checks on structures, the following conditions must be satisfied:

- The sum of the lengths of the structures in a PCF message must equal the length specified by the *BufferLength* parameter on the MQPUT or MQPUT1 call. A PCF message is a message that has a format name of MQFMT_ADMIN, MQFMT_EVENT, or MQFMT_PCF.
- An IBM MQ structure must not be truncated, except in the following situations where truncated structures are permitted:
  - Messages that are report messages.
  - PCF messages.
  - Messages containing an MQDLH structure. (Structures *following* the first MQDLH can be truncated; structures preceding the MQDLH cannot.)
- An IBM MQ structure must not be split over two or more segments; the structure must be contained entirely within one segment.

## Buffer

For the Visual Basic programming language, the following points apply:

- If the size of the *Buffer* parameter is less than the length specified by the *BufferLength* parameter, the call fails with reason code MQRC_BUFFER_LENGTH_ERROR.
- The *Buffer* parameter is declared as being of type `String`. If the data to be placed on the queue is not of type `String`, use the MQPUTAny call in place of MQPUT.

The MQPUTAny call has the same parameters as the MQPUT call, except that the *Buffer* parameter is declared as being of type Any, allowing any type of data to be placed on the queue. However, this means that *Buffer* cannot be checked to ensure that it is at least *BufferLength* bytes in size.

## C invocation

```
MQPUT (Hconn, Hobj, &MsgDesc, &PutMsgOpts, BufferLength, Buffer,
      &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQHOBJ   Hobj;          /* Object handle */
MQMD     MsgDesc;       /* Message descriptor */
MQPMO    PutMsgOpts;    /* Options that control the action of MQPUT */
MQLONG   BufferLength;  /* Length of the message in Buffer */
MQBYTE   Buffer[n];     /* Message data */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
     CALL 'MQPUT' USING HCONN, HOBJ, MSGDESC, PUTMSGOPTS, BUFFERLENGTH,
                        BUFFER, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Object handle
 01  HOBJ          PIC S9(9) BINARY.
**   Message descriptor
 01  MSGDESC.
     COPY CMQMDV.
**   Options that control the action of MQPUT
 01  PUTMSGOPTS.
     COPY CMQPMOV.
**   Length of the message in BUFFER
 01  BUFFERLENGTH  PIC S9(9) BINARY.
**   Message data
 01  BUFFER        PIC X(n).
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQPUT (Hconn, Hobj, MsgDesc, PutMsgOpts, BufferLength, Buffer,
           CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn         fixed bin(31);  /* Connection handle */
dcl Hobj          fixed bin(31);  /* Object handle */
dcl MsgDesc       like MQMD;      /* Message descriptor */
dcl PutMsgOpts    like MQPMO;     /* Options that control the action of
                                     MQPUT */
dcl BufferLength  fixed bin(31);  /* Length of the message in Buffer */
dcl Buffer        char(n);        /* Message data */
dcl CompCode      fixed bin(31);  /* Completion code */
dcl Reason        fixed bin(31);  /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQPUT,(HCONN,HOBJ,MSGDESC,PUTMSGOPTS,BUFFERLENGTH, X
               BUFFER,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN         DS       F      Connection handle
HOBJ          DS       F      Object handle
MSGDESC       CMQMDA   ,      Message descriptor
PUTMSGOPTS    CMQPMOA  ,      Options that control the action of MQPUT
BUFFERLENGTH  DS       F      Length of the message in BUFFER
BUFFER        DS       CL(n)  Message data
COMPCODE      DS       F      Completion code
REASON        DS       F      Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQPUT Hconn, Hobj, MsgDesc, PutMsgOpts, BufferLength, Buffer, CompCode,
      Reason
```

Declare the parameters as follows:

```
Dim Hconn        As Long   'Connection handle'
Dim Hobj         As Long   'Object handle'
Dim MsgDesc      As MQMD   'Message descriptor'
Dim PutMsgOpts   As MQPMO  'Options that control the action of MQPUT'
Dim BufferLength As Long   'Length of the message in Buffer'
Dim Buffer       As String 'Message data'
Dim CompCode     As Long   'Completion code'
Dim Reason       As Long   'Reason code qualifying CompCode'
```

## MQPUT1 - Put one message

The MQPUT1 call puts one message on a queue, or distribution list, or to a topic.

The queue, distribution list, or topic does not need to be open.

### Syntax

MQPUT1 (*Hconn*, *ObjDesc*, *MsgDesc*, *PutMsgOpts*, *BufferLength*, *Buffer*, *CompCode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***ObjDesc***

Type: MQOD - input/output

This is a structure that identifies the queue to which the message is added, or the topic to which the message is published. See "MQOD - Object descriptor" on page 460 for details.

If the structure is a queue, the user must be authorized to open the queue for output. The queue must **not** be a model queue.

***MsgDesc***
Type: MQMD - input/output

This structure describes the attributes of the message being sent, and receives feedback information after the put request is complete. See "MQMD - Message descriptor" on page 402 for details.

If the application provides a version-1 MQMD, the message data can be prefixed with an MQMDE structure to specify values for the fields that exist in the version-2 MQMD but not the version-1. Set the *Format* field in the MQMD to MQFMT_MD_EXTENSION to indicate that an MQMDE is present. See "MQMDE - Message descriptor extension" on page 452 for more details.

The application does not need to provide an MQMD structure if a valid message handle is supplied in the *MsgHandle* field of the MQGMO structure or in the *OriginalMsgHandle* or *NewMsgHandle* fields of the MQPMO structure. If nothing is provided in one of these fields, the descriptor of the message is taken from the descriptor associated with the message handles.

***PutMsgOpts***
Type: MQPMO - input/output

See "MQPMO - Put-message options" on page 480 for details.

***BufferLength***
Type: MQLONG - input

The length of the message in *Buffer*. Zero is valid, and indicates that the message contains no application data. The upper limit depends on various factors; see "MQPUT - Put message" on page 729 for the description of the *BufferLength* parameter.

***Buffer***
Type: MQBYTExBufferLength - input

This is a buffer containing the application message data to be sent. Align the buffer on a boundary appropriate to the nature of the data in the message. 4-byte alignment is suitable for most messages (including messages containing IBM MQ header structures), but some messages might require more stringent alignment. For example, a message containing a 64-bit binary integer might require 8-byte alignment.

If *Buffer* contains character or numeric data, set the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter to the values appropriate to the data; this enables the receiver of the message to convert the data (if necessary) to the character set and encoding used by the receiver.

**Note:** All the other parameters on the MQPUT1 call must be in the character set and encoding of the local queue manager (given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE).

In the C programming language, the parameter is declared as a pointer-to-void; the address of any type of data can be specified as the parameter.

If the *BufferLength* parameter is zero, *Buffer* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler can be null.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

**MQRC_INCOMPLETE_GROUP**
(2241, X'8C1') Message group not complete.

**MQRC_INCOMPLETE_MSG**
(2242, X'8C2') Logical message not complete.

**MQRC_PRIORITY_EXCEEDS_MAXIMUM**
(2049, X'801') Message Priority exceeds maximum value supported.

**MQRC_UNKNOWN_REPORT_OPTION**
(2104, X'838') Report options in message descriptor not recognized.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ALIAS_BASE_Q_TYPE_ERROR**
(2001, X'7D1') Alias base queue not a valid type.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BACKED_OUT**
(2003, X'7D3') Unit of work backed out.

**MQRC_BUFFER_ERROR**
(2004, X'7D4') Buffer parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') coupling facility not available.

**MQRC_CF_STRUC_AUTH_FAILED**
(2348, X'92C') Coupling-facility structure authorization check failed.

**MQRC_CF_STRUC_ERROR**
(2349, X'92D') Coupling-facility structure not valid.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CF_STRUC_LIST_HDR_IN_USE**
(2347, X'92B') Coupling-facility structure list-header in use.

**MQRC_CFGR_ERROR**
(2416, X'970') PCF group parameter structure MQCFGR in the message data is not valid.

**MQRC_CFH_ERROR**
(2235, X'8BB') PCF header structure not valid.

**MQRC_CFIF_ERROR**
(2414, X'96E') PCF integer filter parameter structure in the message data is not valid.

**MQRC_CFIL_ERROR**
(2236, X'8BC') PCF integer list parameter structure or PCIF*64 integer list parameter structure not valid.

**MQRC_CFIN_ERROR**
(2237, X'8BD') PCF integer parameter structure or PCIF*64 integer parameter structure not valid.

**MQRC_CFSF_ERROR**
(2415, X'96F') PCF string filter parameter structure in the message data is not valid.

**MQRC_CFSL_ERROR**
(2238, X'8BE') PCF string list parameter structure not valid.

**MQRC_CFST_ERROR**
(2239, X'8BF') PCF string parameter structure not valid.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CLUSTER_EXIT_ERROR**
(2266, X'8DA') Cluster workload exit failed.

**MQRC_CLUSTER_RESOLUTION_ERROR**
(2189, X'88D') Cluster name resolution failed.

**MQRC_CLUSTER_RESOURCE_ERROR**
(2269, X'8DD') Cluster resource error.

**MQRC_COD_NOT_VALID_FOR_XCF_Q**
(2106, X'83A') COD report option not valid for XCF queue.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_QUIESCING**
(2202, X'89A') Connection quiescing.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_CONTENT_ERROR**
2554 (X'09FA') Message content could not be parsed to determine whether the message can be delivered to a subscriber with an extended message selector.

**MQRC_CONTEXT_HANDLE_ERROR**
(2097, X'831') Queue handle referred to does not save context.

**MQRC_CONTEXT_NOT_AVAILABLE**
(2098, X'832') Context not available for queue handle referred to.

**MQRC_DATA_LENGTH_ERROR**
(2010, X'7DA') Data length parameter not valid.

**MQRC_DB2_NOT_AVAILABLE**
(2342, X'926') Db2 subsystem not available.

**MQRC_DEF_XMIT_Q_TYPE_ERROR**
(2198, X'896') Default transmission queue not local.

**MQRC_DEF_XMIT_Q_USAGE_ERROR**
(2199, X'897') Default transmission queue usage error.

**MQRC_DH_ERROR**
(2135, X'857') Distribution header structure not valid.

**MQRC_DLH_ERROR**
(2141, X'85D') Dead letter header structure not valid.

**MQRC_EPH_ERROR**
(2420, X'974') Embedded PCF structure not valid.

**MQRC_EXPIRY_ERROR**
(2013, X'7DD') Expiry time not valid.

**MQRC_FEEDBACK_ERROR**
(2014, X'7DE') Feedback code not valid.

**MQRC_GLOBAL_UOW_CONFLICT**
(2351, X'92F') Global units of work conflict.

**MQRC_GROUP_ID_ERROR**
(2258, X'8D2') Group identifier not valid.

**MQRC_HANDLE_IN_USE_FOR_UOW**
(2353, X'931') Handle in use for global unit of work.

**MQRC_HANDLE_NOT_AVAILABLE**
(2017, X'7E1') No more handles available.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HEADER_ERROR**
(2142, X'85E') IBM MQ header structure not valid.

**MQRC_IIH_ERROR**
(2148, X'864') IMS information header structure not valid.

**MQRC_LOCAL_UOW_CONFLICT**
(2352, X'930') Global unit of work conflicts with local unit of work.

**MQRC_MD_ERROR**
(2026, X'7EA') Message descriptor not valid.

**MQRC_MDE_ERROR**
(2248, X'8C8') Message descriptor extension not valid.

**MQRC_MISSING_REPLY_TO_Q**
(2027, X'7EB') Missing reply-to queue.

**MQRC_MISSING_WIH**
(2332, X'91C') Message data does not begin with MQWIH.

**MQRC_MSG_FLAGS_ERROR**
(2249, X'8C9') Message flags not valid.

**MQRC_MSG_SEQ_NUMBER_ERROR**
(2250, X'8CA') Message sequence number not valid.

**MQRC_MSG_TOO_BIG_FOR_Q**
(2030, X'7EE') Message length greater than maximum for queue.

**MQRC_MSG_TOO_BIG_FOR_Q_MGR**
(2031, X'7EF') Message length greater than maximum for queue manager.

**MQRC_MSG_TYPE_ERROR**
(2029, X'7ED') Message type in message descriptor not valid.

**MQRC_MULTIPLE_REASONS**
(2136, X'858') Multiple reason codes returned.

**MQRC_NO_DESTINATIONS_AVAILABLE**
(2270, X'8DE') No destination queues available.

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_OBJECT_IN_USE**
(2042, X'7FA') Object already open with conflicting options.

**MQRC_OBJECT_LEVEL_INCOMPATIBLE**
(2360, X'938') Object level not compatible.

**MQRC_OBJECT_NAME_ERROR**
(2152, X'868') Object name not valid.

**MQRC_OBJECT_NOT_UNIQUE**
(2343, X'927') Object not unique.

**MQRC_OBJECT_Q_MGR_NAME_ERROR**
(2153, X'869') Object queue-manager name not valid.

**MQRC_OBJECT_RECORDS_ERROR**
(2155, X'86B') Object records not valid.

**MQRC_OBJECT_TYPE_ERROR**
(2043, X'7FB') Object type not valid.

**MQRC_OD_ERROR**
(2044, X'7FC') Object descriptor structure not valid.

**MQRC_OFFSET_ERROR**
(2251, X'8CB') Message segment offset not valid.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_ORIGINAL_LENGTH_ERROR**
(2252, X'8CC') Original length not valid.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_PAGESET_FULL**
(2192, X'890') External storage medium is full.

**MQRC_PCF_ERROR**
(2149, X'865') PCF structures not valid.

**MQRC_PERSISTENCE_ERROR**
(2047, X'7FF') Persistence not valid.

**MQRC_PERSISTENT_NOT_ALLOWED**
(2048, X'800') Queue does not support persistent messages.

**MQRC_PMO_ERROR**
(2173, X'87D') Put-message options structure not valid.

**MQRC_PMO_RECORD_FLAGS_ERROR**
(2158, X'86E') Put message record flags not valid.

**MQRC_PRIORITY_ERROR**
(2050, X'802') Message priority not valid.

**MQRC_PUBLICATION_FAILURE**
(2502, X'9C6') The publication has not been delivered to any of the subscribers.

**MQRC_PUT_INHIBITED**
(2051, X'803') Put calls inhibited for the queue.

**MQRC_PUT_MSG_RECORDS_ERROR**
(2159, X'86F') Put message records not valid.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_FULL**
(2053, X'805') Queue already contains maximum number of messages.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_QUIESCING**
(2161, X'871') Queue manager quiescing.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_Q_SPACE_NOT_AVAILABLE**
(2056, X'808') No space available on disk for queue.

**MQRC_Q_TYPE_ERROR**
(2057, X'809') Queue type not valid.

**MQRC_RECS_PRESENT_ERROR**
(2154, X'86A') Number of records present not valid.

**MQRC_REMOTE_Q_NAME_ERROR**
(2184, X'888') Remote queue name not valid.

**MQRC_REPORT_OPTIONS_ERROR**
(2061, X'80D') Report options in message descriptor not valid.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_RESPONSE_RECORDS_ERROR**
(2156, X'86C') Response records not valid.

**MQRC_RFH_ERROR**
(2334, X'91E') MQRFH or MQRFH2 structure not valid.

**MQRC_RMH_ERROR**
(2220, X'8AC') Reference message header structure not valid.

**MQRC_SECURITY_ERROR**
(2063, X'80F') Security error occurred.

**MQRC_SEGMENT_LENGTH_ZERO**
(2253, X'8CD') Length of data in message segment is zero.

**MQRC_SELECTION_NOT_AVAILABLE**
2551 (X'09F7') A possible subscriber for the publication exists, but the queue manager cannot check whether to send the publication to the subscriber.

**MQRC_STOPPED_BY_CLUSTER_EXIT**
(2188, X'88C') Call rejected by cluster workload exit.

**MQRC_STORAGE_CLASS_ERROR**
(2105, X'839') Storage class error.

**MQRC_STORAGE_MEDIUM_FULL**
(2192, X'890') External storage medium is full.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_SYNCPOINT_LIMIT_REACHED**
(2024, X'7E8') No more messages can be handled within current unit of work.

**MQRC_SYNCPOINT_NOT_AVAILABLE**
(2072, X'818') Syncpoint support not available.

**MQRC_TM_ERROR**
(2265, X'8D9') Trigger message structure not valid.

**MQRC_TMC_ERROR**
(2191, X'88F') Character trigger message structure not valid.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

**MQRC_UNKNOWN_ALIAS_BASE_Q**
(2082, X'822') Unknown alias base queue.

**MQRC_UNKNOWN_DEF_XMIT_Q**
(2197, X'895') Unknown default transmission queue.

**MQRC_UNKNOWN_OBJECT_NAME**
(2085, X'825') Unknown object name.

**MQRC_UNKNOWN_OBJECT_Q_MGR**
(2086, X'826') Unknown object queue manager.

**MQRC_UNKNOWN_REMOTE_Q_MGR**
(2087, X'827') Unknown remote queue manager.

**MQRC_UNKNOWN_XMIT_Q**
(2196, X'894') Unknown transmission queue.

**MQRC_UOW_ENLISTMENT_ERROR**
(2354, X'932') Enlistment in global unit of work failed.

**MQRC_UOW_MIX_NOT_SUPPORTED**
(2355, X'933') Mixture of unit-of-work calls not supported.

**MQRC_UOW_NOT_AVAILABLE**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**MQRC_WIH_ERROR**
(2333, X'91D') MQWIH structure not valid.

**MQRC_WRONG_CF_LEVEL**
(2366, X'93E') Coupling-facility structure is wrong level.

**MQRC_WRONG_MD_VERSION**
(2257, X'8D1') Wrong version of MQMD supplied.

**MQRC_XMIT_Q_TYPE_ERROR**
(2091, X'82B') Transmission queue not local.

**MQRC_XMIT_Q_USAGE_ERROR**
(2092, X'82C') Transmission queue with wrong usage.

**MQRC_XQH_ERROR**
(2260, X'8D4') Transmission queue header structure not valid.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. Both the MQPUT and MQPUT1 calls can be used to put messages on a queue; which call to use depends on the circumstances:

   - Use the MQPUT call to place multiple messages on the *same* queue.

     An MQOPEN call specifying the MQOO_OUTPUT option is issued first, followed by one or more MQPUT requests to add messages to the queue; finally the queue is closed with an MQCLOSE call. This gives better performance than repeated use of the MQPUT1 call.

   - Use the MQPUT1 call to put only *one* message on a queue.

This call encapsulates the MQOPEN, MQPUT, and MQCLOSE calls into a single call, minimizing the number of calls that must be issued.

2. If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if certain conditions are satisfied. However, in most environments the MQPUT1 call does not satisfy these conditions, and so does not preserve message order. The MQPUT call must be used instead in these environments. See MQPUT usage notes for details.
3. The MQPUT1 call can be used to put messages to distribution lists. For general information about this, see the usage notes for the MQOPEN and MQPUT calls.

   Distribution lists are supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

   The following differences apply when using the MQPUT1 call:

   a. If the application provides MQRR response records, they must be provided using the MQOD structure; they cannot be provided using the MQPMO structure.
   b. The reason code MQRC_OPEN_FAILED is never returned by MQPUT1 in the response records; if a queue fails to open, the response record for that queue contains the reason code resulting from the open operation.

      If an open operation for a queue succeeds with a completion code of MQCC_WARNING, the completion code and reason code in the response record for that queue are replaced by the completion and reason codes resulting from the put operation.

      As with the MQOPEN and MQPUT calls, the queue manager sets the response records (if provided) only when the outcome of the call is not the same for all queues in the distribution list; this is indicated by the call completing with reason code MQRC_MULTIPLE_REASONS.
4. If the MQPUT1 call is used to put a message on a cluster queue, the call behaves as though MQOO_BIND_NOT_FIXED had been specified on the MQOPEN call.
5. If a message is put with one or more IBM MQ header structures at the beginning of the application message data, the queue manager performs certain checks on the header structures to verify that they are valid. For more information about this, see the usage notes for the MQPUT call.
6. If more than one of the warning situations arise (see the *CompCode* parameter), the reason code returned is the *first* one in the following list that applies:

   a. MQRC_MULTIPLE_REASONS
   b. MQRC_INCOMPLETE_MSG
   c. MQRC_INCOMPLETE_GROUP
   d. MQRC_PRIORITY_EXCEEDS_MAXIMUM or MQRC_UNKNOWN_REPORT_OPTION
7. For the Visual Basic programming language, the following points apply:

   - If the size of the *Buffer* parameter is less than the length specified by the *BufferLength* parameter, the call fails with reason code MQRC_BUFFER_LENGTH_ERROR.
   - The *Buffer* parameter is declared as being of type `String`. If the data to be placed on the queue is not of type `String`, use the MQPUT1Any call in place of MQPUT1.

     The MQPUT1Any call has the same parameters as the MQPUT1 call, except that the *Buffer* parameter is declared as being of type `Any`, allowing any type of data to be placed on the queue. However, this means that *Buffer* cannot be checked to ensure that it is at least *BufferLength* bytes in size.
8. When an MQPUT1 call is issued with MQPMO_SYNCPOINT, the default behavior changes, so that the put operation is completed asynchronously. This might cause a change in the behavior of some applications that rely on certain fields in the MQOD and MQMD structures being returned, but which now contain undefined values. An application can specify MQPMO_SYNC_RESPONSE to ensure that the put operation is performed synchronously and that all the appropriate field values are completed.

## C invocation

```
MQPUT1 (Hconn, &ObjDesc, &MsgDesc, &PutMsgOpts,
       BufferLength, Buffer, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQOD     ObjDesc;       /* Object descriptor */
MQMD     MsgDesc;       /* Message descriptor */
MQPMO    PutMsgOpts;    /* Options that control the action of MQPUT1 */
MQLONG   BufferLength;  /* Length of the message in Buffer */
MQBYTE   Buffer[n];     /* Message data */
MQLONG   CompCode;      /* Completion code */
MQLONG   Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
     CALL 'MQPUT1' USING HCONN, OBJDESC, MSGDESC, PUTMSGOPTS,
                         BUFFERLENGTH, BUFFER, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Object descriptor
 01  OBJDESC.
     COPY CMQODV.
**   Message descriptor
 01  MSGDESC.
     COPY CMQMDV.
**   Options that control the action of MQPUT1
 01  PUTMSGOPTS.
     COPY CMQPMOV.
**   Length of the message in BUFFER
 01  BUFFERLENGTH  PIC S9(9) BINARY.
**   Message data
 01  BUFFER        PIC X(n).
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQPUT1 (Hconn, ObjDesc, MsgDesc, PutMsgOpts, BufferLength, Buffer,
            CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn         fixed bin(31);  /* Connection handle */
dcl ObjDesc       like MQOD;      /* Object descriptor */
dcl MsgDesc       like MQMD;      /* Message descriptor */
dcl PutMsgOpts    like MQPMO;     /* Options that control the action of
                                     MQPUT1 */
dcl BufferLength  fixed bin(31);  /* Length of the message in Buffer */
dcl Buffer        char(n);        /* Message data */
dcl CompCode      fixed bin(31);  /* Completion code */
dcl Reason        fixed bin(31);  /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
        CALL MQPUT1,(HCONN,OBJDESC,MSGDESC,PUTMSGOPTS,BUFFERLENGTH,   X
              BUFFER,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN         DS       F      Connection handle
OBJDESC       CMQODA   ,      Object descriptor
MSGDESC       CMQMDA   ,      Message descriptor
PUTMSGOPTS    CMQPMOA  ,      Options that control the action of MQPUT1
BUFFERLENGTH  DS       F      Length of the message in BUFFER
BUFFER        DS       CL(n)  Message data
COMPCODE      DS       F      Completion code
REASON        DS       F      Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQPUT1 Hconn, ObjDesc, MsgDesc, PutMsgOpts, BufferLength, Buffer,
       CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn        As Long   'Connection handle'
Dim ObjDesc      As MQOD   'Object descriptor'
Dim MsgDesc      As MQMD   'Message descriptor'
Dim PutMsgOpts   As MQPMO  'Options that control the action of MQPUT1'
Dim BufferLength As Long   'Length of the message in Buffer'
Dim Buffer       As String 'Message data'
Dim CompCode     As Long   'Completion code'
Dim Reason       As Long   'Reason code qualifying CompCode'
```

## MQSET - Set object attributes

Use the MQSET call to change the attributes of an object represented by a handle. The object must be a queue.

### Syntax

MQSET (*Hconn*, *Hobj*, *SelectorCount*, *Selectors*, *IntAttrCount*, *IntAttrs*, *CharAttrLength*, *CharAttrs*, *Compcode*, *Reason*)

### Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Hobj***
Type: MQHOBJ - input

This handle represents the queue object with attributes that are to be set. The handle was returned by a previous MQOPEN call that specified the MQOO_SET option.

***SelectorCount***

Type: MQLONG - input

This is the count of selectors that are supplied in the *Selectors* array. It is the number of attributes that are to be set. Zero is a valid value. The maximum number allowed is 256.

***Selectors***

Type: MQLONGxSelectorCount - input

This is an array of *SelectorCount* attribute selectors; each selector identifies an attribute (integer or character) with a value that is to be set.

Each selector must be valid for the type of queue that *Hobj* represents. Only certain MQIA_* and MQCA_* values are allowed; as listed later.

Selectors can be specified in any order. Attribute values that correspond to integer attribute selectors (MQIA_* selectors) must be specified in *IntAttrs* in the same order in which these selectors occur in *Selectors*. Attribute values that correspond to character attribute selectors (MQCA_* selectors) must be specified in *CharAttrs* in the same order in which those selectors occur. MQIA_* selectors can be interleaved with the MQCA_* selectors; only the relative order within each type is important.

You can specify the same selector more than once; if you do, the last value specified for a particular selector is the one that takes effect.

**Note:**

1. The integer and character attribute selectors are allocated within two different ranges; the MQIA_* selectors reside within the range MQIA_FIRST through MQIA_LAST, and the MQCA_* selectors within the range MQCA_FIRST through MQCA_LAST.

   For each range, the constants MQIA_LAST_USED and MQCA_LAST_USED define the highest value that the queue manager accepts.
2. If all the MQIA_* selectors occur first, the same element numbers can be used to address corresponding elements in the *Selectors* and *IntAttrs* arrays.
3. If the *SelectorCount* parameter is zero, *Selectors* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler might be null.

The attributes that can be set are listed in the following table. No other attributes can be set using this call. For the MQCA_* attribute selectors, the constant that defines the length in bytes of the string that is required in *CharAttrs* is supplied in parentheses.

*Table 559. MQSET attribute selectors for queues*

| Selector | Description | Note |
|---|---|---|
| MQCA_TRIGGER_DATA | Trigger data (MQ_TRIGGER_DATA_LENGTH). | |
| MQIA_DIST_LISTS | Distribution list support. | 1 |
| MQIA_INHIBIT_GET | Whether get operations are allowed. | |
| MQIA_INHIBIT_PUT | Whether put operations are allowed. | |
| MQIA_TRIGGER_CONTROL | Trigger control. | |
| MQIA_TRIGGER_DEPTH | Trigger depth. | |
| MQIA_TRIGGER_MSG_PRIORITY | Threshold message priority for triggers. | |
| MQIA_TRIGGER_TYPE | Trigger type. | |

**Note:**

1. Supported only on AIX, HP-UX, IBM i, Solaris, Linux, Windows, plus IBM MQ MQI clients connected to these systems.

***IntAttrCount***
Type: MQLONG - input

This is the number of elements in the *IntAttrs* array, and must be at least the number of MQIA_* selectors in the *Selectors* parameter. Zero is a valid value if there are none.

***IntAttrs***
Type: MQLONGxIntAttrCount - input

This is an array of *IntAttrCount* integer attribute values. These attribute values must be in the same order as the MQIA_* selectors in the *Selectors* array.

If the *IntAttrCount* or *SelectorCount* parameter is zero, *IntAttrs* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler might be null.

***CharAttrLength***
Type: MQLONG - input

This is the length in bytes of the *CharAttrs* parameter, and must be at least the sum of the lengths of the character attributes specified in the *Selectors* array. Zero is a valid value if there are no MQCA_* selectors in *Selectors*.

***CharAttrs***
Type: MQCHARxCharAttrLength - input

This is the buffer containing the character attribute values, concatenated together. The length of the buffer is given by the *CharAttrLength* parameter.

The characters attributes must be specified in the same order as the MQCA_* selectors in the *Selectors* array. The length of each character attribute is fixed (see Selectors ). If the value to be set for an attribute contains fewer nonblank characters than the defined length of the attribute, pad the value in *CharAttrs* to the right with blanks to make the attribute value match the defined length of the attribute.

If the *CharAttrLength* or *SelectorCount* parameter is zero, *CharAttrs* is not referred to; in this case, the parameter address passed by programs written in C or System/390 assembler might be null.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed.

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CF_NOT_AVAILABLE**
(2345, X'929') Coupling facility not available.

**MQRC_CF_STRUC_FAILED**
(2373, X'945') Coupling-facility structure failed.

**MQRC_CF_STRUC_IN_USE**
(2346, X'92A') Coupling-facility structure in use.

**MQRC_CF_STRUC_LIST_HDR_IN_USE**
(2347, X'92B') Coupling-facility structure list-header in use.

**MQRC_CHAR_ATTR_LENGTH_ERROR**
(2006, X'7D6') Length of character attributes not valid.

**MQRC_CHAR_ATTRS_ERROR**
(2007, X'7D7') Character attributes string not valid.

**MQRC_CICS_WAIT_FAILED**
(2140, X'85C') Wait request rejected by CICS.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_NOT_AUTHORIZED**
(2217, X'8A9') Not authorized for connection.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_DB2_NOT_AVAILABLE**
(2342, X'926') Db2 subsystem not available.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_HOBJ_ERROR**
(2019, X'7E3') Object handle not valid.

**MQRC_INHIBIT_VALUE_ERROR**
(2020, X'7E4') Value for inhibit-get or inhibit-put queue attribute not valid.

**MQRC_INT_ATTR_COUNT_ERROR**
(2021, X'7E5') Count of integer attributes not valid.

**MQRC_INT_ATTRS_ARRAY_ERROR**
(2023, X'7E7') Integer attributes array not valid.

**MQRC_NOT_OPEN_FOR_SET**
(2040, X'7F8') Queue not open for set.

**MQRC_OBJECT_CHANGED**
(2041, X'7F9') Object definition changed since opened.

**MQRC_OBJECT_DAMAGED**
(2101, X'835') Object damaged.

**MQRC_PAGESET_ERROR**
(2193, X'891') Error accessing page-set data set.

**MQRC_Q_DELETED**
(2052, X'804') Queue has been deleted.

**MQRC_Q_MGR_NAME_ERROR**
(2058, X'80A') Queue manager name not valid or not known.

**MQRC_Q_MGR_NOT_AVAILABLE**
(2059, X'80B') Queue manager not available for connection.

**MQRC_Q_MGR_STOPPING**
(2162, X'872') Queue manager shutting down.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SELECTOR_COUNT_ERROR**
(2065, X'811') Count of selectors not valid.

**MQRC_SELECTOR_ERROR**
(2067, X'813') Attribute selector not valid.

**MQRC_SELECTOR_LIMIT_EXCEEDED**
(2066, X'812') Count of selectors too large.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_SUPPRESSED_BY_EXIT**
(2109, X'83D') Call suppressed by exit program.

**MQRC_TRIGGER_CONTROL_ERROR**
(2075, X'81B') Value for trigger-control attribute not valid.

**MQRC_TRIGGER_DEPTH_ERROR**
(2076, X'81C') Value for trigger-depth attribute not valid.

**MQRC_TRIGGER_MSG_PRIORITY_ERR**
(2077, X'81D') Value for trigger-message-priority attribute not valid.

**MQRC_TRIGGER_TYPE_ERROR**
(2078, X'81E') Value for trigger-type attribute not valid.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. Using this call, the application can specify an array of integer attributes, or a collection of character attribute strings, or both. If no errors occur, the attributes specified are all set simultaneously. If an error occurs (for example, if a selector is not valid, or an attempt is made to set an attribute to a value that is not valid), the call fails and no attributes are set.
2. The values of attributes can be determined using the MQINQ call; see "MQINQ - Inquire object attributes" on page 685 for details.

   **Note:** Not all attributes with values that can be inquired using the MQINQ call can have their values changed using the MQSET call. For example, no process-object or queue-manager attributes can be set with this call.
3. Attribute changes are preserved across restarts of the queue manager (other than alterations to temporary dynamic queues, which do not survive restarts of the queue manager).
4. You cannot change the attributes of a model queue using the MQSET call. However, if you open a model queue using the MQOPEN call with the MQOO_SET option, you can use the MQSET call to set the attributes of the dynamic local queue that is created by the MQOPEN call.
5. If the object being set is a cluster queue, there must be a local instance of the cluster queue for the open to succeed.

For more information about object attributes, see:

- "Attributes for queues" on page 810

- “Attributes for namelists” on page 841
- “Attributes for process definitions” on page 843
- “Attributes for the queue manager” on page 777

## C invocation

```
MQSET (Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs,
      CharAttrLength, CharAttrs, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;           /* Connection handle */
MQHOBJ   Hobj;            /* Object handle */
MQLONG   SelectorCount;   /* Count of selectors */
MQLONG   Selectors[n];    /* Array of attribute selectors */
MQLONG   IntAttrCount;    /* Count of integer attributes */
MQLONG   IntAttrs[n];     /* Array of integer attributes */
MQLONG   CharAttrLength;  /* Length of character attributes buffer */
MQCHAR   CharAttrs[n];    /* Character attributes */
MQLONG   CompCode;        /* Completion code */
MQLONG   Reason;          /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQSET' USING HCONN, HOBJ, SELECTORCOUNT, SELECTORS-TABLE,
                   INTATTRCOUNT, INTATTRS-TABLE, CHARATTRLENGTH,
                   CHARATTRS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN            PIC S9(9) BINARY.
**   Object handle
 01  HOBJ             PIC S9(9) BINARY.
**   Count of selectors
 01  SELECTORCOUNT    PIC S9(9) BINARY.
**   Array of attribute selectors
 01  SELECTORS-TABLE.
  02  SELECTORS        PIC S9(9) BINARY OCCURS n TIMES.
**   Count of integer attributes
 01  INTATTRCOUNT     PIC S9(9) BINARY.
**   Array of integer attributes
 01  INTATTRS-TABLE.
  02  INTATTRS         PIC S9(9) BINARY OCCURS n TIMES.
**   Length of character attributes buffer
 01  CHARATTRLENGTH   PIC S9(9) BINARY.
**   Character attributes
 01  CHARATTRS        PIC X(n).
**   Completion code
 01  COMPCODE         PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON           PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQSET (Hconn, Hobj, SelectorCount, Selectors, IntAttrCount,
           IntAttrs, CharAttrLength, CharAttrs, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn           fixed bin(31);  /* Connection handle */
dcl Hobj            fixed bin(31);  /* Object handle */
dcl SelectorCount   fixed bin(31);  /* Count of selectors */
```

```
dcl Selectors(n)    fixed bin(31);  /* Array of attribute selectors */
dcl IntAttrCount    fixed bin(31);  /* Count of integer attributes */
dcl IntAttrs(n)     fixed bin(31);  /* Array of integer attributes */
dcl CharAttrLength  fixed bin(31);  /* Length of character attributes
                                       buffer */
dcl CharAttrs       char(n);        /* Character attributes */
dcl CompCode        fixed bin(31);  /* Completion code */
dcl Reason          fixed bin(31);  /* Reason code qualifying
                                       CompCode */
```

### High Level Assembler invocation

```
CALL MQSET,(HCONN,HOBJ,SELECTORCOUNT,SELECTORS,INTATTRCOUNT,  X
             INTATTRS,CHARATTRLENGTH,CHARATTRS,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN           DS  F      Connection handle
HOBJ            DS  F      Object handle
SELECTORCOUNT   DS  F      Count of selectors
SELECTORS       DS  (n)F   Array of attribute selectors
INTATTRCOUNT    DS  F      Count of integer attributes
INTATTRS        DS  (n)F   Array of integer attributes
CHARATTRLENGTH  DS  F      Length of character attributes buffer
CHARATTRS       DS  CL(n)  Character attributes
COMPCODE        DS  F      Completion code
REASON          DS  F      Reason code qualifying COMPCODE
```

### Visual Basic invocation

```
MQSET Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs,
      CharAttrLength, CharAttrs, CompCode, Reason
```

Declare the parameters as follows:

```
Dim Hconn          As Long   'Connection handle'
Dim Hobj           As Long   'Object handle'
Dim SelectorCount  As Long   'Count of selectors'
Dim Selectors      As Long   'Array of attribute selectors'
Dim IntAttrCount   As Long   'Count of integer attributes'
Dim IntAttrs       As Long   'Array of integer attributes'
Dim CharAttrLength As Long   'Length of character attributes buffer'
Dim CharAttrs      As String 'Character attributes'
Dim CompCode       As Long   'Completion code'
Dim Reason         As Long   'Reason code qualifying CompCode'
```

## MQSETMP - Set message property

Use the MQSETMP call to set or modify a property of a message handle.

### Syntax

MQSETMP (*Hconn*, *Hmsg*, *SetPropOpts*, *Name*, *PropDesc*, *Type*, *ValueLength*, *Value*, *Compcode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager.

The value must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter. If the message handle was created using MQHC_UNASSOCIATED_HCONN,

a valid connection must be established on the thread setting a property of the message handle, otherwise the call fails with reason code MQRC_CONNECTION_BROKEN.

***Hmsg***
Type: MQHMSG - input

This is the message handle to be modified. The value was returned by a previous MQCRTMH call.

***SetPropOpts***
Type: MQSMPO - input

Control how message properties are set.

This structure allows applications to specify options that control how message properties are set. The structure is an input parameter on the MQSETMP call. See MQSMPO for further information.

***Name***
Type: MQCHARV- input

This is the name of the property to set.

See Property names and Property name restrictions for further information about the use of property names.

***PropDesc***
Type: MQPD - input/output

This structure is used to define the attributes of a property, including:

- what happens if the property is not supported
- what message context the property belongs to
- what messages the property is copied into as it flows

See MQPD for further information about this structure.

***Type***
Type: MQLONG - input

The data type of the property being set. It can be one of the following:

**MQTYPE_BOOLEAN**
A Boolean. *ValueLength* must be 4.

**MQTYPE_BYTE_STRING**
A byte string. *ValueLength* must be zero or greater.

**MQTYPE_INT8**
An 8-bit signed integer. *ValueLength* must be 1.

**MQTYPE_INT16**
A 16-bit signed integer. *ValueLength* must be 2.

**MQTYPE_INT32**
A 32-bit signed integer. *ValueLength* must be 4.

**MQTYPE_INT64**
A 64-bit signed integer. *ValueLength* must be 8.

**MQTYPE_FLOAT32**
A 32-bit floating-point number. *ValueLength* must be 4.

Note: this type is not supported with applications using IBM COBOL for z/OS.

**MQTYPE_FLOAT64**
A 64-bit floating-point number. *ValueLength* must be 8.

Note: this type is not supported with applications using IBM COBOL for z/OS.

**MQTYPE_STRING**
A character string. *ValueLength* must be zero or greater, or the special value MQVL_NULL_TERMINATED.

**MQTYPE_NULL**
The property exists but has a null value. *ValueLength* must be zero.

***ValueLength***
Type: MQLONG - input

The length in bytes of the property value in the *Value* parameter. Zero is valid only for null values or for strings or byte strings. Zero indicates that the property exists but that the value contains no characters or bytes.

The value must be greater than or equal to zero or the following special value if the *Type* parameter has MQTYPE_STRING set:

**MQVL_NULL_TERMINATED**
The value is delimited by the first null encountered in the string. The null is not included as part of the string. This value is invalid if MQTYPE_STRING is not also set.

Note: The null character used to terminate a string if MQVL_NULL_TERMINATED is set is a null from the character set of the Value.

***Value***
Type: MQBYTExValueLength - input

The value of the property to be set. The buffer must be aligned on a boundary appropriate to the nature of the data in the value.

In the C programming language, the parameter is declared as a pointer-to-void; the address of any type of data can be specified as the parameter.

If *ValueLength* is zero, *Value* is not referred to. In this case, the parameter address passed by programs written in C or System/390 assembler can be null.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_RFH_FORMAT_ERROR**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CompCode* is MQCC_FAILED:

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'089C') Adapter not available.

**MQRC_ADAPTER_SERV_LOAD_ERROR**
(2130, X'852') Unable to load adapter service module.

**MQRC_ASID_MISMATCH**
(2157, X'86D') Primary and home ASIDs differ.

**MQRC_BUFFER_ERROR**
(2004, X'07D4') Value parameter not valid.

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'07D5') Value length parameter not valid.

**MQRC_CALL_IN_PROGRESS**
(2219, X'08AB') MQI call entered before previous call completed.

**MQRC_HMSG_ERROR**
(2460, X'099C') Message handle pointer not valid.

**MQRC_MSG_HANDLE_IN_USE**
(2499, X'09C3') Message handle already in use.

**MQRC_OPTIONS_ERROR**
(2046, X'07FE') Options not valid or not consistent.

**MQRC_PD_ERROR**
(2482, X'09B2') Property descriptor structure not valid.

**MQRC_PROPERTY_NAME_ERROR**
(2442, X'098A') Invalid property name.

**MQRC_PROPERTY_TYPE_ERROR**
(2473, X'09A9') Invalid property data type.

**MQRC_PROP_NUMBER_FORMAT_ERROR**
(2472, X'09A8') Number format error encountered in value data.

**MQRC_SMPO_ERROR**
(2463, X'099F') Set message property options structure not valid.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'083F') Property name coded character set identifier not valid.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C invocation

```
MQSETMP (Hconn, Hmsg, &SetPropOpts, &Name, &PropDesc, Type,
ValueLength, &Value, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;       /* Connection handle */
MQHMSG   Hmsg;        /* Message handle */
MQSMPO   SetPropOpts; /* Options that control the action of MQSETMP */
MQCHARV  Name;        /* Property name */
MQPD     PropDesc;    /* Property descriptor */
MQLONG   Type;        /* Property data type */
MQLONG   ValueLength; /* Length of property value in Value */
MQBYTE   Value[n];    /* Property value */
MQLONG   CompCode;    /* Completion code */
MQLONG   Reason;      /* Reason code qualifying CompCode */
```

## COBOL invocation

```
     CALL 'MQSETMP' USING HCONN, HMSG, SETMSGOPTS, NAME, PROPDESC, TYPE,
                          VALUELENGTH, VALUE, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Message handle
 01  HMSG    PIC S9(18) BINARY.
**   Options that control the action of MQSETMP
 01  SETMSGOPTS.
     COPY CMQSMPOV.
**   Property name
 01  NAME
    COPY CMQCHRVV.
**   Property descriptor
 01  PROPDESC.
     COPY CMQPDV.
**   Property data type
 01  TYPE          PIC S9(9) BINARY.
**   Length of property value in VALUE
 01  VALUELENGTH   PIC S9(9) BINARY.
**   Property value
 01  VALUE         PIC X(n).
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

## PL/I invocation

```
call MQSETMP (Hconn, Hmsg, SetPropOpts, Name, PropDesc, Type, ValueLength,
              Value, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31);  /* Connection handle */
dcl Hmsg        fixed bin(63);  /* Message handle */
dcl SetPropOpts like MQSMPO;    /* Options that control the action of MQSETMP */
dcl Name        like MQCHARV;   /* Property name */
dcl PropDesc    like MQPD;      /* Property descriptor */
dcl Type        fixed bin(31);  /* Property data type */
dcl ValueLength fixed bin(31);  /* Length of property value in Value */
dcl Value       char(n);        /* Property value */
dcl CompCode    fixed bin(31);  /* Completion code */
dcl Reason      fixed bin(31);  /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
        CALL MQSETMP,(HCONN,HMSG,SETMSGHOPTS,NAME,PROPDESC,TYPE,VALUELENGTH,
               VALUE,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN        DS         F     Connection handle
HMSG         DS         D     Message handle
SETMSGOPTS   CMQSMPOA   ,     Options that control the action of MQSETMP
NAME         CMQCHRVA   ,     Property name
PROPDESC     CMQPDA     ,     Property descriptor
TYPE         DS         F     Property data type
VALUELENGTH  DS         F     Length of property value in VALUE
VALUE        DS         CL(n) Property value
COMPCODE     DS         F     Completion code
REASON       DS         F     Reason code qualifying COMPCODE
```

## MQSTAT - Retrieve status information

Use the MQSTAT call to retrieve status information. The type of status information returned is determined by the Type value specified on the call.

### Syntax

MQSTAT (*Hconn*, *Type*, *Stat*, *Compcode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Type***

Type: MQLONG - input

Type of status information being requested. The > valid values are:

**MQSTAT_TYPE_ASYNC_ERROR**
Return information about previous asynchronous put operations.

**MQSTAT_TYPE_RECONNECTION**

Return information about reconnection. If the connection is reconnecting or failed to reconnect, the information describes the failure which caused the connection to begin reconnecting.

This value is only valid for client connections. For other types of connection, the call fails with reason code **MQRC_ENVIRONMENT_ERROR**

**MQSTAT_TYPE_RECONNECTION_ERROR**

Return information about a previous failure related to reconnect. If the connection failed to reconnect, the information describes the failure which caused reconnection to fail.

This value is only valid for client connections. For other types of connection, the call fails with reason code **MQRC_ENVIRONMENT_ERROR**.

***Stat***

Type: MQSTS - input/output

Status information structure. See “MQSTS - Status reporting structure” on page 570 for details.

***CompCode***

Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_API_EXIT_ERROR**
(2374, X'946') API exit failed

**MQRC_API_EXIT_LOAD_ERROR**
(2183, X'887') Unable to load API exit.

**MQRC_CALL_IN_PROGRESS**
(2219, X'8AB') MQI call entered before previous call complete.

**MQRC_CONNECTION_BROKEN**
(2009, X'7D9') Connection to queue manager lost.

**MQRC_CONNECTION_STOPPING**
(2203, X'89B') Connection shutting down.

**MQRC_FUNCTION_NOT_SUPPORTED**
(2298, X'8FA') The function requested is not available in the current environment.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_Q_MGR_STOPPING**
(2162,X'872' - Queue manager stopping

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_STAT_TYPE_ERROR**
(2430, X'97E' Error with MQSTAT type

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_STS_ERROR**
(2426, X'97A') Error with MQSTS structure

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

1. A call to MQSTAT specifying a type of MQSTAT_TYPE_ASYNC_ERROR returns information about previous asynchronous MQPUT and MQPUT1 operations. The MQSTS structure passed back on return from the MQSTAT call contains the first recorded asynchronous warning or error information for that connection. If further errors or warnings follow the first, they do not normally alter these values. However, if an error occurs with a completion code of MQCC_WARNING, a subsequent failure with a completion code of MQCC_FAILED is returned instead.
2. If no errors have occurred since the connection was established or since the last call to MQSTAT then a CompCode of MQCC_OK and Reason of MQRC_NONE are returned in the MQSTS structure.
3. Counts of the number of asynchronous calls that have been processed under the connection handle are returned by way of three counter fields; PutSuccessCount, PutWarningCount and PutFailureCount. These counters are incremented by the queue manager each time an asynchronous operation is processed successfully, has a warning, or fails (note that for accounting

purposes a put to a distribution list counts once per destination queue rather than once per distribution list). A counter is not incremented beyond the maximum positive value AMQ_LONG_MAX.

4. A successful call to MQSTAT results in any previous error information or counts being reset.
5. The behavior of MQSTAT depends on the value of the MQSTAT  Type parameter you provide.
6. **MQSTAT_TYPE_ASYNC_ERROR**
    a. A call to MQSTAT specifying a type of MQSTAT_TYPE_ASYNC_ERROR returns information about previous asynchronous MQPUT and MQPUT1 operations. The MQSTS structure passed back on return from the MQSTAT call contains the first recorded asynchronous warning or error information for that connection. If further errors or warnings follow the first, they do not normally alter these values. However, if an error occurs with a completion code of MQCC_WARNING, a subsequent failure with a completion code of MQCC_FAILED is returned instead.
    b. If no errors have occurred since the connection was established or since the last call to MQSTAT then a CompCode of MQCC_OK and Reason of MQRC_NONE are returned in the MQSTS structure.
    c. Counts of the number of asynchronous calls that have been processed under the connection handle are returned by way of three counter fields; PutSuccessCount, PutWarningCount and PutFailureCount. These counters are incremented by the queue manager each time an asynchronous operation is processed successfully, has a warning, or fails (note that for accounting purposes a put to a distribution list counts once per destination queue rather than once per distribution list). A counter is not incremented beyond the maximum positive value AMQ_LONG_MAX.
    d. A successful call to MQSTAT results in any previous error information or counts being reset.

**MQSTAT_TYPE_RECONNECTION**

Suppose you call MQSTAT with Type set to MQSTAT_TYPE_RECONNECTION inside an event handler during reconnection. Consider these examples.

**The client is attempting reconnection or failed to reconnect.**
CompCode in the MQSTS structure is MQCC_FAILED and Reason might be either MQRC_CONNECTION_BROKEN or MQRC_Q_MGR_QUIESCING. ObjectType is MQOT_Q_MGR, ObjectName is the name of the queue manager, and ObjectQMgrName is blank.

**The client completed reconnection successfully or was never disconnected.**
CompCode in the MQSTS structure is MQCC_OK and the Reason is MQRC_NONE

Subsequent calls to MQSTAT return the same results.

**MQSTAT_TYPE_RECONNECTION_ERROR**

Suppose you call MQSTAT with Type set to MQSTAT_TYPE_RECONNECTION_ERROR in response to receiving MQRC_RECONNECT_FAILED to an MQI call. Consider these examples.

**An authorization failure occurred when a queue was being reopened during reconnection to a different queue manager.**
CompCode in the MQSTS structure is MQCC_FAILED and Reason is the reason that the reconnection failed, such as MQRC_NOT_AUTHORIZED. ObjectType is the type of object that caused the problem, such as MQOT_QUEUE, ObjectName is the name of the queue and ObjectQMgrName the name of the queue manager owning the queue.

**A socket connection error occurred during reconnection.**
CompCode in the MQSTS structure is MQCC_FAILED and Reason is the reason that the reconnection failed, such as MQRC_HOST_NOT_AVAILABLE. ObjectType is MQOT_Q_MGR, ObjectName is the name of the queue manager, and ObjectQMgrName is blank.

Subsequent calls to MQSTAT return the same results.

## C invocation

```
MQSTAT (Hconn, StatType, &Stat, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN Hconn;        /* Connection Handle */
MQLONG StatType;    /* Status type */
MQSTS Stat;            /* Status information structure */
MQLONG CompCode;    /* Completion code */
MQLONG Reason;        /* Reason code qualifying CompCode */
```

## COBOL invocation

```
CALL 'MQSTAT' USING HCONN, STATTYPE, STAT, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**    Connection handle
 01    HCONN      PIC S9(9)      BINARY.
**    Status type
 01    STATTYPE   PIC S9(9)      BINARY.
**    Status information
 01    STAT.
    COPY CMQSTSV.
**    Completion code
 01    COMPCODE   PIC S9(9)      BINARY.
**    Reason code qualifying COMPCODE
 01    REASON     PIC S9(9)      BINARY.
```

## PL/I invocation

```
call MQSTAT (Hconn, StatType, Stat, Compcode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31); /* Connection handle */
dcl StatType    fixed bin(31); /* Status type */
dcl Stat        like MQSTS;    /* Status information structure */
dcl CompCode    fixed bin(31); /* Completion code */
dcl Reason      fixed bin(31); /* Reason code qualifying CompCode */
```

## System/390 Assembler invocation

```
CALL MQSTAT,(HCONN,STATTYPE,STAT,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS     F    Connection handle
STATTYPE  DS     F    Status type
STAT      CMQSTSA,    Status information structure
COMPCODE  DS     F    Completion code
REASON    DS     F    Reason code qualifying COMPCODE
```

## MQSUB - Register subscription

Use the MQSUB call to register the applications subscription to a particular topic.

### Syntax

MQSUB (*Hconn*, *SubDesc*, *Hobj*, *Hsub*, *Compcode*, *Reason*)

### Parameters

***Hconn***

Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***SubDesc***

Type: MQSD - input/output

This is a structure that identifies the object in use that is being registered by the application. See “MQSD - Subscription descriptor” on page 544 for more information.

***Hobj***

Type: MQHOBJ - input/output

This handle represents the access that has been established to obtain the messages sent to this subscription. These messages can either be stored on a specific queue or the queue manager can manage their storage without using a specific queue.

To use a specific queue, you must associate it with the subscription when the subscription is created. You can do this in two ways:

- By using the DEFINE SUB MQSC command and provided that command with the name of a queue object.
- By providing this handle when calling MQSUB with the MQSO_CREATE

  If this handle is provided as an input parameter on the call, it must be a valid object handle returned from a previous MQOPEN call of a queue using at least one of the following options:

  – MQOO_INPUT_*
  – MQOO_BROWSE
  – MQOO_OUTPUT (if the queue is a remote queue)

  If this is not the case, the call fails with MQRC_HOBJ_ERROR. It cannot be an object handle to an alias queue that resolves to a topic object. If so, the call fails with MQRC_HOBJ_ERROR.

If the queue manager is to manage the storage of messages sent to this subscription, this should be set when you create the subscription, by using the MQSO_MANAGED option. The queue manager then returns this handle as an output parameter on the call. The handle that is returned is known as a managed handle. If MQHO_NONE is specified but MQSO_MANAGED is not specified, the call fails with MQRC_HOBJ_ERROR.

When a managed handle is returned to you by the queue manager, you can use it on an MQGET or MQCB call with or without browse options, on an MQINQ call, or on MQCLOSE. You cannot

use it on MQPUT, MQSUB, MQSET; attempting to do so fails with MQRC_NOT_OPEN_FOR_OUTPUT, MQRC_HOBJ_ERROR, or MQRC_NOT_OPEN_FOR_SET.

If this subscription is being resumed using the MQSO_RESUME option in the MQSD structure, the handle can be returned to the application in this parameter by setting MQSO_MANAGED to MQHO_NONE. You can do this whether the subscription is using a managed handle or not and it can be useful to provide subscriptions created using DEFINE SUB with the handle to the subscription queue defined on that command. In the case where an administratively created subscription is being resumed, the queue opens with MQOO_INPUT_AS_Q_DEF and MQOO_BROWSE. If you need to specify other options, the application must open the subscription queue explicitly and provide the object handle on the call. If there is a problem opening the queue the call fails with MQRC_INVALID_DESTINATION. If the *Hobj* is provided, it must be equivalent to the *Hobj* in the original MQSUB call. This means if an object handle returned from an MQOPEN call is being provided, the handle must be to the same queue as previously used. If it is not the same queue, the call fails with MQRC_HOBJ_ERROR.

If this subscription is being altered using the MQSO_ALTER option in the MQSD structure, then a different *Hobj* can be provided. Any publications that have been delivered to the queue and were previously identified through this parameter stay on that queue and it is the responsibility of the application to retrieve those messages if the *Hobj* parameter now represents a different queue.

The table summarizes the use of this parameter with various subscription options:

| **Options** | ***Hobj*** | **Description** |
|---|---|---|
| MQSO_CREATE + MQSO_MANAGED | Ignored on input | Creates a subscription with storage of messages managed by the queue manager |
| MQSO_CREATE | A valid object handle | Creates a subscription providing a specific queue as the destination for messages. |
| MQSO_RESUME | MQHO_NONE | Resumes a previously created subscription whether it was managed or not, and has the queue manager return the object handle for use by the application. |
| MQSO_RESUME | A valid, matching, object handle | Resumes a previously created subscription that uses a specific queue as the destination for messages and use an object handle with specific open options. |
| MQSO_ALTER + MQSO_MANAGED | MQHO_NONE | Alters an existing subscription that was previously using a specific queue, so it is now a managed subscription. The class of destination (managed or not) cannot be changed. |
| MQSO_ALTER | A valid object handle | Alters an existing subscription, whether it was managed or not, so that it now uses a specific queue. When the MQSO_MANAGED option is not used, the queue provided can be changed, but the class of destination (managed or not) cannot be changed. |

Whether it was provided or returned, *Hobj* must be specified on subsequent MQGET or MQCB calls that want to receive the publication messages sent to this subscription.

The *Hobj* handle is no longer valid when the MQCLOSE call is issued on it, or when the unit of processing that defines the scope of the handle terminates (until the application disconnects). The scope of the object handle returned is the same as that of the connection handle specified on the call. See Hconn (MQHCONN) - output for information about handle scope. An MQCLOSE of the *Hobj* handle does not affect the *Hsub* handle.

***Hsub***
Type: MQHOBJ - output

This handle represents the subscription that has been made. It can be used for two further operations:

- It can be used on a subsequent MQSUBRQ call to request that publications be sent when the MQSO_PUBLICATIONS_ON_REQUEST option has been used when making the subscription.
- It can be used on a subsequent MQCLOSE call to remove the subscription that has been made. The *Hsub* handle ceases to be valid when the MQCLOSE call is issued, or when the unit of processing that defines the scope of the handle terminates. The scope of the object handle returned is the same as that of the connection handle specified on the call. An MQCLOSE of the *Hsub* handle does not affect the *Hobj* handle.

This handle cannot be passed to an MQGET or MQCB call. You must use the *Hobj* parameter. You cannot use this handle on any IBM MQ call other than MQCLOSE or MQSUBRQ. Passing this handle to any other IBM MQ call results in MQRC_HOBJ_ERROR.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion

**MQCC_WARNING**
Warning (partial completion)

**MQCC_FAILED**
Call failed

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK, the reason code is as follows:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED, the reason code is one of the following:

**MQRC_CLUSTER_RESOLUTION_ERROR**
(2189, X'88D') Cluster name resolution failed.

**MQRC_DURABILITY_NOT_ALLOWED**
2436 (X'0984') An MQSUB call using the MQSO_DURABLE option failed.

**MQRC_FUNCTION_NOT_SUPPORTED**
2298 (X'08FA') The function requested is not available in the current environment.

**MQRC_HOBJ_ERROR**
2019 (X'07E3') Object handle Hobj not valid.

**MQRC_IDENTITY_MISMATCH**
2434 (X'0982') Subscription name matches existing subscription.

**MQRC_NOT_AUTHORIZED**
2035 (X'07F3') The user is not authorized to perform the operation.

**MQRC_NO_SUBSCRIPTION**
2428 (X'097C') The identified subscription name does not exist.

**MQRC_OBJECT_STRING_ERROR**
2441 (X'0989') Objectstring field not valid.

**MQRC_OPTIONS_ERROR**
2046 (X'07FE') Options parameter or field contains options that are not valid, or a combination of options that is not valid.

**MQRC_Q_MGR_QUIESCING**
2161 (X'0871') Queue manager quiescing.

**MQRC_RECONNECT_Q_MGR_REQD**
2555 (X'09FB'X) The MQCNO_RECONNECT_Q_MGR option is required.

**MQRC_RETAINED_MSG_Q_ERROR**
2525 (X'09DD') Retained publications which exist for the subscribed topic string, cannot be retrieved.

**MQRC_RETAINED_NOT_DELIVERED**
2526 (X'09DE') The retained publications which exist for the subscribed topic string, cannot be delivered to the subscription destination queue, and cannot be delivered to the dead-letter queue.

**MQRC_SD_ERROR**
2424 (X'0978') Subscription descriptor (MQSD) not valid.

**MQRC_SELECTION_NOT_AVAILABLE**
2551 (X'09F7') The selection string does not follow the IBM MQ selector syntax and no extended message selection provider was available.

**MQRC_SELECTION_STRING_ERROR**
2519 (X'09D7') The selection string must be specified as described in the MQCHARV structure documentation.

**MQRC_SELECTOR_SYNTAX_ERROR**
2459 (X'099B') An MQOPEN, MQPUT1, or MQSUB call was issued but a selection string was specified which contained a syntax error.

**MQRC_SUB_USER_DATA_ERROR**
2431 (X'097F') SubUserData field not valid.

**MQRC_SUB_NAME_ERROR**
2440 (X'0988') SubName field not valid.

**MQRC_SUB_ALREADY_EXISTS**
2432 (X'0980') Subscription already exists.

**MQRC_SUB_USER_DATA_ERROR**
2431 (X'097F') SubUserData field not valid.

**MQRC_TOPIC_STRING_ERROR**
2425 (X'0979') Topic string is not valid.

**MQRC_UNKNOWN_OBJECT_NAME**
2085 (X'0825') Object identified in the MQSD ObjectName field cannot be found.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

- The subscription is made to a topic, named either using the short name of a pre-defined topic object, the full name of the topic string, or it is formed by the concatenation of two parts. See the description of *ObjectName* and *ObjectString* in "MQSD - Subscription descriptor" on page 544.
- The queue manager performs security checks when an MQSUB call is issued, to verify that the user identifier under which the application is running has the appropriate level of authority before access

is permitted. The appropriate topic object is located in the topic hierarchy and an authority check is made on this topic object to ensure authority to subscribe is set. If the MQSO_MANAGED option is not used, an authority check is made on the destination queue to ensure that authority for output is set. If the MQSO_MANAGED option is used, no authority check is made on the managed queue for output or inquire access.

- If you do not provide an Hobj as input, the MQSUB call allocates two handles, an object handle (Hobj) and a subscription handle (Hsub).
- The Hobj returned on the MQSUB call when the MQSO_MANAGED option is used, can be inquired in order to find out attributes such as the Backout threshold and the Excessive backout requeue name. You can also inquire the name of the managed queue, but you must not attempt to directly open this queue.
- Subscriptions can be grouped allowing only a single publication to be delivered to the group of subscriptions even where more than one of the group matched the publication. Subscriptions are grouped using the MQSO_GROUP_SUB option and in order to group subscriptions they must be
  - using the same named queue (that is not using the MQSO_MANAGED option) on the same queue manager - represented by the Hobj parameter on the MQSUB call
  - share the same SubCorrelId
  - be of the same SubLevel

  These attributes define the set of subscriptions considered to be in the group, and are also the attributes that cannot be altered if a subscription is grouped. Alteration of SubLevel results in MQRC_SUBLEVEL_NOT_ALTERABLE, and alteration of any of the others (which can be changed if a subscription is not grouped) results in MQRC_GROUPING_NOT_ALTERABLE.
- Successful completion of the MQSUB call does not mean that the action completed. To check that this call has completed, see the DEFINE SUB step in Checking that async commands for distributed networks have finished.
- Fields in the MQSD are filled in on return from an MQSUB call which uses the MQSO_RESUME option. The MQSD returned can be passed directly into an MQSUB call which uses the MQSO_ALTER option with any changes you need to make to the subscription applied to the MQSD. Some fields have special considerations as noted in the table.

| MQSD output from MQSUB | |
|---|---|
| **Field name in MQSD** | **Special considerations** |
| Access or creation options | Some of the options can be reset on return from the MQSUB call. If you then reuse the MQSD in an MQSUB call, the option you require must be explicitly set. |
| Durability options, Destination options, Registration Options & Wildcard options | These options are set as appropriate |
| Publication options | These options are set as appropriate, except for MQSO_NEW_PUBLICATIONS_ONLY which is only applicable to MQSO_CREATE. |
| Other options | These options are unchanged on return from an MQSUB call. They control how the API call is issued and are not stored with the subscription. They must be set as required on any subsequent MQSUB call reusing the MQSD. |
| ObjectName | This input only field is unchanged on return from an MQSUB call. |
| ObjectString | This input only field is unchanged on return from an MQSUB call. The Full topic name used is returned in the *ResObjectString* field, if a buffer is provided. |

| MQSD output from MQSUB *(continued)* | |
|---|---|
| **Field name in MQSD** | **Special considerations** |
| AlternateUserId and AlternateSecurityId | These input only fields are unchanged on return from an MQSUB call. They control how the API call is issued and are not stored with the subscription. They must set as required on any subsequent MQSUB call reusing the MQSD. |
| SubExpiry | On return from an MQSUB call using the MQSO_RESUME option, this field is set to the original expiry of the subscription and not the remaining expiry time. If you then reuse the MQSD in an MQSUB call using the MQSO_ALTER option you reset the expiry of the subscription to start counting down again. |
| SubName | This field is an input field on an MQSUB call and is not changed on output. |
| SubUserData and SelectionString | These variable length fields are returned on output from an MQSUB call using the MQSO_RESUME option, if a buffer is provided, and also a positive buffer length in *VSBufSize*. If no buffer is provided only the length is returned in the *VSLength* field of the MQCHARV. If the buffer provided is smaller than the space required to return the field, only *VSBufSize* bytes are returned in the provided buffer.<br>If you then reuse the MQSD in an MQSUB call using the MQSO_ALTER option and a buffer is not provided but a non-zero *VSLength* is provided, if that length matches the existing length of the field, no alteration is made to the field. |
| SubCorrelId and PubAccountingToken | If you do not use MQSO_SET_CORREL_ID, then the *SubCorrelId* is generated by the queue manager. If you do not use MQSO_SET_IDENTITY_CONTEXT, then the *PubAccountingToken* is generated by the queue manager.<br>These fields are returned in the MQSD from an MQSUB call using the MQSO_RESUME option. If they are generated by the queue manager, the generated value is returned on an MQSUB call using the MQSO_CREATE or MQSO_ALTER option. |
| PubPriority, SubLevel & PubApplIdentityData | These fields are returned in the MQSD. |
| ResObjectString | This output only field is returned in the MQSD if a buffer is provided. |

## C invocation

```
MQSUB (Hconn, &SubDesc, &Hobj, &Hsub, &CompCode, &Reason)
```

Declare the parameters as follows:

```
MQHCONN Hconn;    /* Connection handle */
```

```
MQSD    SubDesc;  /* Subscription descriptor */
MQHOBJ  Hobj;     /* Object handle */
MQHOBJ  Hsub;     /* Subscription handle */
MQLONG  CompCode; /* Completion code */
MQLONG  Reason;   /* Reason code qualifying CompCode */
```

### COBOL invocation

```
CALL 'MQSUB' USING HCONN, SUBDESC, HOBJ, HSUB, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN    PIC S9(9) BINARY.
**   Subscription descriptor
 01  SUBDESC.
     COPY CMQSDV.
**   Object handle
 01  HOBJ     PIC S9(9) BINARY.
**   Subscription handle
 01  HSUB     PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON   PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQSUB (Hconn, SubDesc, Hobj, Hsub, CompCode, Reason)
```

Declare the parameters as follows:

```
dcl Hconn    fixed bin(31); /* Connection handle */
dcl SubDesc  like MQSD;     /* Subscription descriptor */
dcl Hobj     fixed bin(31); /* Object handle */
dcl Hsub     fixed bin(31); /* Subscription handle */
dcl CompCode fixed bin(31); /* Completion code */
dcl Reason   fixed bin(31); /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQSUB,(HCONN,SUBDESC,HOBJ,HSUB,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN    DS      F  Connection handle
SUBDESC  CMQSDA  ,  Subscription descriptor
HOBJ     DS      F  Object handle
HSUB     DS      F  Subscription handle
COMPCODE DS      F  Completion code
REASON   DS      F  Reason code qualifying COMPCODE
```

## MQSUBRQ - Subscription request

Use the MQSUBRQ call to make a request for the retained publication, when the subscriber has been registered with MQSO_PUBLICATIONS_ON_REQUEST.

### Syntax

MQSUBRQ (*Hconn*, *Hsub*, *Action*, *SubRqOpts*, *Compcode*, *Reason*)

## Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *Hconn* :

**MQHC_DEF_HCONN**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

***Hsub***
Type: MQHOBJ - input

This handle represents the subscription for which an update is to be requested. The value of *Hsub* was returned from a previous MQSUB call.

***Action***
Type: MQLONG - input

This parameter controls the particular action that is being requested on the subscription. The following value must be specified:

**MQSR_ACTION_PUBLICATION**

This action requests that an update publication is sent for the specified topic. It can be used only if the subscriber specified the option MQSO_PUBLICATIONS_ON_REQUEST on the MQSUB call when it made the subscription. If the queue manager has a retained publication for the topic, this is sent to the subscriber. If not, the call fails. If an application is sent a publication which was retained, this is indicated by the MQIsRetained message property of that publication.

Since the topic in the existing subscription represented by the Hsub parameter can contain wildcards, the subscriber might receive multiple retained publications.

***SubRqOpts***
Type: MQSRO - input/output

These options control the action of MQSUBRQ, see “MQSRO - Subscription request options” on page 568 for details.

If no options are required, programs written in C or S/390 assembler can specify a null parameter address instead of specifying the address of an MQSRO structure.

***CompCode***
Type: MQLONG - output

The completion code; it is one of the following:

**MQCC_OK**
Successful completion

**MQCC_WARNING**
Warning (partial completion)

**MQCC_FAILED**
Call failed

***Reason***
Type: MQLONG - output

The reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_FUNCTION_NOT_SUPPORTED**
2298 (X'08FA') The function requested is not available in the current environment.

**MQRC_NO_RETAINED_MSG**
2437 (X'0985') There are no retained publications currently stored for this topic.

**MQRC_OPTIONS_ERROR**
2046 (X'07FE') Options parameter or field contains options that are not valid, or a combination of options that is not valid.

**MQRC_Q_MGR_QUIESCING**
2161 (X'0871') Queue manager quiescing.

**MQRC_SRO_ERROR**
2438 (X'0986') On the MQSUBRQ call, the Subscription Request Options MQSRO is not valid.

**MQRC_RETAINED_MSG_Q_ERROR**
2525 (X'09DD') Retained publications which exist for the subscribed topic string, cannot be retrieved.

**MQRC_RETAINED_NOT_DELIVERED**
2526 (X'09DE') The retained publications which exist for the subscribed topic string, cannot be delivered to the subscription destination queue, and cannot be delivered to the dead-letter queue.

For detailed information about these codes, see Messages and reason codes.

## Usage notes

The following usage notes apply to the use of the Action code MQSR_ACTION_PUBLICATION:

1. If this verb completes successfully, the retained publications matching the subscription specified have been sent to the subscription and can be received by using MQGET or MQCB using the Hobj returned on the original MQSUB verb that created the subscription.
2. If the topic subscribed to by the original MQSUB verb that created the subscription contained a wildcard, more than one retained publication can be sent. The number of publications sent as a result of this call is recorded in the NumPubs field in the SubRqOpts structure.
3. If this verb completes with a reason code of MQRC_NO_RETAINED_MSG then there were no currently retained publications for the topic specified.#
4. If this verb completes with a reason code of MQRC_RETAINED_MSG_Q_ERROR or MQRC_RETAINED_NOT_DELIVERED then there are currently retained publications for the topic specified but an error has occurred that that meant they were unable to be delivered.
5. The application must have a current subscription to the topic before it can make this call. If the subscription was made in a previous instance of the application and a valid handle to the subscription is not available, the application must first call MQSUB with the MQSO_RESUME option to obtain a handle to it for use in this call.
6. The publications are sent to the destination that is registered for use with the current subscription of this application. If the publications must be sent somewhere else, the subscription must first be altered using the MQSUB call with the MQSO_ALTER option.

## C invocation

```
MQSUB (Hconn, Hsub, Action, &SubRqOpts, &CompCode, &Reason)
```

Declare the parameters as follows:

```
MQHCONN Hconn;     /* Connection handle */
MQHOBJ  Hsub;      /* Subscription handle */
MQLONG  Action;    /* Action requested by MQSUBRQ */
MQSRO   SubRqOpts; /* Options that control the action of MQSUBRQ */
MQLONG  CompCode;  /* Completion code */
MQLONG  Reason;    /* Reason code qualifying CompCode */
```

### COBOL invocation

```
CALL 'MQSUBRQ' USING HCONN, HSUB, ACTION, SUBRQOPTS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
** Connection handle
01 HCONN PIC S9(9) BINARY.
** Subscription handle
01 HSUB PIC S9(9) BINARY.
** Action requested by MQSUBRQ
01 ACTION PIC S9(9) BINARY.
** Options that control the action of MQSUBRQ
01 SUBRQOPTS.
COPY CMQSROV.
** Completion code
01 COMPCODE PIC S9(9) BINARY.
** Reason code qualifying COMPCODE
01 REASON PIC S9(9) BINARY.
```

### PL/I invocation

```
call MQSUBRQ (Hconn, Hsub, Action, SubRqOpts, CompCode, Reason)
```

Declare the parameters as follows:

```
dcl Hconn fixed bin(31);    /* Connection handle */
dcl Hsub fixed bin(31);     /* Subscription handle */
dcl Action fixed bin(31);   /* Action requested by MQSUBRQ */
dcl SubRqOpts like MQSRO;   /* Options that control the action of MQSUBRQ */
dcl CompCode fixed bin(31); /* Completion code */
dcl Reason fixed bin(31);   /* Reason code qualifying CompCode */
```

### High Level Assembler invocation

```
CALL MQSUBRQ,(HCONN, HSUB, ACTION, SUBRQOPTS,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN DS F Connection handle
HSUB DS F Subscription handle
ACTION DS F Action requested by MQSUBRQ
SUBRQOPTS CMQSROA , Options that control the action of MQSUBRQ
COMPCODE DS F Completion code
REASON DS F Reason code qualifying COMPCODE
```

## Attributes of objects

This collection of topics lists only those IBM MQ objects that can be the subject of an MQINQ function call, and gives details of the attributes that can be inquired on and the selectors to be used.

## Attributes for the queue manager

Some queue-manager attributes are fixed for particular implementations; others can be changed by using the MQSC command `ALTER QMGR`.

The attributes can also be displayed by using the command `DISPLAY QMGR`. Most queue-manager attributes can be inquired by opening a special MQOT_Q_MGR object, and using the MQINQ call with the handle returned.

The following table summarizes the attributes that are specific to the queue manager. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown in this section are descriptive names used with the MQINQ call; the names are the same as for the PCF commands. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see Script (MQSC) Commands for more information.

*Table 560. Attributes for the queue manager*

| Attribute | Description |
|---|---|
| AccountingConnOverride | Override accounting settings. |
| AccountingInterval | How often to write intermediate accounting records. |
| ActivityConnOverride | Override activity settings. |
| ActivityTrace | Controls the collection of IBM MQ MQI application activity trace. |
| AdoptNewMCACheck | Elements checked to determine whether to adopt new MCA. |
| AdoptNewMCAType | Whether to restart automatically an orphaned instance of an MCA of a particular channel type. |
| AlterationDate | Date when definition was last changed |
| AlterationTime | Time when definition was last changed |
| AuthorityEvent | Controls whether authorization (Not Authorized) events are generated |
| BridgeEvent | Control attribute for bridge events. |
| ChannelAutoDef | Controls whether automatic channel definition is permitted |
| ChannelAutoDefEvent | Controls whether channel automatic-definition events are generated |
| ChannelAutoDefExit | Name of user exit for automatic channel definition |
| ChannelEvent | Control attribute for channel events. |
| ChannelInitiatorControl | Control attribute for channel initiator |
| ChannelMonitoring | Online monitoring data for channels |
| ChannelStatistics | Controls collection of statistics data for channels. |
| ChinitAdapters | Number of adapter subtasks for processing IBM MQ calls. |
| ChinitDispatchers | Number of dispatchers to use for the channel initiator. |
| | Reserved for IBM use. |
| ChinitTraceAutoStart | Whether channel initiator trace should start automatically. |
| ChinitTraceTableSize | Size of channel initiator's trace data space. |
| ClusterSenderMonitoringDefault | Online monitoring data default for cluster sender channels |
| ClusterSenderStatistics | Controls collection of statistics monitoring information for cluster sender channels. |
| ClusterWorkloadData | User data for cluster workload exit |
| ClusterWorkloadExit | Name of user exit for cluster workload management |
| ClusterWorkloadLength | Maximum length of message data passed to cluster workload exit |
| CLWLMRUChannels | Number of most recently used channels for cluster workload balancing |
| CLWLUseQ | Cluster workload use remote queue. |
| CodedCharSetId | Coded character set identifier |
| CommandEvent | Control attribute for command events. |
| CommandInputQName attribute | Command input queue name |

| *Table 560. Attributes for the queue manager (continued)* | |
|---|---|
| **Attribute** | **Description** |
| CommandLevel | Command level |
| CommandServerControl attribute | Control attribute for command server. |
| Configuration Event attribute | Control attribute for configuration events. |
| DeadLetterQName | Name of dead-letter queue |
| DEFCLXQ | Default cluster transmission queue type |
| DefXmitQName | Default transmission queue name |
| DistLists | Distribution list support |
| DNSGroup | Name of group for TCP listener when using Workload Manager Dynamic Domain Name Services support. |
| DNSWLM | Whether TCP listener registers with Workload Manager for Dynamic Domain Name Services. |
| ExpiryInterval | Interval between scans for expired messages |
| IGQPutAuthority | Intra-group queuing put authority |
| IGQUserId | Intra-group queuing user identifier |
| InhibitEvent | Controls whether inhibit (Inhibit Get and Inhibit Put) events are generated |
| IPAddressVersion | Version of the Internet Protocol address |
| IntraGroupqueuing | Intra-group queuing support |
| ListenerTimer | Time interval between attempts to restart listener after APPC or TCP/IP failure. |
| LocalEvent | Controls whether local error events are generated |
| LoggerEvent | Controls whether logger events are generated |
| LUGroupName | Generic LU name for LU 6.2 listener that handles inbound transmissions for queue-sharing group. |
| LUName | Name of LU to use for outbound LU 6.2 transmissions. |
| LU62ARMSuffix | Suffix of SYS1.PARMLIB member APPCPMxx, that nominates LUADD for this channel initiator. |
| LU62Channels | Maximum number of current channels or connected clients that use LU 6.2. |
| MaxActiveChannels | Maximum number of channels that can be active at any time. |
| MaxChannels | Maximum number of current channels. |
| MaxHandles | Maximum number of handles |
| MaxMsgLength | Maximum message length in bytes |
| MaxPriority attribute | Maximum priority |
| MaxPropertiesLength | Maximum length of property data in bytes |
| MaxUncommittedMsgs | Maximum number of uncommitted messages within a unit of work |
| MQIAccounting | Controls collection of accounting information for MQI data. |
| MQIStatistics | Controls collection of statistics monitoring information for queue manager. |
| MsgMarkBrowseInterval | Interval after which the queue manager can remove the mark from browsed messages. |
| OutboundPortMin | With *OutboundPortMin*, defines range of port numbers to use when binding outgoing channels. |
| OutboundPortMin | With *OutboundPortMax*, defines range of port numbers to use when binding outgoing channels. |
| PerformanceEvent | Controls whether performance-related events are generated |
| Platform | Platform on which the queue manager is running |
| PubSubNPInputMsg | Whether to discard (or keep) an undelivered input message |
| PubSubNPResponse | Controls the behavior of undelivered |
| PubSubMaxMsgRetryCount | The number of retries when processing (under syncpoint) a failed command message |
| PubSubSyncPoint | Whether only persistent (or all) messages should be processed under syncpoint |
| PubSubMode | Whether the queued publish/subscribe interface is running |
| QMgrDesc | Queue manager description |
| QMgrIdentifier | Unique internally generated identifier of queue manager |

| *Table 560. Attributes for the queue manager (continued)* | |
|---|---|
| **Attribute** | **Description** |
| QMgrName | Queue manager name |
| QSGName | Name of queue-sharing group |
| QueueAccounting | Controls collection of accounting information for queues. |
| QueueMonitoring | Online monitoring data for queues |
| QueueStatistics | Controls collection of statistics data for queues. |
| ReceiveTimeout | How long TCP/IP channel waits for data before returning to inactive state. |
| ReceiveTimeoutMin | Qualifier for *ReceiveTimeout*. |
| ReceiveTimeoutType | Minimum time that TCP/IP channel waits for data before returning to inactive state. |
| RemoteEvent | Controls whether remote error events are generated |
| RepositoryName | Name of cluster for which this queue manager provides repository services |
| RepositoryNamelist | Name of namelist object containing names of clusters for which this queue manager provides repository services |
| ScyCase | Case of security profiles |
| SharedQMgrName | Shared queue queue-manager name |
| "SPLCAP" on page 806 | IBM MQ Advanced Message security protection for a queue manager turned on or off. |
| SSLCRLNamelist 1 | Name of namelist object containing names of authentication information objects. |
| SSLCryptoHardware 1 | Cryptographic hardware configuration string. |
| SSLEvent | Control attribute for SSL events. |
| SSLFIPSRequired | Use only FIPS-certified algorithms for cryptography. |
| SSLKeyRepository 1 | Location of SSL key repository. |
| SSLKeyResetCount | SSL key reset count. |
| SSLTasks 1 | Number of server subtasks for processing SSL calls. |
| StatisticsInterval | How often to write statistics monitoring data. |
| StartStopEvent | Controls whether start and stop events are generated |
| SyncPoint | Syncpoint availability |
| TCPChannels | Maximum number of current channels or connected clients that use TCP/IP. |
| TCPKeepAlive | Whether to use TCP KEEPALIVE to check other end of connection. |
| TCPName | Name of TCP/IP system that you are using. |
| TCPStackType | How channel initiator can use TCP/IP addresses. |
| TraceRouteRecording attribute | Controls recording of trace-route information. |
| TriggerInterval | Trigger-message interval |
| Version | Version |
| XrCapability | Specifies whether Telemetry commands are supported. |

**Notes:**

1. This attribute cannot be inquired using the MQINQ call, and is not described in this section. See Change Queue Manager for details of this attribute.

**Related tasks**

Specifying that only FIPS-certified CipherSpecs are used at run time on the MQI client

**Related reference**

Federal Information Processing Standards (FIPS) for UNIX, Linux and Windows

## *AccountingConnOverride (MQLONG)*

This allows applications to override the setting of the ACCTMQI and ACCTQDATA values in the Qmgr attribute.

The value is one of the following:

**MQMON_DISABLED**
Applications cannot override the setting of the ACCTMQI and ACCTQ Qmgr attributes using the Options field in the MQCNO structure on the MQCONNX call. This is the default value.

**MQMON_ENABLED**
Applications can override the ACCTQ and ACCTMQI Qmgr attributes using the Options field in the MQCNO structure.

Changes to this value are only effective for connections to the queue manager after the change to the attribute.

This attribute is supported only on IBM i, Unix systems, and Windows.

To determine the value of this attribute, use the MQIA_ACCOUNTING_CONN_OVERRIDE selector with the MQINQ call.

### *AccountingInterval (MQLONG)*

This specifies how long before intermediate accounting records are written (in seconds).

The value is an integer in the range 0 to 604800, with a default value of 1800 (30 minutes). Specify 0 to turn off intermediate records.

This attribute is supported only on IBM i, Windows, UNIX, and Linux systems.

To determine the value of this attribute, use the MQIA_ACCOUNTING_INTERVAL selector with the MQINQ call.

### *ActivityConnOverride (MQLONG)*

This allows applications to override the setting of the ACTVTRC value in the queue manager attribute.

The value is one of the following:

**MQMON_DISABLED**
Applications cannot override the setting of the ACTVTRC queue manager attribute using the Options field in the MQCNO structure on the MQCONNX call. This is the default value.

**MQMON_ENABLED**
Applications can override the ACTVTRC queue manager attribute using the Options field in the MQCNO structure.

Changes to this value are only effective for connections to the queue manager after the change to the attribute.

This attribute is supported only on IBM i, Unix systems, and Windows.

To determine the value of this attribute, use the MQIA_ACTIVITY_CONN_OVERRIDE selector with the MQINQ call.

### *ActivityTrace (MQLONG)*

This controls the collection of IBM MQ MQI application activity trace.

The value is one of the following:

**MQMON_ON**
Collect IBM MQ MQI application activity trace.

**MQMON_OFF**
Do not collect IBM MQ MQI application activity trace. This is the default value.

If you set the queue manager attribute ACTVCONO to ENABLED, this value might be overridden for individual connections using the Options field in the MQCNO structure.

Changes to this value are only effective for connections to the queue manager after the change to the attribute.

This attribute is supported only on IBM i, Unix systems, and Windows.

To determine the value of this attribute, use the MQIA_ACTIVITY_TRACE selector with the MQINQ call.

### *AdoptNewMCACheck (MQLONG)*

This defines the elements to check to determine whether to adopt an MCA when a new inbound channel is detected that has the same name as an MCA that is already active

The value is one of the following:

**MQADOPT_CHECK_Q_MGR_NAME**
Check the queue manager name.

**MQADOPT_CHECK_NET_ADDR**
Check the network address.

**MQADOPT_CHECK_ALL**
Check the queue manager name and network address. If possible, perform this check to protect your channels from being shut down, inadvertently or maliciously. This is the default value.

**MQADOPT_CHECK_NONE**
Do not check any elements.

Changes to this attribute take effect the next time that a channel attempts to adopt a channel.

This attribute is supported only on z/OS.

To determine the value of this attribute, use the MQIA_ADOPTNEWMCA_CHECK selector with the MQINQ call.

### *AdoptNewMCAType (MQLONG)*

This specifies whether to restart automatically an orphaned instance of an MCA of a particular channel type when a new inbound channel request matching the AdoptNewMCACheck attribute is detected

It is one of the following values:

**MQADOPT_TYPE_NO**
Adopting orphaned channel instances is not required. This is the default value.

**MQADOPT_TYPE_ALL**
Adopt all channel types.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_ADOPTNEWMCA_TYPE selector with the MQINQ call.

### *AlterationDate (MQCHAR12)*

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the MQCA_ALTERATION_DATE selector with the MQINQ call. The length of this attribute is given by MQ_DATE_LENGTH.

### *AlterationTime (MQCHAR8)*

This is the time when the definition was last changed. The format of the time is HH.MM.SS.

To determine the value of this attribute, use the MQCA_ALTERATION_TIME selector with the MQINQ call. The length of this attribute is given by MQ_TIME_LENGTH.

### *AuthorityEvent (MQLONG)*

This controls whether authorization (Not Authorized) events are generated. It is one of the following values:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_AUTHORITY_EVENT selector with the MQINQ call.

### *BridgeEvent (MQLONG)*

This specifies whether IMS bridge events are generated.

The value is one of the following:

**MQEVR_ENABLED**
Generate IMS bridge events, as follows:

MQRC_BRIDGE_STARTED
MQRC_BRIDGE_STOPPED

**MQEVR_DISABLED**
Do not generate IMS bridge events; this is the default value.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_BRIDGE_EVENT selector with the MQINQ call.

### *ChannelAutoDef (MQLONG)*

This attribute controls the automatic definition of channels of type MQCHT_RECEIVER and MQCHT_SVRCONN. Automatic definition of MQCHT_CLUSSDR channels is always enabled. The value is one of the following:

**MQCHAD_DISABLED**
Channel auto-definition disabled.

**MQCHAD_ENABLED**
Channel auto-definition enabled.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, and Windows.

To determine the value of this attribute, use the MQIA_CHANNEL_AUTO_DEF selector with the MQINQ call.

### *ChannelAutoDefEvent (MQLONG)*

This controls whether channel automatic-definition events are generated. It applies to channels of type MQCHT_RECEIVER, MQCHT_SVRCONN, and MQCHT_CLUSSDR. The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, and Windows.

To determine the value of this attribute, use the MQIA_CHANNEL_AUTO_DEF_EVENT selector with the MQINQ call.

### *ChannelAutoDefExit (MQCHARn)*

This is the name of the user exit for automatic channel definition. If this name is nonblank, and *ChannelAutoDef* has the value MQCHAD_ENABLED, the exit is called each time that the queue manager is about to create a channel definition. This applies to channels of type MQCHT_RECEIVER, MQCHT_SVRCONN, and MQCHT_CLUSSDR. The exit can then do one of the following:

- Create the channel definition without change.
- Modify the attributes of the channel definition that is created.
- Suppress creation of the channel entirely.

**Note:** Both the length and the value of this attribute are environment specific. See the introduction to the MQCD structure in "MQCD - Channel definition" on page 1501 for details of the value of this attribute in various environments.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows, and z/OS. On z/OS, it applies only to cluster-sender and cluster-receiver channels.

To determine the value of this attribute, use the MQCA_CHANNEL_AUTO_DEF_EXIT selector with the MQINQ call. The length of this attribute is given by MQ_EXIT_NAME_LENGTH.

### *ChannelEvent (MQLONG)*

This specifies whether channel events are generated.

It is one of the following values:

**MQEVR_EXCEPTION**
Only generate the following channel events:

- MQRC_CHANNEL_ACTIVATED
- MQRC_CHANNEL_CONV_ERROR
- MQRC_CHANNEL_NOT_ACTIVATED
- MQRC_CHANNEL_STOPPED with the following ReasonQualifiers:

  MQRQ_CHANNEL_STOPPED_ERROR
  MQRQ_CHANNEL_STOPPED_RETRY
  MQRQ_CHANNEL_STOPPED_DISABLED

  MQRC_CHANNEL_STOPPED_BY_USER

**MQEVR_ENABLED**
Generate all channel events. That is, in addition to those generated by EXCEPTION, generate the following channel events:

- MQRC_CHANNEL_STARTED
- MQRC_CHANNEL_STOPPED with the following ReasonQualifier:

  MQRQ_CHANNEL_STOPPED_OK

**MQEVR_DISABLED**
Do not generate channel events; this is the default value.

To determine the value of this attribute, use the MQIA_CHANNEL_EVENT selector with the MQINQ call.

### *ChannelInitiatorControl (MQLONG)*

This specifies whether the channel initiator is to be started when the queue manager starts.

It is one of the following values:

**MQSVC_CONTROL_MANUAL**
The channel initiator is not to be started automatically.

**MQSVC_CONTROL_Q_MGR**
The channel initiator is to be started automatically when the queue manager starts.

To determine the value of this attribute, use the MQIA_CHINIT_CONTROL selector with the MQINQ call.

### IBM i distributed *ChannelMonitoring (MQLONG)*

This attribute specifies online monitoring data for channels.

The value is one of the following:

**MQMON_NONE**
Disable data collection for channel monitoring for all channels regardless of the setting of the MONCHL channel attribute. This is the default value.

**MQMON_OFF**
Turn monitoring data collection off for channels that specify QMGR in the MONCHL channel attribute.

**MQMON_LOW**
Turn monitoring data collection on with a low ratio of data collection for channels specifying QMGR in the MONCHL channel attribute.

**MQMON_MEDIUM**
Turn monitoring data collection on with a moderate ratio of data collection for channels specifying QMGR in the MONCHL channel attribute.

**MQMON_HIGH**
Turn monitoring data collection on with a high ratio of data collection for channels specifying QMGR in the MONCHL channel attribute.

On z/OS, this parameter simply turns on statistics data collection, regardless of the value you select. Specifying LOW, MEDIUM, or HIGH makes no difference to your results.

To determine the value of this attribute, use the MQIA_MONITORING_CHANNEL selector with the MQINQ call.

### IBM i distributed *ChannelStatistics (MQLONG)*

This controls the collection of statistics data for channels.

The value is one of the following:

**MQMON_NONE**
Disable data collection for channel statistics for all channels regardless of the setting of the STATCHL channel attribute. This is the default value.

**MQMON_OFF**
Turn statistics data collection off for channels that specify QMGR in the STATCHL channel attribute.

**MQMON_LOW**
Turn statistics data collection on with a low ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

**MQMON_MEDIUM**
Turn statistics data collection on with a moderate ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

**MQMON_HIGH**
Turn statistics data collection on with a high ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

For most systems you are recommended to use MEDIUM. However, for a channel that processes a high volume of messages each second, you might want to reduce the sampling level by selecting LOW. Also, for a channel that processes only a few messages, and for which the most current information is important, you might want to select HIGH.

On z/OS, this parameter simply turns on statistics data collection, regardless of the value you select. Specifying LOW, MEDIUM, or HIGH makes no difference to your results.

To determine the value of this attribute, use the MQIA_STATISTICS_CHANNEL selector with the MQINQ call.

### *ChinitAdapters (MQLONG)*

This is the number of adapter subtasks to use to process IBM MQ calls. The value must be 0 - 9999, with a default value of 8.

The ratio of adapters to dispatchers (the ChinitDispatchers attribute) should be about 8 to 5. However, if you have only few channels, you do not have to decrease the value of this parameter from the default value. You can use the following values: for a test system, 8 (default); for a production system, 20. Ideally, you should have 20 adapters, which gives greater parallelism of IBM MQ calls. This is important for persistent messages. Fewer adapters might be better for nonpersistent messages.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_CHINIT_ADAPTERS selector with the MQINQ call.

### *ChinitDispatchers (MQLONG)*

This is the number of dispatchers to use for the channel initiator. The value must be 0 - 9999, with a default value of 5.

As a guideline, allow one dispatcher for 50 current channels. However, if you have only few channels, you do not have to decrease the value of this attribute from the default value. If you are using TCP/IP, the greatest number of dispatchers that are used for TCP/IP channels is 100, even if you specify a larger value here. You can use the following settings: test systems, 5 (the default); production systems, 20 (you need 20 dispatchers to handle up to 1000 active channels).

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_CHINIT_DISPATCHERS selector with the MQINQ call.

### *ChinitTraceAutoStart (MQLONG)*

This specifies whether to start channel initiator trace automatically.

The value is one of the following:

**MQTRAXSTR_YES**
Start channel initiator trace automatically. This is the default value.

**MQTRAXSTR_NO**
Do not start channel initiator trace automatically.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_CHINIT_TRACE_AUTO_START selector with the MQINQ call.

### *ChinitTraceTableSize (MQLONG)*

This is the size of the channel initiator's trace data space (in MB).

The value must be in the range 0 through 2048, with a default value of 2.

**Note:** Whenever you use large z/OS data spaces, ensure that you have sufficient auxiliary storage on your system to support any related z/OS paging activity. You might also need to increase the size of your SYS1.DUMP data sets.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_CHINIT_TRACE_TABLE_SIZE selector with the MQINQ call.

### *ClusterSenderMonitoringDefault (MQLONG)*

This specifies the value to be substituted for the ChannelMonitoring attribute of automatically-defined cluster sender channels.

The value is one of the following:

**MQMON_Q_MGR**
Collection of online monitoring data is inherited from the setting of the queue manager *ChannelMonitoring* attribute. This is the default value.

**MQMON_OFF**
Monitoring for the channel is switched off

**MQMON_LOW**
Unless *ChannelMonitoring* is MQMON_NONE, monitoring is switched on with a low rate of data collection with a minimal effect on system performance. The data collected is not likely to be the most current.

**MQMON_MEDIUM**
Unless *ChannelMonitoring* is MQMON_NONE, monitoring is switched on with a moderate rate of data collection with limited effect on system performance.

**MQMON_HIGH**
Unless *ChannelMonitoring* is MQMON_NONE, monitoring is switched on with a high rate of data collection with a likely effect on system performance. The data collected is the most current available.

To determine the value of this attribute, use the MQIA_MONITORING_AUTO_CLUSSDR selector with the MQINQ call.

## *ClusterSenderStatistics (MQLONG)*

Because cluster sender channels can be automatically defined from the definition of CLUSRCVR in the repository, you cannot alter the setting of the STATCHL attribute for these auto-defined cluster sender channels using ALTER channel. For these channels the decision of whether to collect online monitoring data is based on the setting of this queue manager attribute.

The value is one of the following:

**MQMON_Q_MGR**
Statistics data collection for auto-defined cluster sender channels is based on the value of the queue manager attribute STATCHL. This is the default value.

**MQMON_OFF**
Switch off statistics data collection for auto-defined cluster sender channels.

**MQMON_LOW**
Switch on statistics data collection for auto-defined cluster sender channels with a low ratio of data collection.

**MQMON_MEDIUM**
Switch on statistics data collection for auto-defined cluster sender channels with a moderate ratio of data collection.

**MQMON_HIGH**
Switch on statistics data collection for auto-defined cluster sender channels with a high ratio of data collection.

For most systems we recommend MEDIUM. However, for an auto-defined cluster sender channel that processes a high volume of messages each second, you might want to reduce the sampling level by selecting LOW. Also, for a channel that processes only a few messages, and for which the most current information is important, you might want to select HIGH.

On z/OS, this parameter simply turns on statistics data collection, regardless of the value you select. Specifying LOW, MEDIUM, or HIGH makes no difference to your results.

To determine the value of this attribute, use the MQIA_STATISTICS_AUTO_CLUSSDR selector with the MQINQ call.

## *ClusterWorkloadData (MQCHAR32)*

This is a user-defined 32-byte character string that is passed to the cluster workload exit when it is called. If there is no data to pass to the exit, the string is blank.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows and z/OS.

To determine the value of this attribute, use the MQCA_CLUSTER_WORKLOAD_DATA selector with the MQINQ call.

### *ClusterWorkloadExit (MQCHARn)*

This is the name of the user exit for cluster workload management. If this name is not blank, the exit is called each time that a message is put to a cluster queue or moved from one cluster-sender queue to another. The exit can then either accept the queue instance selected by the queue manager as the destination for the message, or select another queue instance.

**Note:** Both the length and the value of this attribute are environment specific.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows and z/OS.

To determine the value of this attribute, use the MQCA_CLUSTER_WORKLOAD_EXIT selector with the MQINQ call. The length of this attribute is given by MQ_EXIT_NAME_LENGTH.

### *ClusterWorkloadLength (MQLONG)*

This is the maximum length of message data that is passed to the cluster workload exit. The actual length of data passed to the exit is the minimum of the following:

- The length of the message.
- The queue-manager's *MaxMsgLength* attribute.
- The *ClusterWorkloadLength* attribute.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows and z/OS.

To determine the value of this attribute, use the MQIA_CLUSTER_WORKLOAD_LENGTH selector with the MQINQ call.

### *CLWLMRUChannels (MQLONG)*

This specifies the maximum number of most-recently-used cluster channels, to be considered for use by the cluster workload choice algorithm.

This is a value in the range 1 through 999999999.

To determine the value of this attribute, use the MQIA_CLWL_MRU_CHANNELS selector with the MQINQ call.

### *CLWLUseQ (MQLONG)*

This specifies whether to use remote queues for the cluster workload.

The value is one of the following:

**MQCLWL_USEQ_ANY**
Use both local and remote queues.

**MQCLWL_USEQ_LOCAL**
Do not use remote queues. This is the default value.

To determine the value of this attribute, use the MQIA_CLWL_USEQ selector with the MQINQ call.

### *CodedCharSetId (MQLONG)*

This defines the character set used by the queue manager for all character string fields defined in the MQI such as the names of objects, and queue creation date and time. The character set must be one that has single-byte characters for the characters that are valid in object names. It does not apply to application data carried in the message. The value depends on the environment:

- On z/OS, the value is set from the system parameters when the queue manager is started; the default value is 500.
- On Windows, the value is the primary CODEPAGE of the user creating the queue manager.
- On IBM i, the value is that which is set in the environment when the queue manager is first created.
- On UNIX systems, the value is the default CODESET for the locale of the user creating the queue manager.

To determine the value of this attribute, use the MQIA_CODED_CHAR_SET_ID selector with the MQINQ call.

### *CommandEvent (MQLONG)*

This specifies whether command events are generated, as follows:

**MQEVR_DISABLED**
Do not generate command events. This is the default.

**MQEVR_ENABLED**
Generate command events.

**MQEVR_NO_DISPLAY**
Command events are generated for all successful commands other than MQINQ.

To determine the value of this attribute, use the MQIA_COMMAND_EVENT selector with the MQINQ call.

### *CommandInputQName (MQCHAR48)*

This is the name of the command input queue defined on the local queue manager. This is a queue to which users can send commands, if authorized to do so. The name of the queue depends on the environment:

- On z/OS, the name of the queue is SYSTEM.COMMAND.INPUT; MQSC and PCF commands can be sent to it. See The MQSC commands for details of MQSC commands and Definitions of the Programmable Command Formats for details of PCF commands.
- In all other environments, the name of the queue is SYSTEM.ADMIN.COMMAND.QUEUE, and only PCF commands can be sent to it. However, an MQSC command can be sent to this queue if the MQSC command is enclosed within a PCF command of type MQCMD_ESCAPE. See Escape for information about the Escape command.

To determine the value of this attribute, use the MQCA_COMMAND_INPUT_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *CommandLevel (MQLONG)*

This indicates the level of system control commands supported by the queue manager. This can be one of the following values:

**MQCMDL_LEVEL_600**
Level 600 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 6.0
- IBM WebSphere MQ for HP-UX Version 6.0
- IBM WebSphere MQ for iSeries Version 6.0
- IBM WebSphere MQ for Linux Version 6.0
- IBM WebSphere MQ for Solaris Version 6.0
- IBM WebSphere MQ for Windows Version 6.0
- IBM WebSphere MQ for z/OS Version 6.0

**MQCMDL_LEVEL_700**
Level 700 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 7.0
- IBM WebSphere MQ for HP-UX Version 7.0
- IBM WebSphere MQ for IBM i Version 7.0

- IBM WebSphere MQ for Linux Version 7.0
- IBM WebSphere MQ for Solaris Version 7.0
- IBM WebSphere MQ for Windows Version 7.0
- IBM WebSphere MQ for z/OS Version 7.0

**MQCMDL_LEVEL_701**
Level 701 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 7.0.1
- IBM WebSphere MQ for HP-UX Version 7.0.1
- IBM WebSphere MQ for IBM i Version 7.0.1
- IBM WebSphere MQ for Linux Version 7.0.1
- IBM WebSphere MQ for Solaris Version 7.0.1
- IBM WebSphere MQ for Windows Version 7.0.1
- IBM WebSphere MQ for z/OS Version 7.0.1

**MQCMDL_LEVEL_710**
Level 710 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 7.1
- IBM WebSphere MQ for HP-UX Version 7.1
- IBM WebSphere MQ for IBM i Version 7.1
- IBM WebSphere MQ for Linux Version 7.1
- IBM WebSphere MQ for Solaris Version 7.1
- IBM WebSphere MQ for Windows Version 7.1
- IBM WebSphere MQ for z/OS Version 7.1

**MQCMDL_LEVEL_750**
Level 750 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 7.5
- IBM WebSphere MQ for HP-UX Version 7.5
- IBM WebSphere MQ for IBM i Version 7.5
- IBM WebSphere MQ for Linux Version 7.5
- IBM WebSphere MQ for Solaris Version 7.5
- IBM WebSphere MQ for Windows Version 7.5

**MQCMDL_LEVEL_800**
Level 800 of system control commands.

This value is returned by the following versions:

- IBM WebSphere MQ for AIX Version 8.0
- IBM WebSphere MQ for HP-UX Version 8.0
- IBM WebSphere MQ for IBM i Version 8.0
- IBM WebSphere MQ for Linux Version 8.0
- IBM WebSphere MQ for Solaris Version 8.0
- IBM WebSphere MQ for Windows Version 8.0
- IBM WebSphere MQ for z/OS Version 8.0

V 8.0.0.2 **MQCMDL_LEVEL_801**
Level 801 of system control commands.

This value is returned by the following versions:

- IBM MQ for AIX Version 8.0.0.2
- IBM MQ for HP-UX Version 8.0.0.2
- IBM MQ for IBM i Version 8.0.0.2
- IBM MQ for Linux Version 8.0.0.2
- IBM MQ for Solaris Version 8.0.0.2

V 8.0.0.3 **MQCMDL_LEVEL_802**
Level 802 of system control commands.

This value is returned by the following versions:

- IBM MQ for AIX Version 8.0.0.3
- IBM MQ for HP-UX Version 8.0.0.3
- IBM MQ for IBM i Version 8.0.0.3
- IBM MQ for Linux Version 8.0.0.3
- IBM MQ for Solaris Version 8.0.0.3
- IBM MQ for Windows Version 8.0.0.3

The set of system control commands that corresponds to a particular value of the *CommandLevel* attribute varies according to the value of the *Platform* attribute; both must be used to decide which system control commands are supported.

To determine the value of this attribute, use the MQIA_COMMAND_LEVEL selector with the MQINQ call.

## *CommandServerControl (MQLONG)*

Specifies whether the command server is to be started when the queue manager starts.

The value can be any of the following values:

**MQSVC_CONTROL_MANUAL**
The command server is not to be started automatically.

**MQSVC_CONTROL_Q_MGR**
The command server is to be started automatically when the queue manager starts.

This attribute is not supported on z/OS.

To determine the value of this attribute, use the MQIA_CMD_SERVER_CONTROL selector with the MQINQ call.

## *ConfigurationEvent (MQLONG)*

Controls whether configuration events are generated.

To determine the value of this attribute, use the MQIA_CONFIGURATION_EVENT selector with the MQINQ call.

The value can be any of the following values:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

### *DeadLetterQName (MQCHAR48)*

This is the name of a queue defined on the local queue manager as the dead-letter (undelivered-message) queue. Messages are sent to this queue if they cannot be routed to their correct destination.

For example, messages are put on this queue when:

- A message arrives at a queue manager, destined for a queue that is not yet defined on that queue manager
- A message arrives at a queue manager, but the queue for which it is destined cannot receive it because, possibly:
  - The queue is full
  - Put requests are inhibited
  - The sending node does not have authority to put messages on the queue

Applications can also put messages on the dead-letter queue.

Report messages are treated in the same way as ordinary messages; if the report message cannot be delivered to its destination queue (usually the queue specified by the *ReplyToQ* field in the message descriptor of the original message), the report message is placed on the dead-letter (undelivered-message) queue.

**Note:** Messages that have passed their expiry time (see MQMD - Expiry field ) are **not** transferred to this queue when they are discarded. However, an expiration report message (MQRO_EXPIRATION) is still generated and sent to the *ReplyToQ* queue, if requested by the sending application.

Messages are not put on the dead-letter (undelivered-message) queue when the application that issued the put request has been notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call (for example, a message put on a local queue for which put requests are inhibited).

Messages on the dead-letter (undelivered-message) queue sometimes have their application message data prefixed with an MQDLH structure. This structure contains extra information that indicates why the message was placed on the dead-letter (undelivered-message) queue. See "MQDLH - Dead-letter header" on page 338 for more details of this structure.

This queue must be a local queue, with a *Usage* attribute of MQUS_NORMAL.

If a queue manager does not support a dead-letter (undelivered-message) queue, or one has not been defined, the name is all blanks. All IBM MQ queue managers support a dead-letter (undelivered-message) queue, but by default it is not defined.

If the dead-letter (undelivered-message) queue is not defined, full, or unusable for some other reason, a message which would have been transferred to it by a message channel agent is retained instead on the transmission queue.

To determine the value of this attribute, use the MQCA_DEAD_LETTER_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *DefClusterXmitQueueType (MQLONG)*

The `DefClusterXmitQueueType` attribute controls which transmission queue is selected by default by cluster-sender channels to get messages from, to send the messages to cluster-receiver channels.

The values of **DefClusterXmitQueueType** are `MQCLXQ_SCTQ` or `MQCLXQ_CHANNEL`.

**MQCLXQ_SCTQ**

All cluster-sender channels send messages from `SYSTEM.CLUSTER.TRANSMIT.QUEUE`. The `correlID` of messages placed on the transmission queue identifies which cluster-sender channel the message is destined for.

`SCTQ` is set when a queue manager is defined. This behavior is implicit in versions of IBM WebSphere MQ, earlier than Version 7.5. In earlier versions, the queue manager attribute `DefClusterXmitQueueType` was not present.

**MQCLXQ_CHANNEL**
Each cluster-sender channel sends messages from a different transmission queue. Each transmission queue is created as a permanent dynamic queue from the model queue SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE.

If the queue manager attribute, DefClusterXmitQueueType, is set to CHANNEL, the default configuration is changed to cluster-sender channels being associated with individual cluster transmission queues. The transmission queues are permanent-dynamic queues created from the model queue SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE. Each transmission queue is associated with one cluster-sender channel. As one cluster-sender channel services a cluster transmission queue, the transmission queue contains messages for only one queue manager in one cluster. You can configure clusters so that each queue manager in a cluster contains only one cluster queue. In this case, the message traffic from a queue manager to each cluster queue is transferred separately from messages to other queues.

To query the value, call MQINQ, or send an Inquire Queue Manager ( MQCMD_INQUIRE_Q_MGR) PCF command, setting the MQIA_DEF_CLUSTER_XMIT_Q_TYPE selector. To change the value, send a Change Queue Manager ( MQCMD_CHANGE_Q_MGR) PCF command, setting the MQIA_DEF_CLUSTER_XMIT_Q_TYPE selector.

**Related reference**
Change Queue Manager
Inquire Queue Manager
"MQINQ - Inquire object attributes" on page 685
The MQINQ call returns an array of integers and a set of character strings containing the attributes of an object.

## *DefXmitQName (MQCHAR48)*

This is the name of the transmission queue that is used for the transmission of messages to remote queue managers, if there is no other indication of which transmission queue to use.

If there is no default transmission queue, the name is entirely blank. The initial value of this attribute is blank.

To determine the value of this attribute, use the MQCA_DEF_XMIT_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

## *DistLists (MQLONG)*

This indicates whether the local queue manager supports distribution lists on the MQPUT and MQPUT1 calls. It is one of the following values:

**MQDL_SUPPORTED**
Distribution lists supported.

**MQDL_NOT_SUPPORTED**
Distribution lists not supported.

To determine the value of this attribute, use the MQIA_DIST_LISTS selector with the MQINQ call.

## *DNSGroup (MQCHAR18)*

This parameter is no longer used. Refer to WLM/DNS no longer supported.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQCA_DNS_GROUP selector with the MQINQ call. The length of this attribute is given by MQ_DNS_GROUP_NAME_LENGTH.

## *DNSWLM (MQLONG)*

This parameter is no longer used. Refer to WLM/DNS no longer supported.

The value is one of the following:

**MQDNSWLM_YES**
This value may be seen on a queue manager migrated from an earlier release. The value is ignored.

**MQDNSWLM_NO**
This is the only value supported by the queue manager.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_DNS_WLM selector with the MQINQ call.

## *ExpiryInterval (MQLONG)*

This indicates the frequency with which the queue manager scans the queues looking for expired messages. It is either a time interval in seconds in the range 1 through 99 999 999, or the following special value:

**MQEXPI_OFF**
The queue manager does not scan the queues looking for expired messages.

To determine the value of this attribute, use the MQIA_EXPIRY_INTERVAL selector with the MQINQ call.

This attribute is supported only on z/OS.

## *IGQPutAuthority (MQLONG)*

This attribute applies only if the local queue manager is a member of a queue-sharing group. It indicates the type of authority checking that is performed when the local intra-group queuing agent (IGQ agent) removes a message from the shared transmission queue and places the message on a local queue. The value is one of the following:

**MQIGQPA_DEFAULT**
The user identifier checked for authorization is the value of the *UserIdentifier* field in the *separate* MQMD that is associated with the message when the message is on the shared transmission queue. This is the user identifier of the program that placed the message on the shared transmission queue, and is usually the same as the user identifier under which the remote queue manager is running.

If the RESLEVEL profile indicates that more than one user identifier is to be checked, the user identifier of the local IGQ agent (*IGQUserId*) is also checked.

**MQIGQPA_CONTEXT**
The user identifier checked for authorization is the value of the *UserIdentifier* field in the *separate* MQMD that is associated with the message when the message is on the shared transmission queue. This is the user identifier of the program that placed the message on the shared transmission queue, and is usually the same as the user identifier under which the remote queue manager is running.

If the RESLEVEL profile indicates that more than one user identifier is to be checked, the user identifier of the local IGQ agent (*IGQUserId*) and the value of the *UserIdentifier* field in the *embedded* MQMD are also checked. The latter user identifier is usually the user identifier of the application that originated the message.

**MQIGQPA_ONLY_IGQ**
The user identifier checked for authorization is the user identifier of the local IGQ agent (*IGQUserId*).

If the RESLEVEL profile indicates that more than one user identifier is to be checked, this user identifier is used for all checks.

**MQIGQPA_ALTERNATE_OR_IGQ**
The user identifier checked for authorization is the user identifier of the local IGQ agent (*IGQUserId*).

If the RESLEVEL profile indicates that more than one user identifier is to be checked, the value of the *UserIdentifier* field in the *embedded* MQMD is also checked. This user identifier is usually the user identifier of the application that originated the message.

To determine the value of this attribute, use the MQIA_IGQ_PUT_AUTHORITY selector with the MQINQ call.

This attribute is supported only on z/OS.

### *IGQUserId (MQLONG)*

This attribute is applicable only if the local queue manager is a member of a queue-sharing group. It specifies the user identifier that is associated with the local intra-group queuing agent (IGQ agent). This identifier is one of the user identifiers that can be checked for authorization when the IGQ agent puts messages on local queues. The actual user identifiers checked depend on the setting of the *IGQPutAuthority* attribute, and on external security options.

If *IGQUserId* is blank, no user identifier is associated with the IGQ agent and the corresponding authorization check is not performed (although other user identifiers might still be checked for authorization).

To determine the value of this attribute, use the MQCA_IGQ_USER_ID selector with the MQINQ call. The length of this attribute is given by MQ_USER_ID_LENGTH.

This attribute is supported only on z/OS.

### *InhibitEvent (MQLONG)*

This controls whether inhibit (Inhibit Get and Inhibit Put) events are generated. The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_INHIBIT_EVENT selector with the MQINQ call.

On z/OS, you cannot use the MQINQ call to determine the value of this attribute.

### *IntraGroupqueuing (MQLONG)*

This attribute applies only if the local queue manager is a member of a queue-sharing group. It indicates whether intra-group queuing is enabled for the queue-sharing group. The value is one of the following:

**MQIGQ_DISABLED**
All messages destined for other queue managers in the queue-sharing group are transmitted using conventional channels..

**MQIGQ_ENABLED**
Messages destined for other queue managers in the queue-sharing group are transmitted using the shared transmission queue if the following condition is satisfied:

- The length of the message data plus transmission header does not exceed 63 KB (64 512 bytes).

  It is recommended that somewhat more space than the size of MQXQH be allocated for the transmission header; the constant MQ_MSG_HEADER_LENGTH is provided for this purpose.

If this condition is not satisfied, the message is transmitted using conventional channels.

**Note:** When intra-group queuing is enabled, the order of messages transmitted using the shared transmission queue is not preserved relative to those transmitted using conventional channels.

To determine the value of this attribute, use the MQIA_INTRA_GROUP_queuing selector with the MQINQ call.

This attribute is supported only on z/OS.

### *IPAddressVersion (MQLONG)*

Specifies which IP address version, either IPv4 or IPv6, is used.

This attribute is only relevant for systems that run both IPv4 and IPv6 and only affects channels defined as having a *TransportType* of MQXPY_TCP when one of the following conditions is true:

- The channel's *ConnectionName* is a host name that resolves to both an IPv4 and IPv6 address and its *LocalAddress* parameter is not specified.
- The channel's *ConnectionName* and *LocalAddress* are both host names that resolve to both IPv4 and IPv6 addresses.

The value can be any of the following values:

**MQIPADDR_IPv4**
IPv4 is used.

**MQIPADDR_IPv6**
IPv6 is used.

To determine the value of this attribute, use the MQIA_IP_ADDRESS_VERSION selector with the MQINQ call.

### *ListenerTimer (MQLONG)*

This is the time interval (in seconds) between IBM MQ attempts to restart the listener if there has been an APPC or TCP/IP failure. The value must be between 5 and 9999, with a default value of 60.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_LISTENER_TIMER selector with the MQINQ call.

### *LocalEvent (MQLONG)*

This controls whether local error events are generated. The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_LOCAL_EVENT selector with the MQINQ call.

On z/OS, you cannot use the MQINQ call to determine the value of this attribute.

### *LoggerEvent (MQLONG)*

This controls whether recovery log events are generated. The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_LOGGER_EVENT selector with the MQINQ call.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, and Windows.

### *LUGroupName (MQCHAR8)*

This is the generic LU name for the LU 6.2 listener that handles inbound transmissions for the queue-sharing group. If you leave this name blank, you cannot use this listener.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQCA_LU_GROUP_NAME selector with the MQINQ call. The length of this attribute is given by MQ_LU_NAME_LENGTH.

### *LUName (MQCHAR8)*

This is the name of the LU to use for outbound LU 6.2 transmissions. Set this to the same LU that the listener uses for inbound transmissions. If you leave this name blank, the APPC/MVS default LU is used; this is variable, so always set LUName if you are using LU6.2.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQCA_LU_NAME selector with the MQINQ call. The length of this attribute is given by MQ_LU_NAME_LENGTH.

### *LU62ARMSuffix (MQCHAR2)*

This is the suffix of the SYS1.PARMLIB member APPCPMxx, that nominates the LUADD for this channel initiator. The z/OS command SET APPC=xx is issued when ARM restarts the channel initiator. If you leave this name is blank, no SET APPC=xx is issued.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQCA_LU62_ARM_SUFFIX selector with the MQINQ call. The length of this attribute is given by MQ_ARM_SUFFIX_LENGTH.

### *LU62Channels (MQLONG)*

This is the maximum number of channels that can be current, or clients that can be connected, that use the LU 6.2 transmission protocol.

The value must be in the range 0 through 9999, with a default value of 200. If you set this to zero, the LU 6.2 transmission protocol is not used.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_LU62_CHANNELS selector with the MQINQ call.

### *MaxActiveChannels (MQLONG)*

This attribute is the maximum number of channels that can be *active* at any time.

The default is the value specified for the `MaxChannels` attribute.

For z/OS, the value must be in the range 1 through 9 999.

For all other platforms, the value must be in the range 1 through 65 535.

The **MaxActiveChannels** parameter is a queue manager attribute on z/OS only. On the other platforms, **MaxActiveChannels** is an attribute in the `qm.ini` file. See Configuration file stanzas for distributed queuing for information on how you set the **MaxActiveChannels** attribute on other platforms.

To determine the value of this attribute, use the MQIA_ACTIVE_CHANNELS selector with the **MQINQ** call.

**Related concepts**

Channel states

### *MaxChannels (MQLONG)*

This attribute is the maximum number of channels that can be *current* (including server-connection channels with connected clients).

For z/OS, the value must be in the range 1 through 9 999, with a default value of 200.

For all other platforms, the value must be in the range 1 through 65 535, with a default value of 100.

A system that is busy serving connections from the network might need a higher number than the default setting. Determine the value that is correct for your environment, ideally by observing the behavior of your system during testing.

The **MaxChannels** parameter is a queue manager attribute on z/OS only. On the other platforms, **MaxChannels** is an attribute in the `qm.ini` file. See Configuration file stanzas for distributed queuing for information on how you set the **MaxChannels** attribute on other platforms.

To determine the value of this attribute, use the MQIA_MAX_CHANNELS selector with the **MQINQ** call.

**Related concepts**
Channel states

### *MaxHandles (MQLONG)*

This is the maximum number of open handles that any one task can use concurrently. Each successful MQOPEN call for a single queue (or for an object that is not a queue) uses one handle. That handle becomes available for reuse when the object is closed. However, when a distribution list is opened, each queue in the distribution list is allocated a separate handle, and so that MQOPEN call uses as many handles as there are queues in the distribution list. This must be taken into account when deciding on a suitable value for *MaxHandles*.

The MQPUT1 call performs an MQOPEN call as part of its processing; as a result, MQPUT1 uses as many handles as MQOPEN would, but the handles are used only for the duration of the MQPUT1 call itself.

On z/OS, *task* means a CICS task, an MVS task, or an IMS dependent region.

The value is in the range 1 through 999 999 999. The default value is determined by the environment:

- On z/OS, the default value is 100.
- In all other environments, the default value is 256.

To determine the value of this attribute, use the MQIA_MAX_HANDLES selector with the MQINQ call.

### *MaxMsgLength (MQLONG)*

This is the length of the longest *physical* message that the queue manager can handle. However, because the *MaxMsgLength* queue-manager attribute can be set independently of the *MaxMsgLength* queue attribute, the longest physical message that can be placed on a queue is the lesser of those two values.

If the queue manager supports segmentation, an application can put a *logical* message that is longer than the lesser of the two *MaxMsgLength* attributes, but only if the application specifies the MQMF_SEGMENTATION_ALLOWED flag in MQMD. If that flag is specified, the upper limit for the length of a logical message is 999 999 999 bytes, but usually resource constraints imposed by the operating system, or by the environment in which the application is running, result in a lower limit.

The lower limit for the *MaxMsgLength* attribute is 32 KB (32 768 bytes). The upper limit is 100 MB (104 857 600 bytes).

To determine the value of this attribute, use the MQIA_MAX_MSG_LENGTH selector with the MQINQ call.

### *MaxPriority (MQLONG)*

This is the maximum message priority supported by the queue manager. Priorities range from zero (lowest) to *MaxPriority* (highest).

To determine the value of this attribute, use the MQIA_MAX_PRIORITY selector with the MQINQ call.

### *MaxPropertiesLength (MQLONG)*

This is used to control the size of the properties that can flow with a message. This includes both the property name in bytes and the size of the property value also in bytes.

To determine the value of this attribute, use the MQIA_MAX_PROPERTIES_LENGTH selector with the MQINQ call.

### *MaxUncommittedMsgs (MQLONG)*

This is the maximum number of uncommitted messages that can exist within a unit of work. The number of uncommitted messages is the sum of the following since the start of the current unit of work:

- Messages put by the application with the MQPMO_SYNCPOINT option
- Messages retrieved by the application with the MQGMO_SYNCPOINT option

- Trigger messages and COA report messages generated by the queue manager for messages put with the MQPMO_SYNCPOINT option
- COD report messages generated by the queue manager for messages retrieved with the MQGMO_SYNCPOINT option

The following are *not* counted as uncommitted messages:

- Messages put or retrieved by the application outside a unit of work
- Trigger messages or COA/COD report messages generated by the queue manager as a result of messages put or retrieved outside a unit of work
- Expiration report messages generated by the queue manager (even if the call causing the expiration report message specified MQGMO_SYNCPOINT)
- Event messages generated by the queue manager (even if the call causing the event message specified MQPMO_SYNCPOINT or MQGMO_SYNCPOINT)

**Note:**

1. Exception report messages are generated by the Message Channel Agent (MCA), or by the application, and are treated in the same way as ordinary messages put or retrieved by the application.
2. When a message or segment is put with the MQPMO_SYNCPOINT option, the number of uncommitted messages is incremented by one regardless of how many physical messages actually result from the put. (More than one physical message might result if the queue manager must subdivide the message or segment.)
3. When a distribution list is put with the MQPMO_SYNCPOINT option, the number of uncommitted messages is incremented by one *for each physical message that is generated*. This can be as small as one, or as great as the number of destinations in the distribution list.

The lower limit for this attribute is 1; the upper limit is 999 999 999. The default value is 10000.

To determine the value of this attribute, use the MQIA_MAX_UNCOMMITTED_MSGS selector with the MQINQ call.

### *MQIAccounting (MQLONG)*

This controls the collection of accounting information for MQI data.

The value is one of the following:

**MQMON_ON**
Collect API accounting data.

**MQMON_OFF**
Do not collect API accounting data. This is the default value.

If you set the queue manager attribute ACCTCONO to ENABLED, this value might be overridden for individual connections using the Options field in the MQCNO structure. Changes to this value are only effective for connections to the queue manager that occur after the change to the attribute.

This attribute is supported only on IBM i, UNIX systems, and Windows.

To determine the value of this attribute, use the MQIA_ACCOUNTING_MQI selector with the MQINQ call.

### *MQIStatistics (MQLONG)*

This controls the collection of statistics monitoring information for the queue manager.

The value is one of the following:

**MQMON_ON**
Collect MQI statistics.

**MQMON_OFF**
Do not collect MQI statistics. This is the default value.

This attribute is supported only on IBM i, UNIX and Linux systems, and Windows.

To determine the value of this attribute, use the MQIA_STATISTICS_MQI selector with the MQINQ call.

### *MsgMarkBrowseInterval (MQLONG)*

Time interval in milliseconds after which the queue manager can automatically remove the mark from browse messages.

This is a time interval (in milliseconds) after which the queue manager can automatically remove the mark from browse messages.

This attribute describes the time interval for which messages that have been marked as browsed by a call to MQGET, using the get message option MQGMO_MARK_BROWSE_CO_OP, are expected to remain marked as browsed.

The queue manager might automatically unmark browsed messages that have been marked as browsed for the cooperating set of handles when they have been marked for more than this approximate interval.

This does not affect the state of any message marked as browse, that was obtained by a call to MQGET, using the get message option MQGMO_MARK_BROWSE_HANDLE.

The maximum value is 999 999 999 and the default value is 5000. A special value of -1 for *MsgMarkBrowseInterval* represents an unlimited time interval.

**Attention:** This value should not be below the default of 5000.

To determine the value of this attribute, use the MQIA_MSG_MARK_BROWSE_INTERVAL selector with the MQINQ call.

### *OutboundPortMax (MQLONG)*

This is the highest port number in the range, defined by OutboundPortMin and OutboundPortMax, of port numbers to be used to bind outgoing channels.

The value is an integer in the range 0 through 65535, and must be equal to or greater than the OutboundPortMin value. The default value is 0.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_OUTBOUND_PORT_MAX selector with the MQINQ call.

### *OutboundPortMin (MQLONG)*

This is the lowest port number in the range, defined by OutboundPortMin and OutboundPortMax, of port numbers to be used to bind outgoing channels.

The value is an integer in the range 0 through 65535, and must be equal to or less than the OutboundPortMax value. The default value is 0.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_OUTBOUND_PORT_MIN selector with the MQINQ call.

### *PerformanceEvent (MQLONG)*

This controls whether performance-related events are generated. It is one of the following values:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_PERFORMANCE_EVENT selector with the MQINQ call.

### *Platform (MQLONG)*

This indicates the operating system on which the queue manager is running:

**MQPL_AIX**
AIX (same value as MQPL_UNIX).

V 8.0.0.2 **MQPL_APPLIANCE**
IBM MQ Appliance

**MQPL_MVS**
z/OS (same value as MQPL_ZOS).

**MQPL_NSK**
HP Integrity NonStop Server.

**MQPL_OS390**
z/OS (same value as MQPL_ZOS).

**MQPL_OS400**
IBM i.

**MQPL_UNIX**
UNIX systems.

**MQPL_WINDOWS_NT**
Windows systems.

**MQPL_ZOS**
z/OS.

To determine the value of this attribute, use the MQIA_PLATFORM selector with the MQINQ call.

### *PubSubNPInputMsg (MQLONG)*

Whether to discard or keep an undelivered input message.

The value is one of the following:

**MQUNDELIVERED_DISCARD**
Non-persistent input messages may be discarded if they cannot be processed.

This is the default value.

**MQUNDELIVERED_KEEP**
Non-persistent input messages will not be discarded if they cannot be processed. In this situation the queued publish/subscribe interface will continue to retry the process at appropriate intervals and does not continue processing subsequent messages.

To determine the value of this attribute, use the MQIA_PUBSUB_NP_MSG selector with the MQINQ call.

### *PubSubNPResponse (MQLONG)*

Controls the behavior of undelivered response messages.

The value is one of the following:

**MQUNDELIVERED_NORMAL**
Non-persistent responses which cannot be placed on the reply queue are put on the dead letter queue, if they cannot be placed on the DLQ then they are discarded.

**MQUNDELIVERED_SAFE**
Non-persistent responses which cannot be placed on the reply queue are put on the dead letter queue. If the response cannot be set and cannot be placed on the DLQ then the queued publish/subscribe interface will roll back the current operation and then retry at appropriate intervals and does not continue processing subsequent messages.

**MQUNDELIVERED_DISCARD**
Non-persistent responses are not placed on the reply queue are discarded.

This is the default value for new queue managers.

**MQUNDELIVERED_KEEP**
Non-persistent responses are not placed on the dead letter queue or discarded. Instead, the queued publish/subscribe interface will back out the current operation and then retry it at appropriate intervals.

To determine the value of this attribute, use the MQIA_PUBSUB_NP_RESP selector with the MQINQ call.

### Default value for migrated queue managers.

If the queue manager has been migrated from IBM MQ V6.0, the initial value of this attribute depends on the values of *DiscardNonPersistentResponse* and *DLQNonPersistentResponse* before migration, as shown in the following table.

| | | DLQNonPersistentResponse | | |
|---|---|---|---|---|
| | | **Yes** | **No** | **Not set** |
| **DiscardNonPersistentResponse** | **Yes** | MQUNDELIVERED_NORMAL | MQUNDELIVERED_DISCARD | MQUNDELIVERED_NORMAL |
| | **No** | MQUNDELIVERED_SAFE | MQUNDELIVERED_KEEP | MQUNDELIVERED_SAFE |
| | **Not set** | If SyncPointPersistent = No, MQUNDELIVERED_SAFE else MQUNDELIVERED_NORMAL | If SyncPointPersistent = No, MQUNDELIVERED_KEEP else MQUNDELIVERED_DISCARD | If SyncPointPersistent = No, MQUNDELIVERED_SAFE else MQUNDELIVERED_NORMAL |

## *PubSubMaxMsgRetryCount (MQLONG)*

The number of retries when processing a failed command message under syncpoint.

The value is one of the following:

**0 - 999 999 999**
The default value is 5.

To determine the value of this attribute, use the MQIA_PUBSUB_MAXMSG_RETRY_COUNT selector with the MQINQ call.

## *PubSubSyncPoint (MQLONG)*

Whether only persistent messages or all messages are processed under syncpoint.

The value is one of the following:

**MQSYNCPOINT_IFPER**
This makes the queued publish/subscribe interface receive non-persistent messages outside syncpoint. If the daemon receives a publication outside syncpoint, the daemon forwards the publication to subscribers known to it outside syncpoint.

This is the default value.

**MQSYNCPOINT_YES**
This makes the queued publish/subscribe interface receive all messages under syncpoint.

To determine the value of this attribute, use the MQIA_PUBSUB_SYNC_PT selector with the MQINQ call.

## *PubSubMode (MQLONG)*

Whether the publish/subscribe engine and the queued publish/subscribe interface are running, therefore allowing applications to publish/subscribe by using the application programming interface and the queues that are being monitored by the queued publish/subscribe interface.

The value is one of the following:

**MQPSM_COMPAT**
The publish/subscribe engine is running. It is therefore possible to publish/subscribe by using the application programming interface. The queued publish/subscribe interface is not running, therefore any message that is put to the queues that are monitored by the queued publish/subscribe interface is not acted on. This setting is used for compatibility with WebSphere Message Broker V6 or earlier versions using this queue manager, because it must read the same queues from which the queued publish/subscribe interface normally reads.

**MQPSM_DISABLED**
The publish/subscribe engine and the queued publish/subscribe interface are not running. It is therefore not possible to publish/subscribe by using the application programming interface. Any publish/subscribe messages that are put to the queues that are monitored by the queued publish/subscribe interface are not acted on.

**MQPSM_ENABLED**
The publish/subscribe engine and the queued publish/subscribe interface are running. It is therefore possible to publish/subscribe by using the application programming interface and the queues that are being monitored by the queued publish/subscribe interface. This is the queue manager's initial default value.

To determine the value of this attribute, use the MQIA_PUBSUB_MODE selector with the MQINQ call.

## *QMgrDesc (MQCHAR64)*

Use this field for a commentary describing the queue manager. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, this field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

- On z/OS, the default value is the product name and version number.
- In all other environments, the default value is blanks.

To determine the value of this attribute, use the MQCA_Q_MGR_DESC selector with the MQINQ call. The length of this attribute is given by MQ_Q_MGR_DESC_LENGTH.

## *QMgrIdentifier (MQCHAR48)*

This is an internally-generated unique name for the queue manager.

To determine the value of this attribute, use the MQCA_Q_MGR_IDENTIFIER selector with the MQINQ call. The length of this attribute is given by MQ_Q_MGR_IDENTIFIER_LENGTH.

This attribute is supported in the following environments: AIX, HP-UX, z/OS, IBM i, Solaris, Linux, Windows, plus IBM MQ clients connected to these systems.

## *QMgrName (MQCHAR48)*

This is the name of the local queue manager, that is, the name of the queue manager to which the application is connected.

The first 12 characters of the name are used to construct a unique message identifier (see MQMD - MsgId field ). Queue managers that can intercommunicate must therefore have names that differ in the first 12 characters, in order for message identifiers to be unique in the queue-manager network.

On z/OS, the name is the same as the subsystem name, which is limited to 4 nonblank characters.

To determine the value of this attribute, use the MQCA_Q_MGR_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_MGR_NAME_LENGTH.

## *QSGName (MQCHAR4)*

This is the name of the queue-sharing group to which the local queue manager belongs. If the local queue manager does not belong to a queue-sharing group, the name is blank.

To determine the value of this attribute, use the MQCA_QSG_NAME selector with the MQINQ call. The length of this attribute is given by MQ_QSG_NAME_LENGTH.

This attribute is supported only on z/OS.

### *QueueAccounting (MQLONG)*

This controls the collection of accounting information for queues.

The value is one of the following:

**MQMON_NONE**
Do not collect accounting data for queues, regardless of the setting of the queue accounting attribute ACCTQ. This is the default value.

**MQMON_OFF**
Do not collect accounting data for queues that specify QMGR in the ACCTQ queue attribute.

**MQMON_ON**
Collect accounting data for queues that specify QMGR in the ACCTQ queue attribute.

Changes to this value are only effective for connections to the queue manager that occur after the change to the attribute.

To determine the value of this attribute, use the MQIA_ACCOUNTING_Q selector with the MQINQ call.

### *QueueMonitoring (MQLONG)*

This specifies the default setting for online monitoring of queues.

If the *QueueMonitoring* queue attribute is set to MQMON_Q_MGR, this attribute specifies the value which is assumed by the channel. The value can be:

**MQMON_OFF**
Online monitoring data collection is turned off. This is the queue manager's initial default value.

**MQMON_NONE**
Online monitoring data collection is turned off for queues regardless of the setting of their *QueueMonitoring* attribute.

**MQMON_LOW**
Online monitoring data collection is turned on, with a low ratio of data collection.

**MQMON_MEDIUM**
Online monitoring data collection is turned on, with a moderate ratio of data collection.

**MQMON_HIGH**
Online monitoring data collection is turned on, with a high ratio of data collection.

To determine the value of this attribute, use the MQIA_MONITORING_Q selector with the MQINQ call.

### *QueueStatistics (MQLONG)*

This controls the collection of statistics data for queues.

It is one of the following values:

**MQMON_NONE**
Do not collect queue statistics for queues, regardless of the setting of the *QueueStatistics* queue attribute. This is the default value.

**MQMON_OFF**
Do not collect statistics data for queues that specify Queue Manager in the *QueueStatistics* queue attribute.

**MQMON_ON**
Collect statistics data for queues that specify Queue Manager in the *QueueStatistics* queue attribute.

To determine the value of this attribute, use the MQIA_STATISTICS_Q selector with the MQINQ call.

### *ReceiveTimeout (MQLONG)*

This specifies how long a TCP/IP channel waits to receive data, including heartbeats, from its partner before returning to the inactive state. It applies only to message channels and not to MQI channels.

The exact meaning of the ReceiveTimeout is altered by the value specified in ReceiveTimeoutType. ReceiveTimeoutType can be set to one of the following:

- MQRCVTIME_EQUAL - this value is the number in seconds for the channel to wait. Specify a value in the range 0 - 999999.
- MQRCVTIME_ADD - this value is the number in seconds to add to the negotiated HBINT, and it determines how long a channel waits. Specify a value in the range 1 - 999999.
- MQRCVTIME_MULTIPLY - this value is a multiplier to apply to the negotiated HBINT. Specify a value of 0 or a value in the range 2 - 99.

The default value is 0.

Set ReceiveTimeoutType to MQRCVTIME_MULTIPLY or MQRCVTIME_EQUAL, and ReceiveTimeout to 0, to stop a channel from timing out its wait to receive data from its partner.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_RECEIVE_TIMEOUT selector with the MQINQ call.

### *ReceiveTimeoutMin (MQLONG)*

This is the minimum time, in seconds, that a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state.

It applies only to message channels, not to MQI channels. The value must be in the range 0 through 999999, with a default of 0.

If you use ReceiveTimeoutType to specify that the TCP/IP channel wait time is to be calculated relative to the negotiated value of HBINT, and the resultant value is less than the value of this parameter, this value is used instead.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_RECEIVE_TIMEOUT_MIN selector with the MQINQ call.

### *ReceiveTimeoutType (MQLONG)*

This is the qualifier, applied to ReceiveTimeout to define how long a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state. It applies only to message channels, not to MQI channels.

The value is one of the following:

**MQRCVTIME_MULTIPLY**
ReceiveTimeout is a multiplier to apply to the negotiated HBINT value to determine how long a channel waits. This is the default value.

**MQRCVTIME_ADD**
ReceiveTimeout is a value, in seconds, to add to the negotiated HBINT value to determine how long a channel waits.

**MQRCVTIME_EQUAL**
ReceiveTimeout is a value, in seconds, that the channel waits.

To stop a channel timing out its wait to receive data from its partner, set ReceiveTimeoutType to MQRCVTIME_MULTIPLY or MQRCVTIME_EQUAL, and ReceiveTimeout to 0.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_RECEIVE_TIMEOUT_TYPE selector with the MQINQ call.

### *RemoteEvent (MQLONG)*

This controls whether remote error events are generated. It is one of the following values:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_REMOTE_EVENT selector with the MQINQ call.

### *RepositoryName (MQCHAR48)*

This is the name of a cluster for which this queue manager provides a repository-manager service. If the queue manager provides this service for more than one cluster, *RepositoryNamelist* specifies the name of a namelist object that identifies the clusters, and *RepositoryName* is blank. At least one of *RepositoryName* and *RepositoryNamelist* must be blank.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows, and z/OS.

To determine the value of this attribute, use the MQCA_REPOSITORY_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_MGR_NAME_LENGTH.

### *RepositoryNamelist (MQCHAR48)*

This is the name of a namelist object that contains the names of clusters for which this queue manager provides a repository-manager service. If the queue manager provides this service for only one cluster, the namelist object contains only one name. Alternatively, *RepositoryName* can be used to specify the name of the cluster, in which case *RepositoryNamelist* is blank. At least one of *RepositoryName* and *RepositoryNamelist* must be blank.

This attribute is supported only on AIX, HP-UX, IBM i, Linux, Solaris, Windows, and z/OS.

To determine the value of this attribute, use the MQCA_REPOSITORY_NAMELIST selector with the MQINQ call. The length of this attribute is given by MQ_NAMELIST_NAME_LENGTH.

### *ScyCase(MQCHAR8)*

Specifies whether the queue manager supports security profile names in mixed case, or in uppercase only.

The value is one of the following:

**MQSCYC_UPPER**
Security profile names must be in uppercase.

**MQSCYC_MIXED**
Security profile names can be in uppercase or in mixed case.

Changes to this attribute take effect when a Refresh Security command is run with *SecurityType(MQSECTYPE_CLASSES)* specified.

This attribute is supported only on z/OS.

To determine the value of this attribute, use the MQIA_SECURITY_CASE selector with the MQINQ call.

### *SharedQMgrName (MQLONG)*

This specifies whether the *ObjectQmgrName* should be used or treated as the local queue manager on an MQOPEN call, for a shared queue, when the *ObjectQmgrName* is that of another queue manager in the queue-sharing group.

The value can be any of the following values:

**MQSQQM_USE**
*ObjectQmgrName* is used and the appropriate transmission queue is opened.

**MQSQQM_IGNORE**
If the target queue is shared, and the *ObjectQmgrName* is that of a queue manager in the same queue-sharing group, the open is performed locally.

This attribute is valid only on z/OS.

To determine the value of this attribute, use the MQIA_SHARED_Q_Q_MGR_NAME selector with the MQINQ call.

### *SPLCAP*
Indicates whether security capabilities of IBM MQ Advanced Message Security are available for a queue manager.

**MQCAP_SUPPORTED**
This is the default value if the IBM MQ AMS component is installed for the installation that the queue manager is running under.

**MQCAP_NOT_SUPPORTED**

### *SSLEvent (MQLONG)*
This specifies whether SSL events are generated.

It is one of the following values:

**MQEVR_ENABLED**
Generate SSL events, as follows:

MQRC_CHANNEL_SSL_ERROR

**MQEVR_DISABLED**
Do not generate SSL events; this is the default value.

To determine the value of this attribute, use the MQIA_SSL_EVENT selector with the MQINQ call.

### *SSLFIPSRequired (MQLONG)*

This lets you specify that only FIPS-certified algorithms are to be used if the cryptography is executed in IBM MQ, rather than in cryptographic hardware. If cryptographic hardware is configured, the cryptography modules used are those modules provided by the hardware product; these modules might or might not be FIPS-certified to a particular level depending on the hardware product in use.

The value is one of the following values:

**MQSSL_FIPS_NO**
Use any CipherSpec supported on the platform in use. This value is the default value.

**MQSSL_FIPS_YES**
Use only FIPS-certified cryptographic algorithms in the CipherSpecs allowed on all SSL connections from and to this queue manager.

This parameter is valid only on UNIX, Linux, Windows, and z/OS platforms.

To determine the value of this attribute, use the MQIA_SSL_FIPS_REQUIRED selector with the MQINQ call.

**Related tasks**
Specifying that only FIPS-certified CipherSpecs are used at run time on the MQI client
**Related reference**
Federal Information Processing Standards (FIPS) for UNIX, Linux and Windows

### *SSLKeyResetCount (MQLONG)*

This specifies when SSL channel message channel agents (MCAs) that initiate communication reset the secret key used for encryption on the channel.

The value represents the total number of unencrypted bytes that are sent and received on the channel before the secret key is renegotiated. The number of bytes includes control information sent by the MCA.

The value is a number in the range 0 through 999 999 999, with a default value of 0. If you specify an SSL/TLS secret key reset count in the range 1 byte through 32 KB, SSL/TLS channels will use a secret key reset count of 32 KB. This is to avoid the processing cost of excessive key resets which would occur for small SSL/TLS secret key reset values.

The secret key is renegotiated when the total number of unencrypted bytes sent and received by the initiating channel MCA exceeds the specified value, or if channel heartbeats are enabled before data is sent or received following a channel heartbeat, whichever occurs first.

The count of bytes sent and received for renegotiation includes control information sent and received by the channel MCA and is reset whenever a renegotiation occurs.

Use a value of 0 to indicate that secret keys are never renegotiated.

To determine the value of this attribute, use the MQIA_SSL_RESET_COUNT selector with the MQINQ call.

### *StartStopEvent (MQLONG)*

This controls whether start and stop events are generated. The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_START_STOP_EVENT selector with the MQINQ call.

### *StatisticsInterval (MQLONG)*

This specifies how often (in seconds) to write statistics monitoring data to the monitoring queue.

The value is an integer in the range 0 to 604800, with a default value of 1800 (30 minutes).

To determine the value of this attribute, use the MQIA_STATISTICS_INTERVAL selector with the MQINQ call.

### *SyncPoint (MQLONG)*

This indicates whether the local queue manager supports units of work and syncpointing with the MQGET, MQPUT, and MQPUT1 calls.

**MQSP_AVAILABLE**
Units of work and syncpointing available.

**MQSP_NOT_AVAILABLE**
Units of work and syncpointing not available.

- On z/OS this value is never returned.

To determine the value of this attribute, use the MQIA_SYNCPOINT selector with the MQINQ call.

### *TCPChannels (MQLONG)*

This is the maximum number of channels that can be current, or clients that can be connected, that use the TCP/IP transmission protocol.

The value must be in the range 0 through 9999, with a default value of 200. If you specify 0, TCP/IP is not used.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_TCP_CHANNELS selector with the MQINQ call.

### *TCPKeepAlive (MQLONG)*

This specifies whether to use TCP KEEPALIVE to check that the other end of the connection is still available. If it is not available, the channel is closed.

The value is one of the following:

**MQTCPKEEP_YES**
Use TCP KEEPALIVE as specified in the TCP profile configuration data set. If you specify the channel attribute KeepAliveInterval (KAINT), the value to which it is set is used.

**MQTCPKEEP_NO**
Do not use TCP KEEPALIVE. This is the default value.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_TCP_KEEP_ALIVE selector with the MQINQ call.

### *TCPName (MQCHAR8)*

This is the name of either the only or preferred TCP/IP stack that will be used, depending on the value of TCPStackType. This parameter is only applicable in CINET multiple stack environments. The default value is TCPIP.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQCA_TCP_NAME selector with the MQINQ call. The length of this attribute is given by MQ_TCP_NAME_LENGTH.

### *TCPStackType (MQLONG)*

This specifies whether the channel initiator can use only the TCP/IP stack specified in TCPName, or can optionally bind to any selected TCP/IP stack. This parameter is only applicable in CINET multiple stack environments.

The value is one of the following:

**MQTCPSTACK_SINGLE**
The channel initiator can use only the TCP/IP address spaces named in TCPName. This is the default value.

**MQTCPSTACK_MULTIPLE**
The channel initiator can use any TCP/IP address space available to it. It defaults to the one specified in TCPName if no other is specified for a channel or listener.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_TCP_STACK_TYPE selector with the MQINQ call.

### *TraceRouteRecording (MQLONG)*

This controls the recording of trace- route information.

The value is one of the following:

**MQRECORDING_DISABLED**
No appending to trace- route messages allowed.

**MQRECORDING_Q**
Put trace- route messages to fixed named queue.

**MQRECORDING_MSG**
Put trace- route messages to a queue determined using the message itself. This is the default value

To determine the value of this attribute, use the MQIA_TRACE_ROUTE_RECORDING selector with the MQINQ call.

### *TriggerInterval (MQLONG)*

This is a time interval (in milliseconds) used to restrict the number of trigger messages. This is relevant only when the *TriggerType* is MQTT_FIRST. In this case trigger messages are usually generated only when a suitable message arrives on the queue, and the queue was previously empty. Under certain circumstances, however, an additional trigger message can be generated with MQTT_FIRST triggering even if the queue was not empty. These additional trigger messages are not generated more often than every *TriggerInterval* milliseconds.

For more information on triggering, see Triggering channels.

The value is not less than 0 and not greater than 999 999 999. The default value is 999 999 999.

To determine the value of this attribute, use the MQIA_TRIGGER_INTERVAL selector with the MQINQ call.

### *TriggerInterval (MQLONG)*

This is a time interval (in milliseconds) used to restrict the number of trigger messages. This is relevant only when the *TriggerType* is MQTT_FIRST. In this case trigger messages are usually generated only when a suitable message arrives on the queue, and the queue was previously empty. Under certain circumstances, however, an additional trigger message can be generated with MQTT_FIRST triggering even if the queue was not empty. These additional trigger messages are not generated more often than every *TriggerInterval* milliseconds.

For more information on triggering, see Triggering channels.

The value is not less than 0 and not greater than 999 999 999. The default value is 999 999 999.

To determine the value of this attribute, use the MQIA_TRIGGER_INTERVAL selector with the MQINQ call.

### *Version (MQCFST)*

This is the version of the IBM MQ code as VVRRMMFF, where:

VV - Version

RR - Release

MM - Maintenance level

FF - Fix level

### *XrCapability(MQLONG)*

This controls whether IBM MQ Telemetry commands are supported by the queue manager.

The value is one of the following:

**MQCAP_SUPPORTED**
IBM MQ Telemetry component installed and Telemetry commands are supported.

**MQCAP_NOT_SUPPORTED**
IBM MQ Telemetry component not installed.

This attribute is supported only on IBM i, Unix systems, and Windows.

To determine the value of this attribute, use the MQIA_XR_CAPABILITY selector with the MQINQ call.

## Attributes for queues

There are five types of queue definition. Some queue attributes apply to all types of queue; other queue attributes apply only to certain types of queue.

### Types of queue

The queue manager supports the following types of queue definition:

**Local queue**

You can store messages on a local queue.

z/OS On z/OS you can make it a shared or private queue.

A queue is known to a program as *local* if it is owned by the queue manager to which the program is connected. You can get messages from, and put messages on, local queues.

The queue definition object holds the definition information of the queue as well as the physical messages put on the queue.

**Local queue manager queue**

The queue exists on the local queue manager.

z/OS The queue is known as a private queue on z/OS.

z/OS **Shared queue (z/OS only)**

The queue exists in a shared repository that is accessible to all the queue managers that belong to the queue-sharing group that owns the shared repository.

Applications connected to any queue manager in the queue-sharing group can place messages on and remove messages from queues of this type. Such queues are effectively the same as local queues. The value of the **QType** queue attribute is `MQQT_LOCAL`.

Applications connected to the local queue manager can place messages on and remove messages from queues of this type. The value of the **QType** queue attribute is `MQQT_LOCAL`.

**Cluster queue**

You can store messages on a cluster queue on the queue manager where it is defined. A cluster queue is a queue that is hosted by a cluster queue manager and made available to other queue managers in the cluster. The value of the **QType** queue attribute is `MQQT_CLUSTER`.

A cluster queue definition is advertised to other queue managers in the cluster. The other queue managers in the cluster can put messages to a cluster queue without needing a corresponding remote-queue definition. A cluster queue can be advertised in more than one cluster by using a cluster namelist.

When a queue is advertised, any queue manager in the cluster can put messages to it. To put a message, the queue manager must find out, from the full repositories, where the queue is hosted. Then it adds some routing information to the message and puts the message on a cluster transmission queue.

A queue manager can store messages for other queue managers in a cluster on multiple transmission queues. You can configure a queue manager to store messages on multiple cluster transmission queues in two different ways. If you set the queue manager attribute **DEFCLXQ** to `CHANNEL`, a different cluster transmission queue is created automatically from `SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE` for each cluster-sender channel. If you set the `CLCHNAME` transmission queue option to match one or more cluster-senders channel, the queue manager can store messages for the matching channels on that transmission queue.

**Attention:** If you are using dedicated `SYSTEM.CLUSTER.TRANSMIT.QUEUES` with a queue manager that was upgraded from a version of the product earlier than IBM WebSphere MQ 7.5, ensure that the `SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE` has the SHARE/NOSHARE option set to **SHARE**.

z/OS A cluster queue can be a queue that is shared by members of a queue-sharing group in IBM MQ for z/OS.

**Remote queue**
A remote queue is not a physical queue; it is the local definition of a queue that exists on a remote queue manager. The local definition of the remote queue contains information that tells the local queue manager how to route messages to the remote queue manager.

Applications connected to the local queue manager can place messages on queues of this type; the messages are placed on the local transmission queue used to route messages to the remote queue manager. Applications cannot remove messages from remote queues. The value of the **QType** queue attribute is `MQQT_REMOTE`.

You can also use a remote queue definition for:

- Reply-queue aliasing

  In this case the name of the definition is the name of a reply-to queue. For more information, see Reply-to queue aliases and clusters.
- Queue-manager aliasing

  In this case the name of the definition is an alias for a queue manager, and not the name of a queue. For more information, see Queue manager aliases and clusters.

**Alias queue**
This is not a physical queue; it is an alternative name for a local queue, a shared queue, a cluster queue, or a remote queue. The name of the queue to which the alias resolves is part of the definition of the alias queue.

Applications connected to the local queue manager can place messages on queues of this type; the messages are placed on the queue to which the alias resolves. Applications can remove messages from queues of this type if the alias resolves to a local queue, a shared queue, or a cluster queue that has a local instance. The value of the **QType** queue attribute is `MQQT_ALIAS`.

**Model queue**
This is not a physical queue; it is a set of queue attributes from which a local queue can be created.

Messages cannot be stored on queues of this type.

## Queue limits

V 8.0.0.15

From Version 8.0.0, Fix Pack 15, the queue manager limits the maximum queue file size to 2 TB by default.

## Queue attributes

Some queue attributes apply to all types of queue; other queue attributes apply only to certain types of queue. The types of queue to which an attribute applies are shown in Table 561 on page 812 and subsequent tables.

Table 561 on page 812 summarizes the attributes that are specific to queues. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown in this section are descriptive names used with the `MQINQ` and `MQSET` calls; the names are the same as for the PCF commands. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see Script (MQSC) commands for details.

*Table 561. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If any other attributes are inquired, the call returns completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE (2068).

  If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

  If the cluster queue is opened for inquire alone, or for inquire and output, plus specifying the base queue manager name, the column for local queues applies instead.

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| AlterationDate | Date when definition was last changed | ✓ | | ✓ | ✓ | |
| AlterationTime | Time when definition was last changed | ✓ | | ✓ | ✓ | |
| BackoutRequeueQName | Excessive backout requeue queue name | ✓ | ✓ | | | |
| BackoutThreshold | Backout threshold | ✓ | ✓ | | | |
| BaseQName | Queue name to which alias resolves | | | ✓ | | |
| CFStrucName | Coupling-facility structure name | ✓ | ✓ | | | |
| CLCHNAME | Cluster-sender channel names | ✓ | ✓ | | | |
| ClusterName | Name of cluster to which queue belongs | ✓ | | ✓ | ✓ | ✓ |
| ClusterNamelist | Name of namelist object containing names of clusters to which queue belongs | ✓ | | ✓ | ✓ | |
| CLWLQueuePriority | Cluster workload queue priority | ✓ | | ✓ | ✓ | ✓ |
| CLWLQueueRank | Cluster workload queue rank | ✓ | | ✓ | ✓ | ✓ |
| CLWLUseQ | Use remote queue | ✓ | | | | |
| CreationDate | Date that the queue was created | ✓ | | | | |
| CreationTime | Time that the queue was created | ✓ | | | | |
| CurrentQDepth | Current queue depth | ✓ | | | | |
| DefaultPutResponse | Default put response | ✓ | ✓ | ✓ | ✓ | |
| DefBind | Default binding | ✓ | | ✓ | ✓ | ✓ |
| DefinitionType attribute | Queue definition type | ✓ | ✓ | | | |
| DefInputOpenOption | Default input open option | ✓ | ✓ | | | |
| DefPersistence | Default message persistence | ✓ | ✓ | ✓ | ✓ | ✓ |
| DefPriority | Default message priority | ✓ | ✓ | ✓ | ✓ | ✓ |
| DefReadAhead | Default read ahead | ✓ | ✓ | ✓ | | |
| DistLists | Distribution list support | ✓ | ✓ | | | |
| HardenGetBackout | Whether to maintain an accurate backout count | ✓ | ✓ | | | |
| IndexType | Index type | ✓ | ✓ | | | |
| InhibitGet | Whether get operations for the queue are allowed | ✓ | ✓ | ✓ | | |
| InhibitPut | Whether put operations for the queue are allowed | ✓ | ✓ | ✓ | ✓ | ✓ |

*Table 561. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If any other attributes are inquired, the call returns completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE (2068).

  If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

  If the cluster queue is opened for inquire alone, or for inquire and output, plus specifying the base queue manager name, the column for local queues applies instead.

*(continued)*

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| InitiationQName | Name of initiation queue | ✓ | ✓ | | | |
| MaxMsgLength | Maximum message length in bytes | ✓ | ✓ | | | |
| MaxQDepth | Maximum queue depth | ✓ | ✓ | | | |
| MsgDeliverySequence attribute | Message delivery sequence | ✓ | ✓ | | | |
| NonPersistentMessage Class | Reliability goal for non-persistent messages | ✓ | ✓ | | | |
| OpenInputCount | Number of opens for input | ✓ | | | | |
| OpenOutputCount | Number of opens for output | ✓ | | | | |
| PropertyControl | Property control | ✓ | ✓ | ✓ | | |
| ProcessName | Process name | ✓ | ✓ | | | |
| QDepthHighEvent attribute | Whether Queue Depth High events are generated | ✓ | ✓ | | | |
| QDepthHighLimit | High limit for queue depth | ✓ | ✓ | | | |
| QDepthLowEvent attribute | Whether Queue Depth Low events are generated | ✓ | ✓ | | | |
| QDepthLowLimit attribute | Low limit for queue depth | ✓ | ✓ | | | |
| QDepthMaxEvent | Whether Queue Full events are generated | ✓ | ✓ | | | |
| QDesc | Queue description | ✓ | ✓ | ✓ | ✓ | ✓ |
| QName | Queue name | ✓ | | ✓ | ✓ | ✓ |
| QServiceInterval | Target for queue service interval | ✓ | ✓ | | | |
| QServiceIntervalEvent attribute | Whether Service Interval High or Service Interval OK events are generated | ✓ | ✓ | | | |
| QSGDisp attribute | Queue-sharing group disposition | ✓ | | ✓ | ✓ | |
| QueueAccounting | Queue accounting data collection | ✓ | ✓ | ✓ | ✓ | ✓ |
| QueueMonitoring | Online monitoring data for queues | ✓ | ✓ | | | |
| QueueStatistics | Queue statistics data collection | ✓ | ✓ | ✓ | ✓ | ✓ |
| QType | Queue type | ✓ | | ✓ | ✓ | ✓ |
| RemoteQMgrName | Name of remote queue manager | | | | ✓ | |
| RemoteQName | Name of remote queue | | | | ✓ | |
| RetentionInterval | Retention interval | ✓ | ✓ | | | |

*Table 561. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If any other attributes are inquired, the call returns completion code MQCC_WARNING and reason code MQRC_SELECTOR_NOT_FOR_TYPE (2068).

  If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

  If the cluster queue is opened for inquire alone, or for inquire and output, plus specifying the base queue manager name, the column for local queues applies instead.

*(continued)*

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| Scope | Whether an entry for the queue also exists in a cell directory | ✓ | | ✓ | ✓ | |
| Shareability | Queue shareability | ✓ | ✓ | | | |
| StorageClass | Storage class for queue | ✓ | ✓ | | | |
| TriggerControl | Trigger control | ✓ | ✓ | | | |
| TriggerData | Trigger data | ✓ | ✓ | | | |
| TriggerDepth | Trigger depth | ✓ | ✓ | | | |
| TriggerMsgPriority | Threshold message priority for triggers | ✓ | ✓ | | | |
| TriggerType | Trigger type | ✓ | ✓ | | | |
| Usage attribute | Queue usage | ✓ | ✓ | | | |
| XmitQName | Transmission queue name | | | | ✓ | |

**Related concepts**

Cluster queues

Local queues

## *AlterationDate (MQCHAR12)*

Date when definition was last changed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | |

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes (for example, 1992-09-23¬¬, where ¬¬ represents two blank characters).

The values of certain attributes (for example, *CurrentQDepth*) change as the queue manager operates. Changes to these attributes do not affect *AlterationDate*.

To determine the value of this attribute, use the MQCA_ALTERATION_DATE selector with the MQINQ call. The length of this attribute is given by MQ_DATE_LENGTH.

## *AlterationTime (MQCHAR8)*

Time when definition was last changed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | |

This is the time when the definition was last changed. The format of the time is HH.MM.SS using the 24-hour clock, with a leading zero if the hour is less than 10 (for example 09.10.20).

- On z/OS, the time is Greenwich Mean Time (GMT), subject to the system clock being set accurately to GMT.
- In other environments, the time is local time.

The values of certain attributes (for example, *CurrentQDepth*) change as the queue manager operates. Changes to these attributes do not affect *AlterationTime*.

To determine the value of this attribute, use the MQCA_ALTERATION_TIME selector with the MQINQ call. The length of this attribute is given by MQ_TIME_LENGTH.

### *BackoutRequeueQName (MQCHAR48)*

This is the excessive backout requeue queue name. Apart from allowing its value to be queried, the queue manager takes no action based on the value of this attribute.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

Applications running inside WebSphere Application Server and those that use the IBM MQ Application Server Facilities use this attribute to determine where messages that have been backed out should go. For all other applications, the queue manager takes no action based on the value of the attribute.

IBM MQ classes for JMS uses this attribute to determine where to transfer a message that has already been backed out the maximum number of times as specified by the *BackoutThreshold* attribute.

To determine the value of this attribute, use the MQCA_BACKOUT_REQ_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *BackoutThreshold (MQLONG)*

This is the backout threshold. Apart from allowing its value to be queried, the queue manager takes no action based on the value of this attribute.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

Applications running inside of WebSphere Application Server and those that use the IBM MQ Application Server Facilities will use this attribute to determine if a message should be backed out. For all other applications, the queue manager takes no action based on the value of the attribute.

IBM MQ classes for JMS uses this attribute to determine how many times to allow a message to be backed out before transferring the message to the queue specified by the *BackoutRequeueQName* attribute.

To determine the value of this attribute, use the MQIA_BACKOUT_THRESHOLD selector with the MQINQ call.

### *BaseQName (MQCHAR48)*

This is the name of a queue that is defined to the local queue manager.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | X | | |

(For more information on queue names, see MQOD - ObjectName field.) The queue is one of the following types:

**MQQT_LOCAL**
Local queue.

**MQQT_REMOTE**
Local definition of a remote queue.

**MQQT_CLUSTER**
Cluster queue.

To determine the value of this attribute, use the MQCA_BASE_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *BaseType (MQCFIN)*
The type of object to which the alias resolves.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | X | | |

It is one of the following values:

**MQOT_Q**
Base object type is a queue

**MQOT_TOPIC**
Base object type is a topic

### *CFStrucName (MQCHAR12)*
This is the name of the coupling-facility structure where the messages on the queue are stored. The first character of the name is in the range A through Z, and the remaining characters are in the range A through Z, 0 through 9, or blank.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

To get the full name of the structure in the coupling facility, suffix the value of the *QSGName* queue-manager attribute with the value of the *CFStrucName* queue attribute.

This attribute applies only to shared queues; it is ignored if *QSGDisp* does not have the value MQQSGD_SHARED.

To determine the value of this attribute, use the MQCA_CF_STRUC_NAME selector with the MQINQ call. The length of this attribute is given by MQ_CF_STRUC_NAME_LENGTH.

This attribute is supported only on z/OS.

### *ClusterChannelName ( MQCHAR20)*
`ClusterChannelName` is the generic name of the cluster-sender channels that use this queue as a transmission queue. The attribute specifies which cluster-sender channels send messages to a cluster-receiver channel from this cluster transmission queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

The default queue manager configuration is for all cluster-sender channels to send messages from a single transmission queue, `SYSTEM.CLUSTER.TRANSMIT.QUEUE`. The default configuration can be changed by modified by changing the queue manager attribute, **DefClusterXmitQueueType**. The default value of the attribute is `SCTQ`. You can change the value to `CHANNEL`. If you set the

**DefClusterXmitQueueType** attribute to CHANNEL, each cluster-sender channel defaults to using a specific cluster transmission queue, SYSTEM.CLUSTER.TRANSMIT.*ChannelName*.

You can also set the transmission queue attribute ClusterChannelName attribute to a cluster-sender channel manually. Messages that are destined for the queue manager connected by the cluster-sender channel are stored in the transmission queue that identifies the cluster-sender channel. They are not stored in the default cluster transmission queue. If you set the ClusterChannelName attribute to blanks, the channel switches to the default cluster transmission queue when the channel restarts. The default queue is either SYSTEM.CLUSTER.TRANSMIT.*ChannelName* or SYSTEM.CLUSTER.TRANSMIT.QUEUE, depending on the value of the queue manager DefClusterXmitQueueType attribute.

By specifying asterisks, "*", in **ClusterChannelName**, you can associate a transmission queue with a set of cluster-sender channels. The asterisks can be at the beginning, end, or any number of places in the middle of the channel name string. **ClusterChannelName** is limited to a length of 20 characters: MQ_CHANNEL_NAME_LENGTH.

### *ClusterName (MQCHAR48)*

This is the name of the cluster to which the queue belongs.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

If the queue belongs to more than one cluster, *ClusterNamelist* specifies the name of a namelist object that identifies the clusters, and *ClusterName* is blank. At least one of *ClusterName* and *ClusterNamelist* must be blank.

To determine the value of this attribute, use the MQCA_CLUSTER_NAME selector with the MQINQ call. The length of this attribute is given by MQ_CLUSTER_NAME_LENGTH.

### *ClusterNamelist (MQCHAR48)*

This is the name of a namelist object that contains the names of clusters to which this queue belongs.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | |

If the queue belongs to only one cluster, the namelist object contains only one name. Alternatively, *ClusterName* can be used to specify the name of the cluster, in which case *ClusterNamelist* is blank. At least one of *ClusterName* and *ClusterNamelist* must be blank.

To determine the value of this attribute, use the MQCA_CLUSTER_NAMELIST selector with the MQINQ call. The length of this attribute is given by MQ_NAMELIST_NAME_LENGTH.

### *CLWLQueuePriority (MQLONG)*

This is the cluster workload queue priority, a value in the range 0 through 9 representing the priority of the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

For more information, see Cluster queues.

To determine the value of this attribute, use the MQIA_CLWL_Q_PRIORITY selector with the MQINQ call.

### *CLWLQueueRank (MQLONG)*

This is the cluster workload queue rank, a value in the range 0 through 9 representing the rank of the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

For more information, see Cluster queues.

To determine the value of this attribute, use the MQIA_CLWL_Q_RANK selector with the MQINQ call.

### *CLWLUseQ (MQLONG)*

This defines the behavior of an MQPUT when the target queue has both a local instance and at least one remote cluster instance. If the put originates from a cluster channel, this attribute does not apply.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

The value is one of the following:

**MQCLWL_USEQ_ANY**
Use remote and local queues.

**MQCLWL_USEQ_LOCAL**
Do not use remote queues.

**MQCLWL_USEQ_AS_Q_MGR**
Inherit definition from queue manager's MQIA_CLWL_USEQ.

For more information, see Cluster queues.

To determine the value of this attribute, use the MQCA_CLWL_USEQ selector with the MQINQ call. The length of this attribute is given by MQ_CLWL_USEQ_LENGTH.

### *CreationDate (MQCHAR12)*

This is the date when the queue was created.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes (for example, 2013-09-23¬¬, where ¬¬ represents 2 blank characters).

- On IBM i, the creation date of a queue can differ from that of the underlying operating system entity (file or userspace) that represents the queue.

To determine the value of this attribute, use the MQCA_CREATION_DATE selector with the MQINQ call. The length of this attribute is given by MQ_CREATION_DATE_LENGTH.

### *CreationTime (MQCHAR8)*

This is the time when the queue was created.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

The format of the time is HH.MM.SS using the 24-hour clock, with a leading zero if the hour is less than 10 (for example 09.10.20).

- On z/OS, the time is Greenwich Mean Time (GMT), subject to the system clock being set accurately to GMT.

- In other environments, the time is local time.
- On IBM i, the creation time of a queue can differ from that of the underlying operating system entity (file or userspace) that represents the queue.

To determine the value of this attribute, use the MQCA_CREATION_TIME selector with the MQINQ call. The length of this attribute is given by MQ_CREATION_TIME_LENGTH.

### *CurrentQDepth (MQLONG)*

This is the number of messages currently on the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

It is incremented during an MQPUT call, and during backout of an MQGET call. It is decremented during a nonbrowse MQGET call, and during backout of an MQPUT call. The effect of this is that the count includes messages that have been put on the queue within a unit of work, but that have not yet been committed, even though they are not eligible to be retrieved by the MQGET call. Similarly, it excludes messages that have been retrieved within a unit of work using the MQGET call, but that have yet to be committed.

The count also includes messages that have passed their expiry time but have not yet been discarded, although these messages are not eligible to be retrieved. See MQMD - Expiry field for more information.

Unit-of-work processing and the segmentation of messages can both cause *CurrentQDepth* to exceed *MaxQDepth*. However, this does not affect the retrievability of the messages; *all* messages on the queue can be retrieved using the MQGET call in the normal way.

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the MQIA_CURRENT_Q_DEPTH selector with the MQINQ call.

### *DefaultPutResponse (MQLONG)*

Specifies the type of response to be used for put operations to the queue when an application specifies MQPMO_RESPONSE_AS_Q_DEF.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | |

It is one of the following values:

**MQPRT_SYNC_RESPONSE**
The put operation is issued synchronously, returning a response.

**MQPRT_ASYNC_RESPONSE**
The put operation is issued asynchronously, returning a subset of MQMD fields.

### *DefBind (MQLONG)*

This is the default binding that is used when MQOO_BIND_AS_Q_DEF is specified on the MQOPEN call and the queue is a cluster queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

The value is one of the following:

**MQBND_BIND_ON_OPEN**
Binding fixed by MQOPEN call.

**MQBND_BIND_NOT_FIXED**
Binding not fixed.

**MQBND_BIND_ON_GROUP**
Allows an application to request that a group of messages are all allocated to the same destination instance. Because this value is new in IBM WebSphere MQ 7.1, it must not be used if any of the applications opening this queue are connecting to IBM WebSphere MQ 7.0.1 or earlier queue managers.

To determine the value of this attribute, use the MQIA_DEF_BIND selector with the MQINQ call.

## *DefinitionType (MQLONG)*

This indicates how the queue was defined.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The value is one of the following:

**MQQDT_PREDEFINED**
The queue is a permanent queue created by the system administrator; only the system administrator can delete it.

Predefined queues are created using the DEFINE MQSC command, and can be deleted only by using the DELETE MQSC command. Predefined queues cannot be created from model queues.

Commands can be issued either by an operator, or by an authorized user sending a command message to the command input queue (see CommandInputQName attribute for more information).

**MQQDT_PERMANENT_DYNAMIC**
The queue is a permanent queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value MQQDT_PERMANENT_DYNAMIC for the *DefinitionType* attribute.

This type of queue can be deleted using the MQCLOSE call. See “MQCLOSE - Close object” on page 629 for more details.

The value of the *QSGDisp* attribute for a permanent dynamic queue is MQQSGD_Q_MGR.

**MQQDT_TEMPORARY_DYNAMIC**
The queue is a temporary queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value MQQDT_TEMPORARY_DYNAMIC for the *DefinitionType* attribute.

This type of queue is deleted automatically by the MQCLOSE call when it is closed by the application that created it.

The value of the *QSGDisp* attribute for a temporary dynamic queue is MQQSGD_Q_MGR.

**MQQDT_SHARED_DYNAMIC**
The queue is a shared permanent queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value MQQDT_SHARED_DYNAMIC for the *DefinitionType* attribute.

This type of queue can be deleted using the MQCLOSE call. See “MQCLOSE - Close object” on page 629 for more details.

The value of the *QSGDisp* attribute for a shared dynamic queue is MQQSGD_SHARED.

This attribute in a model queue definition does not indicate how the model queue was defined, because model queues are always predefined. Instead, the value of this attribute in the model queue is used to determine the *DefinitionType* of each of the dynamic queues created from the model queue definition using the MQOPEN call.

To determine the value of this attribute, use the MQIA_DEFINITION_TYPE selector with the MQINQ call.

### *DefInputOpenOption (MQLONG)*

This is the default way in which to open the queue for input.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

It applies if the MQOO_INPUT_AS_Q_DEF option is specified on the MQOPEN call when the queue is opened. The value is one of the following:

**MQOO_INPUT_EXCLUSIVE**
Open queue to get messages with exclusive access.

The queue is opened for use with subsequent MQGET calls. The call fails with reason code MQRC_OBJECT_IN_USE if the queue is currently open by this or another application for input of any type (MQOO_INPUT_SHARED or MQOO_INPUT_EXCLUSIVE).

**MQOO_INPUT_SHARED**
Open queue to get messages with shared access.

The queue is opened for use with subsequent MQGET calls. The call can succeed if the queue is currently open by this or another application with MQOO_INPUT_SHARED, but fails with reason code MQRC_OBJECT_IN_USE if the queue is currently open with MQOO_INPUT_EXCLUSIVE.

To determine the value of this attribute, use the MQIA_DEF_INPUT_OPEN_OPTION selector with the MQINQ call.

### *DefPersistence (MQLONG)*

This is the default persistence of messages on the queue. It applies if MQPER_PERSISTENCE_AS_Q_DEF is specified in the message descriptor when the message is put.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | X |

If there is more than one definition in the queue-name resolution path, the default persistence is taken from the value of this attribute in the *first* definition in the path at the time of the MQPUT or MQPUT1 call. This could be:

- An alias queue
- A local queue
- A local definition of a remote queue
- A queue-manager alias
- A transmission queue (for example, the *DefXmitQName* queue)

The value is one of the following:

**MQPER_PERSISTENT**
The message survives system failures and queue manager restarts. Persistent messages cannot be placed on:

- Temporary dynamic queues
- Shared queues that map to a CFSTRUCT object at CFLEVEL(2) or below, or where the CFSTRUCT object is defined as RECOVER(NO).

Persistent messages can be placed on permanent dynamic queues, and predefined queues.

**MQPER_NOT_PERSISTENT**
The message does not normally survive system failures or queue manager restarts. This applies even if an intact copy of the message is found on auxiliary storage during a queue manager restart.

In the case of shared queues, nonpersistent messages *do* survive restarts of queue managers in the queue-sharing group, but do not survive failures of the coupling facility used to store messages on the shared queues.

Both persistent and nonpersistent messages can exist on the same queue.

To determine the value of this attribute, use the MQIA_DEF_PERSISTENCE selector with the MQINQ call.

### *DefPriority (MQLONG)*

This is the default priority for messages on the queue. This applies if MQPRI_PRIORITY_AS_Q_DEF is specified in the message descriptor when the message is put on the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | X |

If there is more than one definition in the queue-name resolution path, the default priority for the message is taken from the value of this attribute in the *first* definition in the path at the time of the put operation. This could be:

- An alias queue
- A local queue
- A local definition of a remote queue
- A queue-manager alias
- A transmission queue (for example, the *DefXmitQName* queue)

The way in which a message is placed on a queue depends on the value of the queue's *MsgDeliverySequence* attribute:

- If the *MsgDeliverySequence* attribute is MQMDS_PRIORITY, the logical position at which a message is placed on the queue depends on the value of the *Priority* field in the message descriptor.
- If the *MsgDeliverySequence* attribute is MQMDS_FIFO, messages are placed on the queue as though they had a priority equal to the *DefPriority* of the resolved queue, regardless of the value of the *Priority* field in the message descriptor. However, the *Priority* field retains the value specified by the application that put the message. See MsgDeliverySequence attribute for more information.

Priorities are in the range zero (lowest) through *MaxPriority* (highest); see MaxPriority attribute.

To determine the value of this attribute, use the MQIA_DEF_PRIORITY selector with the MQINQ call.

### *DefReadAhead (MQLONG)*

Specifies the default read ahead behavior for non-persistent messages delivered to the client.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | | |

DefReadAhead can be set to one of the following values::

**MQREADA_NO**
Non-persistent messages are not sent ahead to the client before an applications requests them. A maximum of one non-persistent message can be lost if the client ends abnormally.

**MQREADA_YES**
Non-persistent messages are sent ahead to the client before an application requests them. Non-persistent messages can be lost if the client ends abnormally or if the client does not consume all the messages it is sent.

**MQREADA_DISABLED**
Read ahead of non-persistent messages in not enabled for this queue. Messages are not sent ahead to the client regardless of whether read ahead is requested by the client application.

To determine the value of this attribute, use the MQIA_DEF_READ_AHEAD selector with the MQINQ call.

### *DefPResp (MQLONG)*

The default put response type (DEFPRESP) attribute defines the value used by applications when the PutResponseType within MQPMO has been set to MQPMO_RESPONSE_AS_Q_DEF. This attribute is valid for all queue types.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| Yes | Yes | Yes | Yes | Yes |

The value is one of the following:

**SYNC**
The put operation is issued synchronously returning a response.

**ASYNC**
The put operation is issued asynchronously, returning a subset of MQMD fields.

To determine the value of this attribute, use the MQIA_DEF_PUT_RESPONSE_TYPE selector with the MQINQ call.

### *DistLists (MQLONG)*

This indicates whether distribution-list messages can be placed on the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

A message channel agent (MCA) sets the attribute to inform the local queue manager whether the queue manager at the other end of the channel supports distribution lists. This latter queue manager (called the *partnering* queue manager) is the one that next receives the message, after it has been removed from the local transmission queue by a sending MCA.

The sending MCA sets the attribute whenever it establishes a connection to the receiving MCA on the partnering queue manager. In this way, the sending MCA can cause the local queue manager to place on the transmission queue only messages that the partnering queue manager can process correctly.

This attribute is primarily for use with transmission queues, but the processing described is performed regardless of the usage defined for the queue (see Usage attribute ).

The value is one of the following:

**MQDL_SUPPORTED**
Distribution-list messages can be stored on the queue, and transmitted to the partnering queue manager in that form. This reduces the amount of processing required to send the message to multiple destinations.

**MQDL_NOT_SUPPORTED**
Distribution-list messages cannot be stored on the queue, because the partnering queue manager does not support distribution lists. If an application puts a distribution-list message, and that message is to be placed on this queue, the queue manager splits the distribution-list message and places the individual messages on the queue instead. This increases the amount of processing required to send the message to multiple destinations, but ensures that the messages are processed correctly by the partnering queue manager.

To determine the value of this attribute, use the MQIA_DIST_LISTS selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

This attribute is not supported on z/OS.

### *HardenGetBackout (MQLONG)*

For each message, a count is kept of the number of times that the message is retrieved by an MQGET call within a unit of work, and that unit of work subsequently backed out.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This count is available in the *BackoutCount* field in the message descriptor after the MQGET call has completed.

The message backout count survives restarts of the queue manager. However, to ensure that the count is accurate, information has to be *hardened* (recorded on disk or other permanent storage device) each time that an MQGET call retrieves a message within a unit of work for this queue. If this is not done, the queue manager fails, and the MQGET call backs out, the count might or might not be incremented.

Hardening information for each MQGET call within a unit of work, however, imposes additional processing cost, so set the *HardenGetBackout* attribute to MQQA_BACKOUT_HARDENED only if it is essential that the count is accurate.

On IBM i, UNIX systems, and Windows, the message backout count is always hardened, regardless of the setting of this attribute.

The following values are possible:

**MQQA_BACKOUT_HARDENED**
Hardening is used to ensure that the backout count for messages on this queue is accurate.

**MQQA_BACKOUT_NOT_HARDENED**
Hardening is not used to ensure that the backout count for messages on this queue is accurate. The count might therefore be lower than it should be.

To determine the value of this attribute, use the MQIA_HARDEN_GET_BACKOUT selector with the MQINQ call.

### *IndexType (MQLONG)*

This specifies the type of index that the queue manager maintains for messages on the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The type of index required depends on how the application retrieves messages, and whether the queue is a shared queue or a nonshared queue (see QSGDisp attribute ). The following values are possible for *IndexType*:

**MQIT_NONE**
No index is maintained by the queue manager for this queue. Use this value for queues that are typically processed sequentially, that is, without using any selection criteria on the MQGET call.

**MQIT_MSG_ID**
The queue manager maintains an index that uses the message identifiers of the messages on the queue. Use this value queues where the application typically retrieves messages using the message identifier as the selection criterion on the MQGET call.

**MQIT_CORREL_ID**
The queue manager maintains an index that uses the correlation identifiers of the messages on the queue. Use this value for queues where the application typically retrieves messages using the correlation identifier as the selection criterion on the MQGET call.

**MQIT_MSG_TOKEN**

**Important:** This index type should only be used for queues used with the IBM MQ Workflow for z/OS product.

The queue manager maintains an index that uses the message tokens of the messages on the queue for use with the workload manager (WLM) functions of z/OS.

You *must* specify this option for WLM-managed queues; do not specify it for any other type of queue. Also, do not use this value for a queue where an application is not using the z/OS workload manager functions, but is retrieving messages using the message token as a selection criterion on the MQGET call.

**MQIT_GROUP_ID**
The queue manager maintains an index that uses the group identifiers of the messages on the queue. This value *must* be used for queues where the application retrieves messages using the MQGMO_LOGICAL_ORDER option on the MQGET call.

A queue with this index type cannot be a transmission queue. A shared queue with this index type must be defined to map to a CFSTRUCT object at CFLEVEL(3) or higher.

**Note:**

1. The physical order of messages on a queue with index type MQIT_GROUP_ID is not defined, as the queue is optimized for efficient retrieval of messages using the MQGMO_LOGICAL_ORDER option on the MQGET call. This means that the physical order of the messages is not typically the order in which the messages arrived on the queue.
2. If an MQIT_GROUP_ID queue has a *MsgDeliverySequence* of MQMDS_PRIORITY, the queue manager uses message priorities 0 and 1 to optimize the retrieval of messages in logical order. As a result, the first message in a group must not have a priority of zero or one; if it does, the message is processed as though it had a priority of two. The *Priority* field in the MQMD structure is not changed.

For more information about message groups, see the description of the group and segment options in MQGMO - Options field.

The index type that should be used in various cases is shown in Table 562 on page 825 and Table 563 on page 826.

*Table 562. Suggested or required values of queue index type when MQGMO_LOGICAL_ORDER not specified*

| Selection criteria on MQGET call | Index type for nonshared queue | Index type for shared queue |
|---|---|---|
| None | Any | Any |
| **Selection using one identifier:** | | |
| Message identifier | MQIT_MSG_ID suggested | MQIT_NONE or MQIT_MSG_ID required; MQIT_MSG_ID suggested |
| Correlation identifier | MQIT_CORREL_ID suggested | MQIT_CORREL_ID required |
| Group identifier | MQIT_GROUP_ID suggested | MQIT_GROUP_ID required |
| **Selection using two identifiers:** | | |
| Message identifier plus correlation identifier | MQIT_MSG_ID or MQIT_CORREL_ID suggested | MQIT_NONE or MQIT_MSG_ID or MQIT_CORREL_ID required<br>(For efficiency, it is suggested that the index type is chosen to match the MQMD field which will have the most distinct keys) |
| Message identifier plus group identifier | MQIT_MSG_ID or MQIT_GROUP_ID suggested | Not supported |

*Table 562. Suggested or required values of queue index type when MQGMO_LOGICAL_ORDER not specified (continued)*

| Selection criteria on MQGET call | Index type for nonshared queue | Index type for shared queue |
|---|---|---|
| Correlation identifier plus group identifier | MQIT_CORREL_ID or MQIT_GROUP_ID suggested | Not supported |
| **Selection using three identifiers:** | | |
| Message identifier plus correlation identifier plus group identifier | MQIT_MSG_ID or MQIT_CORREL_ID or MQIT_GROUP_ID suggested | Not supported |
| **Selection using group-related criteria:** | | |
| Group identifier plus message sequence number | MQIT_GROUP_ID required | MQIT_GROUP_ID required |
| Message sequence number (must be 1) | MQIT_GROUP_ID required | MQIT_GROUP_ID required |
| **Selection using message token:** | | |
| Message token for application use | Do not use MQIT_MSG_TOKEN | |
| Message token for WLM use | MQIT_MSG_TOKEN required | Not supported |

*Table 563. Suggested or required values of queue index type when MQGMO_LOGICAL_ORDER specified*

| Selection criteria on MQGET call | Index type for nonshared queue | Index type for shared queue |
|---|---|---|
| None | MQIT_GROUP_ID required | MQIT_GROUP_ID required |
| **Selection using one identifier:** | | |
| Message identifier | MQIT_GROUP_ID required | Not supported |
| Correlation identifier | MQIT_GROUP_ID required | Not supported |
| Group identifier | MQIT_GROUP_ID required | MQIT_GROUP_ID required |
| **Selection using two identifiers:** | | |
| Message identifier plus correlation identifier | MQIT_GROUP_ID required | Not supported |
| Message identifier plus group identifier | MQIT_GROUP_ID required | Not supported |
| Correlation identifier plus group identifier | MQIT_GROUP_ID required | Not supported |
| **Selection using three identifiers:** | | |
| Message identifier plus correlation identifier plus group identifier | MQIT_GROUP_ID required | Not supported |

To determine the value of this attribute, use the MQIA_INDEX_TYPE selector with the MQINQ call.

This attribute is supported only on z/OS.

### *InhibitGet (MQLONG)*

This controls whether get operations for this queue are allowed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | | |

If the queue is an alias queue, get operations must be allowed for both the alias and the base queue at the time of the get operation, for the MQGET call to succeed. The value is one of the following:

**MQQA_GET_INHIBITED**
Get operations are inhibited.

MQGET calls fail with reason code MQRC_GET_INHIBITED. This includes MQGET calls that specify MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT.

**Note:** If an MQGET call operating within a unit of work completes successfully, changing the value of the *InhibitGet* attribute subsequently to MQQA_GET_INHIBITED does not prevent the unit of work being committed.

**MQQA_GET_ALLOWED**
Get operations are allowed.

To determine the value of this attribute, use the MQIA_INHIBIT_GET selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *InhibitPut (MQLONG)*

This controls whether put operations for this queue are allowed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | X |

If there is more than one definition in the queue-name resolution path, put operations must be allowed for *every* definition in the path (including any queue-manager alias definitions) at the time of the put operation, for the MQPUT or MQPUT1 call to succeed. The value is one of the following:

**MQQA_PUT_INHIBITED**
Put operations are inhibited.

MQPUT and MQPUT1 calls fail with reason code MQRC_PUT_INHIBITED.

**Note:** If an MQPUT call operating within a unit of work completes successfully, changing the value of the *InhibitPut* attribute subsequently to MQQA_PUT_INHIBITED does not prevent the unit of work being committed.

**MQQA_PUT_ALLOWED**
Put operations are allowed.

To determine the value of this attribute, use the MQIA_INHIBIT_PUT selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *InitiationQName (MQCHAR48)*

This is the name of a queue defined on the local queue manager; the queue must be of type MQQT_LOCAL.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

The queue manager sends a trigger message to the initiation queue when application start-up is required as a result of a message arriving on the queue to which this attribute belongs. The initiation queue must be monitored by a trigger monitor application that starts the appropriate application after receipt of the trigger message.

To determine the value of this attribute, use the MQCA_INITIATION_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *MaxMsgLength (MQLONG)*

This is an upper limit for the length of the longest *physical* message that can be placed on the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

However, because the *MaxMsgLength* queue attribute can be set independently of the *MaxMsgLength* queue-manager attribute, the actual upper limit for the length of the longest physical message that can be placed on the queue is the lesser of those two values.

If the queue manager supports segmentation, it is possible for an application to put a *logical* message that is longer than the lesser of the two *MaxMsgLength* attributes, but only if the application specifies the MQMF_SEGMENTATION_ALLOWED flag in MQMD. If that flag is specified, the upper limit for the length of a logical message is 999 999 999 bytes, but usually resource constraints imposed by the operating system, or by the environment in which the application is running, result in a lower limit.

An attempt to place on the queue a message that is too long fails with one of the following reason codes:

- MQRC_MSG_TOO_BIG_FOR_Q if the message is too big for the queue
- MQRC_MSG_TOO_BIG_FOR_Q_MGR if the message is too big for the queue manager, but not too big for the queue

The lower limit for the *MaxMsgLength* attribute is zero; the upper limit is 100 MB (104 857 600 bytes).

For more information, see MQPUT - BufferLength parameter.

To determine the value of this attribute, use the MQIA_MAX_MSG_LENGTH selector with the MQINQ call.

### *MaxQDepth (MQLONG)*

This is the defined upper limit for the number of physical messages that can exist on the queue at any one time.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

An attempt to put a message on a queue that already contains *MaxQDepth* messages fails with reason code MQRC_Q_FULL.

Unit-of-work processing and the segmentation of messages can both cause the actual number of physical messages on the queue to exceed *MaxQDepth*. However, this does not affect the retrievability of the messages; *all* messages on the queue can be retrieved using the MQGET call.

The value of this attribute is zero or greater. The upper limit is determined by the environment:

- On AIX, HP-UX, z/OS, Solaris, Linux, and Windows, the value cannot exceed 999 999 999.
- On IBM i, the value cannot exceed 640 000.

**Note:** The storage space available to the queue might be exhausted even if there are fewer than *MaxQDepth* messages on the queue.

To determine the value of this attribute, use the MQIA_MAX_Q_DEPTH selector with the MQINQ call.

### *MsgDeliverySequence (MQLONG)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This determines the order in which the MQGET call returns messages to the application :

**MQMDS_FIFO**
Messages are returned in FIFO order (first in, first out).

An MQGET call returns the *first* message that satisfies the selection criteria specified on the call, regardless of the priority of the message.

**MQMDS_PRIORITY**
Messages are returned in priority order.

An MQGET call returns the *highest-priority* message that satisfies the selection criteria specified on the call. Within each priority level, messages are returned in FIFO order (first in, first out).

- On z/OS, if the queue has an *IndexType* of MQIT_GROUP_ID, the *MsgDeliverySequence* attribute specifies the order in which message groups are returned to the application. The particular sequence in which the groups are returned is determined by the position or priority of the first message in each group. The physical order of messages on the queue is not defined, as the queue is optimized for efficient retrieval of messages using the MQGMO_LOGICAL_ORDER option on the MQGET call.
- On z/OS, if *IndexType* is MQIT_GROUP_ID and *MsgDeliverySequence* is MQMDS_PRIORITY, the queue manager uses message priorities zero and one to optimize the retrieval of messages in logical order. As a result, the first message in a group must not have a priority of zero or one; if it does, the message is processed as though it had a priority of two. The *Priority* field in the MQMD structure is not changed.

If the relevant attributes are changed while there are messages on the queue, the delivery sequence is as follows:

- The order in which messages are returned by the MQGET call is determined by the values of the *MsgDeliverySequence* and *DefPriority* attributes in force for the queue at the time that the message arrives on the queue:
  - If *MsgDeliverySequence* is MQMDS_FIFO when the message arrives, the message is placed on the queue as though its priority were *DefPriority*. This does not affect the value of the *Priority* field in the message descriptor of the message; that field retains the value it had when the message was first put.
  - If *MsgDeliverySequence* is MQMDS_PRIORITY when the message arrives, the message is placed on the queue at the place appropriate to the priority given by the *Priority* field in the message descriptor.

  If the value of the *MsgDeliverySequence* attribute is changed while there are messages on the queue, the order of the messages on the queue is not changed.

  If the value of the *DefPriority* attribute is changed while there are messages on the queue, the messages are not necessarily delivered in FIFO order, even though the *MsgDeliverySequence* attribute is set to MQMDS_FIFO; those that were placed on the queue at the higher priority are delivered first.

To determine the value of this attribute, use the MQIA_MSG_DELIVERY_SEQUENCE selector with the MQINQ call.

## *NonPersistentMessageClass (MQLONG)*
The reliability goal for nonpersistent messages.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This specifies the circumstances under which nonpersistent messages put on this queue are discarded:

**MQNPM_CLASS_NORMAL**
Nonpersistent messages are limited to the lifetime of the queue manager session; the messages are discarded in the event of a queue manager restart. This is valid only for non-shared queues, and is the default value.

**MQNPM_CLASS_HIGH**
The queue manager attempts to retain nonpersistent messages for the lifetime of the queue. Nonpersistent messages might still be lost in the event of a failure. This value is enforced for shared queues.

To determine the value of this attribute, use the MQIA_NPM_CLASS selector with the MQINQ call.

### *OpenInputCount (MQLONG)*
This is the number of handles that are currently valid for removing messages from the queue by means of the MQGET call.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

It is the total number of such handles known to the *local* queue manager. If the queue is a shared queue, the count does not include opens for input that were performed for the queue at other queue managers in the queue-sharing group to which the local queue manager belongs.

The count includes handles where an alias queue that resolves to this queue was opened for input. The count does not include handles where the queue was opened for actions that did not include input (for example, a queue opened only for browse).

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the MQIA_OPEN_INPUT_COUNT selector with the MQINQ call.

### *OpenOutputCount (MQLONG)*
This is the number of handles that are currently valid for adding messages to the queue by means of the MQPUT call.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | | | |

It is the total number of such handles known to the *local* queue manager; it does not include opens for output that were performed for this queue at remote queue managers. If the queue is a shared queue, the count does not include opens for output that were performed for the queue at other queue managers in the queue-sharing group to which the local queue manager belongs.

The count includes handles where an alias queue that resolves to this queue was opened for output. The count does not include handles where the queue was opened for actions that did not include output (for example, a queue opened only for inquire).

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the MQIA_OPEN_OUTPUT_COUNT selector with the MQINQ call.

### *ProcessName (MQCHAR48)*
This is the name of a process object that is defined on the local queue manager. The process object identifies a program that can service the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

To determine the value of this attribute, use the MQCA_PROCESS_NAME selector with the MQINQ call. The length of this attribute is given by MQ_PROCESS_NAME_LENGTH.

### *PropertyControl (MQLONG)*

Specifies how message properties are handled for messages that are retrieved from queues using the MQGET call with the MQGMO_PROPERTIES_AS_Q_DEF option.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | | |

The value is one of the following:

**MQPROP_ALL**
All properties of the message are included with the message when it is delivered to the application. The properties, except those in the message descriptor (or extension), are placed in one or more MQRFH2 headers in the message data. If a message handle is supplied then the behavior is to return the properties in the message handle.

**MQPROP_COMPATIBILITY**
If the message contains a property with a prefix of mcd., jms., usr. or mqext., all message properties are delivered to the application in an MQRFH2 header. Otherwise all properties of the message, except those contained in the message descriptor (or extension), are discarded and are no longer accessible to the application. This is the default value; it allows applications which expect JMS related properties to be in an MQRFH2 header in the message data to continue to work unmodified. If a message handle is supplied then the behavior is to return the properties in the message handle..

**MQPROP_FORCE_MQRFH2**
Properties are always returned in the message data in an MQRFH2 header regardless of whether the application specifies a message handle. A valid message handle supplied in the MsgHandle field of the MQGMO structure on the MQGET call is ignored. Properties of the message are not accessible via the message handle.

**MQPROP_NONE**
All properties of the message, except those in the message descriptor (or extension), are removed from the message before the message is delivered to the application. If a message handle is supplied then the behavior is to return the properties in the message handle.

This parameter is applicable to Local, Alias and Model queues. To determine its value, use the MQIA_PROPERTY_CONTROL selector with the MQINQ call.

### *QDepthHighEvent (MQLONG)*

This controls whether Queue Depth High events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

A Queue Depth High event indicates that an application has put a message on a queue, and this has caused the number of messages on the queue to become greater than or equal to the queue depth high threshold (see the *QDepthHighLimit* attribute).

**Note:** The value of this attribute can change dynamically.

The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_Q_DEPTH_HIGH_EVENT selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QDepthHighLimit (MQLONG)*

This is the threshold against which the queue depth is compared to generate a Queue Depth High event.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This event indicates that an application has put a message on a queue, and that this has caused the number of messages on the queue to become greater than or equal to the queue depth high threshold. See QDepthHighEvent attribute.

The value is expressed as a percentage of the maximum queue depth (*MaxQDepth* attribute), and is greater than or equal to 0 and less than or equal to 100. The default value is 80.

To determine the value of this attribute, use the MQIA_Q_DEPTH_HIGH_LIMIT selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QDepthLowEvent (MQLONG)*

This controls whether Queue Depth Low events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

A Queue Depth Low event indicates that an application has retrieved a message from a queue, and that this has caused the number of messages on the queue to become less than or equal to the queue depth low threshold (see QDepthLowLimit attribute ).

**Note:** The value of this attribute can change dynamically.

The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_Q_DEPTH_LOW_EVENT selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QDepthLowLimit (MQLONG)*

This is the threshold against which the queue depth is compared to generate a Queue Depth Low event.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This event indicates that an application has retrieved a message from a queue, and that this has caused the number of messages on the queue to become less than or equal to the queue depth low threshold. See QDepthLowEvent attribute.

The value is expressed as a percentage of the maximum queue depth (*MaxQDepth* attribute), and is greater than or equal to 0 and less than or equal to 100. The default value is 20.

To determine the value of this attribute, use the MQIA_Q_DEPTH_LOW_LIMIT selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QDepthMaxEvent (MQLONG)*

This controls whether Queue Full events are generated. A Queue Full event indicates that a put to a queue has been rejected because the queue is full, that is, the queue depth has already reached its maximum value.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

**Note:** The value of this attribute can change dynamically.

The value is one of the following:

**MQEVR_DISABLED**
Event reporting disabled.

**MQEVR_ENABLED**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_Q_DEPTH_MAX_EVENT selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QDesc (MQCHAR64)*

Use this field for descriptive commentary.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | X |

The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the MQCA_Q_DESC selector with the MQINQ call. The length of this attribute is given by MQ_Q_DESC_LENGTH.

### *QName (MQCHAR48)*

This is the name of a queue defined on the local queue manager.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

All queues defined on a queue manager share the same queue namespace. Therefore, an MQQT_LOCAL queue and an MQQT_ALIAS queue cannot have the same name.

To determine the value of this attribute, use the MQCA_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *QServiceInterval (MQLONG)*

This is the service interval used for comparison to generate Service Interval High and Service Interval OK events.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

See QServiceIntervalEvent attribute.

The value is in units of milliseconds, and is greater than or equal to zero, and less than or equal to 999 999 999.

To determine the value of this attribute, use the MQIA_Q_SERVICE_INTERVAL selector with the MQINQ call.

This attribute is supported on z/OS, but the MQINQ call cannot be used to determine its value.

### *QServiceIntervalEvent (MQLONG)*

This controls whether Service Interval High or Service Interval OK events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

- A Service Interval High event is generated when a check indicates that no messages have been retrieved from the queue for at least the time indicated by the *QServiceInterval* attribute.
- A Service Interval OK event is generated when a check indicates that messages have been retrieved from the queue within the time indicated by the *QServiceInterval* attribute.

**Note:** The value of this attribute can change dynamically.

The value is one of the following:

**MQQSIE_HIGH**
Queue Service Interval High events enabled.

- Queue Service Interval High events are **enabled** and
- Queue Service Interval OK events are **disabled**.

**MQQSIE_OK**
Queue Service Interval OK events enabled.

- Queue Service Interval High events are **disabled** and
- Queue Service Interval OK events are **enabled**.

**MQQSIE_NONE**
No queue service interval events enabled.

- Queue Service Interval High events are **disabled** and
- Queue Service Interval OK events are also **disabled**.

For shared queues, the value of this attribute is ignored; the value MQQSIE_NONE is assumed.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the MQIA_Q_SERVICE_INTERVAL_EVENT selector with the MQINQ call.

On z/OS, you cannot use the MQINQ call to determine the value of this attribute.

### *QSGDisp (MQLONG)*

This specifies the disposition of the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | |

The value is one of the following:

**MQQSGD_Q_MGR**
The object has queue-manager disposition. This means that the object definition is known only to the local queue manager; the definition is not known to other queue managers in the queue-sharing group.

Each queue manager in the queue-sharing group can have an object with the same name and type as the current object, but these are separate objects and there is no correlation between them. Their attributes are not constrained to be the same as each other.

**MQQSGD_COPY**
The object is a local copy of a master object definition that exists in the shared repository. Each queue manager in the queue-sharing group can have its own copy of the object. Initially, all copies have the same attributes, but by using MQSC commands, you can alter each copy so that its attributes differ from those of the other copies. The attributes of the copies are resynchronized when the master definition in the shared repository is altered.

**MQQSGD_SHARED**
The object has shared disposition. This means that there exists in the shared repository a single instance of the object that is known to all queue managers in the queue-sharing group. When a queue manager in the group accesses the object, it accesses the single shared instance of the object.

To determine the value of this attribute, use the MQIA_QSG_DISP selector with the MQINQ call.

This attribute is supported only on z/OS.

### *QueueAccounting (MQLONG)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | |

This controls the collection of accounting data for the queue. For accounting data to be collected for this queue, accounting data for this connection must also be enabled, using either the QMGR attribute ACCTQ or the Options field in the MQCNO structure on the MQCONNX call.

This attribute has one of the following values:

**MQMON_Q_MGR**
Accounting data for this queue is collected based on the setting of the QMGR attribute ACCTQ. This is the default setting.

**MQMON_OFF**
Do not collect accounting data for this queue.

**MQMON_ON**
Collect accounting data for this queue.

To determine the value of this attribute, use the MQIA_ACCOUNTING_Q selector with the MQINQ call.

### *QueueMonitoring (MQLONG)*

Controls the collection of online monitoring data for queues.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The value is one of the following:

**MQMON_Q_MGR**
Collect monitoring data according to the setting of the *QueueMonitoring* queue manager attribute. This is the default value.

**MQMON_OFF**
Online monitoring data collection is turned off for this queue.

**MQMON_LOW**
If the value of the *QueueMonitoring* queue manager attribute is not MQMON_NONE, online monitoring data collection is turned on, with a low rate of data collection for this queue.

**MQMON_MEDIUM**
If the value of the *QueueMonitoring* queue manager attribute is not MQMON_NONE, online monitoring data collection is turned on, with a moderate rate of data collection for this queue.

**MQMON_HIGH**
If the value of the *QueueMonitoring* queue manager attribute is not MQMON_NONE, online monitoring data collection is turned on, with a high rate of data collection for this queue.

To determine the value of this attribute, use the MQIA_MONITORING_Q selector with the MQINQ call.

### *QueueStatistics (MQCHAR12)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | X | X | |

This controls the collection of statistics data for the queue.

This attribute has one of the following values:

**MQMON_Q_MGR**
Accounting data for this queue is collected based on the setting of the QMGR attribute STATQ. This is the default setting.

**MQMON_OFF**
Switch off statistics data collection for this queue.

**MQMON_ON**
Switch on statistics data collection for this queue.

### *QType (MQLONG)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | X |

This is the type of queue; it has one of the following values:

**MQQT_ALIAS**
Alias queue definition.

**MQQT_CLUSTER**
Cluster queue.

**MQQT_LOCAL**
Local queue.

**MQQT_REMOTE**
Local definition of a remote queue.

To determine the value of this attribute, use the MQIA_Q_TYPE selector with the MQINQ call.

## *RemoteQMgrName (MQCHAR48)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | X | |

This is the name of the remote queue manager on which the queue *RemoteQName* is defined. If the *RemoteQName* queue has a *QSGDisp* value of MQQSGD_COPY or MQQSGD_SHARED, *RemoteQMgrName* can be the name of the queue-sharing group that owns *RemoteQName*.

If an application opens the local definition of a remote queue, *RemoteQMgrName* must not be blank and must not be the name of the local queue manager. If *XmitQName* is blank, the local queue with the same name as *RemoteQMgrName* is used as the transmission queue. If there is no queue with the name *RemoteQMgrName*, the queue identified by the *DefXmitQName* queue-manager attribute is used.

If this definition is used for a queue-manager alias, *RemoteQMgrName* is the name of the queue manager that is being aliased. It can be the name of the local queue manager. Otherwise, if *XmitQName* is blank when the open occurs, there must be a local queue with a name that is the same as *RemoteQMgrName* ; this queue is used as the transmission queue.

If this definition is used for a reply-to alias, this name is the name of the queue manager that is to be the *ReplyToQMgr*.

**Note:** No validation is performed on the value specified for this attribute when the queue definition is created or modified.

To determine the value of this attribute, use the MQCA_REMOTE_Q_MGR_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_MGR_NAME_LENGTH.

## *RemoteQName (MQCHAR48)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | X | |

This is the name of the queue as it is known on the remote queue manager *RemoteQMgrName*.

If an application opens the local definition of a remote queue, when the open occurs *RemoteQName* must not be blank.

If this definition is used for a queue-manager alias definition, when the open occurs *RemoteQName* must be blank.

If the definition is used for a reply-to alias, this name is the name of the queue that is to be the *ReplyToQ*.

**Note:** No validation is performed on the value specified for this attribute when the queue definition is created or modified.

To determine the value of this attribute, use the MQCA_REMOTE_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

### *RetentionInterval (MQLONG)*

This is the period of time for which to retain the queue. After this time has elapsed, the queue is eligible for deletion.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The time is measured in hours, counting from the date and time when the queue was created. The creation date and time of the queue are recorded in the *CreationDate* and *CreationTime* attributes.

This information is provided to enable a housekeeping application or the operator to identify and delete queues that are no longer required.

**Note:** The queue manager never takes any action to delete queues based on this attribute, or to prevent the deletion of queues with a retention interval that has not expired; it is the user's responsibility to take any required action.

Use a realistic retention interval to prevent the accumulation of permanent dynamic queues (see DefinitionType attribute ). However, this attribute can also be used with predefined queues.

To determine the value of this attribute, use the MQIA_RETENTION_INTERVAL selector with the MQINQ call.

### *Scope (MQLONG)*

This controls whether an entry for this queue also exists in a cell directory.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | | X | X | |

A cell directory is provided by an installable Name service. The value is one of the following:

**MQSCO_Q_MGR**
The queue definition has queue-manager scope: the definition of the queue does not extend beyond the queue manager that owns it. To open the queue for output from some other queue manager, either the name of the owning queue manager must be specified, or the other queue manager must have a local definition of the queue.

**MQSCO_CELL**
The queue definition has cell scope: the queue definition is also placed in a cell directory available to all the queue managers in the cell. The queue can be opened for output from any of the queue managers in the cell by specifying the name of the queue; the name of the queue manager that owns the queue need not be specified. However, the queue definition is not available to any queue manager in the cell that also has a local definition of a queue with that name, as the local definition takes precedence.

A cell directory is provided by an installable Name service.

Model and dynamic queues cannot have cell scope.

This value is only valid if a name service supporting a cell directory has been configured.

To determine the value of this attribute, use the MQIA_SCOPE selector with the MQINQ call.

Support for this attribute is subject to the following restrictions:

- On IBM i, the attribute is supported, but only MQSCO_Q_MGR is valid.
- On z/OS, the attribute is not supported.

### *Shareability (MQLONG)*

This indicates whether the queue can be opened for input multiple times concurrently.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The value is one of the following:

**MQQA_SHAREABLE**
Queue is shareable.

Multiple opens with the MQOO_INPUT_SHARED option are allowed.

**MQQA_NOT_SHAREABLE**
Queue is not shareable.

An MQOPEN call with the MQOO_INPUT_SHARED option is treated as MQOO_INPUT_EXCLUSIVE.

To determine the value of this attribute, use the MQIA_SHAREABILITY selector with the MQINQ call.

### *StorageClass (MQCHAR8)*

This is a user-defined name that defines the physical storage used to hold the queue. In practice, a message is written to disk only if it needs to be paged out of its memory buffer.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

To determine the value of this attribute, use the MQCA_STORAGE_CLASS selector with the MQINQ call. The length of this attribute is given by MQ_STORAGE_CLASS_LENGTH.

This attribute is supported only on z/OS.

### *TriggerControl (MQLONG)*

This controls whether trigger messages are written to an initiation queue to start an application to service the queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This is one of the following:

**MQTC_OFF**
No trigger messages are to be written for this queue. The value of *TriggerType* is irrelevant in this case.

**MQTC_ON**
Trigger messages are to be written for this queue when the appropriate trigger events occur.

To determine the value of this attribute, use the MQIA_TRIGGER_CONTROL selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerData (MQCHAR64)*

This is free-format data that the queue manager inserts into the trigger message when a message arriving on this queue causes a trigger message to be written to the initiation queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The content of this data is of no significance to the queue manager. It is meaningful either to the trigger-monitor application that processes the initiation queue, or to the application that the trigger monitor starts.

The character string must not contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the MQCA_TRIGGER_DATA selector with the MQINQ call. To change the value of this attribute, use the MQSET call. The length of this attribute is given by MQ_TRIGGER_DATA_LENGTH.

### *TriggerDepth (MQLONG)*

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

This is the number of messages of priority *TriggerMsgPriority* or greater that must be on the queue before a trigger message is written. This applies when *TriggerType* is set to MQTT_DEPTH. The value of *TriggerDepth* is one or greater. This attribute is not used otherwise.

To determine the value of this attribute, use the MQIA_TRIGGER_DEPTH selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerMsgPriority (MQLONG)*

This is the message priority below which messages do not contribute to the generation of trigger messages (that is, the queue manager ignores these messages when deciding whether to generate a trigger message).

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

*TriggerMsgPriority* can be in the range zero (lowest) through *MaxPriority* (highest; see MaxPriority attribute ); a value of zero causes all messages to contribute to the generation of trigger messages.

To determine the value of this attribute, use the MQIA_TRIGGER_MSG_PRIORITY selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerType (MQLONG)*

This controls the conditions under which trigger messages are written as a result of messages arriving on this queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

It has one of the following values:

**MQTT_NONE**
No trigger messages are written as a result of messages on this queue. This has the same effect as setting *TriggerControl* to MQTC_OFF.

**MQTT_FIRST**
A trigger message is written whenever the number of messages of priority *TriggerMsgPriority* or greater on the queue changes from 0 to 1.

**MQTT_EVERY**
A trigger message is written whenever a message of priority *TriggerMsgPriority* or greater arrives on the queue.

**MQTT_DEPTH**
A trigger message is written whenever the number of messages of priority *TriggerMsgPriority* or greater on the queue equals or exceeds *TriggerDepth*. After the trigger message has been written,

*TriggerControl* is set to MQTC_OFF to prevent further triggering until it is explicitly turned on again.

To determine the value of this attribute, use the MQIA_TRIGGER_TYPE selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *Usage (MQLONG)*

This indicates what the queue is used for.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| X | X | | | |

The value is one of the following:

**MQUS_NORMAL**
This is a queue that applications use when putting and getting messages; the queue is not a transmission queue.

**MQUS_TRANSMISSION**
This is a queue used to hold messages destined for remote queue managers. When an application sends a message to a remote queue, the local queue manager stores the message temporarily on the appropriate transmission queue in a special format. A message channel agent then reads the message from the transmission queue, and transports the message to the remote queue manager. For more information about transmission queues, see Defining a transmission queue.

Only privileged applications can open a transmission queue for MQOO_OUTPUT to put messages on it directly. Usually, only utility applications do this. Ensure that the message data format is correct (see "MQXQH - Transmission-queue header" on page 598 ) or errors might occur during the transmission process. Context is not passed or set unless one of the MQPMO_*_CONTEXT context options is specified.

To determine the value of this attribute, use the MQIA_USAGE selector with the MQINQ call.

### *XmitQName (MQCHAR48)*

This is the transmission queue name. If this attribute is nonblank when an open occurs, either for a remote queue or for a queue-manager alias definition, it specifies the name of the local transmission queue to be used for forwarding the message.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | X | |

If *XmitQName* is blank, the local queue with a name that is the same as *RemoteQMgrName* is used as the transmission queue. If there is no queue with the name *RemoteQMgrName*, the queue identified by the *DefXmitQName* queue-manager attribute is used.

This attribute is ignored if the definition is being used as a queue-manager alias and *RemoteQMgrName* is the name of the local queue manager. It is also ignored if the definition is used as a reply-to queue alias definition.

To determine the value of this attribute, use the MQCA_XMIT_Q_NAME selector with the MQINQ call. The length of this attribute is given by MQ_Q_NAME_LENGTH.

## Attributes for namelists

The following table summarizes the attributes that are specific to namelists. The attributes are described in alphabetical order.

Namelists are supported on all IBM MQ systems, plus IBM MQ MQI clients connected to these systems.

**Note:** The names of the attributes shown in this section are descriptive names used with the MQINQ and MQSET calls; the names are the same as for the PCF commands. When MQSC commands are used to

define, alter, or display attributes, alternative short names are used; see Script (MQSC) Commands for more information.

*Table 564. Attributes for namelists*

| Attribute | Description |
|---|---|
| AlterationDate | Date when definition was last changed |
| AlterationTime | Time when definition was last changed |
| NameCount | Number of names in namelist |
| NamelistDesc | Namelist description |
| NamelistName | Namelist name |
| Names | A list of *NameCount* names |
| NamelistType | Namelist type |
| QSGDisp | Queue-sharing group disposition |

### *AlterationDate (MQCHAR12)*

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the MQCA_ALTERATION_DATE selector with the MQINQ call. The length of this attribute is given by MQ_DATE_LENGTH.

### *AlterationTime (MQCHAR8)*

This is the time when the definition was last changed. The format of the time is HH.MM.SS.

To determine the value of this attribute, use the MQCA_ALTERATION_TIME selector with the MQINQ call. The length of this attribute is given by MQ_TIME_LENGTH.

### *NameCount (MQLONG)*

This is the number of names in the namelist. It is greater than or equal to zero. The following value is defined:

**MQNC_MAX_NAMELIST_NAME_COUNT**
Maximum number of names in a namelist.

To determine the value of this attribute, use the MQIA_NAME_COUNT selector with the MQINQ call.

### *NamelistDesc (MQCHAR64)*

Use this field for descriptive commentary; its value is established by the definition process. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, this field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the MQCA_NAMELIST_DESC selector with the MQINQ call.

The length of this attribute is given by MQ_NAMELIST_DESC_LENGTH.

### *NamelistName (MQCHAR48)*

This is the name of a namelist that is defined on the local queue manager. For more information about namelist names, see the Other object names section.

Each namelist has a name that is different from the names of other namelists belonging to the queue manager, but might duplicate the names of other queue manager objects of different types (for example, queues).

To determine the value of this attribute, use the MQCA_NAMELIST_NAME selector with the MQINQ call.

The length of this attribute is given by MQ_NAMELIST_NAME_LENGTH.

### *NamelistType (MQLONG)*

This specifies the nature of the names in the namelist, and indicates how the namelist is used. It is one of the following values:

**MQNT_NONE**
Namelist with no assigned type.

**MQNT_Q**
Namelist containing the names of queues.

**MQNT_CLUSTER**
Namelist containing the names of clusters.

**MQNT_AUTH_INFO**
Namelist containing the names of authentication-information objects.

To determine the value of this attribute, use the MQIA_NAMELIST_TYPE selector with the MQINQ call.

This attribute is supported only on z/OS.

### *Names (MQCHAR48xNameCount)*

This is a list of *NameCount* names, where each name is the name of an object that is defined to the local queue manager. For more information about object names, see Rules for naming IBM MQ objects.

To determine the value of this attribute, use the MQCA_NAMES selector with the MQINQ call.

The length of each name in the list is given by MQ_OBJECT_NAME_LENGTH.

### *QSGDisp (MQLONG)*

This specifies the disposition of the namelist. The value is one of the following:

**MQQSGD_Q_MGR**
The object has queue-manager disposition: the object definition is known only to the local queue manager; the definition is not known to other queue managers in the queue-sharing group.

Each queue manager in the queue-sharing group can have an object with the same name and type as the current object, but these are separate objects and there is no correlation between them. Their attributes are not constrained to be the same as each other.

**MQQSGD_COPY**
The object is a local copy of a master object definition that exists in the shared repository. Each queue manager in the queue-sharing group can have its own copy of the object. Initially, all copies have the same attributes, but you can alter each copy, using MQSC commands, so that its attributes differ from those of the other copies. The attributes of the copies are resynchronized when the master definition in the shared repository is altered.

To determine the value of this attribute, use the MQIA_QSG_DISP selector with the MQINQ call.

This attribute is supported only on z/OS.

## Attributes for process definitions

The following table summarizes the attributes that are specific to process definitions. The attributes are described in alphabetical order.

**Note:** The names of the attributes in this section are descriptive names used with the MQINQ and MQSET calls; the names are the same as for the PCF commands. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see Script (MQSC) Commands for more information.

*Table 565. Attributes for process definitions*

| Attribute | Description |
|---|---|
| AlterationDate | Date when definition was last changed |
| AlterationTime | Time when definition was last changed |
| ApplId | Application identifier |
| ApplType | Application type |
| EnvData | Environment data |
| ProcessDesc | Process description |
| ProcessName | Process name |
| QSGDisp | Queue-sharing group disposition |
| UserData | User data |

### *AlterationDate (MQCHAR12)*

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the MQCA_ALTERATION_DATE selector with the MQINQ call. The length of this attribute is given by MQ_DATE_LENGTH.

### *AlterationTime (MQCHAR8)*

This is the time when the definition was last changed. The format of the time is HH.MM.SS.

To determine the value of this attribute, use the MQCA_ALTERATION_TIME selector with the MQINQ call. The length of this attribute is given by MQ_TIME_LENGTH.

### *ApplId (MQCHAR256)*

This is a character string that identifies the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

The meaning of *ApplId* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ requires *ApplId* to be the name of an executable program. The following notes apply to the environments indicated:

- On z/OS, *ApplId* must be:
  - A CICS transaction identifier, for applications started using the CICS trigger-monitor transaction CKTI
  - An IMS transaction identifier, for applications started using the IMS trigger monitor CSQQTRMN
- On Windows systems, the program name can be prefixed with a drive and directory path.
- On UNIX systems, the program name can be prefixed with a directory path.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the MQCA_APPL_ID selector with the MQINQ call. The length of this attribute is given by MQ_PROCESS_APPL_ID_LENGTH.

### *ApplType (MQLONG)*

This identifies the nature of the program to be started in response to the receipt of a trigger message. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

*ApplType* can have any value, but the following values are recommended for standard types; restrict user-defined application types to values in the range MQAT_USER_FIRST through MQAT_USER_LAST:

**MQAT_AIX**
AIX application (same value as MQAT_UNIX).

**MQAT_BATCH**
Batch application

**MQAT_BROKER**
Broker application

**MQAT_CICS**
CICS transaction.

**MQAT_CICS_BRIDGE**
CICS bridge application.

**MQAT_CICS_VSE**
CICS/VSE transaction.

**MQAT_DOS**
IBM MQ MQI client application on PC DOS.

**MQAT_IMS**
IMS application.

**MQAT_IMS_BRIDGE**
IMS bridge application.

**MQAT_JAVA**
Java application.

**MQAT_MVS**
MVS or TSO application (same value as MQAT_ZOS).

**MQAT_NOTES_AGENT**
Lotus Notes Agent application.

**MQAT_NSK**
HP Integrity NonStop Server application.

**MQAT_OS390**
OS/390 application (same value as MQAT_ZOS).

**MQAT_OS400**
IBM i application.

**MQAT_RRS_BATCH**
RRS batch application.

**MQAT_UNIX**
UNIX application.

**MQAT_UNKNOWN**
Application of unknown type.

**MQAT_USER**
User application.

**MQAT_VOS**
Stratus VOS application.

**MQAT_WINDOWS**
16-bit Windows application.

**MQAT_WINDOWS_NT**
32-bit Windows application.

**MQAT_WLM**
z/OS workload manager application.

**MQAT_XCF**
XCF.

**MQAT_ZOS**
z/OS application.

**MQAT_USER_FIRST**
Lowest value for user-defined application type.

**MQAT_USER_LAST**
Highest value for user-defined application type.

To determine the value of this attribute, use the MQIA_APPL_TYPE selector with the MQINQ call.

### *EnvData (MQCHAR128)*

This is a character string that contains environment-related information pertaining to the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

The meaning of *EnvData* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ appends *EnvData* to the parameter list passed to the started application. The parameter list consists of the MQTMC2 structure, followed by one blank, followed by *EnvData* with trailing blanks removed. The following notes apply to the environments indicated:

- On z/OS:
  - *EnvData* is not used by the trigger-monitor applications provided by IBM MQ.
  - If ApplType is MQAT_WLM, you can supply default values in EnvData for the ServiceName and ServiceStep fields in the work information header (MQWIH).
- On UNIX systems, *EnvData* can be set to the & character to run the started application in the background.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the MQCA_ENV_DATA selector with the MQINQ call. The length of this attribute is given by MQ_PROCESS_ENV_DATA_LENGTH.

### *ProcessDesc (MQCHAR64)*

Use this field for descriptive commentary. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the MQCA_PROCESS_DESC selector with the MQINQ call.

The length of this attribute is given by MQ_PROCESS_DESC_LENGTH.

### *ProcessName (MQCHAR48)*

This is the name of a process definition that is defined on the local queue manager.

Each process definition has a name that is different from the names of other process definitions belonging to the queue manager. But the name of the process definition might be the same as the names of other queue manager objects of different types (for example, queues).

To determine the value of this attribute, use the MQCA_PROCESS_NAME selector with the MQINQ call.

The length of this attribute is given by MQ_PROCESS_NAME_LENGTH.

### *QSGDisp (MQLONG)*

This specifies the disposition of the process definition. The value is one of the following:

**MQQSGD_Q_MGR**
The object has queue-manager disposition: the object definition is known only to the local queue manager; the definition is not known to other queue managers in the queue-sharing group.

Each queue manager in the queue-sharing group can have an object with the same name and type as the current object, but these are separate objects and there is no correlation between them. Their attributes are not constrained to be the same as each other.

**MQQSGD_COPY**
The object is a local copy of a master object definition that exists in the shared repository. Each queue manager in the queue-sharing group can have its own copy of the object. Initially, all copies have the same attributes, but you can alter each copy, using MQSC commands, so that its attributes differ from those of the other copies. The attributes of the copies are resynchronized when the master definition in the shared repository is altered.

To determine the value of this attribute, use the MQIA_QSG_DISP selector with the MQINQ call.

This attribute is supported only on z/OS.

### *UserData (MQCHAR128)*

`UserData` is a character string that contains user information pertaining to the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue, or the application that is started by the trigger monitor. The information is sent to the initiation queue as part of the trigger message.

The meaning of *`UserData`* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ passes *`UserData`* to the started application as part of the parameter list. The parameter list consists of the MQTMC2 structure (containing *`UserData`*), followed by one blank, followed by *`EnvData`* with trailing blanks removed.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary. For Microsoft Windows, the character string must not contain double quotation marks if the process definition is going to be passed to **`runmqtrm`**.

To determine the value of this attribute, use the MQCA_USER_DATA selector with the MQINQ call. The length of this attribute is given by MQ_PROCESS_USER_DATA_LENGTH.

## Return codes

For each IBM MQ Message Queue Interface (MQI) and IBM MQ Administration Interface (MQAI) call, a **completion** code and a **reason** code are returned by the queue manager or by an exit routine, to indicate the success or failure of the call.

Applications must not depend upon errors being checked for in a specific order, except where specifically noted. If more than one completion code or reason code could arise from a call, the particular error reported depends on the implementation.

Applications checking for successful completion following an IBM MQ API call must always check the completion code. Do not assume the completion code value, based on the value of the reason code.

### Completion codes

The completion code parameter (*`CompCode`*) allows the caller to see quickly whether the call completed successfully, completed partially, or failed. The following is a list of completion codes, with more detail than is given in the call descriptions:

**MQCC_OK**
The call completed fully; all output parameters have been set. The *`Reason`* parameter always has the value MQRC_NONE in this case.

**MQCC_WARNING**
The call completed partially. Some output parameters might have been set in addition to the *CompCode* and *Reason* output parameters. The *Reason* parameter gives additional information about the partial completion.

**MQCC_FAILED**
The processing of the call did not complete. The state of the queue manager is unchanged, except where specifically noted. The *CompCode* and *Reason* output parameters have been set; other parameters are unchanged, except where noted.

The reason might be a fault in the application program, or it might be the result of some situation external to the program, for example the user's authority might have been revoked. The *Reason* parameter gives additional information about the error.

### Reason codes

The reason code parameter (*Reason*) qualifies the completion code parameter (*CompCode*).

If there is no special reason to report, MQRC_NONE is returned. A successful call returns MQCC_OK and MQRC_NONE.

If the completion code is either MQCC_WARNING or MQCC_FAILED, the queue manager always reports a qualifying reason; details are given under each call description.

Where user exit routines set completion codes and reasons, they must adhere to these rules. In addition, any special reason values defined by user exits must be less than zero, to ensure that they do not conflict with values defined by the queue manager. Exits can set reasons already defined by the queue manager, where appropriate.

Reason codes also occur in:

- The *Reason* field of the MQDLH structure
- The *Feedback* field of the MQMD structure

For complete descriptions of reason codes, see Messages and reason codes.

## Rules for validating MQI options

This section lists the situations that produce an MQRC_OPTIONS_ERROR reason code from an MQOPEN, MQPUT, MQPUT1, MQGET, MQCLOSE, or MQSUB call.

### MQOPEN call

For the options of the MQOPEN call:

- At least *one* of the following must be specified:
  - MQOO_BROWSE
  - MQOO_INPUT_EXCLUSIVE [1]
  - MQOO_INPUT_SHARED [1]
  - MQOO_INPUT_AS_Q_DEF [1]
  - MQOO_INQUIRE
  - MQOO_OUTPUT
  - MQOO_SET
  - MQOO_BIND_ON_OPEN [2]
  - MQOO_BIND_NOT_FIXED [2]
  - MQOO_BIND_ON_GROUP [2]
  - MQOO_BIND_AS_Q_DEF [2]
- Only *one* of the following is allowed:

- MQOO_READ_AHEAD
- MQOO_NO_READ_AHEAD
- MQOO_READ_AHEAD_AS_Q_DEF

1. Only *one* of the following is allowed:
   - MQOO_INPUT_EXCLUSIVE
   - MQOO_INPUT_SHARED
   - MQOO_INPUT_AS_Q_DEF
2. Only *one* of the following is allowed:
   - MQOO_BIND_ON_OPEN
   - MQOO_BIND_NOT_FIXED
   - MQOO_BIND_ON_GROUP
   - MQOO_BIND_AS_Q_DEF

   **Note:** The options that are listed previously are mutually exclusive. However, as the value of MQOO_BIND_AS_Q_DEF is zero, specifying it with either of the other two bind options does not result in reason code MQRC_OPTIONS_ERROR. MQOO_BIND_AS_Q_DEF is provided to aid program documentation.

- If MQOO_SAVE_ALL_CONTEXT is specified, one of the MQOO_INPUT_* options must also be specified.
- If one of the MQOO_SET_*_CONTEXT or MQOO_PASS_*_CONTEXT options are specified, MQOO_OUTPUT must also be specified.
- If MQOO_CO_OP is specified, MQOO_BROWSE must also be specified
- If MQOO_NO_MULTICAST is specified, MQOO_OUTPUT must also be specified.

## MQPUT call

For the put-message options:

- The combination of MQPMO_SYNCPOINT and MQPMO_NO_SYNCPOINT is not allowed.
- Only *one* of the following is allowed:
  - MQPMO_DEFAULT_CONTEXT
  - MQPMO_NO_CONTEXT
  - MQPMO_PASS_ALL_CONTEXT
  - MQPMO_PASS_IDENTITY_CONTEXT
  - MQPMO_SET_ALL_CONTEXT
  - MQPMO_SET_IDENTITY_CONTEXT
- Only *one* of the following is allowed:
  - MQPMO_ASYNC_RESPONSE
  - MQPMO_SYNC_RESPONSE
  - MQPMO_RESPONSE_AS_TOPIC_DEF
  - MQPMO_RESPONSE_AS_Q_DEF
- MQPMO_ALTERNATE_USER_AUTHORITY is not allowed (it is valid only on the MQPUT1 call).

## MQPUT1 call

For the put-message options, the rules are the same as for the MQPUT call, except for the following:

- MQPMO_ALTERNATE_USER_AUTHORITY is allowed.
- MQPMO_LOGICAL_ORDER is *not* allowed.

## MQGET call

For the get-message options:

- Only *one* of the following is allowed:
  - MQGMO_NO_SYNCPOINT
  - MQGMO_SYNCPOINT
  - MQGMO_SYNCPOINT_IF_PERSISTENT
- Only *one* of the following is allowed:
  - MQGMO_BROWSE_FIRST
  - MQGMO_BROWSE_MSG_UNDER_CURSOR
  - MQGMO_BROWSE_NEXT
  - MQGMO_MSG_UNDER_CURSOR
- MQGMO_SYNCPOINT is not allowed with any of the following:
  - MQGMO_BROWSE_FIRST
  - MQGMO_BROWSE_MSG_UNDER_CURSOR
  - MQGMO_BROWSE_NEXT
  - MQGMO_LOCK
  - MQGMO_UNLOCK
- MQGMO_SYNCPOINT_IF_PERSISTENT is not allowed with any of the following:
  - MQGMO_BROWSE_FIRST
  - MQGMO_BROWSE_MSG_UNDER_CURSOR
  - MQGMO_BROWSE_NEXT
  - MQGMO_COMPLETE_MSG
  - MQGMO_UNLOCK
- MQGMO_MARK_SKIP_BACKOUT requires MQGMO_SYNCPOINT to be specified.
- The combination of MQGMO_WAIT and MQGMO_SET_SIGNAL is not allowed.
- If MQGMO_LOCK is specified, one of the following must also be specified:
  - MQGMO_BROWSE_FIRST
  - MQGMO_BROWSE_MSG_UNDER_CURSOR
  - MQGMO_BROWSE_NEXT
- If MQGMO_UNLOCK is specified, only the following are allowed:
  - MQGMO_NO_SYNCPOINT
  - MQGMO_NO_WAIT

## MQCLOSE call

For the options of the MQCLOSE call:

- The combination of MQCO_DELETE and MQCO_DELETE_PURGE is not allowed.
- Only one of the following is allowed:
  - MQCO_KEEP_SUB
  - MQCO_REMOVE_SUB

## MQSUB call

For the options of the MQSUB call:

- At least one of the following must be specified:
  - MQSO_ALTER
  - MQSO_RESUME
  - MQSO_CREATE
- Only one of the following is allowed:
  - MQSO_DURABLE
  - MQSO_NON_DURABLE

  **Note:** The options that are listed previously are mutually exclusive. However, as the value of MQSO_NON_DURABLE is zero, specifying it with MQSO_DURABLE does not result in reason code MQRC_OPTIONS_ERROR. MQSO_NON_DURABLE is provided to aid program documentation.
- The combination of MQSO_GROUP_SUB and MQSO_MANAGED is not allowed.
- MQSO_GROUP_SUB requires MQSO_SET_CORREL_ID to be specified.
- Only one of the following is allowed:
  - MQSO_ANY_USERID
  - MQSO_FIXED_USERID
- MQSO_NEW_PUBLICATIONS_ONLY is allowed in combination with:
  - MQSO_CREATE
  - MQSO_ALTER, if MQSO_NEW_PUBLICATIONS_ONLY was set on the original subscription
- The combination of MQSO_PUBLICATIONS_ON_REQUEST and SubLevel greater than 1 is not allowed.
- Only one of the following is allowed:
  - MQSO_WILDCARD_CHAR
  - MQSO_WILDCARD_TOPIC
- MQSO_NO_MULTICAST requires MQSO_MANAGED to be specified.

## Queued publish/subscribe command messages

An application can use MQRFH2 command messages to control a queued publish/subscribe application.

An application that is using MQRFH2 for publish/subscribe can send the following command messages to the SYSTEM.BROKER.CONTROL.QUEUE:

- “Delete Publication message” on page 852
- “Deregister Subscriber message” on page 853
- “Publish message” on page 857
- “Register Subscriber message” on page 859
- “Request Update message” on page 863

If you are writing queued publish/subscribe applications, you must understand these messages, the queue manager response message, and the message descriptor ( MQMD); see the following information:

- “Queue Manager Response message” on page 865
- “MQMD settings for publications forwarded by a queue manager” on page 871
- “MQMD settings in queue manager response messages” on page 872
- “Publish/subscribe reason codes” on page 867

The commands are contained in a <psc> folder in the **NameValueData** field of the MQRFH2 header. The message that can be sent by a broker in response to a command message is contained in a <pscr> folder.

The descriptions of each command list the properties that can be contained in a folder. Unless otherwise specified, the properties are optional and can occur only once.

Names of properties are shown as <Command>.
Values must be in string format, for example: Publish.
A string constant representing the value of a property is shown in parentheses, for example: (MQPSC_PUBLISH).
String constants are defined in the header file cmqpsc.h which is supplied with the queue manager.

## Delete Publication message

The **Delete Publication** command message is sent to a queue manager from a publisher, or from another queue manager, to tell the queue manager to delete any retained publications for the specified topics.

This message is sent to a queue monitored by the queue manager's queued publish/subscribe interface.

The input queue should be the queue that the original publication was sent to.

If you have the authority for some, but not all, of the topics that are specified in the **Delete Publication** command message, only those topics are deleted. A **Broker Response** message indicates which topics are not deleted.

Similarly, if a **Publish** command contains more than one topic, a **Delete Publication** command matching some, but not all, of those topics deletes only the publications for the topics that are specified in the **Delete Publication** command.

See "MQMD settings for publications forwarded by a queue manager" on page 871 for details of the message descriptor (MQMD) parameters that are needed when sending a command message to the queue manager.

### *Properties*

**<Command> (*MQPSC_COMMAND*)**
The value is DeletePub (*MQPSC_DELETE_PUBLICATION*).

This property must be specified.

**<Topic> (*MQPSC_TOPIC*)**
The value is a string that contains a topic for which retained publications are to be deleted. Wildcard characters can be included in the string to delete publications on more than one topic.

This property must be specified; it can be repeated for as many topics as needed.

**<DelOpt> (*MQPSC_DELETE_OPTION*)**
The delete options property can take one of the following values:

**Local (*MQPSC_LOCAL*)**

All retained publications for the specified topics are deleted at the local queue manager (that is, the queue manager to which this message is sent), whether they were published with the Local option or not.

Publications at other queue managers are not affected.

**None (*MQPSC_NONE*)**

All options take their default values. This has the same effect as omitting the DelOpt property. If other options are specified at the same time, None is ignored.

The default if this property is omitted is that all retained publications for the specified topics are deleted at all queue managers in the network, regardless of whether they were published with the Local option.

### *Example*

Here is an example of `NameValueData` for a **`Delete Publication`** command message. This is used by the sample application to delete, at the local queue manager, the retained publication that contains the latest score in the match between Team1 and Team2.

```
<psc>
  <Command>DeletePub</Command>
  <Topic>Sport/Soccer/State/LatestScore/Team1 Team2</Topic>
  <DelOpt>Local</DelOpt>
</psc>
```

## Deregister Subscriber message

The **`Deregister Subscriber`** command message is sent to a queue manager by a subscriber, or by another application on behalf of a subscriber, to indicate that it no longer wants to receive messages matching the given parameters.

This message is sent to SYSTEM.BROKER.CONTROL.QUEUE, the queue manager's control queue. The user must have the necessary authority to put a message onto this queue.

See MQMD settings for publications forwarded by a queue manager for details of the message descriptor (MQMD) parameters that are needed when sending a command message to the queue manager.

An individual subscription can be deregistered by specifying the corresponding topic, subscription point and filter values of the original subscription. If any of the values were not specified (that is, they took the default values) in the original subscription, they should be omitted when the subscription is deregistered.

All subscriptions for a subscriber, or a group of subscribers, can be deregistered by using the `DeregAll` option. For example, if `DeregAll` is specified, together with a subscription point (but no topic or filter), then all subscriptions for the subscriber on the specified subscription point are deregistered, regardless of the topic and filter. Any combination of topic, filter and subscription point is allowed; if all three are specified only one subscription can match, and the `DeregAll` option is ignored.

The message must be sent by the subscriber that registered the subscription; this is confirmed by checking the subscriber's user ID.

Subscriptions can also be deregistered by a system administrator using MQSC or PCF commands. However, the subscriptions registered with a temporary dynamic queue are associated with the queue, not just the queue name. If the queue is deleted, either explicitly, or by the application disconnecting from the queue manager, it is no longer possible to use the **`Deregister Subscriber`** command to deregister the subscriptions for that queue. The subscriptions can be deregistered using the developer workbench, and they are removed automatically by the queue manager the next time that it matches a publication to the subscription, or the next time the queue manager restarts. Under normal circumstances, applications should deregister their subscriptions before deleting the queue, or disconnecting from the queue manager.

If a subscriber sends a message to deregister a subscription, and receives a response message to say that this was processed successfully, some publications might still reach the subscriber queue if they were being processed by the queue manager at the same time as the subscription was being deregistered. If the messages are not removed from the queue, there might be a buildup of unprocessed messages on the subscriber queue. If the application executes a loop that includes an MQGET call with the appropriate `CorrelId` after sleeping for a while, these messages are cleared off the queue.

Similarly, if the subscriber uses a permanent dynamic queue, and deregisters and closes the queue with the *MQCO_DELETE_PURGE* option on an MQCLOSE call, the queue might not be empty. If any publications from the queue manager are not yet committed when the queue is deleted, an MQRC_Q_NOT_EMPTY return code is issued by the MQCLOSE call. The application can avoid this problem by sleeping and reissuing the MQCLOSE call from time to time.

### *Properties*

**<Command> (*MQPSC_COMMAND*)**
The value is DeregSub (*MQPSC_DEREGISTER_SUBSCRIBER*).

This property must be specified.

**<Topic> (*MQPSC_TOPIC*)**
The value is a string that contains the topic to be deregistered.

This property can, optionally, be repeated if multiple topics are to be deregistered. It can be omitted if DeregAll is specified in <RegOpt>.

The topics that are specified can be a subset of those that are registered if the subscriber wants to retain subscriptions for other topics. Wildcard characters are allowed, but a topic string that contains wildcard characters must exactly match the corresponding string that was specified in the **Deregister Subscriber** command message.

**<SubPoint> (*MQPSC_SUBSCRIPTION_POINT*)**
The value is a string that specifies the subscription point from which the subscription is to be detached.

This property must not be repeated. It can be omitted if a <Topic> is specified, or if DeregAll is specified in <RegOpt>. If you omit this property, the following happens:

- If you do **not** specify DeregAll, subscriptions matching the <Topic> property (and the <Filter> property, if present) are deregistered from the default subscription point.
- If you specify DeregAll, all subscriptions (matching the <Topic> and <Filter> properties if present) are deregistered from all subscription points.

Note that you cannot specify the default subscription point explicitly. Therefore, there is no way of deregistering all subscriptions from this subscription point only; you must specify the topics.

**<SubIdentity> (*MQPSC_SUBSCRIPTION_IDENTITY*)**
This is a variable-length string with a maximum length of 64 characters. It is used to represent an application with an interest in a subscription. The queue manager maintains a set of subscriber identities for each subscription. Each subscription can allow its identity set to hold only a single identity, or an unlimited number of identities.

If the SubIdentity is in the identity set for the subscription then it is removed from the set. If the identity set becomes empty as a result of this, the subscription is removed from the queue manager, unless LeaveOnly is specified as a value of the RegOpt property. If the identity set still contains other identities then the subscription is not removed from the queue manager, and publication flow is not interrupted.

If SubIdentity is specified, but the SubIdentity is not in the identity set for the subscription, then the **Deregister Subscriber** command fails with the return code *MQRCCF_SUB_IDENTITY_ERROR*.

**<Filter> (*MQPSC_FILTER*)**
The value is a string specifying the filter to be deregistered. It must match exactly, including case and any spaces, a subscription filter that has been previously registered.

This property can, optionally, be repeated if more than one filter is to be deregistered. It can be omitted if a <Topic> is specified, or if DeregAll is specified in <RegOpt>.

The filters specified can be a subset of those registered if the subscriber wants to retain subscriptions for other filters.

**<RegOpt> (*MQPSC_REGISTRATION_OPTION*)**
The registration options property can take the following values:

**DeregAll**
(*MQPSC_DEREGISTER_ALL*)

All matching subscriptions registered for this subscriber are to be deregistered.

If you specify DeregAll:

- <Topic>, <SubPoint>, and <Filter> can be omitted.
- <Topic> and <Filter> can be repeated, if required.
- <SubPoint> must not be repeated.

If you do **not** specify DeregAll:

- <Topic> must be specified, and can be repeated if required.
- <SubPoint> and <Filter> can be omitted.
- <SubPoint> must not be repeated.
- <Filter> can be repeated, if required.

If topics and filters are both repeated, then all subscriptions matching all combinations of the two are removed. For example, a **Deregister Subscriber** command that specifies three topics and three filters will attempt to remove nine subscriptions.

**CorrelAsId**
(*MQPSC_CORREL_ID_AS_IDENTITY*)

The CorrelId in the message descriptor (MQMD), which must not be zero, is used to identify the subscriber. It must match the CorrelId used in the original subscription.

**FullResp**
(*MQPSC_FULL_RESPONSE*)

When FullResp is specified all attributes of the subscription are returned in the response message, if the command does not fail.

When FullResp is specified DeregAll is not permitted in the **Deregister Subscriber** command. It is also not possible to specify multiple topics. The command fails with return code *MQRCCF_REG_OPTIONS_ERROR*, in both cases.

**LeaveOnly**
(*MQPSC_LEAVE_ONLY*)

When you specify this with a SubIdentity which is in the identity set for the subscription the SubIdentity is removed from the identity set for the subscription. The subscription is not removed from the queue manager, even if the resulting identity set is empty. If the SubIdentity value is not in the identity set the command fails with return code *MQRCCF_SUB_IDENTITY_ERROR*.

If LeaveOnly is specified with no SubIdentity, the command fails with return code *MQRCCF_REG_OPTIONS_ERROR*.

If neither LeaveOnly nor a SubIdentity are specified, then the subscription is removed regardless of the contents of the identity set for the subscription.

**None**
(MQPSC_NONE)

All options take their default values. This has the same effect as omitting the registration options property. If other options are specified at the same time, None is ignored.

**VariableUserId**
(*MQPSC_VARIABLE_USER_ID*)

When specified the identity of the subscriber (queue, queue manager and correlid) is not restricted to a single userid. This differs from the existing behavior of the queue manager that associates the userid of the original registration message with the subscriber's identity and from then on prevents any other user using that identity. If a new subscriber tries to use the same identity, the return code *MQRCCF_DUPLICATE_SUBSCRIPTION* is returned.

Any user can modify or deregister the subscription when they have suitable authority, avoiding the existing check that the userid must match that of the original subscriber.

To add this option to an existing subscription the command must come from the same userid as the original subscription itself.

If the subscription to be deregistered has VariableUserId set this must be set at deregister time to indicate which subscription is being deregistered. Otherwise, the userid of the **Deregister Subscriber** command is used to identify the subscription. This is overridden, along with the other subscriber identifiers, if a subscription name is supplied.

The default, if this property is omitted, is that no registration options are set.

**<QMgrName> (*MQPSC_Q_MGR_NAME*)**
The value is the queue manager name for the subscriber queue. It must match the QMgrName used in the original subscription.

If this property is omitted, the default is the ReplyToQMgr name in the message descriptor (MQMD). If the resulting name is blank, it defaults to the name of the queue manager.

**<QName> (*MQPSC_Q_NAME*)**
The value is the name of the subscriber queue. It must match the QName used in the original subscription.

If this property is omitted, the default is the ReplyToQ name in the message descriptor (MQMD), which must not be blank.

**<SubName> (*MQPSC_SUBSCRIPTION_NAME*)**
If you specify SubName on a **Deregister Subscriber** command the SubName value takes precedence over all other identifier fields except the userid, unless VariableUserId is set on the subscription itself. If VariableUserId is not set, the **Deregister Subscriber** command succeeds only if the userid of the command message matches that of the subscription, if not the command fails with return code *MQRCCF_DUPLICATE_IDENTITY*.

If a subscription exists that matches the traditional identity of this command but has no SubName the **Deregister Subscriber** command fails with return code *MQRCCF_SUB_NAME_ERROR*. If an attempt is made to deregister a subscription that has a SubName using a command message that matches the traditional identity but with no SubName specified the command succeeds.

**<SubUserData> (*MQPSC_SUBSCRIPTION_USER_DATA*)**
This is a variable-length text string. The value is stored by the queue manager with the subscription but has no influence on the delivery of the publication to the subscriber. The value can be altered by re-registering to the same subscription with a new value. This attribute is for the use of the application.

SubUserData is returned in the Metatopic information (MQCACF_REG_SUB_USER_DATA) for a subscription, if SubUserData is present.

## *Example*

Here is an example of NameValueData for a **Deregister Subscriber** command message. In this example, the sample application is deregistering its subscription to the topics which contain the latest score for all matches. The subscriber's identity, including the CorrelId, is taken from the defaults in the MQMD.

```
<psc>
  <Command>DeregSub</Command>
  <RegOpt>CorrelAsId</RegOpt>
  <Topic>Sport/Soccer/State/LatestScore/#</Topic>
</psc>
```

## Publish message

The **Publish** command message is put to a queue, or from a queue manager to a subscriber, to publish information on a specified topic or topics.

Authority to put a message onto a queue and authority to publish information on a specified topic or topics is necessary.

If the user has authority to publish information on some, but not all, topics, only those topics are used to publish; a warning response indicates which topics are not used to publish.

If a subscriber has any matching subscriptions, the queue manager forwards the **Publish** message to the subscriber queues defined in the corresponding **Register Subscriber** command messages.

See Queue Manager Response message for details of the message descriptor (MQMD) parameters needed when sending a command message to the queue manager, and used when a queue manager forwards a publication to a subscriber.

The queue manager forwards the **Publish** message to other queue managers in the network that have matching subscriptions, unless it is a local publication.

Publication data, if any, is included in the body of the message. The data can be described in an <mcd> folder in the NameValueData field of the MQRFH2 header.

### Properties

**<Command> (*MQPSC_COMMAND*)**
The value is Publish (*MQPSC_PUBLISH*).

This property must be specified.

**<Topic> (*MQPSC_TOPIC*)**
The value is a string that contains a topic that categorizes this publication. No wildcard characters are allowed.

You must add the topic to the namelist SYSTEM.QPUBSUB.QUEUE.NAMELIST, see Adding a stream for instructions on how to complete this task.

This property must be specified, and can optionally be repeated for as many topics as needed.

**<SubPoint> (*MQPSC_SUBSCRIPTION_POINT*)**
The subscription point on which the publication is published.

In WebSphere Event Broker V6, the value of the <SubPoint> property is the value of the Subscription Point attribute of the Publication node that is handling the publishing.

In IBM MQ V7.0.1, the value of the <SubPoint> property must match the name of a subscription point. See Adding a subscription point.

**<PubOpt> (*MQPSC_PUBLICATION_OPTION*)**
The publication options property can take the following values:

**RetainPub**
(*MQPSC_RETAIN_PUB*)

The queue manager is to retain a copy of the publication. If this option is not set, the publication is deleted as soon as the queue manager has sent the publication to all its current subscribers.

**IsRetainedPub**
(*MQPSC_IS_RETAINED_PUB*)

(Can only be set by a queue manager.) This publication has been retained by the queue manager. The queue manager sets this option to notify a subscriber that this publication was published earlier and has been retained, provided that the subscription has been registered with the InformIfRetained option. It is set only in response to a Register Subscriber or Request Update command message. Retained publications that are sent directly to subscribers do not have this option set.

**Local**
(*MQPSC_LOCAL*)

This option tells the queue manager that this publication must not be sent to other queue managers. All subscribers that registered at this queue manager receive this publication if they have matching subscriptions.

**OtherSubsOnly**
(*MQPSC_OTHER_SUBS_ONLY*)

This option allows simpler processing of conference-type applications, where a publisher is also a subscriber to the same topic. It tells the queue manager not to send the publication to the publisher's subscriber queue even if it has a matching subscription. The publisher's subscriber queue consists of its `QMgrName`, `QName`, and optional `CorrelId`, as described in the following list.

**CorrelAsId**
(*MQPSC_CORREL_ID_AS_IDENTITY*)

The `CorrelId` in the MQMD (which must not be zero) is part of the publisher's subscriber queue, in applications where the publisher is also a subscriber.

**None**
(*MQPSC_NONE*)

All options take their default values. This has the same effect as omitting the publication options property. If other options are specified at the same time, `None` is ignored.

You can have more than one publication option by introducing additional <PubOpt> elements.

The default, if this property is omitted, is that no publication options are set.

**<PubTime> (*MQPSC_PUBLISH_TIMESTAMP*)**
The value is an optional publication timestamp set by the publisher. It is 16 characters long with format:

```
YYYYMMDDHHMMSSTH
```

using Universal Time. This information is not checked by the queue manager before being sent to the subscribers.

**<SeqNum> (*MQPSC_SEQUENCE_NUMBER*)**
The value is an optional sequence number set by the publisher.

It must be incremented by 1 with each publication. However, this is not checked by the queue manager, which merely transmits this information to subscribers.

If publications on the same topic are published to different interconnected queue managers, it is the responsibility of the publishers to ensure that sequence numbers, if used, are meaningful.

**<QMgrName> (*MQPSC_Q_MGR_NAME*)**
The value is a string containing the name of the queue manager for the publisher's subscriber queue, in applications where the publisher is also a subscriber (see `OtherSubsOnly` ).

If this property is omitted, the default is the `ReplyToQMgr` name in the message descriptor (MQMD). If the resulting name is blank, it defaults to the name of the queue manager.

**<QName> (*MQPSC_Q_NAME*)**
The value is a string containing the name of the publisher's subscriber queue, in applications where the publisher is also a subscriber (see `OtherSubsOnly` ).

If this property is omitted, the default is the `ReplyToQ` name in the message descriptor (MQMD), which must not be blank if `OtherSubsOnly` is set.

## Example

Here are some examples of *NameValueData* for a **Publish** command message.

The first example is for a publication sent by the match simulator in the sample application to indicate that a match has started.

```
<psc>
  <Command>Publish</Command>
  <Topic>Sport/Soccer/Event/MatchStarted</Topic>
</psc>
```

The second example is for a retained publication. The latest score in the match between Team1 and Team2 is published.

```
<psc>
  <Command>Publish</Command>
  <PubOpt>RetainPub</PubOpt>
  <Topic>Sport/Soccer/State/LatestScore/Team1 Team2</Topic>
</psc>
```

## Register Subscriber message

The **Register Subscriber** command message is sent to a queue manager by a subscriber, or by another application on behalf of a subscriber, to indicate that it wants to subscribe to one or more topics at a subscription point. A message content filter can also be specified.

In publish/subscribe filter expressions, nesting parentheses causes performance to decrease exponentially. Avoid nesting parentheses to a depth greater than about 6.

The message is sent to SYSTEM.BROKER.CONTROL.QUEUE, which is the queue manager's control queue. Authority to put a message to this queue is required, in addition to access authority (set by the queue manager's system administrator) for the topic, or topics, in the subscription.

If the user has authority on some, but not all, topics, only those with authority are registered; a warning response indicates those that are not registered.

See “MQMD settings in command messages to the queue manager” on page 870 for details of the message descriptor (MQMD) parameters that are needed when sending a command message to the queue manager.

If the reply to queue is a temporary dynamic queue, the subscription is deregistered automatically by the queue manager when the queue is closed.

### Properties

**<Command> (*MQPSC_COMMAND*)**
The value is RegSub (*MQPSC_REGISTER_SUBSCRIBER*). This property must be specified.

**<Topic> (*MQPSC_TOPIC*)**
The topic for which the subscriber wants to receive publications. Wildcard characters can be specified as part of the topic.

If you use the MQSC command **display sub** to examine the subscription created in this way, the value of the <Topic> tag is shown as the TOPICSTR property of the subscription.

This property is required, and can optionally be repeated for as many topics as needed.

**<SubPoint> (*MQPSC_SUBSCRIPTION_POINT*)**
The value is the subscription point to which the subscription is attached.

If this property is omitted, the default subscription point is used.

In WebSphere Event Broker V6, the value of the <SubPoint> property must match the value of the Subscription Point attribute of the Publication nodes that are subscribed to.

In IBM MQ V7.0.1, the value of the <SubPoint> property must match the name of a subscription point. See Adding a subscription point.

**<Filter> (*MQPSC_FILTER*)**
The value is an SQL expression that is used as a filter on the contents of publication messages. If a publication on the specified topic matches the filter, it is sent to the subscriber. This property corresponds to the Selection String that is used in MQSUB and MQOPEN calls. For more information, see Selecting on the content of a message

If this property is omitted, no content filtering takes place.

**<RegOpt> (*MQPSC_REGISTRATION_OPTION*)**
This Registration Options property can take the following values:

**AddName**
(*MQPSC_ADD_NAME*)

When specified for an existing subscription that matches the traditional identity of this Register Subscription command, but with no current SubName value, the SubName specified in this command is added to the subscription.

If AddName is specified the SubName field is mandatory, otherwise MQRCCF_REG_OPTIONS_ERROR is returned.

**CorrelAsId**
(*MQPSC_CORREL_ID_AS_IDENTITY*)

The CorrelId in the message descriptor (MQMD) is used when sending matching publications to the subscriber queue. The CorrelId must not be zero,

**FullResp**
(*MQPSC_FULL_RESPONSE*)

When specified all attributes of the subscription are returned in the response message, if the command does not fail.

FullResp is valid only when the command message refers to a single subscription. Therefore, only one topic is permitted in the command; otherwise the command fails with return code *MQRCCF_REG_OPTIONS_ERROR*.

**InformIfRet**
(*MQPSC_INFORM_IF_RETAINED*)

The queue manager informs the subscriber if a publication is retained when it sends a Publish message in response to a **Register Subscriber** or **Request Update** command message. The queue manager does this by including the IsRetainedPub publication option in the message.

**JoinExcl**
(*MQPSC_JOIN_EXCLUSIVE*)

This option indicates that the specified SubIdentity should be added as the exclusive member of the identity set for the subscription, and that no other identities can be added to the set.

If the identity has already joined 'shared' and is the sole entry in the set, the set is changed to an exclusive lock held by this identity. Otherwise, if the subscription currently has other identities in the identity set (with shared access) the command fails with return code *MQRCCF_SUBSCRIPTION_IN_USE*.

**JoinShared**
(*MQPSC_JOIN_SHARED*)

This option indicates that the specified SubIdentity should be added to the identity set for the subscription.

If the subscription is currently locked exclusively (using the JoinExcl option), the command fails with return code *MQRCCF_SUBSCRIPTION_LOCKED*, unless the identity that has the subscription locked is the same identity as that in this command message. In this case the lock is automatically modified to a shared lock.

**Local**
(*MQPSC_LOCAL*)

The subscription is local and is not distributed to other queue managers in the network. Publications made at other queue managers are not delivered to this subscriber, unless it also has a corresponding global subscription.

**NewPubsOnly**
(*MQPSC_NEW_PUBS_ONLY*)

Retained publications that exist at the time the subscription is registered are not sent to the subscriber; only new publications are sent.

If a subscriber re-registers and changes this option so that it is no longer set, a publication that has already been sent to it might be sent again.

**NoAlter**
(*MQPSC_NO_ALTER*)

The attributes of an existing matching subscription is not changed.

When a subscription is being created, this option is ignored. All other options specified apply to the new subscription.

If a `SubIdentity` also has one of the join options ( `JoinExcl` or `JoinShared` ) specified, the identity is added to the identity set regardless of whether `NoAlter` is specified.

**None**
(*MQPSC_NONE*)

All registration options take their default values.

If the subscriber is already registered, its options are reset to their default values (note that this does *not* have the same affect as omitting the registration options property), and the subscription expiry is updated from the MQMD of the **`Register Subscriber`** message.

If other registration options are specified at the same time, `None` is ignored.

**NonPers**
(*MQPSC_NON_PERSISTENT*)

Publications matching this subscription are delivered to the subscriber as non-persistent messages.

**Pers**
(*MQPSC_PERSISTENT*)

Publications matching this subscription are delivered to the subscriber as persistent messages.

**PersAsPub**
(*MQPSC_PERSISTENT_AS_PUBLISH*)

Publications matching this subscription are delivered to the subscriber with the persistence specified by the publisher. This is the default behavior.

**PersAsQueue**
(*MQPSC_PERSISTENT_AS_Q*)

Publications matching this subscription are delivered to the subscriber with the persistence specified on the subscriber queue.

**PubOnReqOnly**
(*MQPSC_PUB_ON_REQUEST_ONLY*)

The queue manager does not send publications to the subscriber, except in response to a **`Request Update`** command message.

**VariableUserId**
(*MQPSC_VARIABLE_USER_ID*)

When specified the identity of the subscriber (queue, queue manager and correlid) is not restricted to a single userid. This differs from the existing behavior of the queue manager that associates the userid of the original registration message with the subscriber's identity and from then on prevents any other user using that identity. If a new subscriber tries to use the same identity *MQRCCF_DUPLICATE_SUBSCRIPTION* is returned.

This allows any user to modify or deregister the subscription if the user has suitable authority. There is therefore no need to check that the userid matches that of the original subscriber.

To add this option to an existing subscription the command must come from the same userid as the original subscription itself.

If the subscription of the **Request Update** command has `VariableUserId` set, this must be set at request update time to indicate which subscription is referred to. Otherwise, the userid of the **Request Update** command is used to identify the subscription. This is overridden, along with the other subscriber identifiers, if a subscription name is supplied.

If a **Register Subscriber** command message without this option set refers to an existing subscription which has this option set, the option is removed from this subscription and the userid of the subscription is now fixed. If there already exists a subscriber which has the same identity (queue, queue manager and correlation identifier) but with a different user ID associated to it, the command fails with return code *MQRCCF_DUPLICATE_IDENTITY* because there can only be one userid associated with a subscriber identity.

If the registration options property is omitted and the subscriber is already registered, its registration options are not changed and the subscription expiry is updated from the MQMD of the **Register Subscriber** message.

If the subscriber is not already registered, a new subscription is created with all registration options taking their default values.

The default values are `PersAsPub` and no other options set.

**<QMgrName> (*MQPSC_Q_MGR_NAME*)**
The value is the name of the queue manager for the subscriber queue, to which matching publications are sent by the queue manager.

If this property is omitted, the default is the `ReplyToQMgr` name in the message descriptor (MQMD). If the resulting name is blank, it defaults to the queue manager's `QMgrName`.

**<QName> (*MQPSC_Q_NAME*)**
The value is the name of the subscriber queue, to which matching publications are sent by the queue manager.

If this property is omitted, the default is the `ReplyToQ` name in the message descriptor (MQMD), which must not be blank in this case.

If the queue is a temporary dynamic queue, nonpersistent delivery of publications ( `NonPers` ) must be specified in the <RegOpt> property.

If the queue is a temporary dynamic queue, the subscription is deregistered automatically by the queue manager when the queue is closed.

**<SubName> (*MQPSC_SUBSCRIPTION_NAME*)**
This is a name given to a particular subscription. You can use it instead of the queue manager, queue and optional correlId to refer to a subscription.

If a subscription already exists with this **SubName** , any other attributes of the subscription (Topic, QMgrName, QName, CorrelId, UserId, RegOpts, UserSubData, and Expiry) are overridden with the attributes, if specified, that are passed in the new `Register Subscriber` command message. However, if **SubName** is used with no QName field specified, and a ReplyToQ is specified in the MQMD header, the subscriber queue is changed to be the ReplyToQ.

If a subscription that matches the traditional identity of this command already exists, but has no **SubName** , the Registration command fails with return code *MQRCCF_DUPLICATE_SUBSCRIPTION*, unless the **AddName** option is specified.

If you try to alter an existing named subscription by using another `Register Subscriber` command that specifies the same **SubName** , and the values of Topic, QMgrName, QName, and CorrelId in the new command match a different existing subscription, with or without a SubName defined, the command fails with return code *MQRCCF_DUPLICATE_SUBSCRIPTION*. This prevents two subscription names referring to the same subscription.

**<SubIdentity> (*MQPSC_SUBSCRIPTION_IDENTITY*)**
This string is used to represent an application with an interest in a subscription. It is a variable-length character string with a maximum length of 64 characters, and is optional. The queue manager maintains a set of subscriber identities for each subscription. Each subscription can allow its identity set to contain only one identity, or an unlimited number of identities (see the **JoinShared** and **JoinExcl** options).

A subscribe command that specifies the **JoinShared** or **JoinExcl** option adds the **SubIdentity** to the subscription's identity set, if it is not already there and if the existing set of identities allows such an action; that is, no other subscriber has joined exclusively or the identity set is empty.

Any alteration of the subscription's attributes as the result of a `Register Subscriber` command in which a **SubIdentity** is specified, only succeeds if it would be the only member of the set of identities for this subscription. Otherwise the command fails with return code *MQRCCF_SUBSCRIPTION_IN_USE*. This prevents a subscription's attributes from changing without other interested subscribers being aware.

If you specify a character string that is longer than 64 characters, the command fails with return code *MQRCCF_SUB_IDENTITY_ERROR*.

**<SubUserData> (*MQPSC_SUBSCRIPTION_USER_DATA*)**
This is a variable-length text string. The value is stored by the queue manager with the subscription, but has no influence on publication delivery to the subscriber. The value can be altered by re-registering to the same subscription with a new value. This attribute is there for the use of the application.

The **SubUserData** is returned in the Metatopic information (*MQCACF_REG_SUB_USER_DATA*) for a subscription if present.

If you specify more than one of the registration option values `NonPers, PersAsPub, PersAsQueue, and Pers`, then only the last one is used. You cannot combine these options in an individual subscription.

### Example

Here is an example of `NameValueData` for a **`Register Subscriber`** command message. In the sample application, the results service uses this message to register a subscription to the topics containing the latest scores in all matches, with the 'Persistent as publish' option set. The subscriber's identity, including the `CorrelId`, is taken from the defaults in the MQMD.

```
<psc>
  <Command>RegSub</Command>
  <RegOpt>PersAsPub</RegOpt>
  <RegOpt>CorrelAsId</RegOpt>
  <Topic>Sport/Soccer/State/LatestScore/#</Topic>
</psc>
```

## Request Update message

The **`Request Update`** command message is sent from a subscriber to a queue manager, to request the current retained publications for the specified topic and subscription point that match the given (optional) filter.

This message is sent to *SYSTEM.BROKER.CONTROL.QUEUE*, the queue manager's control queue. Authority to put a message to this queue is required, in addition to access authority for the topic in the request update; this is set by the queue manager's system administrator.

This command is normally used if the subscriber specified the option PubOnReqOnly when it registered. If the queue manager has any matching retained publications, they are sent to the subscriber.
If the queue manager has no matching retained publications, the request fails with return code *MQRCCF_NO_RETAINED_MSG*. The requester must have previously registered a subscription with the same Topic, SubPoint, and Filter values.

## *Properties*

**<Command> (*MQPSC_COMMAND*)**
The value is ReqUpdate (*MQPSC_REQUEST_UPDATE*). This property must be specified.

**<Topic> (*MQPSC_TOPIC*)**
The value is the topic that the subscriber is requesting; wildcard characters are allowed.

This property must be specified, but only one occurrence is allowed in this message.

**<SubPoint> (*MQPSC_SUBSCRIPTION_POINT*)**
The value is the subscription point to which the subscription is attached.

If this property is omitted, the default subscription point is used.

**<Filter> (*MQPSC_FILTER*)**
The value is an ESQL expression that is used as a filter on the contents of publication messages. If a publication on the specified topic matches the filter, it is sent to the subscriber.

The <Filter> property should have the same value as that specified on the original subscription for which you are now requesting an update.

If this property is omitted, no content filtering takes place.

**<RegOpt> (*MQPSC_REGISTRATION_OPTION*)**
The registration options property can take the following value:

**CorrelAsId**
(*MQPSC_CORREL_ID_AS_IDENTITY*)

The CorrelId in the message descriptor (MQMD), which must not be zero, is used when sending matching publications to the subscriber queue.

**None**
(*MQPSC_NONE*)

All options take their default values. This has the same effect as omitting the <RegOpt> property. If other options are specified at the same time, None is ignored.

**VariableUserId**
(*MQPSC_VARIABLE_USER_ID*)

When specified the identity of the subscriber (queue, queue manager, and correlid) is not restricted to a single userid. This differs from the existing behavior of the queue manager that associates the userid of the original registration message with the subscriber's identity and from then on prevents any other user using that identity. If a new subscriber tries to use the same identity, the command fails with return code *MQRCCF_DUPLICATE_SUBSCRIPTION*.

This allows any user to modify or deregister the subscription when they have suitable authority. Therefore, there is no need to check that the userid matches that of the original subscriber.

To add this option to an existing subscription, the command must come from the same userid as the original subscription.

If the subscription of the **Request Update** command has VariableUserId set, this must be set at request update time to indicate which subscription is referred to. Otherwise, the userid of the **Request Update** command is used to identify the subscription. This is overridden, along with the other subscriber identifiers, if a subscription name is supplied.

The default, if this property is omitted, is that no registration options are set.

**<QMgrName> (*MQPSC_Q_MGR_NAME*)**
The value is the name of the queue manager for the subscriber queue, to which the matching retained publication is sent by the queue manager.

If this property is omitted, the default is the ReplyToQMgr name in the message descriptor (MQMD). If the resulting name is blank, it defaults to the queue manager's QMgrName.

**<QName> (*MQPSC_Q_NAME*)**
The value is the name of the subscriber queue, to which the matching retained publication is sent by the queue manager.

If this property is omitted, the default is the ReplyToQ name in the message descriptor (MQMD), which must not be blank in this case.

**<SubName> (*MQPSC_SUBSCRIPTION_NAME*)**
This is a name given to a particular subscription. If specified on a **Request Update** command the SubName value takes precedence over all other identifier fields except the userid, unless VariableUserId is set on the subscription itself. If VariableUserId is not set, the *Request Update* command succeeds only if the userid of the command message matches that of the subscription. If the userid of the command message does not match that of the subscription, the command fails with return code *MQRCCF_DUPLICATE_IDENTITY*.

If VariableUserId is set, and the userid differs from that of the subscription, the command succeeds if the userid of the new command message has authority to browse the stream queue and put to the subscriber queue of the subscription. Otherwise, the command fails with return code *MQRCCF_NOT_AUTHORIZED*.

If a subscription exists that matches the traditional identity of this command, but has no SubName, the **Request Update** command fails with return code *MQRCCF_SUB_NAME_ERROR*.

If an attempt is made to request an update for a subscription that has a SubName using a command message that matches the traditional identity, but with no SubName specified, the command succeeds.

### *Example*

Here is an example of NameValueData for a **Request Update** command message. In the sample application, the results service uses this message to request retained publications containing the latest scores for all teams. The subscriber's identity, including the CorrelId, is taken from the defaults in the MQMD.

```
<psc>
  <Command>ReqUpdate</Command>
  <RegOpt>CorrelAsId</RegOpt>
  <Topic>Sport/Soccer/State/LatestScore/#</Topic>
</psc>
```

## Queue Manager Response message

A **Queue Manager Response** message is sent from a queue manager to the ReplyToQ of a publisher or a subscriber, to indicate the success or failure of a command message received by the queue manager if the command message descriptor specified that a response is required.

The response message is contained within the NameValueData field of the MQRFH2 header, in a <pscr> folder.

In the case of a warning or error, the response message contains the <psc> folder from the command message as well as the <pscr> folder. The message data, if any, is not contained in the queue manager response message. In the case of an error, none of the message that caused an error has been processed; in the case of a warning, some of the message might have been processed successfully.

If there is a failure sending a response:

- For publication messages, the queue manager tries to send the response to the IBM MQ dead-letter queue if the MQPUT fails. This allows the publication to be sent to subscribers even if the response cannot be sent back to the publisher.
- For other messages, or if the publication response cannot be sent to the dead-letter queue, an error is logged and the command message is normally rolled back. Whether this happens depends on how the MQInput node has been configured.

## *Properties*

**<Completion> (*MQPSCR_COMPLETION*)**
The completion code, which can take one of three values:

**ok**
Command completed successfully

**warning**
Command completed but with warning

**error**
Command failed

**<Response> (*MQPSCR_RESPONSE*)**
The response to a command message, if that command produced a completion code of `warning` or `error`. It contains a <Reason> property, and might contain other properties that indicate the cause of the warning or error.

In the case of one or more errors, there is only one response folder, indicating the cause of the first error only. In the case of one or more warnings, there is a response folder for each warning.

**<Reason> (*MQPSCR_REASON*)**
The reason code qualifying the completion code, if the completion code is a `warning` or `error`. It is set to one of the error codes listed in the following example. The <Reason> property is contained within a <Response> folder. The reason code can be followed by any valid property from the <psc> folder (for example, a topic name), indicating the cause of the error or warning. If you get a reason code of ????, check the data for correctness, for example, matching angled brackets (< >).

## *Examples*

Here are some examples of NameValueData in a **Queue Manager Response** message. A successful response might be the following:

```
<pscr>
  <Completion>ok</Completion>
</pscr>
```

Here is an example of a failure response; the failure is a filter error. The first NameValueData string contains the response; the second contains the original command.

```
<pscr>
  <Completion>error</Completion>
  <Response>
    <Reason>3150</Reason>
  </Reponse>
</pscr>

<psc>
 ...
 command message (to which
 the queue manager is responding)
 ...
</psc>
```

Here is an example of a warning response (due to unauthorized topics). The first NameValueData string contains the response; the second NameValueData string contains the original command.

```
<pscr>
  <Completion>warning</Completion>
  <Response>
    <Reason>3081</Reason>
    <Topic>topic1</Topic>
  </Reponse>
  <Response>
    <Reason>3081</Reason>
    <Topic>topic2</Topic>
  </Reponse>
</pscr>

<psc>
 ...
 command message (to which
 the queue manager is responding)
 ...
</psc>
```

## Publish/subscribe reason codes

These reason codes might be returned in the Reason field of a publish/subscribe response <pscr> folder. Constants that can be used to represent these codes in the C or C++ programming languages are also listed.

The MQRC_ constants require the IBM MQ cmqc.h header file. The MQRCCF_ constants require the IBM MQ cmqcfc.h header file (apart from *MQRCCF_FILTER_ERROR* and *MQRCCF_WRONG_USER*, which require the cmqpsc.h header file).

| Reason code and text | Explanation | Issued by |
|---|---|---|
| 2336<br>MQRC_RFH_COMMAND_ERROR | Valid values for the <Command> field of a <psc> folder are: RegSub, DeregSub, Publish, DeletePub, and ReqUpdate. Any other values result in this error code being issued. | Any command |
| 2337<br>MQRC_RFH_ PARM_ERROR | The <psc> and <mcd> folders both have a set of valid parameters that can be specified within them. Check the descriptions of these folders and ensure that you have not specified incorrect parameters. | Any command |
| 2338<br>MQRC_RFH_DUPLICATE_PARM | Some parameters (for example, Topic) within a <psc> folder can be repeated, but others (for example, Command) cannot be repeated. Check that you have not duplicated a non-repeatable parameter. | Any command |
| 2339<br>MQRC_RFH_PARM_MISSING | Some parameters within <psc> or <mcd> folders are optional and can be omitted; some are mandatory and must not be omitted. Check that you have included all mandatory parameters within your <psc> and <mcd> folders. | Any command |

| Reason code and text | Explanation | Issued by |
|---|---|---|
| 2551<br>MQRC_SELECTION_NOT_AVAILABLE | No extended message selection provider was available to determine which subscribers with a filter specified should receive the publication. | Publish, Register Subscriber, and Request Update |
| | No extended message selection provider was available to handle the filter of the specified subscriber. | Register Subscriber and Request Update |
| 2554<br>MQRC_CONTENT_ERROR | An extended message selection provider found an error in the current or retained publication. | Publish and Request Update |
| 3008<br>MQRCCF_COMMAND_FAILED | An internal error occurred which prevented the command from executing correctly. The error might occur if the command is reissued. The system event log for the queue manager contains information which should be used when reporting the problem to IBM. | Any command |
| 3072<br>MQRCCF_TOPIC_ERROR | One or more of the values you supplied for the Topic parameter are incorrect. Check that your values for Topic conform to the specified restrictions. | Any command |
| 3073<br>MQRCCF_NOT_REGISTERED | The combination of SubPoint, Topic, and Filter that you specified on your DeregSub or ReqUpdate command was either not a combination with which you had previously registered or, for the DeregSub command if the DeregAll option was specified, one of the SubPoint, Topic, or Filter properties was not used to deregister any subscription. | Deregister Subscriber and Request Update commands |
| 3074<br>MQRCCF_Q_MGR_NAME_ERROR | The specified queue manager was not valid, or the queue manager was not available or did not exist. | Deregister Subscriber, Publish, Register Subscriber, and Request Update commands |
| 3076<br>MQRCCF_Q_NAME_ERROR | The specified queue name was not valid, or the queue did not exist on the specified queue manager. | Deregister Subscriber, Publish, Register Subscriber, and Request Update commands |
| 3077<br>MQRCCF_NO_RETAINED_MSG | There were no retained messages for the topic you specified. This might or might not be an error, depending on the design of your application program. | Request Update command |

| Reason code and text | Explanation | Issued by |
|---|---|---|
| 3079<br>MQRCCF_INCORRECT_Q | RegSub, DeregSub, and ReqUpdate commands are always sent to the SYSTEM.BROKER.CONTROL.QUEUE queue of the queue manager for which they are intended. Publish and Delete Publication commands are sent to the input queue for the particular publish/subscribe message flow for which they are intended; this is determined when the message flow is designed. This error code is returned if a command is sent to the wrong queue. | Any command |
| 3080<br>MQRCCF_CORREL_ID_ERROR | You have specified CorrelAsId as one of your RegOpt parameters. However, the CorrelId field of the MQMD does not contain a valid correlation identifier (that is, it is set to MQCI_NONE). | Deregister Subscriber and Register Subscriber commands |
| 3081<br>MQRCCF_NOT_AUTHORIZED | You are not authorized to perform the requested action. Authorization settings for the queue manager are handled by the system administrator using the Topics Hierarchy editor. | Publish and Register Subscriber commands |
| 3083<br>MQRCCF_REG_OPTIONS_ERROR | You have specified an unrecognized RegOpt parameter in the <psc> folder that contains your RegSub or DeregSub command. | Deregister Subscriber and Register Subscriber commands |
| 3084<br>MQRCCF_PUB_OPTIONS_ERROR | You have specified an unrecognized PubOpt parameter in the <psc> folder that contains your Publish command. | Publish command |
| 3087<br>MQRCCF_DEL_OPTIONS_ERROR | You have specified an unrecognized DelOpt parameter in the <psc> folder that contains your DeletePub command. | Delete Publication command |
| 3150<br>MQRCCF_FILTER_ERROR | The value specified for the Filter parameter is not valid. Check the section that describes the valid syntax for filter expressions and ensure that your expression conforms. | Deregister Subscriber, Register Subscriber, and Request Update commands |
| 3151<br>MQRCCF_WRONG_USER | A subscription that matches the one specified already exists; however, it was registered by a different user. A subscription can only be changed or deregistered by the user who originally registered it. | Deregister Subscriber, Register Subscriber, and Request Update commands |
| 3152<br>MQRCCF_DUPLICATE_SUBSCRIPTION | A matching subscription already exists with a different subscription name. | |

| Reason code and text | Explanation | Issued by |
|---|---|---|
| 3153<br>MQRCCF_SUB_NAME_ERROR | Either the format of the subscription name is not valid, or a matching subscription already exists with no subscription name. | |
| 3154<br>MQRCCF_SUB_IDENTITY_ERROR | The subscription identity parameter is in error. Either the supplied value exceeds the maximum length allowed, or the subscription identity is not currently a member of the subscription's identity set and a Join registration option was not specified. | |
| 3155<br>MQRCCF_SUBSCRIPTION_IN_USE | An attempt to modify or deregister a subscription was attempted by a member of the identity set when it was not the only member of this set. | |
| 3156<br>MQRCCF_SUBSCRIPTION_LOCKED | The subscription is currently exclusively locked by another identity. | |
| 3157<br>MQRCCF_ALREADY_JOINED | A Join registration option was specified but the subscriber identity was already a member of the subscription's identity set. | |

## MQMD settings in command messages to the queue manager

Applications that send command messages to the queue manager use the following settings of fields in the message descriptor (MQMD). Fields that are left as the default value, or can be set to any valid value in the usual way, are not listed here.

**Report**
See MsgType and CorrelId.

**MsgType**
MsgType should be set to either *MQMT_REQUEST* or *MQMT_DATAGRAM*. *MQRC_MSG_TYPE_ERROR* will be returned if MsgType is not set to one of these values.

MsgType should be set to *MQMT_REQUEST* for a command message if a response is always required. The MQRO_PAN and MQRO_NAN flags in the Report field are not significant in this case.

If MsgType is set to *MQMT_DATAGRAM*, responses depend on the setting of the MQRO_PAN and MQRO_NAN flags in the Report field:

- MQRO_PAN alone means that the queue manager sends a response only if the command succeeds.
- MQRO_NAN alone means that the queue manager sends a response only if the command fails.
- If a command completes with a warning, a response is sent if either MQRO_PAN or MQRO_NAN is set.
- MQRO_PAN + MQRO_NAN means that the queue manager sends a response whether the command succeeds or fails. This has the same effect from the queue manager's perspective as setting MsgType to MQMT_REQUEST.
- If neither MQRO_PAN nor MQRO_NAN is set, no response is ever sent.

**Format**
Set to MQFMT_RF_HEADER_2

**MsgId**
This field is normally set to MQMI_NONE, so that the queue manager generates a unique value.

**CorrelId**
This field can be set to any value. If the sender's identity includes a CorrelId, specify this value, together with MQRO_PASS_CORREL_ID in the Report field, to ensure that it is set in all response messages sent by the queue manager to the sender.

**ReplyToQ**
This field defines the queue to which responses, if any, are to be sent. This might be the sender's queue; this has the advantage that the QName parameter can be omitted from the message. If, however, responses are to be sent to a different queue, the QName parameter is needed.

**ReplyToQMgr**
This field defines the queue manager for responses. If you leave this field blank (the default value), the local queue manager puts its own name in this field.

## MQMD settings for publications forwarded by a queue manager

A queue manager uses these settings of fields in the message descriptor (MQMD) when it sends a publication to a subscriber. All other fields in the MQMD are set to their default values.

**Report**
Report is set to MQRO_NONE.

**MsgType**
MsgType is set to MQMT_DATAGRAM.

**Expiry**
Expiry is set to the value in the Publish message received from the publisher. In the case of a retained message, the time outstanding is reduced by the approximate time that the message has been at the queue manager.

**Format**
Format is set to MQFMT_RF_HEADER_2

**MsgId**
MsgId is set to a unique value.

**CorrelId**
If CorrelId is part of the subscriber's identity, this is the value specified by the subscriber when registering. Otherwise, it is a non-zero value chosen by the queue manager.

**Priority**
Priority takes the value set by the publisher, or as resolved if the publisher specified MQPRI_PRIORITY_AS_Q_DEF.

**Persistence**
Persistence takes the value set by the publisher, or as resolved if the publisher specified MQPER_PERSISTENCE_AS_Q_DEF, unless specified otherwise in the Register Subscriber message for the subscriber to which this publication is being sent.

**ReplyToQ**
ReplyToQ is set to blanks.

**ReplyToQMgr**
ReplyToQMgr is set to the name of the queue manager.

**UserIdentifier**
UserIdentifier is the subscriber's user identifier, as set when the subscriber registered.

**AccountingToken**
AccountingToken is the subscriber's accounting token, as set when the subscriber first registered.

**ApplIdentityData**
ApplIdentityData is the subscriber's application identity data, as set when the subscriber first registered.

**PutApplType**
PutApplType is set to MQAT_BROKER.

**PutApplName**
PutApplName is set to the first 28 characters of the name of the queue manager.

**PutDate**
PutDate is the date when the message was put.

**PutTime**
PutTime is the time when the message was put.

**ApplOriginData**
ApplOriginData is set to blanks.

### MQMD settings in queue manager response messages

A queue manager uses these settings of fields in the message descriptor (MQMD) when sending a reply to a publication message. All other fields in the MQMD are set to their default values.

**Report**
Report is set to all zeros.

**MsgType**
MsgType is set to MQMT_REPLY.

**Format**
Format is set to MQFMT_RF_HEADER_2

**MsgId**
The setting of MsgId depends on the Report options in the original command message. By default, it is set to MQMI_NONE, so that the queue manager generates a unique value.

**CorrelId**
The setting of CorrelId depends on the Report options in the original command message. By default, this means that the CorrelId is set to the same value as the MsgId of the command message. This can be used to correlate commands with their responses.

**Priority**
Priority is set to the same value as in the original command message.

**Persistence**
Persistence is set to the value set in the original command message.

**Expiry**
Expiry is set to the same value as in the original command message received by the queue manager.

**PutApplType**
PutApplType is set to MQAT_BROKER.

**PutApplName**
PutApplName is set to the first 28 characters of name of the queue manager.

Other context fields are set as if generated with MQPMO_PASS_IDENTITY_CONTEXT.

## Machine encodings

This section describes the structure of the *Encoding* field in the message descriptor.

See “MQMD - Message descriptor” on page 402 for a summary of the fields in the structure.

The *Encoding* field is a 32-bit integer that is divided into four separate subfields; these subfields identify:

- The encoding used for binary integers
- The encoding used for packed-decimal integers
- The encoding used for floating-point numbers
- Reserved bits

Each subfield is identified by a bit mask that has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined:

**MQENC_INTEGER_MASK**
Mask for binary-integer encoding.

This subfield occupies bit positions 28 through 31 within the *Encoding* field.

**MQENC_DECIMAL_MASK**
Mask for packed-decimal-integer encoding.

This subfield occupies bit positions 24 through 27 within the *Encoding* field.

**MQENC_FLOAT_MASK**
Mask for floating-point encoding.

This subfield occupies bit positions 20 through 23 within the *Encoding* field.

**MQENC_RESERVED_MASK**
Mask for reserved bits.

This subfield occupies bit positions 0 through 19 within the *Encoding* field.

## Binary-integer encoding

The following values are valid for the binary-integer encoding:

**MQENC_INTEGER_UNDEFINED**
Binary integers are represented using an encoding that is undefined.

**MQENC_INTEGER_NORMAL**
Binary integers are represented in the conventional way:

- The least significant byte in the number has the highest address of any of the bytes in the number; the most significant byte has the lowest address
- The least significant bit in each byte is adjacent to the byte with the next higher address; the most significant bit in each byte is adjacent to the byte with the next lower address

**MQENC_INTEGER_REVERSED**
Binary integers are represented in the same way as MQENC_INTEGER_NORMAL, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as MQENC_INTEGER_NORMAL.

## Packed-decimal-integer encoding

The following values are valid for the packed-decimal-integer encoding:

**MQENC_DECIMAL_UNDEFINED**
Packed-decimal integers are represented using an encoding that is undefined.

**MQENC_DECIMAL_NORMAL**
Packed-decimal integers are represented in the conventional way:

- Each decimal digit in the printable form of the number is represented in packed decimal by a single hexadecimal digit in the range X'0' through X'9'. Each hexadecimal digit occupies four bits, and so each byte in the packed decimal number represents two decimal digits in the printable form of the number.
- The least significant byte in the packed-decimal number is the byte that contains the least significant decimal digit. Within that byte, the most significant four bits contain the least significant decimal digit, and the least significant four bits contain the sign. The sign is either X'C' (positive), X'D' (negative), or X'F' (unsigned).
- The least significant byte in the number has the highest address of any of the bytes in the number; the most significant byte has the lowest address.
- The least significant bit in each byte is adjacent to the byte with the next higher address; the most significant bit in each byte is adjacent to the byte with the next lower address.

**MQENC_DECIMAL_REVERSED**
Packed-decimal integers are represented in the same way as MQENC_DECIMAL_NORMAL, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as MQENC_DECIMAL_NORMAL.

## Floating-point encoding

The following values are valid for the floating-point encoding:

**MQENC_FLOAT_UNDEFINED**
Floating-point numbers are represented using an encoding that is undefined.

**MQENC_FLOAT_IEEE_NORMAL**
Floating-point numbers are represented using the standard IEEE [3] floating-point format, with the bytes arranged as follows:

- The least significant byte in the mantissa has the highest address of any of the bytes in the number; the byte containing the exponent has the lowest address
- The least significant bit in each byte is adjacent to the byte with the next higher address; the most significant bit in each byte is adjacent to the byte with the next lower address

Details of the IEEE float encoding can be found in IEEE Standard 754.

**MQENC_FLOAT_IEEE_REVERSED**
Floating-point numbers are represented in the same way as MQENC_FLOAT_IEEE_NORMAL, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as MQENC_FLOAT_IEEE_NORMAL.

**MQENC_FLOAT_S390**
Floating-point numbers are represented using the standard System/390 floating-point format; this is also used by System/370.

## Constructing encodings

To construct a value for the *Encoding* field in MQMD, the relevant constants that describe the required encodings can be added together (do not add the same constant more than once), or combined using the bitwise OR operation (if the programming language supports bit operations).

Whichever method is used, combine only one of the MQENC_INTEGER_* encodings with one of the MQENC_DECIMAL_* encodings and one of the MQENC_FLOAT_* encodings.

## Analyzing encodings

The *Encoding* field contains subfields; because of this, applications that need to examine the integer, packed decimal, or float encoding must use one of the techniques described.

### Using bit operations

If the programming language supports bit operations, perform the following steps:

1. Select one of the following values, according to the type of encoding required:
   - MQENC_INTEGER_MASK for the binary integer encoding
   - MQENC_DECIMAL_MASK for the packed decimal integer encoding
   - MQENC_FLOAT_MASK for the floating point encoding

   Call the value A.
2. Combine the *Encoding* field with A using the bitwise AND operation; call the result B.

[3] The Institute of Electrical and Electronics Engineers

3. B is the encoding required, and can be tested for equality with each of the values that is valid for that type of encoding.

### Using arithmetic

If the programming language *does not* support bit operations, perform the following steps using integer arithmetic:

1. Select one of the following values, according to the type of encoding required:
   - 1 for the binary integer encoding
   - 16 for the packed decimal integer encoding
   - 256 for the floating point encoding

   Call the value A.
2. Divide the value of the *Encoding* field by A ; call the result B.
3. Divide B by 16; call the result C.
4. Multiply C by 16 and subtract from B ; call the result D.
5. Multiply D by A ; call the result E.
6. E is the encoding required, and can be tested for equality with each of the values that is valid for that type of encoding.

## Summary of machine architecture encodings

Encodings for machine architectures are shown in Table 566 on page 875.

*Table 566. Summary of encodings for machine architectures*

| Machine architecture | Binary integer encoding | Packed-decimal integer encoding | Floating-point encoding |
|---|---|---|---|
| IBM i | normal | normal | IEEE normal |
| Intel x86 | reversed | reversed | IEEE reversed |
| PowerPC® | normal | normal | IEEE normal |
| System/390 | normal | normal | System/390 |

# Report options and message flags

This section describes the *Report* and *MsgFlags* fields that are part of the message descriptor MQMD specified on the MQGET, MQPUT, and MQPUT1 calls.

The topics in this section describe:

- The structure of the report field and how the queue manager processes it
- How an application analyzes the report field
- The structure of the message-flags field

For more information about the MQMD message descriptor, see “MQMD - Message descriptor” on page 402.

## Structure of the report field

This information describes the structure of the report field.

The *Report* field is a 32-bit integer that is divided into three separate subfields. These subfields identify:

- Report options that are rejected if the local queue manager does not recognize them

- Report options that are always accepted, even if the local queue manager does not recognize them
- Report options that are accepted only if certain other conditions are satisfied

Each subfield is identified by a bit mask that has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. The bits in a subfield are not necessarily adjacent. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined to identify the subfields:

**MQRO_REJECT_UNSUP_MASK**
This mask identifies the bit positions within the *Report* field where report options that are not supported by the local queue manager cause the MQPUT or MQPUT1 call to fail with completion code MQCC_FAILED and reason code MQRC_REPORT_OPTIONS_ERROR.

This subfield occupies bit positions 3, and 11 through 13.

**MQRO_ACCEPT_UNSUP_MASK**
This mask identifies the bit positions within the *Report* field where report options that are not supported by the local queue manager are nevertheless accepted on the MQPUT or MQPUT1 calls. Completion code MQCC_WARNING with reason code MQRC_UNKNOWN_REPORT_OPTION are returned in this case.

This subfield occupies bit positions 0 through 2, 4 through 10, and 24 through 31.

The following report options are included in this subfield:

- MQRO_ACTIVITY
- MQRO_COPY_MSG_ID_TO_CORREL_ID
- MQRO_DEAD_LETTER_Q
- MQRO_DISCARD_MSG
- MQRO_EXCEPTION
- MQRO_EXCEPTION_WITH_DATA
- MQRO_EXCEPTION_WITH_FULL_DATA
- MQRO_EXPIRATION
- MQRO_EXPIRATION_WITH_DATA
- MQRO_EXPIRATION_WITH_FULL_DATA
- MQRO_NAN
- MQRO_NEW_MSG_ID
- MQRO_NONE
- MQRO_PAN
- MQRO_PASS_CORREL_ID
- MQRO_PASS_MSG_ID

**MQRO_ACCEPT_UNSUP_IF_XMIT_MASK**
This mask identifies the bit positions within the *Report* field where report options that are not supported by the local queue manager are nevertheless accepted on the MQPUT or MQPUT1 calls *provided* that both of the following conditions are satisfied:

- The message is destined for a remote queue manager.
- The application is not putting the message directly on a local transmission queue (that is, the queue identified by the *ObjectQMgrName* and *ObjectName* fields in the object descriptor specified on the MQOPEN or MQPUT1 call is not a local transmission queue).

Completion code MQCC_WARNING with reason code MQRC_UNKNOWN_REPORT_OPTION are returned if these conditions are satisfied, and MQCC_FAILED with reason code MQRC_REPORT_OPTIONS_ERROR if not.

This subfield occupies bit positions 14 through 23.

The following report options are included in this subfield:

- MQRO_COA
- MQRO_COA_WITH_DATA
- MQRO_COA_WITH_FULL_DATA
- MQRO_COD
- MQRO_COD_WITH_DATA
- MQRO_COD_WITH_FULL_DATA

If any options are specified in the *Report* field that the queue manager does not recognize, the queue manager checks each subfield in turn by using the bitwise AND operation to combine the *Report* field with the mask for that subfield. If the result of that operation is not zero, the completion code and reason codes described previously are returned.

If MQCC_WARNING is returned, it is not defined which reason code is returned if other warning conditions exist.

The ability to specify and have accepted report options that are not recognized by the local queue manager is useful when sending a message with a report option that is recognized and processed by a *remote* queue manager.

## Analyzing the report field

The *Report* field contains subfields; because of this, applications that need to check whether the sender of the message requested a particular report must use one of the techniques described.

### Using bit operations

If the programming language supports bit operations, perform the following steps:

1. Select one of the following values, according to the type of report to be checked:
   - MQRO_COA_WITH_FULL_DATA for COA report
   - MQRO_COD_WITH_FULL_DATA for COD report
   - MQRO_EXCEPTION_WITH_FULL_DATA for exception report
   - MQRO_EXPIRATION_WITH_FULL_DATA for expiration report

   Call the value A.

   On z/OS, use the MQRO_*_WITH_DATA values instead of the MQRO_*_WITH_FULL_DATA values.
2. Combine the *Report* field with A using the bitwise AND operation; call the result B.
3. Test B for equality with each value that is possible for that type of report.

   For example, if A is MQRO_EXCEPTION_WITH_FULL_DATA, test B for equality with each of the following to determine what was specified by the sender of the message:

   - MQRO_NONE
   - MQRO_EXCEPTION
   - MQRO_EXCEPTION_WITH_DATA
   - MQRO_EXCEPTION_WITH_FULL_DATA

   The tests can be performed in whatever order is most convenient for the application logic.

Use a similar method to test for the MQRO_PASS_MSG_ID or MQRO_PASS_CORREL_ID options; select as the value A whichever of these two constants is appropriate, and then proceed as described previously.

### Using arithmetic

If the programming language *does not* support bit operations, perform the following steps using integer arithmetic:

1. Select one of the following values, according to the type of report to be checked:
   - MQRO_COA for COA report
   - MQRO_COD for COD report
   - MQRO_EXCEPTION for exception report
   - MQRO_EXPIRATION for expiration report

   Call the value A.
2. Divide the *Report* field by A ; call the result B.
3. Divide B by 8 ; call the result C.
4. Multiply C by 8 and subtract from B ; call the result D.
5. Multiply D by A ; call the result E.
6. Test E for equality with each value that is possible for that type of report.

   For example, if A is MQRO_EXCEPTION, test E for equality with each of the following to determine what was specified by the sender of the message:
   - MQRO_NONE
   - MQRO_EXCEPTION
   - MQRO_EXCEPTION_WITH_DATA
   - MQRO_EXCEPTION_WITH_FULL_DATA

   The tests can be performed in whatever order is most convenient for the application logic.

The following pseudocode illustrates this technique for exception report messages:

```
A = MQRO_EXCEPTION
B = Report/A
C = B/8
D = B - C*8
E = D*A
```

Use a similar method to test for the MQRO_PASS_MSG_ID or MQRO_PASS_CORREL_ID options; select as the value A whichever of these two constants is appropriate, and then proceed as described previously, but replacing the value 8 in the previous steps by the value 2.

## Structure of the message-flags field

This information describes the structure of the message-flags field.

The *MsgFlags* field is a 32-bit integer that is divided into three separate subfields. These subfields identify:

- Message flags that are rejected if the local queue manager does not recognize them
- Message flags that are always accepted, even if the local queue manager does not recognize them
- Message flags that are accepted only if certain other conditions are satisfied

**Note:** All subfields in *MsgFlags* are reserved for use by the queue manager.

Each subfield is identified by a bit mask that has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined to identify the subfields:

**MQMF_REJECT_UNSUP_MASK**
This mask identifies the bit positions within the *MsgFlags* field where message flags that are not supported by the local queue manager cause the MQPUT or MQPUT1 call to fail with completion code MQCC_FAILED and reason code MQRC_MSG_FLAGS_ERROR.

This subfield occupies bit positions 20 through 31.

The following message flags are included in this subfield:

- MQMF_LAST_MSG_IN_GROUP
- MQMF_LAST_SEGMENT
- MQMF_MSG_IN_GROUP
- MQMF_SEGMENT
- MQMF_SEGMENTATION_ALLOWED
- MQMF_SEGMENTATION_INHIBITED

**MQMF_ACCEPT_UNSUP_MASK**
This mask identifies the bit positions within the *MsgFlags* field where message flags that are not supported by the local queue manager are nevertheless accepted on the MQPUT or MQPUT1 calls. The completion code is MQCC_OK.

This subfield occupies bit positions 0 through 11.

**MQMF_ACCEPT_UNSUP_IF_XMIT_MASK**
This mask identifies the bit positions within the *MsgFlags* field where message flags that are not supported by the local queue manager are nevertheless accepted on the MQPUT or MQPUT1 calls *provided* that both of the following conditions are satisfied:

- The message is destined for a remote queue manager.
- The application is not putting the message directly on a local transmission queue (that is, the queue identified by the *ObjectQMgrName* and *ObjectName* fields in the object descriptor specified on the MQOPEN or MQPUT1 call is not a local transmission queue).

Completion code MQCC_OK is returned if these conditions are satisfied, and MQCC_FAILED with reason code MQRC_MSG_FLAGS_ERROR if not.

This subfield occupies bit positions 12 through 19.

If there are flags specified in the *MsgFlags* field that the queue manager does not recognize, the queue manager checks each subfield in turn by using the bitwise AND operation to combine the *MsgFlags* field with the mask for that subfield. If the result of that operation is not zero, the completion code and reason codes described previously are returned.

## Data-conversion exit

This collection of topics describes the interface to the data-conversion exit, and the processing performed by the queue manager when data conversion is required.

For more information about data conversion, see *Data Conversion under IBM MQ* at https://www.ibm.com/support/docview.wss?uid=swg27005729.

The data-conversion exit is invoked as part of the processing of the MQGET call in order to convert the application message data to the representation required by the receiving application. Conversion of the application message data is optional; it requires the MQGMO_CONVERT option to be specified on the MQGET call.

The following subjects are described:

- The processing performed by the queue manager in response to the MQGMO_CONVERT option; see “Conversion processing” on page 880.
- Processing conventions used by the queue manager when processing a built-in format; these conventions are recommended for user-written exits too. See “Processing conventions” on page 881.
- Special considerations for converting report messages; see “Conversion of report messages” on page 885.
- The parameters passed to the data-conversion exit; see “MQ_DATA_CONV_EXIT - Data conversion exit” on page 897.
- A call that can be used from the exit to convert character data between different representations; see “MQXCNVC - Convert characters” on page 891.

- The data-structure parameter that is specific to the exit; see "MQDXP - Data-conversion exit parameter" on page 886.

## Conversion processing

This information describes the processing performed by the queue manager in response to the MQGMO_CONVERT option.

The queue manager performs the following actions if the MQGMO_CONVERT option is specified on the MQGET call, and there is a message to be returned to the application:

1. If one or more of the following is true, no conversion is necessary:
   - The message data is already in the character set and encoding required by the application issuing the MQGET call. The application must set the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter of the MQGET call to the values required, before issuing the call.
   - The length of the message data is zero.
   - The length of the *Buffer* parameter of the MQGET call is zero.

   In these cases the message is returned without conversion to the application issuing the MQGET call; the *CodedCharSetId* and *Encoding* values in the *MsgDesc* parameter are set to the values in the control information in the message, and the call completes with one of the following combinations of completion code and reason code:

   | Completion code | Reason code |
   |---|---|
   | MQCC_OK | MQRC_NONE |
   | MQCC_WARNING | MQRC_TRUNCATED_MSG_ACCEPTED |
   | MQCC_WARNING | MQRC_TRUNCATED_MSG_FAILED |

   The following steps are performed only if the character set or encoding of the message data differs from the corresponding value in the *MsgDesc* parameter, and there is data to be converted:
2. If the *Format* field in the control information in the message has the value MQFMT_NONE, the message is returned unconverted, with completion code MQCC_WARNING and reason code MQRC_FORMAT_ERROR.

   In all other cases conversion processing continues.
3. The message is removed from the queue and placed in a temporary buffer that is the same size as the *Buffer* parameter. For browse operations, the message is copied into the temporary buffer, instead of being removed from the queue.
4. If the message has to be truncated to fit in the buffer, the following is done:
   - If the MQGMO_ACCEPT_TRUNCATED_MSG option was *not* specified, the message is returned unconverted, with completion code MQCC_WARNING and reason code MQRC_TRUNCATED_MSG_FAILED.
   - If the MQGMO_ACCEPT_TRUNCATED_MSG option *was* specified, the completion code is set to MQCC_WARNING, the reason code is set to MQRC_TRUNCATED_MSG_ACCEPTED, and conversion processing continues.
5. If the message can be accommodated in the buffer without truncation, or the MQGMO_ACCEPT_TRUNCATED_MSG option was specified, the following is done:
   - If the format is a built-in format, the buffer is passed to the queue-manager's data-conversion service.
   - If the format is not a built-in format, the buffer is passed to a user-written exit with the same name as the format. If the exit cannot be found, the message is returned unconverted, with completion code MQCC_WARNING and reason code MQRC_FORMAT_ERROR.

If no error occurs, the output from the data-conversion service or from the user-written exit is the converted message, plus the completion code and reason code to be returned to the application issuing the MQGET call.

6. If the conversion is successful, the queue manager returns the converted message to the application. In this case, the completion code and reason code returned by the MQGET call are one of the following combinations:

| Completion code | Reason code |
|---|---|
| MQCC_OK | MQRC_NONE |
| MQCC_WARNING | MQRC_TRUNCATED_MSG_ACCEPTED |

However, if the conversion is performed by a user-written exit, other reason codes can be returned, even when the conversion is successful.

If the conversion fails, the queue manager returns the unconverted message to the application, with the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter set to the values in the control information in the message, and with completion code MQCC_WARNING.

## Processing conventions

When converting a built-in format, the queue manager follows the processing conventions described.

User-written exits should also follow these conventions, although this is not enforced by the queue manager. The built-in formats converted by the queue manager are:

- MQFMT_ADMIN
- MQFMT_CICS ( z/OS only)
- MQFMT_COMMAND_1
- MQFMT_COMMAND_2
- MQFMT_DEAD_LETTER_HEADER
- MQFMT_DIST_HEADER
- MQFMT_EVENT version 1
- MQFMT_EVENT version 2
- MQFMT_IMS
- MQFMT_IMS_VAR_STRING
- MQFMT_MD_EXTENSION
- MQFMT_PCF
- MQFMT_REF_MSG_HEADER
- MQFMT_RF_HEADER
- MQFMT_RF_HEADER_2
- MQFMT_STRING
- MQFMT_TRIGGER
- MQFMT_WORK_INFO_HEADER ( z/OS only)
- MQFMT_XMIT_Q_HEADER

1. If the message expands during conversion, and exceeds the size of the *Buffer* parameter, the following is done:
   - If the MQGMO_ACCEPT_TRUNCATED_MSG option was *not* specified, the message is returned unconverted, with completion code MQCC_WARNING and reason code MQRC_CONVERTED_MSG_TOO_BIG.

- If the MQGMO_ACCEPT_TRUNCATED_MSG option *was* specified, the message is truncated, the completion code is set to MQCC_WARNING, the reason code is set to MQRC_TRUNCATED_MSG_ACCEPTED, and conversion processing continues.

2. If truncation occurs (either before or during conversion), the number of valid bytes returned in the *Buffer* parameter can be *less than* the length of the buffer.

   This can occur, for example, if a 4-byte integer or a DBCS character straddles the end of the buffer. The incomplete element of information is not converted, and those bytes in the returned message do not contain valid information. This can also occur if a message that was truncated before conversion shrinks during conversion.

   If the number of valid bytes returned is less than the length of the buffer, the unused bytes at the end of the buffer are set to nulls.

3. If an array or string straddles the end of the buffer, as much of the data as possible is converted; only the particular array element or DBCS character which is incomplete is not converted; preceding array elements or characters are converted.
4. If truncation occurs (either before or during conversion), the length returned for the *DataLength* parameter is the length of the *unconverted* message before truncation.
5. When strings are converted between single-byte character sets (SBCS), double-byte character sets (DBCS), or multi-byte character sets (MBCS), the strings can expand or contract.

   - In the PCF formats MQFMT_ADMIN, MQFMT_EVENT, and MQFMT_PCF, the strings in the MQCFST and MQCFSL structures expand or contract as necessary to accommodate the string after conversion.

     For the string-list structure MQCFSL, the strings in the list might expand or contract by different amounts. If this happens, the queue manager pads the shorter strings with blanks to make them the same length as the longest string after conversion.
   - In the format MQFMT_REF_MSG_HEADER, the strings addressed by the *SrcEnvOffset*, *SrcNameOffset*, *DestEnvOffset*, and *DestNameOffset* fields expand or contract as necessary to accommodate the strings after conversion.
   - In the format MQFMT_RF_HEADER, the *NameValueString* field expands or contracts as necessary to accommodate the name/value pairs after conversion.
   - In structures with fixed field sizes, the queue manager allows strings to expand or contract within their fixed fields, provided that no significant information is lost. In this regard, trailing blanks and characters following the first null character in the field are treated as insignificant.
     - If the string expands, but only insignificant characters need to be discarded to accommodate the converted string in the field, the conversion succeeds and the call completes with MQCC_OK and reason code MQRC_NONE (assuming no other errors).
     - If the string expands, but the converted string requires significant characters to be discarded in order to fit in the field, the message is returned unconverted and the call completes with MQCC_WARNING and reason code MQRC_CONVERTED_STRING_TOO_BIG.

       **Note:** Reason code MQRC_CONVERTED_STRING_TOO_BIG results in this case whether or not the MQGMO_ACCEPT_TRUNCATED_MSG option was specified.
     - If the string contracts, the queue manager pads the string with blanks to the length of the field.

6. For messages consisting of one or more MQ header structures followed by user data, one or more of the header structures might be converted, while the remainder of the message is not. However, (with two exceptions) the *CodedCharSetId* and *Encoding* fields in each header structure always correctly indicate the character set and encoding of the data that follows the header structure.

   The two exceptions are the MQCIH and MQIIH structures, where the values in the *CodedCharSetId* and *Encoding* fields in those structures are not significant. For those structures, the data following the structure is in the same character set and encoding as the MQCIH or MQIIH structure itself.

7. If the *CodedCharSetId* or *Encoding* fields in the control information of the message being retrieved, or in the *MsgDesc* parameter, specify values that are undefined or not supported, the

queue manager might ignore the error if the undefined or unsupported value does not need to be used in converting the message.

For example, if the *Encoding* field in the message specifies an unsupported float encoding, but the message contains only integer data, or contains floating-point data that does not require conversion (because the source and target float encodings are identical), the error might not be diagnosed.

If the error is diagnosed, the message is returned unconverted, with completion code MQCC_WARNING and one of the MQRC_SOURCE_*_ERROR or MQRC_TARGET_*_ERROR reason codes (as appropriate); the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter are set to the values in the control information in the message.

If the error is not diagnosed and the conversion completes successfully, the values returned in the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter are those specified by the application issuing the MQGET call.

8. In all cases, if the message is returned to the application unconverted the completion code is set to MQCC_WARNING, and the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter are set to the values appropriate to the unconverted data. This is done for MQFMT_NONE also.

   The *Reason* parameter is set to a code that indicates why the conversion could not be carried out, unless the message also had to be truncated; reason codes related to truncation take precedence over reason codes related to conversion. (To determine if a truncated message was converted, check the values returned in the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter.)

   When an error is diagnosed, either a specific reason code is returned, or the general reason code MQRC_NOT_CONVERTED. The reason code returned depends on the diagnostic capabilities of the underlying data-conversion service.

9. If completion code MQCC_WARNING is returned, and more than one reason code is relevant, the order of precedence is as follows:

   a. The following reasons take precedence over all others; only one of the reasons in this group can arise:

      - MQRC_SIGNAL_REQUEST_ACCEPTED
      - MQRC_TRUNCATED_MSG_ACCEPTED

   b. The order of precedence within the remaining reason codes is not defined.

10. On completion of the MQGET call:

    - The following reason code indicates that the message was converted successfully:
      - MQRC_NONE
    - The following reason codes indicate that the message *might* have been converted successfully (check the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter to find out):
      - MQRC_MSG_MARKED_BROWSE_CO_OP
      - MQRC_TRUNCATED_MSG_ACCEPTED
    - All other reason codes indicate that the message was not converted.

    The following processing is specific to the built-in formats; it does not apply to user-defined formats:

11. With the exception of the following formats:

    - MQFMT_ADMIN
    - MQFMT_COMMAND_1
    - MQFMT_COMMAND_2
    - MQFMT_EVENT
    - MQFMT_IMS_VAR_STRING
    - MQFMT_PCF
    - MQFMT_STRING

none of the built-in formats can be converted from or to character sets that do not have SBCS characters for the characters that are valid in queue names. If an attempt is made to perform such a conversion, the message is returned unconverted, with completion code MQCC_WARNING and reason code MQRC_SOURCE_CCSID_ERROR or MQRC_TARGET_CCSID_ERROR, as appropriate.

The Unicode character set UCS-2 is an example of a character set that does not have SBCS characters for the characters that are valid in queue names.

12. If the message data for a built-in format is truncated, fields within the message that contain lengths of strings, or counts of elements or structures, are *not* adjusted to reflect the length of the data actually returned to the application; the values returned for such fields within the message data are the values applicable to the message *before truncation*.

    When processing messages such as a truncated MQFMT_ADMIN message, ensure that the application does not attempt to access data beyond the end of the data returned.

13. If the format name is MQFMT_DEAD_LETTER_HEADER, the message data begins with an MQDLH structure, possibly followed by zero or more bytes of application message data. The format, character set, and encoding of the application message data are defined by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQDLH structure at the start of the message. Because the MQDLH structure and application message data can have different character sets and encodings, one, other, or both of the MQDLH structure and application message data might require conversion.

    The queue manager converts the MQDLH structure first, as necessary. If conversion is successful, or the MQDLH structure does not require conversion, the queue manager checks the *CodedCharSetId* and *Encoding* fields in the MQDLH structure to see if conversion of the application message data is required. If conversion *is* required, the queue manager invokes the user-written exit with the name given by the *Format* field in the MQDLH structure, or performs the conversion itself (if *Format* is the name of a built-in format).

    If the MQGET call returns a completion code of MQCC_WARNING, and the reason code is one of those indicating that conversion was not successful, one of the following applies:

    - The MQDLH structure could not be converted. In this case the application message data will not have been converted either.
    - The MQDLH structure was converted, but the application message data was not.

    The application can examine the values returned in the *CodedCharSetId* and *Encoding* fields in the *MsgDesc* parameter, and those in the MQDLH structure, in order to determine which of the previously applies.

14. If the format name is MQFMT_XMIT_Q_HEADER, the message data begins with an MQXQH structure, possibly followed by zero or more bytes of additional data. This additional data is usually the application message data (which may be of zero length), but there can also be one or more further MQ header structures present, at the start of the additional data.

    The MQXQH structure must be in the character set and encoding of the queue manager. The format, character set, and encoding of the data following the MQXQH structure are given by the *Format*, *CodedCharSetId*, and *Encoding* fields in the MQMD structure contained *within* the MQXQH. For each subsequent MQ header structure present, the *Format*, *CodedCharSetId*, and *Encoding* fields in the structure describe the data that follows that structure; that data is either another MQ header structure, or the application message data.

    If the MQGMO_CONVERT option is specified for an MQFMT_XMIT_Q_HEADER message, the application message data and certain of the MQ header structures are converted, *but the data in the MQXQH structure is not*. On return from the MQGET call, therefore:

    - The values of the *Format*, *CodedCharSetId*, and *Encoding* fields in the *MsgDesc* parameter describe the data in the MQXQH structure, and *not* the application message data; the values are therefore *not* the same as those specified by the application that issued the MQGET call.

      The effect of this is that an application that repeatedly gets messages from a transmission queue with the MQGMO_CONVERT option specified must reset the *CodedCharSetId* and *Encoding*

fields in the *MsgDesc* parameter to the values required for the application message data, before each MQGET call.

- The values of the *Format*, *CodedCharSetId*, and *Encoding* fields in the last MQ header structure present describe the application message data. If there are no other MQ header structures present, the application message data is described by these fields in the MQMD structure within the MQXQH structure. If conversion is successful, the values will be the same as those specified in the *MsgDesc* parameter by the application that issued the MQGET call.

If the message is a distribution-list message, the MQXQH structure is followed by an MQDH structure (plus its arrays of MQOR and MQPMR records), which in turn might be followed by zero or more further MQ header structures and zero or more bytes of application message data. Like the MQXQH structure, the MQDH structure must be in the character set and encoding of the queue manager, and it is not converted on the MQGET call, even if the MQGMO_CONVERT option is specified.

The processing of the MQXQH and MQDH structures described previously is primarily intended for use by message channel agents when they get messages from transmission queues.

## Conversion of report messages

In general a report message can contain varying amounts of application message data, according to the report options specified by the sender of the original message. However, an activity report can contain data but without the report option mentioning *_WITH_DATA in the constant.

In particular, a report message can contain either:

1. No application message data
2. Some of the application message data from the original message

   This occurs when the sender of the original message specifies MQRO_*_WITH_DATA and the message is longer than 100 bytes.
3. All the application message data from the original message

   This occurs when the sender of the original message specifies MQRO_*_WITH_FULL_DATA, or specifies MQRO_*_WITH_DATA and the message is 100 bytes or shorter.

When the queue manager or message channel agent generates a report message, it copies the format name from the original message into the *Format* field in the control information in the report message. The format name in the report message might therefore imply a length of data that is different from the length actually present in the report message (cases 1 and 2 previously).

If the MQGMO_CONVERT option is specified when the report message is retrieved:

- For case 1 previously, the data-conversion exit is not invoked (because the report message has no data).
- For case 3 previously, the format name correctly implies the length of the message data.
- But for case 2 previously, the data-conversion exit is invoked to convert a message that is *shorter* than the length implied by the format name.

  In addition, the reason code passed to the exit is usually MQRC_NONE (that is, the reason code does not indicate that the message has been truncated). This happens because the message data was truncated by the *sender* of the report message, and not by the receiver's queue manager in response to the MQGET call.

Because of these possibilities, the data-conversion exit must *not* use the format name to deduce the length of data passed to it; instead the exit must check the length of data provided, and be prepared to convert *less* data than the length implied by the format name. If the data can be converted successfully, completion code MQCC_OK and reason code MQRC_NONE must be returned by the exit. The length of the message data to be converted is passed to the exit as the *InBufferLength* parameter.

**Product-sensitive programming interface**

## MQDXP - Data-conversion exit parameter

The MQDXP structure is a parameter that the queue manager passes to the data-conversion exit when the exit is invoked to convert the message data as part of the processing of the MQGET call. See the description of the MQ_DATA_CONV_EXIT call for details of the data conversion exit.

Character data in MQDXP is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute. Numeric data in MQDXP is in the native machine encoding; this is given by MQENC_NATIVE.

Only the *DataLength*, *CompCode*, *Reason*, and *ExitResponse* fields in MQDXP can be changed by the exit; changes to other fields are ignored. However, the *DataLength* field *cannot* be changed if the message being converted is a segment that contains only part of a logical message.

When control returns to the queue manager from the exit, the queue manager checks the values returned in MQDXP. If the values returned are not valid, the queue manager continues processing as though the exit had returned MQXDR_CONVERSION_FAILED in *ExitResponse* ; however, the queue manager ignores the values of the *CompCode* and *Reason* fields returned by the exit in this case, and uses instead the values those fields had on *input* to the exit. The following values in MQDXP cause this processing to occur:

- *ExitResponse* field not MQXDR_OK and not MQXDR_CONVERSION_FAILED
- *CompCode* field not MQCC_OK and not MQCC_WARNING
- *DataLength* field less than zero, or *DataLength* field changed when the message being converted is a segment that contains only part of a logical message.

The following table summarizes the fields in the structure.

*Table 567. Fields in MQDXP*

| Field | Description | Topic |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *AppOptions* | Application options | AppOptions |
| *Encoding* | Numeric encoding required by application | Encoding |
| *CodedCharSetId* | Character set required by application | CodedCharSetId |
| *DataLength* | Length in bytes of message data | DataLength |
| *CompCode* | Completion code | CompCode |
| *Reason* | Reason code qualifying *CompCode* | Reason |
| *ExitResponse* | Response from exit | ExitResponse |
| *Hconn* | Connection handle | Hconn |
| *pEntryPoints* | Address of the MQIEP structure | pEntryPoints |

### Fields

The MQDXP structure contains the following fields; the fields are described in alphabetical order.

**AppOptions**
Type: MQLONG

This is a copy of the *Options* field of the MQGMO structure specified by the application issuing the MQGET call. The exit might need to examine these to ascertain whether the MQGMO_ACCEPT_TRUNCATED_MSG option was specified.

This is an input field to the exit.

**CodedCharSetId**
Type: MQLONG

This is the coded character-set identifier of the character set required by the application issuing the MQGET call; see the *CodedCharSetId* field in the MQMD structure for more details. If the application specifies the special value MQCCSI_Q_MGR on the MQGET call, the queue manager changes this to the actual character-set identifier of the character set used by the queue manager, before invoking the exit.

If the conversion is successful, the exit must copy this to the *CodedCharSetId* field in the message descriptor.

This is an input field to the exit.

**CompCode**
Type: MQLONG

When the exit is invoked, this contains the completion code that is returned to the application that issued the MQGET call, if the exit does nothing. It is always MQCC_WARNING, because either the message was truncated, or the message requires conversion and this has not yet been done.

On output from the exit, this field contains the completion code to be returned to the application in the *CompCode* parameter of the MQGET call; only MQCC_OK and MQCC_WARNING are valid. See the description of the *Reason* field for suggestions on how the exit can set this field on output.

This is an input/output field to the exit.

**DataLength**
Type: MQLONG

When the exit is invoked, this field contains the original length of the application message data. If the message was truncated to fit into the buffer provided by the application, the size of the message provided to the exit is *smaller* than the value of *DataLength*. The size of the message provided to the exit is always given by the *InBufferLength* parameter of the exit, irrespective of any truncation that has occurred.

Truncation is indicated by the *Reason* field having the value MQRC_TRUNCATED_MSG_ACCEPTED on input to the exit.

Most conversions do not need to change this length, but an exit can do so if necessary; the value set by the exit is returned to the application in the *DataLength* parameter of the MQGET call. However, this length *cannot* be changed if the message being converted is a segment that contains only part of a logical message. This is because changing the length would cause the offsets of later segments in the logical message to be incorrect.

Note that, if the exit wants to change the length of the data, be aware that the queue manager has already decided whether the message data fits into the application's buffer, based on the length of the *unconverted* data. This decision determines whether the message is removed from the queue (or the browse cursor moved, for a browse request), and is not affected by any change to the data length caused by the conversion. For this reason it is recommended that conversion exits do not cause a change in the length of the application message data.

If character conversion does imply a change of length, a string can be converted into another string with the same length in bytes, truncating trailing blanks, or padding with blanks as necessary.

The exit is not invoked if the message contains no application message data; hence *DataLength* is always greater then zero.

This is an input/output field to the exit.

**Encoding**
Type: MQLONG

Numeric encoding required by application.

This is the numeric encoding required by the application issuing the MQGET call; see the *Encoding* field in the MQMD structure for more details.

If the conversion is successful, the exit copies this to the *Encoding* field in the message descriptor.

This is an input field to the exit.

**ExitOptions**
Type: MQLONG

This is a reserved field; its value is `0`.

**ExitResponse**
Type: MQLONG

Response from exit. This is set by the exit to indicate the success or otherwise of the conversion. It must be one of the following:

**MQXDR_OK**
Conversion was successful.

If the exit specifies this value, the queue manager returns the following to the application that issued the MQGET call:

- The value of the *CompCode* field on output from the exit
- The value of the *Reason* field on output from the exit
- The value of the *DataLength* field on output from the exit
- The contents of the exit's output buffer *OutBuffer*. The number of bytes returned is the lesser of the exit's *OutBufferLength* parameter, and the value of the *DataLength* field on output from the exit.

If the *Encoding* and *CodedCharSetId* fields in the exit's message descriptor parameter are *both* unchanged, the queue manager returns:

- The value of the *Encoding* and *CodedCharSetId* fields in the MQDXP structure on *input* to the exit.

If one or both of the *Encoding* and *CodedCharSetId* fields in the exit's message descriptor parameter has been changed, the queue manager returns:

- The value of the *Encoding* and *CodedCharSetId* fields in the exit's message descriptor parameter on output from the exit

**MQXDR_CONVERSION_FAILED**
Conversion was unsuccessful.

If the exit specifies this value, the queue manager returns the following to the application that issued the MQGET call:

- The value of the *CompCode* field on output from the exit
- The value of the *Reason* field on output from the exit
- The value of the *DataLength* field on *input* to the exit
- The contents of the exit's input buffer *InBuffer*. The number of bytes returned is given by the *InBufferLength* parameter

If the exit has altered *InBuffer*, the results are undefined.

*ExitResponse* is an output field from the exit.

**Hconn**
Type: MQHCONN

This is a connection handle which can be used on the MQXCNVC call. This handle is not necessarily the same as the handle specified by the application which issued the MQGET call.

**pEntryPoints**
Type: PMQIEP

The address of an MQIEP structure through which MQI and DCI calls can be made.

**Reason**
Type: MQLONG

Reason code qualifying *CompCode*.

When the exit is invoked, this contains the reason code that is returned to the application that issued the MQGET call, if the exit chooses to do nothing. Among possible values are MQRC_TRUNCATED_MSG_ACCEPTED, indicating that the message was truncated in order fit into the buffer provided by the application, and MQRC_NOT_CONVERTED, indicating that the message requires conversion but that this has not yet been done.

On output from the exit, this field contains the reason to be returned to the application in the *Reason* parameter of the MQGET call; the following is recommended:

- If *Reason* had the value MQRC_TRUNCATED_MSG_ACCEPTED on input to the exit, the *Reason* and *CompCode* fields must not be altered, irrespective of whether the conversion succeeds or fails.

  (If the *CompCode* field is not MQCC_OK, the application which retrieves the message can identify a conversion failure by comparing the returned *Encoding* and *CodedCharSetId* values in the message descriptor with the values requested; in contrast, the application cannot distinguish a truncated message from a message that fitted the buffer. For this reason, MQRC_TRUNCATED_MSG_ACCEPTED must be returned in preference to any of the reasons that indicate conversion failure.)
- If *Reason* had any other value on input to the exit:
  - If the conversion succeeds, *CompCode* must be set to MQCC_OK and *Reason* set to MQRC_NONE.
  - If the conversion fails, or the message expands and has to be truncated to fit in the buffer, *CompCode* must be set to MQCC_WARNING (or left unchanged), and *Reason* set to one of the values listed, to indicate the nature of the failure.

    Note if the message after conversion is too large for the buffer, it must be truncated only if the application that issued the MQGET call specified the MQGMO_ACCEPT_TRUNCATED_MSG option:

    - If it did specify that option, reason MQRC_TRUNCATED_MSG_ACCEPTED is returned.
    - If it did not specify that option, the message is returned unconverted, with reason code MQRC_CONVERTED_MSG_TOO_BIG.

The reason codes listed are recommended for use by the exit to indicate the reason that conversion failed, but the exit can return other values from the set of MQRC_* codes if deemed appropriate. In addition, the range of values MQRC_APPL_FIRST through MQRC_APPL_LAST are allocated for use by the exit to indicate conditions that the exit wants to communicate to the application issuing the MQGET call.

**Note:** If the message cannot be converted successfully, the exit *must* return MQXDR_CONVERSION_FAILED in the *ExitResponse* field, in order to cause the queue manager to return the unconverted message. This is true regardless of the reason code returned in the *Reason* field.

**MQRC_APPL_FIRST**
(900, X'384') Lowest value for application-defined reason code.

**MQRC_APPL_LAST**
(999, X'3E7') Highest value for application-defined reason code.

**MQRC_CONVERTED_MSG_TOO_BIG**
(2120, X'848') Converted data too large for buffer.

**MQRC_NOT_CONVERTED**
(2119, X'847') Message data not converted.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'83F') Source coded character set identifier not valid.

**MQRC_SOURCE_DECIMAL_ENC_ERROR**
(2113, X'841') Packed-decimal encoding in message not recognized.

**MQRC_SOURCE_FLOAT_ENC_ERROR**
(2114, X'842') Floating-point encoding in message not recognized.

**MQRC_SOURCE_INTEGER_ENC_ERROR**
(2112, X'840') Source integer encoding not recognized.

**MQRC_TARGET_CCSID_ERROR**
(2115, X'843') Target coded character set identifier not valid.

**MQRC_TARGET_DECIMAL_ENC_ERROR**
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.

**MQRC_TARGET_FLOAT_ENC_ERROR**
(2118, X'846') Floating-point encoding specified by receiver not recognized.

**MQRC_TARGET_INTEGER_ENC_ERROR**
(2116, X'844') Target integer encoding not recognized.

**MQRC_TRUNCATED_MSG_ACCEPTED**
(2079, X'81F') Truncated message returned (processing completed).

This is an input/output field to the exit.

**StrucId**
Type: MQCHAR4

Structure identifier. The value must be:

**MQDXP_STRUC_ID**
Identifier for data conversion exit parameter structure.

For the C programming language, the constant MQDXP_STRUC_ID_ARRAY is also defined; this has the same value as MQDXP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the exit.

**Version**
Type: MQLONG

Structure version number. The value must be:

**MQDXP_VERSION_1**
Version number for data-conversion exit parameter structure.

The following constant specifies the version number of the current version:

**MQDXP_CURRENT_VERSION**
Current version of data-conversion exit parameter structure.

**Note:** When a new version of this structure is introduced, the layout of the existing part is not changed. The exit must therefore check that the *Version* field is equal to or greater than the lowest version which contains the fields that the exit needs to use.

This is an input field to the exit.

## C declaration

```
typedef struct tagMQDXP MQDXP;
struct tagMQDXP {
  MQCHAR4  StrucId;         /* Structure identifier */
  MQLONG   Version;         /* Structure version number */
  MQLONG   ExitOptions;     /* Reserved */
```

```
  MQLONG   AppOptions;      /* Application options */
  MQLONG   Encoding;        /* Numeric encoding required by
                               application */
  MQLONG   CodedCharSetId;  /* Character set required by application */
  MQLONG   DataLength;      /* Length in bytes of message data */
  MQLONG   CompCode;        /* Completion code */
  MQLONG   Reason;          /* Reason code qualifying CompCode */
  MQLONG   ExitResponse;    /* Response from exit */
  MQHCONN  Hconn;           /* Connection handle */
  PMQIEP   pEntryPoints;    /* Address of the MQIEP structure */
};
```

### COBOL declaration ( IBM i only)

```
**   MQDXP structure
  10 MQDXP.
**    Structure identifier
   15 MQDXP-STRUCID        PIC X(4).
**    Structure version number
   15 MQDXP-VERSION        PIC S9(9) BINARY.
**    Reserved
   15 MQDXP-EXITOPTIONS    PIC S9(9) BINARY.
**    Application options
   15 MQDXP-APPOPTIONS     PIC S9(9) BINARY.
**    Numeric encoding required by application
   15 MQDXP-ENCODING       PIC S9(9) BINARY.
**    Character set required by application
   15 MQDXP-CODEDCHARSETID PIC S9(9) BINARY.
**    Length in bytes of message data
   15 MQDXP-DATALENGTH     PIC S9(9) BINARY.
**    Completion code
   15 MQDXP-COMPCODE       PIC S9(9) BINARY.
**    Reason code qualifying COMPCODE
   15 MQDXP-REASON         PIC S9(9) BINARY.
**    Response from exit
   15 MQDXP-EXITRESPONSE   PIC S9(9) BINARY.
**    Connection handle
   15 MQDXP-HCONN          PIC S9(9) BINARY.
```

### System/390 assembler declaration

```
MQDXP                 DSECT
MQDXP_STRUCID         DS   CL4  Structure identifier
MQDXP_VERSION         DS   F    Structure version number
MQDXP_EXITOPTIONS     DS   F    Reserved
MQDXP_APPOPTIONS      DS   F    Application options
MQDXP_ENCODING        DS   F    Numeric encoding required by application
MQDXP_CODEDCHARSETID  DS   F    Character set required by application
MQDXP_DATALENGTH      DS   F    Length in bytes of message data
MQDXP_COMPCODE        DS   F    Completion code
MQDXP_REASON          DS   F    Reason code qualifying COMPCODE
MQDXP_EXITRESPONSE    DS   F    Response from exit
MQDXP_HCONN           DS   F    Connection handle
*
MQDXP_LENGTH          EQU  *-MQDXP
                      ORG  MQDXP
MQDXP_AREA            DS   CL(MQDXP_LENGTH)
```

## MQXCNVC - Convert characters

The MQXCNVC call converts characters from one character set to another using the C programming language.

This call is part of the IBM MQ Data Conversion Interface (DCI), which is one of the IBM MQ framework interfaces.

Note: The call can be used from both application, and data-conversion exit environments.

## Syntax

MQXCNVC (*Hconn*, *Options*, *SourceCCSID*, *SourceLength*, *SourceBuffer*, *TargetCCSID*, *TargetLength*, *TargetBuffer*, *DataLength*, *CompCode*, *Reason*)

## Parameters

***Hconn***
Type: MQHCONN - input

This handle represents the connection to the queue manager.

In a data-conversion exit, *Hconn* is normally the handle that is passed to the data-conversion exit in the *Hconn* field of the MQDXP structure; this handle is not necessarily the same as the handle specified by the application which issued the MQGET call.

On IBM i, the following special value can be specified for *Hconn*:

**MQHC_DEF_HCONN**
Default connection handle.

If you run a CICS TS 3.2 or higher application, ensure that the character conversion exit program, which invokes the MQXCNVC call, is defined as OPENAPI. This definition prevents the 2018 MQRC_HCONN_ERROR error caused by from an incorrect connection, and allows the MQGET to complete.

***Options***
Type: MQLONG - input

Options that control the action of MQXCNVC.

Zero or more of the options described can be specified. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**Default-conversion option**: The following option controls the use of default character conversion:

**MQDCC_DEFAULT_CONVERSION**
Default conversion.

This option specifies that default character conversion can be used if one or both of the character sets specified on the call is not supported. This allows the queue manager to use an installation-specified default character set that approximates the specified character set, when converting the string.

**Note:** The result of using an approximate character set to convert the string is that some characters can be converted incorrectly. This can be avoided by using in the string only characters which are common to both the specified character set and the default character set.

The default character sets are defined by a configuration option when the queue manager is installed or restarted.

If MQDCC_DEFAULT_CONVERSION is not specified, the queue manager uses only the specified character sets to convert the string, and the call fails if one or both of the character sets is not supported.

This option is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows.

**Padding option**: The following option allows the queue manager to pad the converted string with blanks or discard insignificant trailing characters, in order to make the converted string fit the target buffer:

**MQDCC_FILL_TARGET_BUFFER**
Fill target buffer.

This option requests that conversion take place in such a way that the target buffer is filled completely:

- If the string contracts when it is converted, trailing blanks are added in order to fill the target buffer.
- If the string expands when it is converted, trailing characters that are not significant are discarded to make the converted string fit the target buffer. If this can be done successfully, the call completes with MQCC_OK and reason code MQRC_NONE.

  If there are too few insignificant trailing characters, as much of the string as can fit is placed in the target buffer, and the call completes with MQCC_WARNING and reason code MQRC_CONVERTED_MSG_TOO_BIG.

  Insignificant characters are:

  – Trailing blanks
  – Characters following the first null character in the string (but excluding the first null character itself)
- If the string, *TargetCCSID* , and *TargetLength* are such that the target buffer cannot be set completely with valid characters, the call fails with MQCC_FAILED and reason code MQRC_TARGET_LENGTH_ERROR. This can occur when *TargetCCSID* is a pure DBCS character set (such as UCS-2, but *TargetLength* specifies a length that is an odd number of bytes.
- *TargetLength* can be less than or greater than *SourceLength* . On return from MQXCNVC, *DataLength* has the same value as *TargetLength* .

If this option is not specified:

- The string is allowed to contract or expand within the target buffer as required. Insignificant trailing characters are not added or discarded.

  If the converted string fits in the target buffer, the call completes with MQCC_OK and reason code MQRC_NONE.

  If the converted string is too large for the target buffer, as much of the string as fits is placed in the target buffer, and the call completes with MQCC_WARNING and reason code MQRC_CONVERTED_MSG_TOO_BIG. Note fewer than *TargetLength* bytes can be returned in this case.
- *TargetLength* can be less than or greater than *SourceLength* . On return from MQXCNVC, *DataLength* is less than or equal to *TargetLength* .

This option is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Linux, Windows.

**Encoding options**: The options described can be used to specify the integer encodings of the source and target strings. The relevant encoding is used *only* when the corresponding character set identifier indicates that the representation of the character set in main storage is dependent on the encoding used for binary integers. This affects only certain multibyte character sets (for example, UCS-2 character sets).

The encoding is ignored if the character set is a single-byte character set (SBCS), or a multibyte character set with representation in main storage that is not dependent on the integer encoding.

Only one of the MQDCC_SOURCE_* values must be specified, combined with one of the MQDCC_TARGET_* values:

**MQDCC_SOURCE_ENC_NATIVE**
Source encoding is the default for the environment and programming language.

**MQDCC_SOURCE_ENC_NORMAL**
Source encoding is normal.

**MQDCC_SOURCE_ENC_REVERSED**
Source encoding is reversed.

**MQDCC_SOURCE_ENC_UNDEFINED**
Source encoding is undefined.

**MQDCC_TARGET_ENC_NATIVE**
Target encoding is the default for the environment and programming language.

**MQDCC_TARGET_ENC_NORMAL**
Target encoding is normal.

**MQDCC_TARGET_ENC_REVERSED**
Target encoding is reversed.

**MQDCC_TARGET_ENC_UNDEFINED**
Target encoding is undefined.

The encoding values defined previously can be added directly to the *Options* field. However, if the source or target encoding is obtained from the *Encoding* field in the MQMD or other structure, the following processing must be done:

1. The integer encoding must be extracted from the *Encoding* field by eliminating the float and packed-decimal encodings; see "Analyzing encodings" on page 874 for details of how to do this.
2. The integer encoding resulting from step 1 must be multiplied by the appropriate factor before being added to the *Options* field. These factors are:
   - MQDCC_SOURCE_ENC_FACTOR for the source encoding
   - MQDCC_TARGET_ENC_FACTOR for the target encoding

The following example code illustrates how this might be coded in the C programming language:

```
Options = (MsgDesc.Encoding & MQENC_INTEGER_MASK)
           * MQDCC_SOURCE_ENC_FACTOR
        + (DataConvExitParms.Encoding & MQENC_INTEGER_MASK)
           * MQDCC_TARGET_ENC_FACTOR;
```

If not specified, the encoding options default to undefined (MQDCC_*_ENC_UNDEFINED). In most cases, this does not affect the successful completion of the MQXCNVC call. However, if the corresponding character set is a multibyte character set with representation that is dependent on the encoding (for example, a UCS-2 character set), the call fails with reason code MQRC_SOURCE_INTEGER_ENC_ERROR or MQRC_TARGET_INTEGER_ENC_ERROR as appropriate.

The encoding options are supported in the following environments: AIX, HP-UX, z/OS, IBM i, Solaris, Linux, Windows.

**Default option**: If none of the options described previously is specified, the following option can be used:

**MQDCC_NONE**
No options specified.

MQDCC_NONE is defined to aid program documentation. It is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

***SourceCCSID***
Type: MQLONG - input

This is the coded character set identifier of the input string in *SourceBuffer*.

***SourceLength***
Type: MQLONG - input

This is the length in bytes of the input string in *SourceBuffer* ; it must be zero or greater.

***SourceBuffer***
Type: MQCHARxSourceLength - input

This is the buffer containing the string to be converted from one character set to another.

***TargetCCSID***
Type: MQLONG - input

This is the coded character set identifier of the character set to which *SourceBuffer* is to be converted.

***TargetLength***
Type: MQLONG - input

This is the length in bytes of the output buffer *TargetBuffer* ; it must be zero or greater. It can be less than or greater than *SourceLength*.

***TargetBuffer***
Type: MQCHARxTargetLength - output

This is the string after it has been converted to the character set defined by *TargetCCSID*. The converted string can be shorter or longer than the unconverted string. The *DataLength* parameter indicates the number of valid bytes returned.

***DataLength***
Type: MQLONG - output

This is the length of the string returned in the output buffer *TargetBuffer*. The converted string can be shorter or longer than the unconverted string.

***CompCode***
Type: MQLONG - output

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_CONVERTED_MSG_TOO_BIG**
(2120, X'848') Converted data too large for buffer.

If *CompCode* is MQCC_FAILED:

**MQRC_DATA_LENGTH_ERROR**
(2010, X'7DA') Data length parameter not valid.

**MQRC_DBCS_ERROR**
(2150, X'866') DBCS string not valid.

**MQRC_HCONN_ERROR**
(2018, X'7E2') Connection handle not valid.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') Insufficient system resources available.

**MQRC_SOURCE_BUFFER_ERROR**
(2145, X'861') Source buffer parameter not valid.

**MQRC_SOURCE_CCSID_ERROR**
(2111, X'83F') Source coded character set identifier not valid.

**MQRC_SOURCE_INTEGER_ENC_ERROR**
(2112, X'840') Source integer encoding not recognized.

**MQRC_SOURCE_LENGTH_ERROR**
(2143, X'85F') Source length parameter not valid.

**MQRC_STORAGE_NOT_AVAILABLE**
(2071, X'817') Insufficient storage available.

**MQRC_TARGET_BUFFER_ERROR**
(2146, X'862') Target buffer parameter not valid.

**MQRC_TARGET_CCSID_ERROR**
(2115, X'843') Target coded character set identifier not valid.

**MQRC_TARGET_INTEGER_ENC_ERROR**
(2116, X'844') Target integer encoding not recognized.

**MQRC_TARGET_LENGTH_ERROR**
(2144, X'860') Target length parameter not valid.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') Unexpected error occurred.

For detailed information about these codes, see Messages and reason codes.

## C invocation

```
MQXCNVC (Hconn, Options, SourceCCSID, SourceLength, SourceBuffer,
        TargetCCSID, TargetLength, TargetBuffer, &DataLength,
        &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;            /* Connection handle */
MQLONG   Options;          /* Options that control the action of
                              MQXCNVC */
MQLONG   SourceCCSID;      /* Coded character set identifier of string
                              before conversion */
MQLONG   SourceLength;     /* Length of string before conversion */
MQCHAR   SourceBuffer[n];  /* String to be converted */
MQLONG   TargetCCSID;      /* Coded character set identifier of string
                              after conversion */
MQLONG   TargetLength;     /* Length of output buffer */
MQCHAR   TargetBuffer[n];  /* String after conversion */
MQLONG   DataLength;       /* Length of output string */
MQLONG   CompCode;         /* Completion code */
MQLONG   Reason;           /* Reason code qualifying CompCode */
```

## COBOL declaration ( IBM i only)

```
     CALL 'MQXCNVC' USING HCONN, OPTIONS, SOURCECCSID, SOURCELENGTH,
                          SOURCEBUFFER, TARGETCCSID, TARGETLENGTH,
                          TARGETBUFFER, DATALENGTH, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN         PIC S9(9) BINARY.
**   Options that control the action of MQXCNVC
 01  OPTIONS       PIC S9(9) BINARY.
**   Coded character set identifier of string before conversion
```

```
 01  SOURCECCSID   PIC S9(9) BINARY.
**   Length of string before conversion
 01  SOURCELENGTH  PIC S9(9) BINARY.
**   String to be converted
 01  SOURCEBUFFER  PIC X(n).
**   Coded character set identifier of string after conversion
 01  TARGETCCSID   PIC S9(9) BINARY.
**   Length of output buffer
 01  TARGETLENGTH  PIC S9(9) BINARY.
**   String after conversion
 01  TARGETBUFFER  PIC X(n).
**   Length of output string
 01  DATALENGTH    PIC S9(9) BINARY.
**   Completion code
 01  COMPCODE      PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON        PIC S9(9) BINARY.
```

### S/390 assembler declaration

```
         CALL MQXCNVC,(HCONN,OPTIONS,SOURCECCSID,SOURCELENGTH,         X
               SOURCEBUFFER,TARGETCCSID,TARGETLENGTH,TARGETBUFFER,     X
               DATALENGTH,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN         DS  F      Connection handle
OPTIONS       DS  F      Options that control the action of MQXCNVC
SOURCECCSID   DS  F      Coded character set identifier of string before
*                        conversion
SOURCELENGTH  DS  F      Length of string before conversion
SOURCEBUFFER  DS  CL(n)  String to be converted
TARGETCCSID   DS  F      Coded character set identifier of string after
*                        conversion
TARGETLENGTH  DS  F      Length of output buffer
TARGETBUFFER  DS  CL(n)  String after conversion
DATALENGTH    DS  F      Length of output string
COMPCODE      DS  F      Completion code
REASON        DS  F      Reason code qualifying COMPCODE
```

## MQ_DATA_CONV_EXIT - Data conversion exit

The MQ_DATA_CONV_EXIT call describes the parameters that are passed to the data-conversion exit.

No entry point called MQ_DATA_CONV_EXIT is provided by the queue manager (see usage note 11 ).

This definition is part of the IBM MQ Data Conversion Interface (DCI), which is one of the IBM MQ framework interfaces.

### Syntax

MQ_DATA_CONV_EXIT (*DataConvExitParms*, *MsgDesc*, *InBufferLength*, *InBuffer*, *OutBufferLength*, *OutBuffer*)

### Parameters

***DataConvExitParms***
Type: MQDXP - input/output

This structure contains information relating to the invocation of the exit. The exit sets information in this structure to indicate the outcome of the conversion. See “MQDXP - Data-conversion exit parameter” on page 886 for details of the fields in this structure.

***MsgDesc***
Type: MQMD - input/output

On input to the exit, this is the message descriptor associated with the message data passed to the exit in the *InBuffer* parameter.

**Note:** The *MsgDesc* parameter passed to the exit is always the most-recent version of MQMD supported by the queue manager which invokes the exit. If the exit is intended to be portable between different environments, the exit will check the *Version* field in *MsgDesc* to verify that the fields that the exit needs to access are present in the structure.

In the following environments, the exit is passed a version-2 MQMD: AIX, HP-UX, IBM i, Solaris, Linux, Windows. In all other environments that support the data conversion exit, the exit is passed a version-1 MQMD.

On output, the exit will change the *Encoding* and *CodedCharSetId* fields to the values requested by the application, if conversion was successful; these changes are reflected back to the application. Any other changes that the exit makes to the structure are ignored; they are not reflected back to the application.

If the exit returns MQXDR_OK in the *ExitResponse* field of the MQDXP structure, but does not change the *Encoding* or *CodedCharSetId* fields in the message descriptor, the queue manager returns for those fields the values that the corresponding fields in the MQDXP structure had on input to the exit.

***InBufferLength***
Type: MQLONG - input

Length in bytes of *InBuffer*.

This is the length of the input buffer *InBuffer*, and specifies the number of bytes to be processed by the exit. *InBufferLength* is the lesser of the length of the message data before conversion, and the length of the buffer provided by the application on the MQGET call.

The value is always greater than zero.

***InBuffer***
Type: MQBYTExInBufferLength - input

Buffer containing the unconverted message.

This contains the message data before conversion. If the exit is unable to convert the data, the queue manager returns the contents of this buffer to the application after the exit has completed.

**Note:** The exit should not alter *InBuffer* ; if this parameter is altered, the results are undefined.

In the C programming language, this parameter is defined as a pointer-to-void.

***OutBufferLength***
Type: MQLONG - input

Length in bytes of *OutBuffer*.

This is the length of the output buffer *OutBuffer*, and is the same as the length of the buffer provided by the application on the MQGET call.

The value is always greater than zero.

***OutBuffer***
Type: MQBYTExOutBufferLength - output

Buffer containing the converted message.

On output from the exit, if the conversion was successful (as indicated by the value MQXDR_OK in the *ExitResponse* field of the *DataConvExitParms* parameter), *OutBuffer* contains the message data to be delivered to the application, in the requested representation. If the conversion was unsuccessful, any changes that the exit has made to this buffer are ignored.

In the C programming language, this parameter is defined as a pointer-to-void.

## Usage notes

1. A data-conversion exit is a user-written exit which receives control during the processing of an MQGET call. The function performed by the data-conversion exit is defined by the provider of the exit; however, the exit must conform to the rules described here, and in the associated parameter structure MQDXP.

   The programming languages that can be used for a data-conversion exit are determined by the environment.

2. The exit is invoked only if *all* of the following are true:

   - The MQGMO_CONVERT option is specified on the MQGET call
   - The *Format* field in the message descriptor is not MQFMT_NONE
   - The message is not already in the required representation; that is, one or both of the message's *CodedCharSetId* and *Encoding* is different from the value specified by the application in the message descriptor supplied on the MQGET call
   - The queue manager has not already done the conversion successfully
   - The length of the application's buffer is greater than zero
   - The length of the message data is greater than zero
   - The reason code so far during the MQGET operation is MQRC_NONE or MQRC_TRUNCATED_MSG_ACCEPTED

3. When an exit is being written, consider coding the exit in a way that allows it to convert messages that have been truncated. Truncated messages can arise in the following ways:

   - The receiving application provides a buffer that is smaller than the message, but specifies the MQGMO_ACCEPT_TRUNCATED_MSG option on the MQGET call.

     In this case, the *Reason* field in the *DataConvExitParms* parameter on input to the exit has the value MQRC_TRUNCATED_MSG_ACCEPTED.

   - The sender of the message truncated it before sending it. This can happen with report messages, for example (see "Conversion of report messages" on page 885 for more details).

     In this case, the *Reason* field in the *DataConvExitParms* parameter on input to the exit has the value MQRC_NONE (if the receiving application provided a buffer that was large enough for the message).

   Thus the value of the *Reason* field on input to the exit cannot always be used to decide whether the message has been truncated.

   The distinguishing characteristic of a truncated message is that the length provided to the exit in the *InBufferLength* parameter is *less than* the length implied by the format name contained in the *Format* field in the message descriptor. The exit should therefore check the value of *InBufferLength* before attempting to convert any of the data; the exit *should not* assume that the full amount of data implied by the format name has been provided.

   If the exit has *not* been written to convert truncated messages, and *InBufferLength* is less than the value expected, the exit will return MQXDR_CONVERSION_FAILED in the *ExitResponse* field of the *DataConvExitParms* parameter, with the *CompCode* and *Reason* fields set to MQCC_WARNING and MQRC_FORMAT_ERROR.

   If the exit *has* been written to convert truncated messages, the exit will convert as much of the data as possible (see next usage note), taking care not to attempt to examine or convert data beyond the end of *InBuffer*. If the conversion completes successfully, the exit will leave the *Reason* field in the *DataConvExitParms* parameter unchanged. This returns MQRC_TRUNCATED_MSG_ACCEPTED if the message was truncated by the receiver's queue manager, and MQRC_NONE if the message was truncated by the sender of the message.

   It is also possible for a message to expand *during* conversion, to the point where it is bigger than *OutBuffer*. In this case the exit must decide whether to truncate the message; the *AppOptions*

field in the *DataConvExitParms* parameter indicates whether the receiving application specified the MQGMO_ACCEPT_TRUNCATED_MSG option.

4. Generally, all the data in the message provided to the exit in *InBuffer* is converted, or that none of it is. An exception to this, however, occurs if the message is truncated, either before conversion or during conversion; in this case there can be an incomplete item at the end of the buffer (for example: 1 byte of a double-byte character, or 3 bytes of a 4-byte integer). In this situation, consider omitting the incomplete item and set the unused bytes in the *OutBuffer* to nulls. However, complete elements or characters within an array or string *should* be converted.
5. When an exit is needed for the first time, the queue manager attempts to load an object that has the same name as the format (apart from extensions). The object loaded must contain the exit that processes messages with that format name. Consider making the exit name, and the name of the object that contains the exit identical, although not all environments require this.
6. A new copy of the exit is loaded when an application attempts to retrieve the first message that uses that *Format* since the application connected to the queue manager. For CICS or IMS applications, this means when the CICS or IMS subsystem connected to the queue manager. A new copy can also be loaded at other times, if the queue manager has discarded a previously loaded copy. For this reason, an exit must not attempt to use static storage to communicate information from one invocation of the exit to the next - the exit can be unloaded between the two invocations.
7. If there is a user-supplied exit with the same name as one of the built-in formats supported by the queue manager, the user-supplied exit does not replace the built-in conversion routine. The only circumstances in which such an exit is invoked are:
   - If the built-in conversion routine cannot handle conversions to or from either the *CodedCharSetId* or *Encoding* involved, or
   - If the built-in conversion routine has failed to convert the data (for example, because there is a field or character which cannot be converted).
8. The scope of the exit is environment-dependent. *Format* names must be chosen to minimize the risk of clashes with other formats. Consider starting with characters that identify the application defining the format name.
9. The data-conversion exit runs in an environment like that of the program which issued the MQGET call; environment includes address space and user profile (where applicable). The program could be a message channel agent sending messages to a destination queue manager that does not support message conversion. The exit cannot compromise the queue manager's integrity, since it does not run in the queue manager's environment.
10. The only MQI call which can be used by the exit is MQXCNVC; attempting to use other MQI calls fails with reason code MQRC_CALL_IN_PROGRESS, or other unpredictable errors.
11. No entry point called MQ_DATA_CONV_EXIT is provided by the queue manager. However, a `typedef` is provided for the name MQ_DATA_CONV_EXIT in the C programming language, and this can be used to declare the user-written exit, to ensure that the parameters are correct. The name of the exit must be the same as the format name (the name contained in the *Format* field in MQMD), although this is not required in all environments.

    The following example illustrates how the exit that processes the format MYFORMAT can be declared in the C programming language:

```
#include "cmqc.h"
#include "cmqxc.h"

MQ_DATA_CONV_EXIT MYFORMAT;

void MQENTRY MYFORMAT(
     PMQDXP   pDataConvExitParms, /* Data-conversion exit parameter
                                     block */
     PMQMD    pMsgDesc,           /* Message descriptor */
     MQLONG   InBufferLength,     /* Length in bytes of InBuffer */
     PMQVOID  pInBuffer,          /* Buffer containing the unconverted
                                     message */
     MQLONG   OutBufferLength,    /* Length in bytes of OutBuffer */
     PMQVOID  pOutBuffer)         /* Buffer containing the converted
```

```
                                        message */
{
  /* C language statements to convert message */
}
```

12. On z/OS, if an API-crossing exit is also in force, it is called after the data-conversion exit.

## C invocation

```
exitname (&DataConvExitParms, &MsgDesc, InBufferLength,
         InBuffer, OutBufferLength, OutBuffer);
```

The parameters passed to the exit are declared as follows:

```
MQDXP   DataConvExitParms;  /* Data-conversion exit parameter block */
MQMD    MsgDesc;            /* Message descriptor */
MQLONG  InBufferLength;     /* Length in bytes of InBuffer */
MQBYTE  InBuffer[n];        /* Buffer containing the unconverted
                               message */
MQLONG  OutBufferLength;    /* Length in bytes of OutBuffer */
MQBYTE  OutBuffer[n];       /* Buffer containing the converted
                               message */
```

## COBOL declaration ( IBM i only)

```
     CALL 'exitname' USING DATACONVEXITPARMS, MSGDESC, INBUFFERLENGTH,
                           INBUFFER, OUTBUFFERLENGTH, OUTBUFFER.
```

The parameters passed to the exit are declared as follows:

```
**   Data-conversion exit parameter block
 01  DATACONVEXITPARMS.
     COPY CMQDXPV.
**   Message descriptor
 01  MSGDESC.
     COPY CMQMDV.
**   Length in bytes of INBUFFER
 01  INBUFFERLENGTH     PIC S9(9) BINARY.
**   Buffer containing the unconverted message
 01  INBUFFER           PIC X(n).
**   Length in bytes of OUTBUFFER
 01  OUTBUFFERLENGTH    PIC S9(9) BINARY.
**   Buffer containing the converted message
 01  OUTBUFFER          PIC X(n).
```

## System/390 assembler declaration

```
         CALL EXITNAME,(DATACONVEXITPARMS,MSGDESC,INBUFFERLENGTH,      X
               INBUFFER,OUTBUFFERLENGTH,OUTBUFFER)
```

The parameters passed to the exit are declared as follows:

```
DATACONVEXITPARMS  CMQDXPA  ,      Data-conversion exit parameter block
MSGDESC            CMQMDA   ,      Message descriptor
INBUFFERLENGTH     DS       F      Length in bytes of INBUFFER
INBUFFER           DS       CL(n)  Buffer containing the unconverted
*                                  message
OUTBUFFERLENGTH    DS       F      Length in bytes of OUTBUFFER
OUTBUFFER          DS       CL(n)  Buffer containing the converted
*                                  message
```

# Properties specified as MQRFH2 elements

Non-message descriptor properties can be specified as elements in MQRFH2 header folders. Overview of MQRFH2 elements being specified as properties.

This retains compatibility with the previous versions of the IBM MQ JMS and XMS clients. This section describes how to specify properties in MQRFH2 headers.

To use MQRFH2 elements as properties, specify the elements as described in Using IBM MQ classes for Java . This information supplements the information described in “MQRFH2 - Rules and formatting header 2” on page 507.

## Mapping property data types to MQRFH2 data types

This topic provides information on message property types mapped to their corresponding MQRFH2 data types.

*Table 568. Supported MQRFH2 data types*

| Message property type | MQRFH2 data type |
|---|---|
| MQBYTE[] | bin.hex |
| MQBOOL | boolean |
| MQINT8 | i1 |
| MQINT16 | i2 |
| MQINT32 | i4 |
| MQINT64 | i8 |
| MQFLOAT32 | r4 |
| MQFLOAT64 | r8 |
| MQCHAR[] | string |

Any element without a data type is assumed to be of type "string".

An MQRFH2 data type of `int`, meaning an integer of unspecified size, is treated as if it were an `i8`.

A null value is indicated by the element attribute `xsi:nil='true'`. Do not use the attribute `xsi:nil='false'` for non-null values.

For example, the following property has a null value:

```
<NullProperty xsi:nil='true'></NullProperty>
```

A byte or character string property can have an empty value. This is represented by an MQRFH2 element with a zero length element value.

For example, the following property has an empty value:

```
<EmptyProperty></EmptyProperty>
```

## Supported MQRFH2 folders

Overview of the use of message descriptor fields as properties.

The folders <jms>, <mcd>, <mqext>, and <usr> are described in The MQRFH2 header and JMS. The <usr> folder is used to transport any JMS application-defined properties that are associated with a message. Groups are not allowed in the <usr> folder.

The MQRFH2 header and JMS supports the following additional folders:

- <mq>

  This folder is used and reserved for MQ-defined properties that are used by IBM MQ.

- <mq_usr>

  This folder can be used to transport any application-defined properties that are not exposed as JMS user-defined properties, as the properties might not meet the requirements of a JMS property. This folder can contain groups that the <usr> folder cannot.

- Any folder marked with the content='properties' attribute.

  Such a folder is equivalent to the <mq_usr> folder in content.

- <mqps>

  This folder is used for IBM MQ publish/subscribe properties.

IBM MQ also supports the following folders that are already in use by WAS/SIB:

- <sib>

  This folder is used and reserved for WAS/SIB system message properties that are not exposed as JMS properties, or are mapped to JMS_IBM_* properties, but are exposed to WAS/SIB applications; these include forward and reverse routing paths properties.

  At least some cannot be exposed as JMS properties, because they are byte arrays. If your application adds properties to this folder, the value is either ignored or removed.

- <sib_usr>

  This folder is used and reserved for WAS/SIB user message properties that cannot be exposed as JMS user properties because they are not of supported types; they are exposed to WAS/SIB applications.

  These are user properties, that you can get or set through the SIMessage interface, but the content of the byte array is mapped to the required property value.

  If your IBM MQ application writes an arbitrary bin.hex element to the folder, the application probably receives an IOException, as it is not of the format expected to restore. If you add anything other than a bin.hex element you receive a ClassCastException.

  Do not attempt to make properties available to WAS/SIB by using this folder; instead user the <usr> folder for that purpose.

- <sib_context>

  This folder is used for WAS/SIB system message properties that are not exposed to WAS/SIB user applications or as JMS properties. These include security and transactional properties that are used for web services and similar.

  Your application must not add properties to this folder.

- <mqema>

  This folder was used by WAS/SIB instead of the <mqext> folder.

MQRFH2 folder names are case-sensitive.

The following folders are reserved, in any mixture of lowercase or uppercase characters:

- Any folder prefixed by mq or wmq ; reserved for use by IBM MQ.
- Any folder prefixed by sib ; reserved for use by WAS/SIB.
- <Root> and <Body> folders; reserved but not used.

The following folders are not recognized as containing message properties:

- <psc>

  Used by IBM Integration Bus to convey publish/subscribe command messages to the broker.

- <pscr>

Used by IBM Integration Bus to contain information from the broker, in response to publish/subscribe command messages.

- Any folder not defined by IBM, that is not marked with the `content='properties'` attribute.

Do not specify `content='properties'` on the <psc> or <pscr> folders. If you do so, these folders are treated as properties and IBM Integration Bus is likely to stop functioning as expected.

If your application is building messages with properties, in MQRFH2 headers to be recognized as an MQRFH2 header containing properties, the header must be in the list of headers that can be chained at the head of the message.

The MQRFH2 can be preceded by any number of MQH standard headers, or an MQCIH, an MQDLH, an MQIIH, an MQTM, an MQTMC2, or an MQXQH. A string or an MQCFH ends parsing because they cannot be chained.

It is possible for a message to contain multiple MQRFH2 headers all carrying message properties. Folders with the same name can coexist in different headers unless otherwise restricted, for example by WAS/SIB. The folders are treated as one logical folder, if they are all in significant headers.

While folders from the significant headers cannot be merged with those folders in nonsignificant headers, folders with the same name within the significant headers can be merged, removing any conflicting properties. Your applications must not depend on the layout of properties within their message.

MQRFH2 groups are parsed for properties in user-defined folders, that is, not the <wmq>, <jms>, <mcd>, <usr>, <mqext>, <sib>, <sib_usr>, <sib_context>, and <mqema> folders.

Groups in the IBM-defined properties folders, except for the <wmq> and <mq> folders, are parsed for properties.

An MQRFH2 folder cannot contain mixed content; a folder or group can contain either groups or properties, or a value, but not both.

A segment of a message, either the first or a subsequent segment, cannot contain IBM MQ -defined properties other than those properties in the message descriptor. Therefore putting a message containing such properties with either MQMF_SEGMENT or MQMF_SEGMENTATION_ALLOWED set causes the put to fail with MQRC_SEGMENTATION_NOT_ALLOWED.

However, message groups can contain IBM MQ -defined properties.

## Generation of MQRFH2 headers

If IBM MQ converts message properties to their MQRFH2 representation, it must add the MQRFH2 to the message. It adds the MQRFH2 either as a separate header, or merges it with an existing header.

Generation of new MQRFH2 headers by IBM MQ might disrupt existing headers in a message. Applications that parse a message buffer for headers must be aware that the number and position of headers in a buffer might change in some circumstances. IBM MQ attempts to minimize the impact of adding properties to a message by merging message properties into an existing MQRFH2 header, where it can. It also attempts to minimize the impact by inserting a generated MQRFH2 into a fixed position relative to other headers in the message buffer.

A generated MQRFH2 header is placed following the MQMD, and any number of MQXQH, MQRFH, and MQDLH headers, whatever order they are in. The generated MQRFH2 header is placed immediately before the first header that is not an MQMD, MQXQH, MQDLH, or MQRFH header.

z/OS On z/OS systems, the generated MQRFH2 header is created in the application's CCSID. This is defined as follows:

- For batch LE applications using the DLL interface, the CCSID is the CODESET associated with the current locale at the time **MQCONN** is issued (default value is 1047).
- For batch LE applications bound with one of the batch MQ stubs, the CCSID is the CODESET associated with the current locale at the time of the first MQI call issued after **MQCONN** (default value is 1047).

- For batch non-LE applications running on a USS thread, the CCSID is the value of THLICCSID at the time of the first MQI call issued after **MQCONN** (default value is 1047).
- For other batch applications, the CCSID is the CCSID of the queue manager.

For LE applications, the locale can be changed using the setlocale() / CEESETL LE callable service. For non-LE applications running on USS threads, the value of THLICCSID can be changed using USS mapping macro **BPXYTHLI**.

### Rules for merging generated MQRFH2

The following rules apply to merging a generated MQRFH2 with an existing MQRFH2. The generated MQRFH2 header is merged with an existing MQRFH2 header, if:

1. The existing MQRFH2 is in the same position IBM MQ would place a generated MQRFH2, or earlier in the header chain.
2. The CCSID of the generated properties is the same as the NameValueCCSID of the existing MQRFH2.

Otherwise, the generated header is placed separately in the buffer, in the position described before.

### Rules for merging folders in an existing MQRFH2

If message properties are merged into an existing MQRFH2, then the existing MQRFH2 is scanned for folders that match the message properties, and merges them. If a matching folder does not exist a new folder is added to the end of the existing folders. If a matching folder does exist, the folder is searched. Any matching properties are overwritten. Any new ones are added at the end of the folder.

## MQRFH2 folder restrictions

Overview of folder restrictions in MQRFH2 headers

The MQRFH2 restrictions apply to the following folders:

- Element names in the <usr> folder must not begin with the prefix JMS ; such property names are reserved for use by JMS and are not valid for user-defined properties.

  Such an element name does not cause parsing of the MQRFH2 to fail, but is not accessible to the IBM MQ message property APIs.
- Element names in the <usr> folder must not be, in any mixture of lower or uppercase, NULL, TRUE, FALSE, NOT, AND, OR, BETWEEN, LIKE, IN, IS and ESCAPE. These names match SQL keywords and make parsing selectors harder, because <usr> is the default folder used when no folder is specified for a particular property in a selector.

  Such an element name does not cause parsing of the MQRFH2 to fail, but is not accessible to the IBM MQ message property APIs.
- The content model of the <usr> folder is as follows:
  - Any valid XML name can be used as an element name, providing that it does not contain a colon.
  - Only simple elements, not nested folders, are allowed.
  - All elements take the default type of string, unless modified by a dt="xxx" attribute.
  - All elements are optional, but should occur no more than once in a folder.
- Element names in any folder considered to contain message properties must not contain a period (.) (Unicode character U+002E), because this is used in property names to indicate the hierarchy.

  Such an element name does not cause parsing of the MQRFH2 to fail, but is not accessible to the IBM MQ message property APIs.

In general, MQRFH2 headers that contain valid XML-style data can be parsed by IBM MQ without failure, although certain elements of the MQRFH2 are not accessible through the IBM MQ message property APIs.

## MQRFH2 element name conflicts

Overview of conflicts within MQRFH2 element names.

Only one value can be attached to a message property. If an attempt to access a property leads to a conflict of values, one is chosen in preference over another.

The IBM MQ syntax for accessing MQRFH2 elements allows unique identification of an element, if a folder contains no elements with the same name. If a folder contains more than one element with the same name, the value of the property used is the one closest to the head of the message.

This applies if two or more folders of the same name are contained in different significant MQRFH2 headers within the same message.

A conflict can result when the MQGET call is processed after a non-message descriptor property has been set twice: both through an MQSETMP call and directly in the raw MQRFH2 header.

If this happens, the property associated with the message by an API call takes preference over one in the message data, that is, the one in the raw MQRFH2 header. If a conflict occurs, it is considered to come logically before the message data.

## Mapping from property names to MQRFH2 folder and element names

Overview of the differences between property names and element names in the MQRFH2 header.

When using any of the defined APIs that ultimately generate MQRFH2 headers, in order to specify message properties (for example, MQ JMS), the property name is not necessarily the element name in the MQRFH2 folder.

Therefore, a mapping occurs from the property name to the MQRFH2 element, and in the reverse way, taking into account both the folder name that contains the element, and the element name. Some examples from IBM MQ classes for JMS are already documented in Using Java.

| Property name | MQRFH2 folder name | MQRFH2 element name |
|---|---|---|
| `JMSDestination` | `jms` | `Dst` |
| `JMSType` | `mcd` | `Type`, `Set`, `Fmt` |
| `xxx` (user defined, where `xxx` does not begin with JMS) | `usr` | `xxx` |

Therefore, when a JMS application accesses the `JMSDestination` property this maps to the `Dst` element in the <jms> folder.

When specifying properties as MQRFH2 elements, IBM MQ defines its elements as follows:

| Property name | MQRFH2 folder name | MQRFH2 group name | MQRFH2 element name |
|---|---|---|---|
| <Property> | <usr> | n/a | <Property> |
| <folder>. <Property> | <folder> | n/a | <Property> |
| <folder>. <group>. <Property> | <folder> | <group> | <Property> |

For example, when an IBM MQ application attempts to access the `Property1` property, this maps to the `Property1` element in the <usr> folder. The `wmq.Property2` property maps to the `Property2` property in the <wmq> folder.

If the property name contains more than one . character, the MQRFH2 element name used is the one following the final . character, and MQRFH2 groups are used to form a hierarchy; nested MQRFH2 groups are permitted.

The JMS header and provider-specific properties that are contained in an MQRFH2 in the <mcd>, <jms>, and <mqext> folders are accessed by an IBM MQ application using the short names defined in Using IBM MQ classes for Java .

JMS user-defined properties are accessed from the <usr> folder. An IBM MQ application can use the <usr> folder for its application properties if it is acceptable for the property to appear to JMS applications as one of its user-defined properties.

If it is not acceptable, choose another folder; the <wmq_usr> folder is provided as a standard location for such non-JMS properties.

Your applications can specify and use any MQRFH2 folder with a well-defined use, not documented in “Properties specified as MQRFH2 elements” on page 902 if you note the following:

1. The folder might already be in use, or might be used in the future, by another application providing undefined access to properties contained inside it; see Property names for the suggested naming convention for property names.
2. The properties are not accessible to previous versions of the IBM MQ classes for JMS or XMS client that can only access the <usr> folder for user-defined properties
3. The folder must be marked with the attribute `content` with the value set to `properties`, for example, `content='properties'`.

   “MQSETMP - Set message property” on page 758 automatically adds this attribute as required. This attribute must not be added to any of the IBM-defined folders, for example, <jms> and <usr>. Doing so, causes the message to be rejected by the IBM MQ classes for JMS client before Version 7.0. with a `MessageFormatException`.

Because the <usr> folder is the default location for properties of the <Property> syntax, an IBM MQ application and a JMS application to access the same user-defined property value using the same name.

## Reserved folder names

There are several reserved folder names. You cannot use such names as your folder prefixes; for example, `Root.Property1` does not access a valid property because `Root` is reserved. The following list contains reserved folder names:

- Root
- Body
- Properties
- Environment
- LocalEnvironment
- DestinationList
- ExceptionList
- InputBody
- InputRoot
- InputProperties
- InputLocalEnvironment
- InputDestinationList
- InputExceptionList
- OutputRoot
- OutputLocalEnvironment
- OutputDestinationList
- OutputExceptionList

## Mapping property descriptor fields into MQRFH2 headers

When a property is translated into an MQRFH2 element the following element attributes are used to specify the significant fields of the property descriptor: This describes how MQPD fields are translated to MQRFH2 element attributes.

### Support

The Support property descriptor field is split into three element attributes

- The **sr** element attribute specifies values in the MQPD_REJECT_UNSUP_MASK bit mask.
- The **sa** element attribute specifies values in the MQPD_ACCEPT_UNSUP_MASK bit mask.
- The **sx** element attribute specifies values in the MQPD_ACCEPT_UNSUP_IF_XMIT_MASK bit mask.

These element attributes are only valid in the <mq> folder and are ignored if set on elements in the other folders containing properties.

| Support value | MQRFH2 element attribute | MQRFH2 attribute value |
|---|---|---|
| MQPD_SUPPORT_OPTIONAL | sa | optional<br>This is the default value. |
| MQPD_SUPPORT_REQUIRED | sr | required |
| MQPD_SUPPORT_REQUIRED_IF_LOCAL | sx | local |

### Context

Use the **context** element attribute to indicate the message context to which a property belongs. Use one value only. This element attribute is valid on a property in any folder containing properties.

| Context value | MQRFH2 attribute value |
|---|---|
| MQPD_NO_CONTEXT | none<br>This is the default value. |
| MQPD_USER _CONTEXT | user |

### CopyOptions

Use the **copy** element attribute to indicate messages into which a property should be copied. More than one value is acceptable; separate multiple values with a comma. For example **copy='reply'** and **copy='publish,report'** are both valid. This element attribute is valid on a property in any folder containing properties.

**Note:** In the attribute definition, single quotation marks or double quotation marks are valid use, for example **copy='reply'** or **copy="report"**

| CopyOption value | MQRFH2 attribute value |
|---|---|
| MQPD_COPY_FORWARD | forward |
| MQPD_COPY_REPLY | reply |
| MQPD_COPY_REPORT | report |
| MQPD_COPY_PUBLISH | publish |

| CopyOption value | MQRFH2 attribute value |
|---|---|
| MQPD_COPY_ALL | all<br>Do not specify this with any other value. When used with another value, this takes precedence over any value except **none**. |
| MQPD_COPY_DEFAULT | default<br>This is the default value. It is equivalent to specifying the three values MQCOPY_FORWARD, MQCOPY_REPORT and MQCOPY_PUBLISH.<br>Do not specify this with any other value. |
| MQPD_COPY_NONE | none<br>Do not specify this with any other value. When used with another value, this takes precedence. |

### Restrictions to the <mq> MQRFH2 folder

When a message is put on to a queue, it is searched for an <mq> folder so that the message can be processed according to its MQ-defined properties. To allow the efficient parsing of MQ-defined properties, the following restrictions apply to the folder:

- Only properties in the first significant <mq> folder in the message are acted upon by MQ; properties in any other <mq> folder in the message are ignored.
- If the folder is in UTF-8, only single-byte UTF-8 characters are allowed in the folder. A multi-byte character in the folder, can cause parsing to fail, and the message to be rejected.
- Do not include MQRFH2 groups in the <mq> folder. The presence of Unicode character U+003C in a property value will cause the message to be rejected.
- Do not use escape strings in the folder. An escape string is treated as the actual value of the element.
- Only Unicode character U+0020 is treated as white space within the folder. All other characters are treated as significant and can cause parsing of the folder to fail, and the message to be rejected.

If parsing of the <mq> folder fails, or if the folder does not observe these restrictions, the message is rejected with CompCode **MQCC_FAILED** and Reason **MQRC_RFH_RESTRICTED_FORMAT_ERR**.

## MQRFH2 headers that are not valid

At the time an MQPUT, MQPUT1, or MQGET call processes, a partial parsing of any MQRFH2 headers in the message can occur to check what folders are included, and to determine if the folders contain properties. Overview of MQRFH2 headers that are not valid.

If the partial parsing of the message cannot complete successfully because the structure is not valid, for example, the `StrucLength` field is too small, then:

- The MQPUT or MQPUT1 call fails with reason code MQRC_RFH_ERROR, if it can be determined that the application includes some IBM MQ Version 7 option, so that existing applications do not fail.
- The MQGET call returns successfully, and the MQRFH2 containing the error is returned in the buffer you provided.

If the partial parsing fails because it cannot be detected whether a particular folder contains properties or not, for example, the folder begins `<<jms`, so parsing fails before the folder name is determined, then:

- The MQPUT or MQPUT1 call fails with reason code MQRC_RFH_FORMAT_ERROR, if it can be determined that the application includes some IBM MQ Version 7 option, so that existing applications do not fail.

- The MQGET call returns successfully, and the MQRFH2 containing the error is returned in the buffer you provided.
- While internally within the queue manager, the message is not rejected due to the badly formatted folder, but the folder is always treated as if no properties were contained inside it.

A message can flow through the queue manager network with a folder containing such a syntax error, but never being parsed and detected, while one or more folders in the message are:

- Valid
- Successfully parsed
- Used in the processing of the message

Therefore, detection is not guaranteed.

If one of your applications uses "MQSETMP - Set message property" on page 758, or MQINQMP to access a property, and in so doing this causes an MQRFH2 folder to be fully parsed, detecting an error such that parsing cannot complete, this is indicated by an appropriate return code to the API call. No properties in the folder are made available to the application.

If an attempt is made to fully parse an MQRFH2 folder and the parser finds unrecognized element attributes, or an unrecognized data type, parsing continues and complete successfully with no warnings being issued; this does not constitute a parsing error.

## Code page conversion

This section describes codeset names and CCSIDs, national language, z/OS conversion, IBM i conversion, and Unicode conversion support.

Each national language section lists the following information:

- The native CCSIDs supported
- The code page conversions that are **not** supported

The following terms are used in the information:

**-8**
Indicates for HP-UX that the CCSID is for the HP-UX defined codeset *roman8*

**AIX**
Indicates IBM MQ for AIX

**HP-UX**
Indicates IBM MQ for HP-UX

**Linux**
Indicates IBM MQ for Linux for Intel and IBM MQ for Linux for zSeries

**HP Integrity NonStop Server**
Indicates IBM WebSphere MQ for HP Integrity NonStop Server

**OS/400**
Indicates IBM MQ for IBM i

**Solaris**
Indicates IBM MQ for Solaris

**Windows**
Indicates IBM MQ for Windows

**z/OS**
Indicates IBM MQ for z/OS

The default for data conversion is for the conversion to be performed at the target (receiving) system.

If the source product supports the conversion a channel can be set up and data exchanged by setting the channel attribute CONVERT to YES at the source.

**Note:**

1. Conversion for IBM MQ MQI client information takes place in the server, so the server must support conversion from the client CCSID to the server CCSID.
2. The conversion might include support added by CSD/PTF to the latest version of IBM MQ. Check the content of the latest service level to see if you need to install a CSD/PTF to enable this conversion.
3. The IBM MQ queue manager CCSID must be Mixed or SBCS.
4. Some CCSIDs, for example 850 on AIX, that are not supported by the operating system can still be used by the application and also can be set as the IBM MQ queue manager CCSID. This is allowed for backward compatibility purpose only and the conversion will fail if the relevant conversion tables are not installed.

See Table 569 on page 911 for a cross reference between some of the CCSID numbers and some industry codeset names.

## Codeset names and CCSIDs

IBM MQ for z/OS provides more conversion than is listed in the language specific tables.

*Table 569. Codeset names and CCSIDs*

| Codeset names | CCSIDs |
|---|---|
| ISO 8859-1 | 819 |
| ISO 8859-2 | 912 |
| ISO 8859-3 | 913 |
| ISO 8859-5 | 915 |
| ISO 8859-6 | 1089 |
| ISO 8859-7 | 813 |
| ISO 8859-8 | 916 |
| ISO 8859-9 | 920 |
| ISO 8859-13 | 921 |
| ISO 8859-15 (euro) | 923 |
| big5 | 950 |
| eucJP | 954 5050 33722 |
| eucKR | 970 |
| eucTW | 964 |
| eucCN | 1383 |
| PCK | 943 |
| GBK | 1386 |
| koi8-r | 878 |

z/OS A complete list of conversions provided is shown in Table 571 on page 936.

## National languages

This information contains languages supported by IBM MQ.

The languages supported by IBM MQ are:

- US English - see topic "US English" on page 912

- German - see topic “German” on page 913
- Danish and Norwegian - see topic “Danish and Norwegian” on page 913
- Finnish and Swedish - see topic “Finnish and Swedish” on page 914
- Italian - see topic “Italian” on page 915
- Spanish - see topic “Spanish” on page 916
- UK English / Gaelic - see topic “UK English /Gaelic” on page 916
- French - see topic “French” on page 917
- Multilingual - see topic “Multilingual” on page 917
- Portuguese - see topic “Portuguese” on page 918
- Icelandic - see topic “Icelandic” on page 919
- Eastern European languages - see topic “Eastern European languages” on page 919
- Cyrillic - see topic “Cyrillic” on page 920
- Estonian - see topic “Estonian” on page 921
- Latvian and Lithuanian - see topic “Latvian and Lithuanian” on page 922
- Ukranian - see topic “Ukrainian” on page 923
- Greek - see topic “Greek” on page 924
- Turkish - see topic “Turkish” on page 924
- Hebrew - see topic “Hebrew” on page 925
- Farsi - see topic “Farsi” on page 927
- Urdu - see topic “Urdu” on page 927
- Thai - see topic “Thai” on page 927
- Lao - see topic “Lao” on page 928
- Vietnamese - see topic “Vietnamese” on page 928
- Japanese Latin SBCS - see topic “Japanese Latin SBCS” on page 928
- Japanese Katakana SBCS - see topic “Japanese Katakana SBCS” on page 929
- Japanese Kanji/ Latin Mixed - see topic “Japanese Kanji/ Latin Mixed” on page 931
- Japanese Kanji/ Katakana Mixed - see topic “Japanese Kanji/ Katakana Mixed” on page 932
- Korean - see topic “Korean” on page 934
- Simplified Chinese - see topic “Simplified Chinese” on page 934
- Traditional Chinese - see topic “Traditional Chinese” on page 935

### *US English*

Details of CCSIDs and CCSID conversion for US English.

The following table shows the native CCSIDs for US English on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 37, 924, 1140 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 1252, 5348, 858 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**37**
Does not convert to code pages 923, 858

**924**
Does not convert to code pages 437, 858, 1051, 1140, 1252, 1275, 5348

**1140**
Does not convert to code pages 924, 1051, 1275

## *German*

Details of CCSIDs and CCSID conversion for German.

The following table shows the native CCSIDs for German on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 273, 924, 1141 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**273**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 273, 437, 858, 1051, 1141, 1252, 1275, 5348

**1141**
Does not convert to code pages 924, 1051, 1275

## *Danish and Norwegian*

Details of CCSIDs and CCSID conversion for Danish and Norwegian.

The following table shows the native CCSIDs for Danish and Norwegian on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 277, 924, 1142 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 850, 858, 865, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |

| Platform | Native CCSIDs |
|---|---|
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**277**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 277, 858, 865, 1051, 1142, 1252, 1275, 5348

**1142**
Does not convert to code pages 924, 865, 1051, 1275

### AIX

Code page:

**819**
Does not convert to code page 865

### HP-UX

Code page:

**1051**
Does not convert to code page 865

### Windows

Code page:

**865**
Does not convert to code pages 1051, 1275

## *Finnish and Swedish*

Details of CCSIDs and CCSID conversion for Finnish and Swedish.

The following table shows the native CCSIDs for Finnish and Swedish on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 278, 924, 1143 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 865, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**278**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 278, 437, 858, 865, 1051, 1143, 1252, 1275, 5348

**1143**
Does not convert to code pages 865, 924, 1051, 1275

### AIX

Code page:

**819**
Does not convert to code page 865

**850**
Does not convert to code page 865

### HP-UX

Code page:

**1051**
Does not convert to code page 865

### Windows

Code page:

**865**
Does not convert to code pages 1051, 1275

## *Italian*

Details of CCSIDs and CCSID conversion for Italian.

The following table shows the native CCSIDs for Italian on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 280, 924, 1144 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**280**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 280, 437, 858, 1051, 1144, 1252, 1275, 5348

**1144**
Does not convert to code pages 924, 1051, 1275

### *Spanish*

Details of CCSIDs and CCSID conversion for Spanish.

The following table shows the native CCSIDs for Spanish on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 284, 924, 1145 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

#### IBM i

Code page:

**284**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 284, 437, 858, 1051, 1145, 1252, 1275, 5348

**1145**
Does not convert to code pages 924, 1051, 1275

### *UK English /Gaelic*

Details of CCSIDs and CCSID conversion for UK English/Gaelic.

The following table shows the native CCSIDs for UK English / Gaelic on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 285, 924, 1146 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

#### IBM i

Code page:

**285**
Does not convert to code pages 858, 923, 924, 1275

**924**
Does not convert to code pages 285, 437, 858, 1051, 1146, 1252, 1275, 5348

**1146**
Does not convert to code pages 924, 1051, 1275

### *French*

Details of CCSIDs and CCSID conversion for French.

The following table shows the native CCSIDs for French on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 297, 924, 1147 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

## IBM i

Code page:

**297**
Does not convert to code pages 858, 923, 924, 1275, 5348

**924**
Does not convert to code pages 297, 437, 858, 1051, 1147, 1252, 1275, 5348

**1147**
Does not convert to code pages 924, 1051, 1275

### *Multilingual*

Details of CCSIDs and CCSID conversion for Multilingual.

The following table shows the native CCSIDs for multilingual conversion on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 500, 924, 1148 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 437, 850, 858, 1252, 5348 |
| HP Integrity NonStop Server, SINIX, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**500**
Does not convert to code pages 858, 923

**924**
Does not convert to code pages 437, 858, 1051, 1148, 1252, 1275, 5348

**1148**
Does not convert to code pages 924, 1051, 1275

## *Portuguese*

Details of CCSIDs and CCSID conversion for Portuguese.

The following table shows the native CCSIDs for Portuguese on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i | 37, 500, 924, 1140 |
| z/OS | 500, 924, 1140 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 850, 858, 860, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**37**
Does not convert to code pages 858, 923, 1275

**500**
Does not convert to code pages 858, 923, 1275

**924**
Does not convert to code pages 858, 860, 1051, 1140, 1252, 1275, 5348

**1140**
Does not convert to code pages 860, 924, 1051, 1275

### HP-UX

Code page:

**1051**
Does not convert to code page 860

### Windows

Code page:

**860**
Does not convert to code pages 1051, 1275

### *Icelandic*

Details of CCSIDs and CCSID conversion for Icelandic.

The following table shows the native CCSIDs for Icelandic on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 871, 924, 1149 |
| AIX | 819, 923, 5348 |
| HP-UX | 819, 923, 1051 |
| Windows | 850, 858, 861, 1252, 5348 |
| HP Integrity NonStop Server, Solaris, Linux | 819, 923 |
| Apple client | 1275 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

#### IBM i

Code page:

**871**
Does not convert to code pages 858, 923, 924, 1275, 5348

**924**
Does not convert to code pages 858, 861, 871, 1051, 1149, 1252, 1275, 5348

**1149**
Does not convert to code pages 924, 1051, 1275

#### HP-UX

Code page:

**1051**
Does not convert to code page 861

#### Windows

Code page:

**861**
Does not convert to code pages 1051, 1275

### *Eastern European languages*

Details of CCSIDs and CCSID conversion for Eastern European Languages. The typical languages using these CCSIDs include Albanian, Croatian, Czech, Hungarian, Polish, Romanian, Serbian, Slovak, and Slovenian.

The following table shows the native CCSIDs for Eastern European languages on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 870, 1153 |
| Windows | 852, 1250, 5346, 9044 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux | 912 |
| Eastern European Apple client | 1282 |

| Platform | Native CCSIDs |
|---|---|
| Romanian Apple client | 1285 |
| Croatian Apple client | 1284 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### z/OS

Code page:

**870**
Does not convert to code pages 1284, 1285

**1153**
Does not convert to code pages 1250, 1284, 1285

### IBM i

Code page:

**870**
Does not convert to code pages 1284, 1285, 5346, 9044

**1153**
Does not convert to code pages 1282, 1284, 1285, 5346, 9044

### HP-UX, Solaris, Linux

Code page:

**912**
Does not convert to code pages 1284, 1285

### HP Integrity NonStop Server

Code page:

**912**
Does not convert to code pages 1153, 1284, 1285, 9044

### Windows

Code page:

**852**
Does not convert to code pages 1284, 1285

**1250**
Does not convert to code pages 1284, 1285

**9044**
Does not convert to code pages 912, 1282, 1284, 1285

## *Cyrillic*

Details of CCSIDs and CCSID conversion for Cyrillic. The typical languages using these CCSIDs include Belarussion, Bulgarian, Macedonian, Russian, and Serbian.

The following table shows the native CCSIDs for Cyrillic on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| z/OS | 1025 |
| IBM i | 880, 1025 |
| Windows | 855, 866, 1131, 1251, 5347 |
| Solaris | 878, 915 |
| AIX, HP-UX, Linux , HP Integrity NonStop Server | 915 |
| Apple client | 1283 |

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

### IBM i

Code page:

**880**
Does not convert to code pages 855, 866, 878, 1131, 5347

**1025**
Does not convert to code pages 878, 5347

### Windows

Code page:

**855**
Does not convert to code page 1131

**866**
Does not convert to code page 1131

**1131**
Does not convert to code pages 855, 866, 880, 1283

## *Estonian*

Details of CCSIDs and CCSID conversion for Estonian.

The following table shows the native CCSIDs for Estonian on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1122, 1157 |
| Windows | 902, 922, 1257, 5353, 9449 |
| AIX, HP-UX, Solaris, Linux | 902, 922 |
| HP Integrity NonStop Server | 922 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**1122**
Does not convert to code pages 902, 1157, 9449

**1157**
Does not convert to code pages 922, 1122, 1257, 9449

### IBM i

Code page:

**1122**
Does not convert to code pages 902, 5353, 9449

**1157**
Does not convert to code pages 922, 5353, 9449

### HP-UX, Solaris, Linux

Code page:

**902**
Does not convert to code pages 922, 1122, 9449

**922**
Does not convert to code pages 902, 1157, 9449

### Windows

Code page:

**5353**
Does not convert to code page 9449

**9449**
Does not convert to code pages 902, 922, 1122, 1157, 1257, 5353

**902**
Does not convert to code pages 922, 1122, 9449

### HP Integrity NonStop Server

Code page:

**922**
Does not convert to code pages 902, 1157, 9449

## *Latvian and Lithuanian*

Details of CCSIDs and CCSID conversion for Latvian and Lithuanian.

The following table shows the native CCSIDs for Latvian and Lithuanian on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1112, 1156 |
| Windows | 901, 921, 1257, 5353, 9449 |
| AIX, HP-UX, Solaris, Linux | 901, 921 |
| HP Integrity NonStop Server, | 921 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**1112**
Does not convert to code pages 901, 1156, 9449

**1156**
Does not convert to code pages 901, 1156, 9449

### IBM i

Code page:

**1112**
Does not convert to code page 5353

**1153**
Does not convert to code pages 921, 5353, 9449

### HP-UX, Solaris, Linux

Code page:

**902**
Does not convert to code pages 921, 1112, 1257, 9449

**921**
Does not convert to code pages 901, 1156, 9449

### Windows

Code page:

**901**
Does not convert to code pages 921, 1112, 1257, 9449

**5355**
Does not convert to code page 9449

**9449**
Does not convert to code pages 901, 921, 1112, 1156, 1257

### HP Integrity NonStop Server

Code page:

**921**
Does not convert to code pages 901, 1156, 9449

## *Ukrainian*

Details of CCSIDs and CCSID conversion for Ukrainian.

The following table shows the native CCSIDs for Ukranian on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1123 |
| Windows | 1124, 1125, 1251, 5347 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux | 1124 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### IBM i

Code page:

**1123**
Does not convert to code page 5347

### HP-UX

Code page:

**1124**
Does not convert to code page 5347

### Windows

Code page:

**1125**
Does not convert to code page 1123

## *Greek*

Details of CCSIDs and CCSID conversion for Greek.

The following table shows the native CCSIDs for Greek on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 875 |
| HP-UX | 813 (see note) |
| Windows | 869, 1253, 5349 |
| AIX, NCR, HP Integrity NonStop Server, Solaris, Linux | 813 |
| Apple client | 1280 |
| DOS client | 737 |

**Note:** Only the ISO codeset is supported on HP-UX. The HP-UX proprietary greek8 codeset has no registered CCSID and is not supported.

All non-client platforms support conversion between their native CCSIDs, the native CCSIDs of the other platforms with the following exceptions.

### IBM i

Code page:

**875**
Does not convert to code page 5349

### Windows

Code page:

**1253**
Does not convert to code page 737

**5349**
Does not convert to code page 737

## *Turkish*

Details of CCSIDs and CCSID conversion for Turkish.

The following table shows the native CCSIDs for Turkish on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1026 |
| HP-UX | 920 (see note) |
| Windows | 857, 1254, 5350 |
| AIX, HP Integrity NonStop Server, Solaris, Linux | 920 |
| Apple client | 1281 |

**Note:** Only the ISO codeset is supported on HP-UX. The HP-UX proprietary turkish8 codeset has no registered CCSID and is not supported.

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

## IBM i

Code page:

**1026**
Does not convert to code page 5350

### *Hebrew*

Details of CCSIDs and CCSID conversion for Hebrew.

The following table shows the native CCSIDs for Hebrew on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| z/OS | 424, 803, 4899, 12712 |
| IBM i | 424 |
| AIX | 916, 9048 |
| HP-UX | 916 (see note) |
| Windows | 1255, 5351 |
| HP Integrity NonStop Server, Solaris, Linux | 916 |

**Note:** Only the ISO codeset is supported on HP-UX. The HP-UX proprietary greek8 codeset has no registered CCSID and is not supported.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

## z/OS

Code page:

**424**
Does not convert to code pages 867, 4899, 9048, 12712

**803**
Does not convert to code pages 867, 4899, 5351, 9048, 12712

**4899**
Does not convert to code pages 424, 803, 856, 862, 916, 1255

**12712**
Does not convert to code pages 424, 803, 856, 916, 1255

### IBM i

Code page:

**424**
Does not convert to code pages 803, 867, 4899, 5351, 9048, 12712

Code page 424 also converts to and from CCSID 4952, which is a variant of 856.

### AIX

Code page:

**916**
Does not convert to code pages 867, 4899, 9048, 12712

**9048**
Does not convert to code pages 424, 803, 856, 862, 916, 1255

### Windows

Code page:

**1255**
Does not convert to code pages 867, 4899, 9048, 12712

**5351**
Does not convert to code page 803

## *Arabic*

Details of CCSIDs and CCSID conversion for Arabic

The following table shows the native CCSIDs for Arabic on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 420 |
| AIX | 1046, 1089 |
| HP-UX | 1089 (see note) |
| Windows | 720, 864, 1256, 5352 |
| HP Integrity NonStop Server, Solaris, Linux | 1089 |

**Note:** Only the ISO codeset is supported on HP-UX. The HP-UX proprietary arabic8 codeset has no registered CCSID and is not supported.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### IBM i

Code page:

**420**
Does not convert to code page 5352

### HP-UX, Solaris, Linux, HP Integrity NonStop Server, Tru64

Code page:

**1089**
Does not convert to code page 720

## Windows

Code page:

**720**
Does not convert to code pages 1089, 5352

**5352**
Does not convert to code page 720

### *Farsi*

Details of CCSIDs and CCSID conversion for Farsi.

The following table shows the native CCSIDs for Farsi on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1097 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux Windows | 1098 (see note) |

**Note:** The native CCSID for these platforms has not been standardized and might change.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms.

### *Urdu*

Details of CCSIDs and CCSID conversion for Urdu.

The following table shows the native CCSIDs for Urdu on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 918 |
| Windows | 868 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux | 1006 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

## IBM i

Code page:

**918**
Does not convert to code page 1006

### *Thai*

Details of CCSIDs and CCSID conversion for Thai.

The following table shows the native CCSIDs for Thai on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 838 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux Windows | 874 (see note) |

**Note:** The native CCSID for these platforms has not been standardized and might change.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms.

### *Lao*

Details of CCSIDs and CCSID conversion for Lao.

The following table shows the native CCSIDs for Lao on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1132 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux Windows | 1133 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms.

### *Vietnamese*

Details of CCSIDs and CCSID conversion for Vietnamese.

The following table shows the native CCSIDs for Vietnamese on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1130 |
| Windows | 1258, 5354 |
| AIX, HP-UX, HP Integrity NonStop Server, Solaris, Linux | 1129 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

## IBM i

Code page:

**1130**
Does not convert to code pages 1129, 5354

### *Japanese Latin SBCS*

Details of CCSIDs and CCSID conversion for Japanese Latin SBCS.

The following table shows the native CCSIDs for Japanese Latin SBCS on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1027 |
| AIX | 932, 5050, 33722 (see Note 1) |
| Windows | 932, 943 (see Notes 2 and 3) |
| Linux, HP Integrity NonStop Server, Solaris | 943, 5050 |
| HP-UX | Not known |

**Note:**

1. 5050 and 33722 are CCSIDs related to base code page 954 on AIX. The CCSID reported by the operating system is 33722.
2. Windows NT uses code page 932 but this is best represented by the CCSID of 943. However, not all platforms of IBM MQ support this CCSID.

   On IBM MQ for Windows CCSID 932 is used to represent code page 932, but a change to file `../conv/table/ccsid.tbl` can be made which changes the CCSID used to 943.
3. IBM MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**1027**
Does not convert to code pages 932, 942, 943, 954, 5050, 33722

### IBM i

Code page:

**1027**
Does not convert to code page 932

### AIX

Code page:

**932**
Does not convert to code page 1027

**5050**
Does not convert to code page 1027

**33722**
Does not convert to code page 1027

### Linux

Code page:

**943**
Does not convert to code page 1027

**5050**
Does not convert to code page 1027

### Solaris

Code page:

**943**
Does not convert to code page 1027

**5050**
Does not convert to code page 1027

### HP Integrity NonStop Server

Code page:

**943**
Does not convert to code page 1027

**5050**
Does not convert to code page 1027

## *Japanese Katakana SBCS*

Details of CCSIDs and CCSID conversion for Japanese Katakana SBCS.

The following table shows the native CCSIDs for Japanese Katakana SBCS on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 290 |
| HP-UX | 897 |
| AIX | 932, 5050, 33722 (see Note 1) |
| Windows | 932, 943 (see Notes 2 and 3) |
| Linux, HP Integrity NonStop Server, Solaris | 943, 5050 |

**Note:**

1. 5050 and 33722 are CCSIDs related to base code page 954 on AIX. The CCSID reported by the operating system is 33722.
2. Windows NT uses code page 932 but this is best represented by the CCSID of 943. However, not all platforms of IBM MQ support this CCSID.

   On IBM MQ for Windows CCSID 932 is used to represent code page 932, but a change to file `../conv/table/ccsid.tbl` can be made which changes the CCSID used to 943.
3. IBM MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.
4. In addition to the previous conversions, the IBM MQ products on AIX, HP-UX, Solaris, Linux and Tru64 support conversion from CCSID 897 to CCSIDs 37, 273, 277, 278, 280, 284, 285, 290, 297, 437, 500, 819, 850, 1027, and 1252.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

## z/OS

Code page:

**290**
Does not convert to code pages 932, 943, 954, 5050, 33722

## IBM i

Code page:

**290**
Does not convert to code page 932

## AIX

Code page:

**932**
Does not convert to code pages 290, 897

**5050**
Does not convert to code pages 290, 897

**33722**
Does not convert to code pages 290, 897

## HP-UX

Code page:

**897**
Does not convert to code pages 932, 943, 954, 5050, 33722

### Linux

Code page:

**943**
Does not convert to code pages 290, 897

**5050**
Does not convert to code pages 290, 897

### Solaris

Code page:

**943**
Does not convert to code pages 290, 897

**5050**
Does not convert to code pages 290, 897

### HP Integrity NonStop Server

Code page:

**943**
Does not convert to code pages 290, 897

**5050**
Does not convert to code pages 290, 897

### *Japanese Kanji/ Latin Mixed*

Details of CCSIDs and CCSID conversion for Japanese Kanji/Latin Mixed.

The following table shows the native CCSIDs for Japanese Kanji/ Latin Mixed on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| IBM i, z/OS | 1399, 5035 (see Note 1) |
| AIX | 932, 5050, 33722 (see Note 2) |
| HP-UX | 932, 954, 5039 (see Note 3) |
| Windows | 932, 943 (see Notes 4 and 5) |
| Linux, HP Integrity NonStop Server, Solaris | 943, 5050 |

**Note:**

1. 5035 is a CCSID related to code page 939
2. 5050 and 33722 are CCSIDs related to base code page 954 on AIX. The CCSID reported by the operating system is 33722.
3. Code sets `japan15` and SJIS on HP-UX are represented by CCSID 932. These have a few DBCS characters having different representations in SJIS so 932 may be converted incorrectly if the conversion is not performed on an HP-UX system. IBM MQ for HP-UX supports 5039, the correct CCSID for HP SJIS. A change to file `/var/mqm/conv/ccsid.tbl` can be made to change the CCSID used from 932 to 5039.
4. Windows NT uses code page 932 but this is best represented by the CCSID of 943. However, not all platforms of IBM MQ support this CCSID.

   On IBM MQ for Windows CCSID 932 is used to represent code page 932, but a change to file `../conv/table/ccsid.tbl` can be made which changes the CCSID used to 943.
5. IBM MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**1399**
Does not convert to code pages 954, 5035, 5050, 33722

**5035**
Does not convert to code pages 954, 1399, 5050, 33722

### IBM i

Code page:

**1399**
Does not convert to code page 5039

**5035**
Does not convert to code page 5039

### HP-UX

Code page:

**932**
Does not convert to code pages 942, 943, 1399

**954**
Does not convert to code pages 942, 943, 1399

**5039**
Does not convert to code pages 942, 943, 1399

### HP Integrity NonStop Server

Code page:

**943**
Does not convert to code page 1399

**5050**
Does not convert to code page 1399

## *Japanese Kanji/ Katakana Mixed*

Details of CCSIDs and CCSID conversion for Japanese Kanji/Katakana Mixed.

*Table 570. Native CCSIDs for Japanese Kanji/ Katakana Mixed on supported platforms*

| Platform | Native CCSIDs |
|---|---|
| z/OS | 1390, 5026 (see Note 1) |
| IBM i | 5026 (see Note 1) |
| AIX | 932, 5050, 33722 (see Note 2) |
| HP-UX | 932, 954, 5039 (see Note 3) |
| Windows | 932, 943 (see Notes 4 and 5) |
| Linux, HP Integrity NonStop Server, Solaris | 943, 5050 |

**Note:**

1. The single-byte mode of CCSIDs 1390 and 5026 in EBCDIC contain lower-case characters in different locations to the typical/invariant layout for basic Latin and care must be taken to ensure data is not lost when message data is being converted to other CCSIDs. In addition, the use of these CCSIDs as a queue manager's default CCSID may cause issues when communicating with other queue managers, for example, channel names using lower case characters may not be correctly interpreted on the remote system. 5026 is a CCSID related to code page 930. CCSID 5026 is the CCSID reported on IBM i when the Japanese Katakana (DBCS) feature is selected.
2. 5050 and 33722 are CCSIDs related to base code page 954 on AIX. The CCSID reported by the operating system is 33722.
3. Code sets `japan15` and SJIS on HP-UX are represented by CCSID 932. These have a few DBCS characters having different representations in SJIS so 932 may be converted incorrectly if the conversion is not performed on an HP-UX system. IBM MQ for HP-UX supports 5039, the correct CCSID for HP SJIS. A change to file `/var/mqm/conv/ccsid.tbl` can be made to change the CCSID used from 932 to 5039.
4. Windows NT uses code page 932 but this is best represented by the CCSID of 943. However, not all platforms of IBM MQ support this CCSID.

   On IBM MQ for Windows, CCSID 932 is used to represent code page 932, but a change to file `../conv/table/ccsid.tbl` can be made that changes the CCSID used to 943.
5. IBM MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

## z/OS

Code page:

**1390**
Does not convert to code pages 954, 5026, 5050, 33722

Does not accept lowercase characters.

**5026**
Does not convert to code pages 954, 1390, 5050, 33722

## IBM i

Code page:

**5026**
Does not convert to code pages 1390, 5039

## HP-UX

Code page:

**932**
Does not convert to code pages 942, 943, 1390

**954**
Does not convert to code pages 942, 943, 1390

**5039**
Does not convert to code pages 942, 943, 1390

## HP Integrity NonStop Server

Code page:

**943**
Does not convert to code page 1390

**5050**
Does not convert to code page 1390

### *Korean*

Details of CCSIDs and CCSID conversion for Korean.

The following table shows the native CCSIDs for Korean on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| z/OS, IBM i | 933, 1364 |
| AIX, HP-UX, Linux, HP Integrity NonStop Server, Solaris | 970 |
| Windows | 949, 1363 |

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

#### z/OS

Code page:

**933**
Does not convert to code page 970

**1364**
Does not convert to code page 970

#### HP-UX

Code page:

**970**
Does not convert to code pages 949, 1363, 1364

### *Simplified Chinese*

Details of CCSIDs and CCSID conversion for Simplified Chinese.

The following table shows the native CCSIDs for Simplified Chinese on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| z/OS | 935, 1388 |
| IBM i | 935, 1388 |
| AIX | 1383, 1386 |
| HP-UX | 1381 (see Note 1) |
| Windows | 1381, 1386(see Note 2) |
| Linux, HP Integrity NonStop Server, Solaris | 1383 |

**Note:**

1. Code sets `prc15` and `hp15CN` on HP-UX are represented by CCSID 1381.
2. Windows uses code page 936 but this is best represented by the CCSID of 1386. However, not all platforms of IBM MQ support this CCSID.

   On IBM MQ for Windows CCSID 1381 is used to represent code page 936, but a change to file `../conv/table/ccsid.tbl` can be made which changes the CCSID used to 1386.
3. IBM MQ supports phase one of the Chinese GB18030 standard.

On z/OS, Linux, Windows, and Solaris, conversion support is provided between Unicode (UTF-8 and UCS-2) and CCSID 1388 (EBCDIC with GB18030 extensions), Unicode (UTF-8 and UCS-2) and CCSID 5488 (GB18030 phase one), and between CCSID 1388 and CCSID 5488.

**Note:**

On IBM i, support is provided by the operating system for conversion between Unicode (UTF-8 and UCS-2) and CCSID 1388 (EBCDIC with GB18030 extensions).

On HP-UX there is currently no support available on the HP11 operating system for GB18030. On HP11i, patch PHCO_26456 provides conversion support between GB18030 (CCSID 5488) and Unicode. Support is not provided for the conversion between GB18030 and 1388 (EBCDIC).

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**935**
Does not convert to code page 1383

**1388**
Does not convert to code page 1383

### HP-UX

Code page:

**1381**
Does not convert to code pages 1383, 1386, 1388

## *Traditional Chinese*

Details of CCSIDs and CCSID conversion for Traditional Chinese.

The following table shows the native CCSIDs for Traditional Chinese on supported platforms:

| Platform | Native CCSIDs |
|---|---|
| z/OS, IBM i | 937 |
| HP-UX | 938, 950, 964 (see Note) |
| Windows | 950 |
| AIX, HP Integrity NonStop Server, Solaris, Linux | 950, 964 |

**Note:** Code set `roc15` on HP-UX is represented by CCSID 938.

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

### z/OS

Code page:

**937**
Does not convert to code page 964

**1388**
Does not convert to code page 1383

### HP-UX

Code page:

**938**
Does not convert to code page 948

**950**
Does not convert to code page 948

**964**
Does not convert to code page 948

### Linux, Solaris

Code page:

**964**
Does not convert to code page 938

## z/OS conversion support

A list of supported CCSID conversions.

*Table 571. IBM MQ for z/OS CCSID conversion support*

| CCSID | Converts to and from CCSIDS |
|---|---|
| 37 | 256, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 720, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-866, 869-871, 874-875, 880, 897, 903-905, 912, 914-916, 920-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1097, 1100, 1112, 1114-1115, 1122, 1124, 1126, 1130-1132, 1137, 1140-1149, 1200, 1208, 1250-1255, 1257-1258, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5210-5211, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25480, 25617, 25619, 25664, 28709 |
| 256 | 37, 273, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 737, 775, 819, 833, 836, 838, 850, 852, 857, 860-866, 869-871, 875, 880, 905, 1025-1027, 1112, 1122, 1200, 1208, 1251-1252, 1275, 4386, 4929, 4932, 4934, 4946, 4948, 4953, 4960, 4971, 5123, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 13121, 13488, 16804, 17248, 17584, 28709 |
| 259 | 437, 808, 850-852, 855-858, 860-865, 867, 869, 872, 874, 899, 901-902, 915, 1098, 1161-1162, 1200, 1208, 1250-1258, 4946, 4948, 4951-4953, 4960, 4970, 5346, 5348, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584 |
| 273 | 37, 256, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1250, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951-4953, 4960, 4970-4971, 5012, 5123, 5346, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 274 | 500, 1047 |
| 275 | 37, 437, 500, 819, 850, 1047, 1200, 1208, 1252, 4946, 5348, 8229, 13488, 17584, 28709 |

| Table 571. IBM MQ for z/OS CCSID conversion support (continued) | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 277 | 37, 256, 273, 278, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 278 | 37, 256, 273, 277, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 280 | 37, 256, 273, 277-278, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 281 | 1047 |
| 282 | 500, 1047, 1200, 1208, 13488, 17584 |
| 284 | 37, 256, 273, 277-278, 280, 285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 285 | 37, 256, 273, 277-278, 280, 284, 290, 297, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 290 | 37, 256, 273, 277-278, 280, 284-285, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 895-897, 1009, 1025-1027, 1040-1043, 1047, 1088, 1112, 1122, 1139, 1200, 1208, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 4992, 5123, 8229, 8482, 9025, 9044, 9049, 9056, 13121, 13488, 17248, 17584, 25473, 25617, 25619, 25664, 28709 |
| 293 | 1200, 1208, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 297 | 37, 256, 273, 277-278, 280, 284-285, 290, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1100, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 300 | 301, 941, 1200, 1208, 1351, 4396, 8492, 13488, 16684, 17584 |
| 301 | 300, 941, 1200, 1208, 1351, 4396, 8492, 13488, 16684, 17584 |
| 367 | 37, 256, 273, 277-278, 280, 284, 290, 297, 500, 819, 833, 836, 850, 871, 875, 1009, 1026-1027, 1041, 1088, 1115, 1126, 1200, 1208, 4386, 4929, 4932, 4946, 4971, 5123, 5211, 8229, 8482, 9025, 13121, 13488, 17584, 25617, 25664, 28709 |
| 420 | 37, 256, 424, 437, 500, 720, 737, 775, 819, 850, 852, 857, 860-865, 1008, 1046, 1089, 1098, 1112, 1122, 1127, 1200, 1208, 1252, 1256, 4946, 4948, 4953, 4960, 5104, 5142, 5352, 8229, 8612, 9044, 9049, 9056, 9238, 13488, 16804, 17248, 17584, 28709 |
| 423 | 37, 256, 273, 277-278, 280, 284-285, 297, 437, 500, 737, 775, 813, 819, 838, 850-852, 857, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1009, 1025-1027, 1041-1043, 1112, 1122, 1200, 1208, 1252-1253, 1280, 4909, 4934, 4946, 4948, 4953, 4960, 4970-4971, 5012, 5123, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 28709 |
| 424 | 37, 256, 420, 437, 500, 737, 775, 803, 819, 836, 850, 852, 856-857, 860-865, 916, 1112, 1122, 1200, 1208, 1252, 1255, 4932, 4946, 4948, 4952-4953, 4960, 5012, 5351, 8229, 8612, 9044, 9049, 9056, 13488, 16804, 17248, 17584, 28709 |
| 437 | 37, 256, 259, 273, 275, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-863, 865-866, 869-871, 874-875, 880, 897, 903, 905, 912, 914-916, 920-924, 1025-1027, 1040-1043, 1047, 1051, 1097, 1098, 1114-1115, 1126, 1140-1149, 1200, 1208, 1252, 1257, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5210-5211, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 28709 |
| 500 | 37, 256, 273-275, 277-278, 280, 282, 284-285, 290, 297, 367, 420, 423-424, 437, 737, 775, 813, 819, 833, 836, 838, 850-852, 855-858, 860-866, 869-871, 874-875, 880, 891, 895, 897, 903-905, 912, 914-916, 920-924, 1004, 1009-1021, 1023, 1025-1027, 1040-1043, 1046-1047, 1051, 1088-1089, 1097, 1100-1107, 1112, 1114-1115, 1122, 1124-1126, 1129-1133, 1137, 1140-1149, 1200, 1208, 1250-1258, 1275, 1280-1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951-4953, 4960, 4970-4971, 5012, 5123, 5142, 5210-5211, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 9238, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25480, 25617, 25619, 25664, 28709 |
| 720 | 37, 420, 864, 1200, 1208, 1256, 4960, 8229, 8612, 9056, 13488, 16804, 17248, 17584, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 737 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 833, 836, 838, 850, 869-871, 875, 880, 905, 1025-1027, 1097, 1200, 1208, 1252-1253, 1280, 4386, 4909, 4929, 4932, 4934, 4946, 4971, 5123, 8229, 8482, 8612, 9025, 9030, 9061, 13121, 13488, 16804, 17584, 28709 |
| 775 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 833, 836, 838, 850, 870-871, 875, 880, 905, 1025-1027, 1097, 1112, 1122, 1200, 1208, 1252, 1257, 4386, 4929, 4932, 4934, 4946, 4971, 5123, 8229, 8482, 8612, 9025, 9030, 13121, 13488, 16804, 17584, 28709 |
| 803 | 424, 819, 850, 856, 862, 916, 1200, 1208, 1252, 1255, 4946, 4952, 5012, 13488, 17584 |
| 806 | 1200, 1208, 13488, 17584 |
| 808 | 259, 858-859, 872, 923-924, 1140, 1148, 1153-1154, 1200, 1208, 5347, 5348, 13488, 17584 |
| 813 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252-1253, 1280, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 819 | 37, 256, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 803, 813, 833, 836, 838, 850, 852, 855, 857-858, 860-861, 863-866, 869-871, 874-875, 880, 897, 903, 905, 912, 914-916, 920-924, 1004, 1025-1027, 1041-1043, 1047, 1051, 1088-1089, 1097, 1098, 1112, 1114, 1122-1123, 1126, 1130, 1132, 1137, 1140-1149, 1200, 1208, 1250-1255, 1257-1258, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5210, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 833 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 836, 850, 852, 855, 857, 860-865, 870-871, 891, 1009, 1025-1027, 1040-1043, 1088, 1112, 1122, 1126, 1200, 1208, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 5123, 8229, 8482, 9025, 9044, 9049, 9056, 13121, 13488, 17248, 17584, 25617, 25619, 25664, 28709 |
| 834 | 926, 951, 1200, 1208, 1362, 4930, 9026, 13488, 17584 |
| 835 | 927, 947, 1200, 1208, 4931, 9027, 13488, 17584, 21427 |
| 836 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 424, 437, 500, 737, 775, 819, 833, 850, 852, 855, 857, 870-871, 875, 903, 1009, 1025-1027, 1040-1043, 1088, 1112, 1114-1115, 1122, 1200, 1208, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4971, 5123, 5210-5211, 8229, 8482, 9025, 9044, 9049, 13121, 13488, 17584, 25479, 25617, 25619, 25664, 28709 |
| 837 | 928, 1200, 1208, 1380, 1385, 4933, 13488, 17584 |
| 838 | 37, 256, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 775, 813, 819, 850, 852, 857, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1112, 1122, 1200, 1208, 1252, 4909, 4934, 4946, 4948, 4953, 4960, 4970-4971, 5012, 5123, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 848 | 924, 1148, 1158, 1200, 1208, 5347, 13488, 17584 |
| 849 | 924, 1148, 1154, 1200, 1208, 5347, 13488, 17584 |
| 850 | 37, 256, 259, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 737, 775, 803, 813, 819, 833, 836, 838, 852, 855-858, 860-866, 869-871, 874-875, 880, 897, 903, 905, 912, 914-916, 920-924, 1004, 1025-1027, 1040-1043, 1047, 1051, 1088-1089, 1097, 1098, 1100, 1112, 1114, 1122, 1126, 1130, 1132, 1140-1149, 1200, 1208, 1250-1257, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951-4953, 4960, 4970-4971, 5012, 5123, 5210, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 851 | 259, 423, 500, 875, 1200, 1208, 4971, 13488, 17584 |
| 852 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1047, 1088, 1097, 1200, 1208, 1250, 1252, 1282, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5346, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 855 | 37, 259, 273, 277-278, 280, 284-285, 290, 297, 437, 500, 819, 833, 836, 850, 852, 857, 866, 870-871, 878, 880, 912, 915, 1025-1027, 1040-1043, 1088, 1200, 1208, 1250-1252, 1283, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 5123, 5346, 5347, 8229, 8482, 9025, 9044, 9049, 13121, 13488, 17584, 25617, 25619, 25664, 28709 |
| 856 | 259, 273, 424, 500, 803, 850, 862, 916, 1200, 1208, 1255, 4946, 4952, 5012, 5351, 13488, 17584 |
| 857 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1088, 1097, 1200, 1208, 1252, 1254, 1281, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5350, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 858 | 37, 259, 273, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 850, 860-861, 865, 871-872, 901-902, 923-924, 1047, 1051, 1140-1149, 1153-1157, 1160-1162, 1164, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 859 | 808, 872, 901-902, 1153-1157, 1160-1162, 1164, 1200, 1208, 13488, 17584 |
| 860 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 838, 850, 852, 857-858, 861, 863, 865, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 923-924, 1025-1027, 1041-1043, 1097, 1140, 1145-1146, 1148, 1200, 1208, 1252, 4386, 4909, 4929, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 861 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 838, 850, 852, 857-858, 860, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 923-924, 1025-1027, 1041-1043, 1097, 1148, 1149, 1200, 1208, 1252, 4386, 4909, 4929, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 28709 |
| 862 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 803, 833, 838, 850, 856, 870-871, 875, 880, 905, 916, 1025-1027, 1097, 1200, 1208, 1252, 1255, 4386, 4929, 4934, 4946, 4952, 4971, 5012, 5123, 5351, 8229, 8482, 8612, 9025, 9030, 12712, 13121, 13488, 16804, 17584, 28709 |
| 863 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 838, 850, 852, 857, 860-861, 865, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1041-1043, 1051, 1097, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 28709 |
| 864 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 720, 819, 833, 838, 850, 870-871, 875, 880, 905, 918, 1008, 1025-1027, 1046, 1089, 1097, 1127, 1200, 1208, 1252, 1256, 4386, 4929, 4934, 4946, 4960, 4971, 5104, 5123, 5142, 5352, 8229, 8482, 8612, 9025, 9030, 9056, 9238, 13121, 13488, 16804, 17248, 17584, 28709 |
| 865 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 819, 833, 838, 850, 858, 860, 863, 870-871, 875, 880, 905, 923-924, 1025-1027, 1097, 1142-1143, 1148, 1200, 1208, 1252, 4386, 4929, 4934, 4946, 4971, 5123, 5348, 8229, 8482, 8612, 9025, 9030, 13121, 13488, 16804, 17584, 28709 |
| 866 | 37, 256, 437, 500, 819, 850, 855, 870, 878, 880, 915, 1025, 1200, 1208, 1251-1252, 1283, 4946, 4951, 5347, 8229, 13488, 17584, 28709 |
| 867 | 259, 1153-1155, 1160, 1200, 1208, 4899, 5351, 9048, 12712, 13488, 17584 |
| 868 | 918, 1006, 1200, 1208, 13488, 17584 |
| 869 | 37, 256, 259, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 813, 819, 838, 850, 852, 857, 860-861, 863, 870-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252-1254, 1280, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 870 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-866, 869, 871, 874-875, 880, 897, 903, 912, 915-916, 920, 1009, 1025-1027, 1040-1043, 1047, 1088, 1112, 1122, 1200, 1208, 1250, 1252, 1282, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5346, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 871 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-865, 869, 870, 874-875, 880, 897, 903, 912, 916, 920, 923-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1112, 1122, 1140-1149, 1200, 1208, 1252, 1275, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5348, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 872 | 259, 808, 858-859, 923-924, 1140-1149, 1153-1155, 1200, 1208, 5347, 5348, 13488, 17584 |
| 874 | 37, 259, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 875 | 37, 256, 273, 277-278, 280, 284-285, 297, 367, 423, 437, 500, 737, 775, 813, 819, 836, 838, 850-852, 857, 860-865, 869-871, 874, 880, 897, 903, 912, 916, 920, 1009, 1025-1027, 1041-1043, 1047, 1088, 1112, 1122, 1200, 1208, 1252-1253, 1280, 4909, 4932, 4934, 4946, 4948, 4953, 4960, 4970-4971, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 878 | 855, 866, 880, 915, 1025, 1131, 1200, 1208, 1251, 1283, 4951, 5347, 13488, 17584 |
| 880 | 37, 256, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 775, 813, 819, 838, 850, 852, 855, 857, 860-866, 869-871, 874-875, 878, 897, 903, 912, 915-916, 920, 1009, 1025-1027, 1041-1043, 1112, 1122, 1200, 1208, 1251-1252, 1283, 4909, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5347, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 28709 |
| 891 | 500, 833, 1088, 1200, 1208, 4929, 9025, 13121, 13488, 17584, 25664 |
| 895 | 290, 500, 1027, 1041, 1200, 1208, 4386, 5123, 8482, 13488, 17584, 25617 |
| 896 | 290, 1027, 1041, 1200, 1208, 4386, 4992, 5123, 8482, 13488, 17584, 25617 |
| 897 | 37, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252, 4386, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 8229, 8482, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 899 | 259 |
| 901 | 259, 858-859, 902, 923-924, 1140, 1148, 1156-1157, 1200, 1208, 5348, 5353, 13488, 17584 |
| 902 | 259, 858-859, 901, 923-924, 1140, 1148, 1156-1157, 1200, 1208, 5348, 5353, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 903 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 836, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 912, 916, 920, 1025-1027, 1041-1043, 1115, 1200, 1208, 1252, 4909, 4932, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5211, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 904 | 37, 500, 1114, 1200, 1208, 5210, 8229, 13488, 17584, 25480, 28709 |
| 905 | 37, 256, 437, 500, 737, 775, 819, 850, 852, 857, 860-865, 920, 1026, 1112, 1122, 1200, 1208, 1252, 1254, 1281, 4946, 4948, 4953, 4960, 8229, 9044, 9049, 9056, 13488, 17248, 17584, 28709 |
| 912 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 916, 920, 1025-1027, 1041-1043, 1047, 1200, 1208, 1250, 1252, 1282, 4909, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5346, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 914 | 37, 437, 500, 819, 850, 1200, 1208, 1252, 1257, 4946, 8229, 13488, 17584, 28709 |
| 915 | 37, 259, 437, 500, 819, 850, 855, 866, 870, 878, 880, 1025, 1131, 1200, 1208, 1251-1252, 1283, 4946, 4951, 5347, 8229, 13488, 17584, 28709 |
| 916 | 37, 273, 277-278, 280, 284-285, 297, 423-424, 437, 500, 803, 813, 819, 838, 850, 852, 856-857, 860-863, 869-871, 874-875, 880, 897, 903, 912, 920, 1025-1027, 1041-1043, 1200, 1208, 1252, 1255, 4909, 4934, 4946, 4948, 4952-4953, 4970-4971, 5012, 5123, 5351, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 918 | 864, 868, 1006, 1200, 1208, 4960, 9056, 13488, 17248, 17584 |
| 920 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 1025-1026, 1200, 1208, 1252, 1254, 1281, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5350, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 28709 |
| 921 | 37, 437, 500, 819, 850, 922, 1112, 1122, 1200, 1208, 1252, 1257, 4946, 5353, 8229, 13488, 17584, 28709 |
| 922 | 37, 437, 500, 819, 850, 921, 1112, 1122, 1200, 1208, 1252, 1257, 4946, 5353, 8229, 13488, 17584, 28709 |
| 923 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 850, 858, 860-861, 865, 871-872, 901-902, 924, 1047, 1051, 1140-1149, 1153-1158, 1160-1162, 1164, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 924 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 848-850, 858, 860-861, 865, 871-872, 901-902, 923, 1047, 1051, 1140-1149, 1153-1157, 1160-1164, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 926 | 834, 951, 9026 |
| 927 | 835, 947, 1200, 1208, 4931, 9027, 13488, 17584, 21427 |
| 928 | 837, 1200, 1208, 1380, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 930 | 931-932, 939, 942-943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 931 | 930, 932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 932 | 930-931, 939, 942-943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 933 | 934, 944, 949, 1200, 1208, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13488, 13651, 17317, 17584, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 934 | 933, 949, 5029, 5045, 5460, 9125, 13221, 17317, 25510, 25525, 29621, 33717, 37813 |
| 935 | 936, 946, 1200, 1208, 1381, 1386, 1388, 5031, 5477, 5482, 5484, 9127, 13223, 13488, 17584, 25512 |
| 936 | 935, 946, 1381, 5031, 5477, 5484, 9127, 13223, 25512 |
| 937 | 938, 948, 950, 1200, 1208, 1370, 5033, 5046, 9142, 13488, 17584, 25514, 25524, 29620 |
| 938 | 937, 950, 1370, 5033, 5046, 9142, 25514 |
| 939 | 930-932, 942-943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 941 | 300-301, 1200, 1208, 1351, 4396, 8492, 13488, 16684, 17584 |
| 942 | 930-932, 939, 943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 943 | 930-932, 939, 942, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 944 | 933, 949, 1200, 1208, 5029, 5045, 5460, 9125, 13221, 13488, 17317, 17584, 25520, 25525, 29616, 29621, 33717, 37813 |
| 946 | 935-936, 1200, 1208, 5031, 5484, 9127, 13223, 13488, 17584, 25512 |
| 947 | 835, 927, 1200, 1208, 4931, 9027, 13488, 17584, 21427 |
| 948 | 937, 950, 1200, 1208, 1370, 5033, 5046, 9142, 13488, 17584, 25524, 29620 |
| 949 | 933-934, 944, 1200, 1208, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13488, 13651, 17317, 17584, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 950 | 937-938, 948, 1200, 1208, 1370, 5033, 5046, 9142, 13488, 17584, 25514, 25524, 29620 |
| 951 | 834, 926, 1200, 1208, 1362, 4930, 9026, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1004 | 500, 819, 850, 1200, 1208, 4946, 13488, 17584 |
| 1006 | 868, 918, 1200, 1208, 13488, 17584 |
| 1008 | 420, 864, 1200, 1208, 4960, 5104, 8612, 9056, 13488, 16804, 17248, 17584 |
| 1009 | 37, 273, 277-278, 280, 284, 290, 297, 367, 423, 500, 833, 836, 870-871, 875, 880, 1025-1026, 1200, 1208, 4386, 4929, 4932, 4971, 8229, 8482, 9025, 13121, 13488, 17584, 28709 |
| 1010 | 500, 1200, 1208, 13488, 17584 |
| 1011 | 500, 1200, 1208, 13488, 17584 |
| 1012 | 500, 1200, 1208, 13488, 17584 |
| 1013 | 500, 1140, 1200, 1208, 13488, 17584 |
| 1014 | 500, 1200, 1208, 13488, 17584 |
| 1015 | 500, 1200, 1208, 13488, 17584 |
| 1016 | 500, 1200, 1208, 13488, 17584 |
| 1017 | 500, 1200, 1208, 13488, 17584 |
| 1018 | 500, 1200, 1208, 13488, 17584 |
| 1019 | 500, 1200, 1208, 13488, 17584 |
| 1020 | 500 |
| 1021 | 500 |
| 1023 | 500 |
| 1025 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-866, 869-871, 874-875, 878, 880, 897, 903, 912, 915-916, 920, 1009, 1026-1027, 1040-1043, 1051, 1088, 1112, 1122, 1131, 1200, 1208, 1251-1252, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5347, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 1026 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-865, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1009, 1025, 1027, 1040-1043, 1047, 1088, 1112, 1122, 1200, 1208, 1252, 1254, 1281, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5350, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 1027 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-865, 869-871, 874-875, 880, 895-897, 903, 912, 916, 1025-1026, 1040-1043, 1047, 1088, 1112, 1122, 1139, 1200, 1208, 1252, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 4992, 5012, 5123, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1040 | 37, 273, 277-278, 280, 284-285, 290, 297, 437, 500, 833, 836, 850, 852, 855, 857, 870-871, 1025-1027, 1041-1043, 1088, 1200, 1208, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 5123, 8229, 8482, 9025, 9044, 9049, 13121, 13488, 17584, 25617, 25619, 25664, 28709 |
| 1041 | 37, 273, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 895-897, 903, 912, 916, 1025-1027, 1040, 1042-1043, 1088, 1200, 1208, 1252, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 4992, 5012, 5123, 8229, 8482, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 1042 | 37, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 1025-1027, 1040, 1041, 1043, 1088, 1200, 1208, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 8229, 8482, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 1043 | 37, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 1025-1027, 1040, 1041, 1042, 1088, 1114, 1200, 1208, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5210, 8229, 8482, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 1046 | 420, 500, 864, 1089, 1127, 1200, 1208, 1256, 4960, 5142, 5352, 8612, 9056, 9238, 13488, 16804, 17248, 17584 |
| 1047 | 37, 273-275, 277-278, 280, 281, 282, 284-285, 290, 297, 437, 500, 819, 850, 852, 858, 870-871, 875, 912, 923-924, 1026-1027, 1140-1149, 1200, 1208, 1252, 1254, 4946, 4948, 5123, 8229, 8482, 13488, 17584, 28709 |
| 1051 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 871, 923-924, 1025, 1097, 1140-1149, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1088 | 37, 273, 277-278, 280, 284-285, 290, 297, 367, 500, 819, 833, 836, 850, 852, 855, 857, 870-871, 875, 891, 1025-1027, 1040-1043, 1126, 1200, 1208, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4971, 5123, 8229, 8482, 9025, 9044, 9049, 13121, 13488, 17584, 25617, 25619, 25664, 28709 |
| 1089 | 420, 500, 819, 850, 864, 1046, 1127, 1200, 1208, 1256, 4946, 4960, 5142, 5352, 8612, 9056, 9238, 13488, 16804, 17248, 17584 |
| 1097 | 37, 437, 500, 737, 775, 819, 850, 852, 857, 860-865, 1051, 1098, 1112, 1122, 1200, 1208, 1252, 4946, 4948, 4953, 4960, 8229, 9044, 9049, 9056, 13488, 17248, 17584, 28709 |
| 1098 | 259, 420, 437, 819, 850, 1097, 1200, 1208, 1252, 4946, 8612, 13488, 16804, 17584 |
| 1100 | 37, 273, 277-278, 280, 284-285, 297, 500, 850, 4946, 8229, 28709 |
| 1101 | 500 |
| 1102 | 500 |

| Table 571. IBM MQ for z/OS CCSID conversion support (continued) | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1103 | 500 |
| 1104 | 500 |
| 1105 | 500 |
| 1106 | 500 |
| 1107 | 500 |
| 1112 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 775, 819, 833, 836, 838, 850, 870-871, 875, 880, 905, 921-922, 1025-1027, 1097, 1122, 1200, 1208, 1252, 1257, 4386, 4929, 4932, 4934, 4946, 4971, 5123, 5353, 8229, 8482, 8612, 9025, 9030, 13121, 13488, 16804, 17584, 28709 |
| 1114 | 37, 437, 500, 819, 836, 850, 904, 1043, 1115, 1200, 1208, 4932, 4946, 5210-5211, 8229, 13488, 17584, 25480, 25619, 28709 |
| 1115 | 37, 367, 437, 500, 836, 903, 1114, 1200, 1208, 4932, 5210-5211, 8229, 13488, 17584, 25479, 28709 |
| 1122 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 775, 819, 833, 836, 838, 850, 870-871, 875, 880, 905, 921-922, 1025-1027, 1097, 1112, 1200, 1208, 1252, 1257, 4386, 4929, 4932, 4934, 4946, 4971, 5123, 5353, 8229, 8482, 8612, 9025, 9030, 13121, 13488, 16804, 17584, 28709 |
| 1123 | 819, 1124-1125, 1148, 1200, 1208, 1251-1252, 1283, 5347, 13488, 17584 |
| 1124 | 37, 500, 1123, 1125, 1200, 1208, 1251, 1283, 5347, 8229, 13488, 17584, 28709 |
| 1125 | 500, 1123, 1124, 1200, 1208, 1251, 1283, 5347, 13488, 17584 |
| 1126 | 37, 367, 437, 500, 819, 833, 850, 1088, 1200, 1208, 1252, 4929, 4946, 8229, 9025, 13121, 13488, 17584, 25664, 28709 |
| 1127 | 420, 864, 1046, 1089, 1256, 4960, 5142, 8612, 9056, 9238, 16804, 17248 |
| 1129 | 500, 1130, 1200, 1208, 1258, 5354, 13488, 17584 |
| 1130 | 37, 500, 819, 850, 1129, 1200, 1208, 1252, 1258, 4946, 5354, 8229, 13488, 17584, 28709 |
| 1131 | 37, 500, 878, 915, 1025, 1200, 1208, 1251, 1283, 5347, 8229, 13488, 17584, 28709 |
| 1132 | 37, 500, 819, 850, 1133, 1200, 1208, 1252, 4946, 8229, 13488, 17584, 28709 |
| 1133 | 500, 1132, 1200, 1208, 13488, 17584 |
| 1137 | 37, 500, 819, 1200, 1208, 8229, 13488, 17584, 28709 |
| 1139 | 290, 1027, 4386, 5123, 8482 |
| 1140 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 850, 858, 860, 863, 871-872, 901-902, 923-924, 1013, 1047, 1051, 1141-1149, 1153-1157, 1160-1162, 1164, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1141 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 871-872, 923-924, 1047, 1051, 1140, 1142-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1142 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 865, 871-872, 923-924, 1047, 1051, 1140-1141, 1143-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1143 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 865, 871-872, 923-924, 1047, 1051, 1140-1142, 1144-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1144 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 871-872, 923-924, 1047, 1051, 1140-1143, 1145-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1145 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 860, 863, 871-872, 923-924, 1047, 1051, 1140-1144, 1146-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1146 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 860, 863, 871-872, 923-924, 1047, 1051, 1140-1145, 1147-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1147 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 871-872, 923-924, 1047, 1051, 1140-1146, 1148-1149, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1148 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 848-850, 858, 860-861, 863, 865, 871-872, 901-902, 923-924, 1047, 1051, 1123, 1140-1147, 1149, 1153-1164, 1200, 1208, 1252, 1275, 4899, 4946, 5348, 5349, 8229, 12712, 13488, 17584, 28709 |
| 1149 | 37, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 861, 863, 871-872, 923-924, 1047, 1051, 1140-1148, 1153-1157, 1160-1162, 1200, 1208, 1252, 1275, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1153 | 808, 858-859, 867, 872, 923-924, 1140-1149, 1154-1157, 1160-1162, 1200, 1208, 5348, 9044, 13488, 17584 |
| 1154 | 808, 849, 858-859, 867, 872, 923-924, 1140-1149, 1153, 1155-1157, 1160-1162, 1200, 1208, 5347, 5348, 13488, 17584 |
| 1155 | 858-859, 867, 872, 923-924, 1140-1149, 1153-1154, 1156-1157, 1160-1162, 1200, 1208, 5348, 5350, 9049, 13488, 17584 |
| 1156 | 858-859, 901-902, 923-924, 1140-1149, 1153-1155, 1157, 1160, 1200, 1208, 5348, 5353, 12712, 13488, 17584 |
| 1157 | 858-859, 901-902, 923-924, 1140-1149, 1153-1156, 1160, 1200, 1208, 5348, 5353, 12712, 13488, 17584 |
| 1158 | 848, 923, 1148, 1200, 1208, 5347, 5348, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1159 | 1148, 1200, 1208, 13488, 17584 |
| 1160 | 858-859, 867, 923-924, 1140-1149, 1153-1157, 1161-1162, 1200, 1208, 5348, 13488, 17584 |
| 1161 | 259, 858-859, 923-924, 1140-1149, 1153-1155, 1160, 5348, 17584 |
| 1162 | 259, 858-859, 923-924, 1140-1149, 1153-1155, 1160, 5348, 17584 |
| 1163 | 924, 1148, 1164, 5354, 17584 |
| 1164 | 858-859, 923-924, 1140, 1148, 1163, 1200, 1208, 5348, 5354, 13488, 17584 |
| 1166 | 1200,1208,13488,17584 |
| 1200 | 37, 256, 259, 273, 275, 277-278, 280, 282, 284-285, 290, 293, 297, 300-301, 367, 420, 423-424, 437, 500, 720, 737, 775, 803, 806, 808, 813, 819, 833-838, 848-852, 855-872, 874-875, 878, 880, 891, 895-897, 901-905, 912, 914-916, 918, 920-924, 927-928, 930, 932-933, 935, 937, 939, 941-944, 946-951, 1004, 1006, 1008-1019, 1025-1027, 1040-1043, 1046-1047, 1051, 1088-1089, 1097-1098, 1112, 1114-1115, 1122-1126, 1129-1133, 1137, 1140-1149, 1153-1160, 1164, 1166, 1208, 1250-1258, 1275-1277, 1280-1285, 1351, 1362-1364, 1370-1371, 1380-1381, 1385-1386, 1388, 1390, 1399, 4899, 4909, 4930, 4933, 4948, 4951-4952, 4960, 4971, 5012, 5039, 5104, 5123, 5142, 5210, 5346-5354, 8482, 8612, 9027, 9030, 9044, 9048-9049, 9056, 9061, 9066, 9238, 12712, 13121, 13218, 13488, 16684, 16804, 17248, 17584, 21427, 28709 |
| 1208 | 37, 256, 259, 273, 275, 277-278, 280, 282, 284-285, 290, 293, 297, 300-301, 367, 420, 423-424, 437, 500, 720, 737, 775, 803, 806, 808, 813, 819, 833-838, 848-852, 855-872, 874-875, 878, 880, 891, 895-897, 901-905, 912, 914-916, 918, 920-924, 927-928, 930, 932-933, 935, 937, 939, 941-944, 946-951, 1004, 1006, 1008-1019, 1025-1027, 1040-1043, 1046-1047, 1051, 1088-1089, 1097-1098, 1112, 1114-1115, 1122-1126, 1129-1133, 1137, 1140-1149, 1153-1160, 1164, 1166, 1200, 1250-1258, 1275-1277, 1280-1285, 1351, 1362-1364, 1370-1371, 1380-1381, 1385-1386, 1388, 1390, 1399, 4899, 4909, 4930, 4933, 4948, 4951-4952, 4960, 4971, 5012, 5026, 5035, 5039, 5104, 5123, 5142, 5210, 5346-5354, 8482, 8612, 9027, 9030, 9044, 9048-9049, 9056, 9061, 9066, 9238, 12712, 13121, 13218, 13488, 16684, 16804, 17248, 17584, 21427, 28709 |
| 1250 | 37, 259, 273, 500, 819, 850, 852, 855, 870, 912, 1200, 1208, 1252, 1282, 4946, 4948, 4951, 5346, 8229, 9044, 13488, 17584, 28709 |
| 1251 | 37, 256, 259, 500, 819, 850, 855, 866, 878, 880, 915, 1025, 1123-1125, 1131, 1200, 1208, 1252, 1283, 4946, 4951, 5347, 8229, 13488, 17584, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1252 | 37, 256, 259, 273, 275, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 737, 775, 803, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-866, 869-871, 874-875, 880, 897, 903, 905, 912, 914-916, 920-924, 1025-1027, 1041, 1047, 1051, 1097-1098, 1112, 1122-1123, 1126, 1130, 1132, 1140-1149, 1200, 1208, 1250-1251, 1254-1255, 1257, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25617, 28709 |
| 1253 | 37, 259, 423, 500, 737, 813, 819, 850, 869, 875, 1200, 1208, 1280, 4909, 4946, 4971, 5349, 8229, 9061, 13488, 17584, 28709 |
| 1254 | 37, 259, 500, 819, 850, 857, 869, 905, 920, 1026, 1047, 1200, 1208, 1252, 1281, 4946, 4953, 5350, 8229, 9049, 9061, 13488, 17584, 28709 |
| 1255 | 37, 259, 424, 500, 803, 819, 850, 856, 862, 916, 1200, 1208, 1252, 1281, 4946, 4952, 5012, 5351, 8229, 13488, 17584, 28709 |
| 1256 | 259, 420, 500, 720, 850, 864, 1046, 1089, 1127, 1200, 1208, 4946, 4960, 5142, 5352, 8612, 9056, 9238, 13488, 16804, 17248, 17584 |
| 1257 | 37, 259, 437, 500, 775, 819, 850, 914, 921-922, 1112, 1122, 1200, 1208, 1252, 4946, 5353, 8229, 13488, 17584, 28709 |
| 1258 | 37, 259, 500, 819, 1129-1130, 1200, 1208, 5354, 8229, 13488, 17584, 28709 |
| 1275 | 37, 256, 273, 277-278, 280, 284-285, 297, 437, 500, 819, 850, 858, 863, 871, 923-924, 1051, 1140-1149, 1200, 1208, 1252, 4946, 5348, 8229, 13488, 17584, 28709 |
| 1276 | 1200, 1208, 13488, 17584 |
| 1277 | 1200, 1208, 13488, 17584 |
| 1280 | 37, 423, 437, 500, 737, 813, 819, 850, 869, 875, 1200, 1208, 1252-1253, 4909, 4946, 4971, 5349, 8229, 9061, 13488, 17584, 28709 |
| 1281 | 37, 437, 500, 819, 850, 857, 905, 920, 1026, 1200, 1208, 1252, 1254-1255, 4946, 4953, 5350, 8229, 9049, 13488, 17584, 28709 |
| 1282 | 500, 852, 870, 912, 1200, 1208, 1250, 4948, 5346, 9044, 13488, 17584 |
| 1283 | 37, 437, 500, 819, 850, 855, 866, 878, 880, 915, 1025, 1123-1125, 1131, 1200, 1208, 1251-1252, 4946, 4951, 5347, 8229, 13488, 17584, 28709 |
| 1284 | 1200, 1208, 13488, 17584 |
| 1285 | 1200, 1208, 13488, 17584 |
| 1351 | 300-301, 941, 1200, 1208, 4396, 8492, 13488, 16684, 17584 |
| 1362 | 834, 951, 1200, 1208, 4930, 9026, 13488, 17584 |
| 1363 | 933, 949, 1200, 1208, 1364, 5029, 5045, 5460, 9125, 9555, 13221, 13488, 13651, 17317, 17584, 25525, 29621, 33717, 37813 |
| 1364 | 933, 949, 1200, 1208, 1363, 5029, 5045, 5460, 9125, 9555, 13221, 13488, 13651, 17317, 17584, 25525, 29621, 33717, 37813 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 1370 | 937-938, 948, 950, 1200, 1208, 1371, 5033, 5046, 9142, 13488, 17584, 25514, 25524, 29620 |
| 1371 | 1200, 1208, 1370, 13488, 17584 |
| 1380 | 837, 928, 1200, 1208, 1385, 4933, 13488, 17584 |
| 1381 | 935-936, 1200, 1208, 1386, 1388, 5031, 5477, 5482, 5484, 9127, 13223, 13488, 17584, 25512 |
| 1385 | 837, 1200, 1208, 1380, 4933, 13488, 17584 |
| 1386 | 935, 1200, 1208, 1381, 1388, 5031, 5477, 5482, 5484, 9127, 13223, 13488, 17584 |
| 1388 | 935, 1200, 1208, 1381, 1386, 5031, 5477, 5482, 5484, 5488, 9127, 13223, 13488, 17584 |
| 1390 | 930-932, 939, 942-943, 1200, 1208, 1399, 5026, 5028, 5035, 5038-5039, 5055, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 1399 | 930-932, 939, 942-943, 1200, 1208, 1390, 5026, 5028, 5035, 5038-5039, 5050, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 4386 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 895-897, 1009, 1025-1027, 1040-1043, 1088, 1112, 1122, 1139, 1252, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 4992, 5123, 8229, 8482, 9025, 9044, 9049, 9056, 13121, 17248, 25473, 25617, 25619, 25664, 28709 |
| 4396 | 300-301, 941, 1351, 8492, 16684 |
| 4899 | 867, 1148, 1200, 1208, 5351, 9048, 12712, 13488, 17584 |
| 4909 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252-1253, 1280, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 4929 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 891, 1009, 1025-1027, 1040-1043, 1088, 1112, 1122, 1126, 1252, 4386, 4932, 4946, 4948, 4951, 4953, 4960, 5123, 8229, 8482, 9025, 9044, 9049, 9056, 13121, 17248, 25617, 25619, 25664, 28709 |
| 4930 | 834, 951, 1200, 1208, 1362, 9026, 13488, 17584 |
| 4931 | 835, 927, 947, 9027, 21427 |
| 4932 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 424, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 870-871, 875, 903, 1009, 1025-1027, 1040-1043, 1088, 1112, 1114-1115, 1122, 1252, 4386, 4929, 4946, 4948, 4951, 4953, 4971, 5123, 5210-5211, 8229, 8482, 9025, 9044, 9049, 13121, 25479, 25617, 25619, 25664, 28709 |
| 4933 | 837, 1200, 1208, 1380, 1385, 13488, 17584 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 4934 | 37, 256, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 775, 813, 819, 838, 850, 852, 857, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1112, 1122, 1252, 4909, 4946, 4948, 4953, 4960, 4970-4971, 5012, 5123, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 17248, 25473, 25479, 25617, 25619, 28709 |
| 4946 | 37, 256, 259, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 737, 775, 803, 813, 819, 833, 836, 838, 850, 852, 855-858, 860-866, 869-871, 874-875, 880, 897, 903, 905, 912, 914-916, 920-924, 1004, 1025-1027, 1040-1043, 1047, 1051, 1088-1089, 1097-1098, 1100, 1112, 1114, 1122, 1126, 1130, 1132, 1140-1149, 1250-1257, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4948, 4951-4953, 4960, 4970-4971, 5012, 5123, 5210, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 16804, 17248, 25473, 25479, 25617, 25619, 25664, 28709 |
| 4948 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1047, 1088, 1097, 1200, 1208, 1250, 1252, 1282, 4386, 4909, 4929, 4932, 4934, 4946, 4951, 4953, 4970-4971, 5012, 5123, 5346, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 4951 | 37, 259, 273, 277-278, 280, 284-285, 290, 297, 437, 500, 819, 833, 836, 850, 852, 855, 857, 866, 870-871, 878, 880, 912, 915, 1025-1027, 1040-1043, 1088, 1200, 1208, 1250-1252, 1283, 4386, 4929, 4932, 4946, 4948, 4953, 5123, 5346, 5347, 8229, 8482, 9025, 9044, 9049, 13121, 13488, 17584, 25617, 25619, 25664, 28709 |
| 4952 | 259, 273, 424, 500, 803, 850, 856, 862, 916, 1200, 1208, 1255, 4946, 5012, 5351, 13488, 17584 |
| 4953 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1088, 1097, 1252, 1254, 1281, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4970-4971, 5012, 5123, 5350, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 16804, 25473, 25479, 25617, 25619, 25664, 28709 |
| 4960 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 720, 819, 833, 838, 850, 864, 870-871, 875, 880, 905, 918, 1008, 1025-1027, 1046, 1089, 1097, 1127, 1200, 1208, 1252, 1256, 4386, 4929, 4934, 4946, 4971, 5104, 5123, 5142, 5352, 8229, 8482, 8612, 9025, 9030, 9056, 9238, 13121, 13488, 16804, 17248, 17584, 28709 |
| 4970 | 37, 259, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1252, 4909, 4934, 4946, 4948, 4953, 4971, 5012, 5123, 8229, 9030, 9044, 9049, 9061, 9066, 25473, 25479, 25617, 25619, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 4971 | 37, 256, 273, 277-278, 280, 284-285, 297, 367, 423, 437, 500, 737, 775, 813, 819, 836, 838, 850-852, 857, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1009, 1025-1027, 1041-1043, 1047, 1088, 1112, 1122, 1200, 1208, 1252-1253, 1280, 4909, 4932, 4934, 4946, 4948, 4953, 4960, 4970, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 4992 | 290, 896, 1027, 1041, 4386, 5123, 8482, 25617 |
| 5012 | 37, 273, 277-278, 280, 284-285, 297, 423-424, 437, 500, 803, 813, 819, 838, 850, 852, 856-857, 860-863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252, 1255, 4909, 4934, 4946, 4948, 4952-4953, 4970-4971, 5123, 5351, 8229, 9030, 9044, 9049, 9061, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 5026 | 930-932, 939, 942-943, 1390, 1399, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 1208, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 5028 | 930-932, 939, 942-943, 1390, 1399, 5026, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 5029 | 933-934, 944, 949, 1363-1364, 5045, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 5031 | 935-936, 946, 1381, 1386, 1388, 5477, 5482, 5484, 9127, 13223, 25512 |
| 5033 | 937-938, 948, 950, 1370, 5046, 9142, 25514, 25524, 29620 |
| 5035 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5038-5039, 9122, 9124, 9131, 9135, 1208, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 5038 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 5039 | 930-932, 939, 942-943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038, 9122, 9124, 9131, 9135, 13218-13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 5045 | 933-934, 944, 949, 1363-1364, 5029, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 5046 | 937-938, 948, 950, 1370, 5033, 9142, 25514, 25524, 29620 |
| 5104 | 420, 864, 1008, 1200, 1208, 4960, 8612, 9056, 13488, 16804, 17248, 17584 |
| 5123 | 290, 367, 423, 437, 819, 1027, 1041, 1047, 1140-1149, 1156, 1157, 1160, 1200, 1208, 1252, 4948, 5348, 8482, 13488 |
| 5142 | 420, 500, 864, 1046, 1089, 1127, 1200, 1208, 1256, 4960, 5352, 8612, 9056, 9238, 13488, 16804, 17248, 17584 |
| 5210 | 37, 437, 500, 819, 836, 850, 904, 1043, 1114-1115, 1200, 1208, 4932, 4946, 5211, 8229, 13488, 17584, 25480, 25619, 28709 |
| 5211 | 37, 367, 437, 500, 836, 903, 1114-1115, 4932, 5210, 8229, 25479, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 5346 | 37, 259, 273, 500, 819, 850, 852, 855, 870, 912, 1200, 1208, 1250, 1252, 1282, 4946, 4948, 4951, 8229, 9044, 13488, 17584, 28709 |
| 5347 | 808, 848-849, 855, 866, 872, 878, 880, 915, 1025, 1123-1125, 1131, 1154, 1158, 1200, 1208, 1251, 1283, 4951, 13488, 17584 |
| 5348 | 37, 259, 273, 275, 277-278, 280, 284-285, 297, 437, 500, 808, 819, 850, 858, 860-861, 863, 865, 871-872, 901-902, 923-924, 1051, 1140-1149, 1153-1158, 1160-1162, 1164, 1200, 1208, 1252, 1275, 4946, 8229, 13488, 17584, 28709 |
| 5349 | 813, 869, 875, 1148, 1200, 1208, 1253, 1280, 4909, 4971, 9061, 13488, 17584 |
| 5350 | 857, 920, 1026, 1155, 1200, 1208, 1254, 1281, 4953, 9049, 13488, 17584 |
| 5351 | 424, 856, 862, 867, 916, 1200, 1208, 1255, 4899, 4952, 5012, 9048, 12712, 13488, 17584 |
| 5352 | 420, 864, 1046, 1089, 1200, 1208, 1256, 4960, 5142, 8612, 9056, 9238, 13488, 16804, 17248, 17584 |
| 5353 | 901-902, 921-922, 1112, 1122, 1156-1157, 1200, 1208, 1257, 13488, 17584 |
| 5354 | 1129-1130, 1163, 1164, 1200, 1208, 1258, 13488, 17584 |
| 5460 | 933-934, 944, 949, 1363-1364, 5029, 5045, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 5477 | 935-936, 1381, 1386, 1388, 5031, 5482, 5484, 9127, 13223, 25512 |
| 5482 | 935, 1381, 1386, 1388, 5031, 5477, 5484, 9127, 13223 |
| 5484 | 935-936, 946, 1381, 1386, 1388, 5031, 5477, 5482, 9127, 13223, 25512 |
| 5488 | 1388 |
| 8229 | 37, 256, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 720, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-866, 869-871, 874-875, 880, 897, 903-905, 912, 914-916, 920-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1097, 1100, 1112, 1114-1115, 1122, 1124, 1126, 1130-1132, 1137, 1140-1149, 1250-1255, 1257-1258, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5210-5211, 5346, 5348, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 16804, 17248, 25473, 25479, 25480, 25617, 25619, 25664, 28709 |
| 8482 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 895-897, 1009, 1025-1027, 1040-1043, 1047, 1088, 1112, 1122, 1139, 1200, 1208, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 4992, 5123, 8229, 9025, 9044, 9049, 9056, 13121, 13488, 17248, 17584, 25473, 25617, 25619, 25664, 28709 |
| 8492 | 300-301, 941, 1351, 4396, 16684 |
| 8612 | 37, 256, 420, 424, 437, 500, 720, 737, 775, 819, 850, 852, 857, 860-865, 1008, 1046, 1089, 1098, 1112, 1122, 1127, 1200, 1208, 1252, 1256, 4946, 4948, 4953, 4960, 5104, 5142, 5352, 8229, 9044, 9049, 9056, 9238, 13488, 16804, 17248, 17584, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 9025 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 891, 1009, 1025-1027, 1040-1043, 1088, 1112, 1122, 1126, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 5123, 8229, 8482, 9044, 9049, 9056, 13121, 17248, 25617, 25619, 25664, 28709 |
| 9026 | 834, 926, 951, 1362, 4930 |
| 9027 | 835, 927, 947, 1200, 1208, 4931, 13488, 17584, 21427 |
| 9030 | 37, 256, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 775, 813, 819, 838, 850, 852, 857, 860-865, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1112, 1122, 1200, 1208, 1252, 4909, 4934, 4946, 4948, 4953, 4960, 4970-4971, 5012, 5123, 8229, 9044, 9049, 9056, 9061, 9066, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 28709 |
| 9044 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1047, 1088, 1097, 1153, 1200, 1208, 1250, 1252, 1282, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5346, 8229, 8482, 8612, 9025, 9030, 9049, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 9048 | 867, 1200, 1208, 4899, 5351, 12712, 13488, 17584 |
| 9049 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 905, 912, 916, 920, 1025-1027, 1040-1043, 1088, 1097, 1155, 1200, 1208, 1252, 1254, 1281, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5350, 8229, 8482, 8612, 9025, 9030, 9044, 9061, 9066, 13121, 13488, 16804, 17584, 25473, 25479, 25617, 25619, 25664, 28709 |
| 9056 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 720, 819, 833, 838, 850, 864, 870-871, 875, 880, 905, 918, 1008, 1025-1027, 1046, 1089, 1097, 1127, 1200, 1208, 1252, 1256, 4386, 4929, 4934, 4946, 4960, 4971, 5104, 5123, 5142, 5352, 8229, 8482, 8612, 9025, 9030, 9238, 13121, 13488, 16804, 17248, 17584, 28709 |
| 9061 | 37, 256, 259, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 737, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252-1254, 1280, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5349, 8229, 9030, 9044, 9049, 9066, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 9066 | 37, 259, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1200, 1208, 1252, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 8229, 9030, 9044, 9049, 9061, 13488, 17584, 25473, 25479, 25617, 25619, 28709 |
| 9122 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 9124 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 9125 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 9127 | 935-936, 946, 1381, 1386, 1388, 5031, 5477, 5482, 5484, 13223, 25512 |
| 9131 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 9135 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 9142 | 937-938, 948, 950, 1370, 5033, 5046, 25514, 25524, 29620 |
| 9238 | 420, 500, 864, 1046, 1089, 1127, 1200, 1208, 1256, 4960, 5142, 5352, 8612, 9056, 13488, 16804, 17248, 17584 |
| 9555 | 933, 949, 1363-1364, 5029, 5045, 5460, 9125, 13221, 13651, 17317, 25525, 29621, 33717, 37813 |
| 12712 | 862, 867, 1148, 1156-1157, 1200, 1208, 4899, 5351, 9048, 13488, 17584 |
| 13121 | 37, 256, 273, 277-278, 280, 284-285, 290, 297, 367, 437, 500, 737, 775, 819, 833, 836, 850, 852, 855, 857, 860-865, 870-871, 891, 1009, 1025-1027, 1040-1043, 1088, 1112, 1122, 1126, 1200, 1208, 1252, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4960, 5123, 8229, 8482, 9025, 9044, 9049, 9056, 13488, 17248, 17584, 25617, 25619, 25664, 28709 |
| 13218 | 930-932, 939, 942-943, 1200, 1208, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13219, 13231, 13488, 17314, 17584, 25508, 25518, 29614, 33698-33700, 37796 |
| 13219 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218, 13231, 17314, 25508, 25518, 29614, 33698-33700, 37796 |
| 13221 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 13223 | 935-936, 946, 1381, 1386, 1388, 5031, 5477, 5482, 5484, 9127, 25512 |
| 13231 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 17314, 25508, 25518, 29614, 33698-33700, 37796 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 13488 | 37, 256, 259, 273, 275, 277-278, 280, 282, 284-285, 290, 293, 297, 300-301, 367, 420, 423-424, 437, 500, 720, 737, 775, 803, 806, 808, 813, 819, 833-838, 848-852, 855-872, 874-875, 878, 880, 891, 895-897, 901-905, 912, 914-916, 918, 920-924, 927-928, 930, 932-933, 935, 937, 939, 941-944, 946-951, 1004, 1006, 1008-1019, 1025-1027, 1040-1043, 1046-1047, 1051, 1088-1089, 1097-1098, 1112, 1114-1115, 1122-1126, 1129-1133, 1137, 1140-1149, 1153-1160, 1164, 1166, 1200, 1208, 1250-1258, 1275-1277, 1280-1285, 1351, 1362-1364, 1370-1371, 1380-1381, 1385-1386, 1388, 1390, 1399, 4899, 4909, 4930, 4933, 4948, 4951-4952, 4960, 4971, 5012, 5039, 5104, 5123, 5142, 5210, 5346-5354, 8482, 8612, 9027, 9030, 9044, 9048-9049, 9056, 9061, 9066, 9238, 12712, 13121, 13218, 16684, 16804, 17248, 17584, 21427, 28709 |
| 13651 | 933, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 17317, 25525, 29621, 33717, 37813 |
| 16684 | 300-301, 941, 1200, 1208, 1351, 4396, 8492, 13488, 17584 |
| 16804 | 37, 256, 420, 424, 437, 500, 720, 737, 775, 819, 850, 852, 857, 860-865, 1008, 1046, 1089, 1098, 1112, 1122, 1127, 1200, 1208, 1252, 1256, 4946, 4948, 4953, 4960, 5104, 5142, 5352, 8229, 8612, 9044, 9049, 9056, 9238, 13488, 17248, 17584, 28709 |
| 17248 | 37, 256, 259, 273, 277-278, 280, 284-285, 290, 297, 420, 423-424, 500, 720, 819, 833, 838, 850, 864, 870-871, 875, 880, 905, 918, 1008, 1025-1027, 1046, 1089, 1097, 1127, 1200, 1208, 1252, 1256, 4386, 4929, 4934, 4946, 4960, 4971, 5104, 5123, 5142, 5352, 8229, 8482, 8612, 9025, 9030, 9056, 9238, 13121, 13488, 16804, 17584, 28709 |
| 17314 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 25508, 25518, 29614, 33698-33700, 37796 |
| 17317 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13651, 25510, 25520, 25525, 29616, 29621, 33717, 37813 |
| 17584 | 37, 256, 259, 273, 275, 277-278, 280, 282, 284-285, 290, 293, 297, 300-301, 367, 420, 423-424, 437, 500, 720, 737, 775, 803, 806, 808, 813, 819, 833-838, 848-852, 855-872, 874-875, 878, 880, 891, 895-897, 901-905, 912, 914-916, 918, 920-924, 927-928, 930, 932-933, 935, 937, 939, 941-944, 946-951, 1004, 1006, 1008-1019, 1025-1027, 1040-1043, 1046-1047, 1051, 1088-1089, 1097-1098, 1112, 1114-1115, 1122-1126, 1129-1133, 1137, 1140-1149, 1153-1160, 1164, 1166, 1200, 1208, 1250-1258, 1275-1277, 1280-1285, 1351, 1362-1364, 1370-1371, 1380-1381, 1385-1386, 1388, 1390, 1399, 4899, 4909, 4930, 4933, 4948, 4951-4952, 4960, 4971, 5012, 5039, 5104, 5123, 5142, 5210, 5346-5354, 8482, 8612, 9027, 9030, 9044, 9048-9049, 9056, 9061, 9066, 9238, 12712, 13121, 13218, 13488, 16684, 16804, 17248, 21427, 28709 |
| 21427 | 835, 927, 947, 1200, 1208, 4931, 9027, 13488, 17584 |
| 25473 | 37, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 813, 819, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1252, 4386, 4909, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 8229, 8482, 9030, 9044, 9049, 9061, 9066, 25479, 25617, 25619, 28709 |

| *Table 571. IBM MQ for z/OS CCSID conversion support (continued)* | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 25479 | 37, 273, 277-278, 280, 284-285, 297, 423, 437, 500, 813, 819, 836, 838, 850, 852, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 920, 1025-1027, 1041-1043, 1115, 1252, 4909, 4932, 4934, 4946, 4948, 4953, 4970-4971, 5012, 5123, 5211, 8229, 9030, 9044, 9049, 9061, 9066, 25473, 25617, 25619, 28709 |
| 25480 | 37, 500, 904, 1114, 5210, 8229, 28709 |
| 25508 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25518, 29614, 33698-33700, 37796 |
| 25510 | 933-934, 949, 5029, 5045, 5460, 9125, 13221, 17317, 25525, 29621, 33717, 37813 |
| 25512 | 935-936, 946, 1381, 5031, 5477, 5484, 9127, 13223 |
| 25514 | 937-938, 950, 1370, 5033, 5046, 9142 |
| 25518 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 29614, 33698-33700, 37796 |
| 25520 | 933, 944, 949, 5029, 5045, 5460, 9125, 13221, 17317, 25525, 29616, 29621, 33717, 37813 |
| 25524 | 937, 948, 950, 1370, 5033, 5046, 9142, 29620 |
| 25525 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 29616, 29621, 33717, 37813 |
| 25617 | 37, 273, 277-278, 280, 284-285, 290, 297, 367, 423, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 895-897, 903, 912, 916, 1025-1027, 1040-1043, 1088, 1252, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 4992, 5012, 5123, 8229, 8482, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 25473, 25479, 25619, 25664, 28709 |
| 25619 | 37, 273, 277-278, 280, 284-285, 290, 297, 423, 437, 500, 813, 819, 833, 836, 838, 850, 852, 855, 857, 860-861, 863, 869-871, 874-875, 880, 897, 903, 912, 916, 1025-1027, 1040-1043, 1088, 1114, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4970-4971, 5012, 5123, 5210, 8229, 8482, 9025, 9030, 9044, 9049, 9061, 9066, 13121, 25473, 25479, 25617, 25664, 28709 |
| 25664 | 37, 273, 277-278, 280, 284-285, 290, 297, 367, 500, 819, 833, 836, 850, 852, 855, 857, 870-871, 875, 891, 1025-1027, 1040-1043, 1088, 1126, 4386, 4929, 4932, 4946, 4948, 4951, 4953, 4971, 5123, 8229, 8482, 9025, 9044, 9049, 13121, 25617, 25619, 28709 |

| Table 571. IBM MQ for z/OS CCSID conversion support (continued) | |
|---|---|
| **CCSID** | **Converts to and from CCSIDS** |
| 28709 | 37, 256, 273, 275, 277-278, 280, 284-285, 290, 297, 367, 420, 423-424, 437, 500, 720, 737, 775, 813, 819, 833, 836, 838, 850, 852, 855, 857-858, 860-866, 869-871, 874-875, 880, 897, 903-905, 912, 914-916, 920-924, 1009, 1025-1027, 1040-1043, 1047, 1051, 1088, 1097, 1100, 1112, 1114-1115, 1122, 1124, 1126, 1130-1132, 1137, 1140-1149, 1200, 1208, 1250-1255, 1257-1258, 1275, 1280-1281, 1283, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 5012, 5123, 5210-5211, 5346, 5348, 8229, 8482, 8612, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 16804, 17248, 17584, 25473, 25479, 25480, 25617, 25619, 25664 |
| 29614 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 33698-33700, 37796 |
| 29616 | 933, 944, 949, 5029, 5045, 5460, 9125, 13221, 17317, 25520, 25525, 29621, 33717, 37813 |
| 29620 | 937, 948, 950, 1370, 5033, 5046, 9142, 25524 |
| 29621 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 33717, 37813 |
| 33698 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33699-33700, 37796 |
| 33699 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698, 33700, 37796 |
| 33700 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33699, 37796 |
| 33717 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 37813 |
| 37796 | 930-932, 939, 942-943, 1390, 1399, 5026, 5028, 5035, 5038-5039, 9122, 9124, 9131, 9135, 13218-13219, 13231, 17314, 25508, 25518, 29614, 33698-33700 |
| 37813 | 933-934, 944, 949, 1363-1364, 5029, 5045, 5460, 9125, 9555, 13221, 13651, 17317, 25510, 25520, 25525, 29616, 29621, 33717 |

## IBM i conversion support

A full list of CCSIDs, and conversions supported by IBM i, can be found in the appropriate IBM i publication.

The supported code pages are listed in Supported CCSID mappings.

## Unicode conversion support

Some platforms support the conversion of user data to or from Unicode encoding. The two forms of Unicode encoding supported are UCS-2 (CCSIDs 1200, 13488, and 17584) and UTF-8 (CCSID 1208).

The term *UCS-2* is often used interchangeably but incorrectly with *UTF-16*. UCS-2 is a fixed-width encoding where each character occupies 2 bytes. UTF-16 is variable-width encoding that is a superset of

UCS-2. In addition to the 2-byte UCS-2 characters, UTF-16 contains characters, known as surrogate pairs, that are 4 bytes in length. IBM MQ does not support surrogate pairs. The support for UTF-16 and UTF-8 in IBM MQ is therefore limited to those Unicode characters that can be encoded in UCS-2.

**Note:** IBM MQ does not support UCS-2 queue manager CCSIDs so message header data cannot be encoded in UCS-2.

### IBM MQ AIX support for Unicode

On IBM MQ for AIX conversion to and from Unicode CCSIDs is supported for the CCSIDs in the following table.

| | | | | | |
|---|---|---|---|---|---|
| 037 | 273 | 278 | 280 | 284 | 285 |
| 297 | 423 | 437 | 500 | 813 | 819 |
| 850 | 852 | 856 | 857 | 858 | 860 |
| 861 | 865 | 867 | 869 | 875 | 878 |
| 880 | 901 | 902 | 912 | 915 | 916 |
| 920 | 923 | 924 | 932 | 933 | 935 |
| 937 | 938 | 939 | 942 | 943 | 948 |
| 949 | 950 | 954 | 964 | 970 | 1026 |
| 1046 | 1089 | 1129 | 1130 | 1131 | 1132 |
| 1133 | 1140 | 1141 | 1142 | 1143 | 1144 |
| 1145 | 1146 | 1147 | 1148 | 1149 | 1200 |
| 1153 | 1156 | 1157 | 1208 | 1250 | 1251 |
| 1253 | 1254 | 1258 | 1280 | 1281 | 1282 |
| 1283 | 1284 | 1285 | 1363 | 1364 | 1381 |
| 1383 | 1386 | 1388 | 4899 | 5026 | 5035 |
| 5050 | 5346 | 5347 | 5348 | 5349 | 5350 |
| 5351 | 5352 | 5353 | 5354 | 5488 | 9044 |
| 9048 | 9449 | 12712 | 13488 | 17584 | 33722 |

### IBM MQ HP-UX support for Unicode

On IBM MQ for HP-UX conversion to and from Unicode CCSIDs is supported for the CCSIDs listed in the following table.

| | | | | | |
|---|---|---|---|---|---|
| 437 | 737 | 813 | 819 | 850 | 852 |
| 855 | 857 | 861 | 864 | 865 | 866 |
| 869 | 874 | 912 | 915 | 916 | 920 |
| 932 | 938 | 950 | 954 | 964 | 970 |
| 1051 | 1089 | 1140 | 1141 | 1142 | 1143 |
| 1144 | 1145 | 1146 | 1147 | 1148 | 1149 |
| 1200 | 1208 | 1250 | 1251 | 1252 | 1253 |
| 1254 | 1255 | 1256 | 1257 | 1258 | 1381 |
| 5050 | 5488 | 13488 | 33722 | | |

### IBM MQ for Windows, Solaris, and Linux support for Unicode

On IBM MQ for Windows, IBM MQ for Solaris, and IBM MQ for Linux conversion to, and from, Unicode CCSIDs is supported for the CCSIDs in the following table.

| | | | | | |
|---|---|---|---|---|---|
| 037 | 277 | 278 | 280 | 284 | 285 |
| 290 | 297 | 300 | 301 | 420 | 424 |
| 437 | 500 | 813 | 819 | 833 | 835 |
| 836 | 837 | 838 | 850 | 852 | 855 |
| 856 | 857 | 858 | 860 | 861 | 862 |
| 863 | 864 | 865 | 866 | 867 | 868 |
| 869 | 870 | 871 | 874 | 875 | 878 |
| 880 | 891 | 897 | 901 | 902 | 903 |
| 904 | 912 | 913 (5) | 915 | 916 | 918 |
| 920 | 921 | 922 | 923 | 924 | 927 |
| 928 | 930 | 931 (1) | 932 (2) | 933 | 935 |
| 937 | 938 (3) | 939 | 941 | 942 | 943 |
| 947 | 948 | 949 | 950 | 951 | 954 (4) |
| 964 | 970 | 1006 | 1025 | 1026 | 1027 |
| 1040 | 1041 | 1042 | 1043 | 1046 | 1047 |
| 1051 | 1088 | 1089 | 1097 | 1098 | 1112 |
| 1114 | 1115 | 1122 | 1123 | 1124 | 1129 |
| 1130 | 1132 | 1133 | 1140 | 1141 | 1142 |
| 1143 | 1144 | 1145 | 1146 | 1147 | 1148 |
| 1149 | 1153 | 1156 | 1157 | 1200 | 1208 |
| 1250 | 1251 | 1252 | 1253 | 1254 | 1255 |
| 1256 | 1257 | 1258 | 1275 | 1280 | 1281 |
| 1282 | 1283 | 1363 | 1364 | 1380 | 1381 |
| 1383 | 1386 | 1388 | 4899 | 5050 | 5346 |
| 5347 | 5348 | 5349 | 5350 | 5351 | 5352 |
| 5353 | 5354 | 5488 (5) | 9044 | 9048 | 9449 |
| 12712 | 13488 | 17584 | 33722 (4) | | |

**Notes:**

1. 931 uses 939 for conversion.
2. 932 uses 942 for conversion.
3. 938 uses 948 for conversion.
4. 954 and 33722 use 5050 for conversion.
5. On Windows, Linux, and Solaris only.

### IBM i support for Unicode

For details on UNICODE support refer to the appropriate IBM i publication relating to your operating system.

### IBM MQ for z/OS support for Unicode

On IBM MQ for z/OS conversion to and from the Unicode CCSIDs is supported for the following CCSIDs:

| | | | | | |
|---|---|---|---|---|---|
| 37 | 256 | 259 | 273 | 275 | 277 |
| 278 | 280 | 282 | 284 | 285 | 290 |
| 293 | 297 | 300 | 301 | 367 | 420 |
| 423 | 424 | 437 | 500 | 720 | 737 |
| 775 | 803 | 806 | 808 | 813 | 819 |
| 833 | 834 | 835 | 836 | 837 | 838 |
| 848 | 849 | 850 | 851 | 852 | 855 |
| 856 | 857 | 858 | 859 | 860 | 861 |
| 862 | 863 | 864 | 865 | 866 | 867 |
| 868 | 869 | 870 | 871 | 872 | 874 |
| 875 | 878 | 880 | 891 | 895 | 896 |
| 897 | 901 | 902 | 903 | 904 | 905 |
| 912 | 914 | 915 | 916 | 918 | 920 |
| 921 | 922 | 923 | 924 | 927 | 928 |
| 930 | 932 | 933 | 935 | 937 | 939 |
| 941 | 942 | 943 | 944 | 946 | 947 |
| 948 | 949 | 950 | 951 | 1004 | 1006 |
| 1008 | 1009 | 1010 | 1011 | 1012 | 1013 |
| 1014 | 1015 | 1016 | 1017 | 1018 | 1019 |
| 1025 | 1026 | 1027 | 1040 | 1041 | 1042 |
| 1043 | 1046 | 1047 | 1051 | 1088 | 1089 |
| 1097 | 1098 | 1112 | 1114 | 1115 | 1122 |
| 1123 | 1124 | 1125 | 1126 | 1129 | 1130 |
| 1131 | 1132 | 1133 | 1137 | 1140 | 1141 |
| 1142 | 1143 | 1144 | 1145 | 1146 | 1147 |
| 1148 | 1149 | 1153 | 1154 | 1155 | 1156 |
| 1157 | 1158 | 1159 | 1160 | 1161 | 1162 |
| 1164 | 1200 | 1208 | 1250 | 1251 | 1252 |
| 1253 | 1254 | 1255 | 1256 | 1257 | 1258 |
| 1275 | 1276 | 1277 | 1280 | 1281 | 1282 |
| 1283 | 1284 | 1285 | 1351 | 1362 | 1363 |
| 1364 | 1370 | 1371 | 1380 | 1381 | 1385 |
| 1386 | 1388 | 1390 | 1399 | 4899 | 4909 |

| | | | | | |
|---|---|---|---|---|---|
| 4930 | 4933 | 4948 | 4951 | 4952 | 4960 |
| 4971 | 5012 | 5039 | 5104 | 5123 | 5142 |
| 5210 | 5346 | 5347 | 5348 | 5349 | 5350 |
| 5351 | 5352 | 5353 | 5354 | 5488 | 8482 |
| 8612 | 9027 | 9030 | 9044 | 9048 | 9049 |
| 9056 | 9061 | 9066 | 9238 | 9449 | 1166 |
| 12712 | 13121 | 13218 | 13488 | 16684 | 16804 |
| 17248 | 17584 | 21427 | 28709 | | |

# Coding standards on 64-bit platforms

Use this information to learn about coding standards on 64-bit platforms and the preferred data types.

## Preferred data types

These types never change size and are available on both 32-bit and 64-bit IBM MQ platforms:

| Name | Length |
|---|---|
| MQLONG | 4 bytes |
| MQULONG | 4 bytes |
| MQINT32 | 4 bytes |
| MQUINT32 | 4 bytes |
| MQINT64 | 8 bytes |
| MQUINT64 | 8 bytes |

## Standard data types

Learn about standard data types on 32-bit UNIX, 64-bit UNIX, and 64-bit Windows applications.

### 32-bit UNIX applications

This section is included for comparison and is based on Solaris. Any differences with other UNIX platforms are noted:

| Name | Length |
|---|---|
| char | 1 byte |
| short | 2 bytes |
| int | 4 bytes |
| long | 4 bytes |
| float | 4 bytes |
| double | 8 bytes |
| long double | 16 bytes<br>Note that on AIX and Linux PPC a long double is 8 bytes. |
| pointer | 4 bytes |
| ptrdiff_t | 4 bytes |

| Name | Length |
|---|---|
| size_t | 4 bytes |
| time_t | 4 bytes |
| clock_t | 4 bytes |
| wchar_t | 4 bytes |
| | Note that on AIX a wchar_t is 2 bytes. |

## 64-bit UNIX applications

This section is based on Solaris. Any differences with other UNIX platforms are noted:

| Name | Length |
|---|---|
| char | 1 byte |
| short | 2 bytes |
| int | 4 bytes |
| long | 8 bytes |
| float | 4 bytes |
| double | 8 bytes |
| long double | 16 bytes |
| | Note that on AIX and Linux PPC a long double is 8 bytes. |
| pointer | 8 bytes |
| ptrdiff_t | 8 bytes |
| size_t | 8 bytes |
| time_t | 8 bytes |
| clock_t | 8 bytes |
| | Note that on the other UNIX platforms a clock_t is 4 bytes. |
| wchar_t | 4 bytes |
| | Note that on AIX a wchar_t is 2 bytes. |

## Windows 64-bit applications

| Name | Length |
|---|---|
| char | 1 byte |
| short | 2 bytes |
| int | 4 bytes |
| long | 4 bytes |
| float | 4 bytes |
| double | 8 bytes |
| long double | 8 bytes |

| Name | Length |
|---|---|
| pointer | 8 bytes<br>Note that all pointers are 8 bytes. |
| ptrdiff_t | 8 bytes |
| size_t | 8 bytes |
| time_t | 8 bytes |
| clock_t | 4 bytes |
| wchar_t | 2 bytes |
| WORD | 2 bytes |
| DWORD | 4 bytes |
| HANDLE | 8 bytes |
| HFILE | 4 bytes |

## Coding considerations on Windows

**HANDLE hf;**

Use

```
hf = CreateFile((LPCTSTR) FileName,
                Access,
                ShareMode,
                xihSecAttsNTRestrict,
                Create,
                AttrAndFlags,
                NULL);
```

Do not use

```
HFILE hf;
hf = (HFILE) CreateFile((LPCTSTR) FileName,
                        Access,
                        ShareMode,
                        xihSecAttsNTRestrict,
                        Create,
                        AttrAndFlags,
                        NULL);
```

as this produces an error.

**size_t len fgets**

Use

```
size_t len
while (fgets(string1, (int) len, fp) != NULL)
len = strlen(buffer);
```

Do not use

```
int len;

while (fgets(string1, len, fp) != NULL)
len = strlen(buffer);
```

**printf**

Use

```
printf("My struc pointer: %p", pMyStruc);
```

Do not use

```
printf("My struc pointer: %x", pMyStruc);
```

If you need hexadecimal output, you have to print the upper and lower 4 bytes separately.

**char *ptr**

Use

```
char * ptr1;
char * ptr2;
size_t bufLen;

bufLen = ptr2 - ptr1;
```

Do not use

```
char *ptr1;
char *ptr2;
UINT32 bufLen;

bufLen = ptr2 - ptr1;
```

**alignBytes**

Use

```
alignBytes = (unsigned short) ((size_t) address % 16);
```

Do not use

```
void *address;
unsigned short alignBytes;

alignBytes = (unsigned short) ((UINT32) address % 16);
```

**len**

Use

```
len = (UINT32) ((char *) address2 - (char *) address1);
```

Do not use

```
void *address1;
void *address2;
UINT32 len;

len = (UINT32) ((char *) address2 - (char *) address1);
```

**sscanf**

Use

```
MQLONG SBCSprt;

sscanf(line, "%d", &SBCSprt);
```

Do not use

```
MQLONG SBCSprt;
sscanf(line, "%1d", &SBCSprt);
```

%1d tries to put an 8-byte type into a 4-byte type; only use %1 if you are dealing with an actual long data type. MQLONG, UINT32 and INT32 are defined to be four bytes, the same as an int on all IBM MQ platforms:

# IBM i IBM i Application Programming Reference (ILE/RPG)

Application programming for IBM i

Use the following topics to help you develop applications for IBM i:


- "Data type descriptions" on page 967
- "Function calls" on page 1216
- "Attributes of objects" on page 1335
- "Applications" on page 1380
- "Return codes for IBM i (ILE RPG)" on page 1392
- "Rules for validating MQI options for IBM i (ILE RPG)" on page 1394
- "Machine encodings on IBM i" on page 1396
- "Report options and message flags" on page 1399


## Compatibility mode for RPG applications on IBM i

This mode of operation was needed for applications that are written before MQSeries Version 5.1. Subsequent versions of the product provide a compatible runtime environment for these applications, even though the copybooks needed for compiling them were removed in IBM WebSphere MQ 6.0. Although dynamic linkage (compatibility mode) is provided in library QMQM for versions of the product after MQSeries Version 5.1, applications that use this compatibility mode of operation, need to be recompiled to use the static bound MQ calls that are provided by the LIBMQM and LIBMQM_R service programs, instead.

**Related tasks**

Developing applications

# Data type descriptions

This collection of topics provides descriptions of data types used in IBM i programming.

## Conventions used in the description of data types

For each elementary data type, this information gives a description of its usage, in a form that is independent of the programming language. This is followed by typical declarations in the ILE version of the RPG programming language. The definitions of elementary data types are included here to provide consistency. RPG uses 'D' specifications where working fields can be declared using whatever attributes you need. You can, however, do this in the calculation specifications where the field is used.

To use the elementary data types, you create:

- A /COPY member containing all the data types, or
- An external data structure (PF) containing all the data types. You then need to specify your working fields with attributes 'LIKE' the appropriate data type field.

The benefits of the second option are that the definitions can be used as a 'FIELD REFERENCE FILE' for other IBM i objects. If an IBM MQ data type definition changes, it is a relatively simple matter to re-create these objects.

## Elementary data types

All of the other data types described in this section equate either directly to these elementary data types, or to aggregates of these elementary data types (arrays or structures).

*Table 572. Elementary data types*

| Data type | Representation |
|---|---|
| MQBOOL | 10-digit signed integer |
| MQBYTE | 1-byte alphanumeric field |
| MQBYTE16 | 16-byte alphanumeric field |
| MQBYTE24 | 24-byte alphanumeric field |
| MQBYTE32 | 32-byte alphanumeric field |
| MQBYTE64 | 64-byte alphanumeric field |
| MQCHAR | 1-byte alphanumeric field |
| MQCHAR4 | 4-byte alphanumeric field |
| MQCHAR8 | 8-byte alphanumeric field |
| MQCHAR12 | 12-byte alphanumeric field |
| MQCHAR16 | 16-byte alphanumeric field |
| MQCHAR20 | 20-byte alphanumeric field |
| MQCHAR28 | 28-byte alphanumeric field |
| MQCHAR32 | 32-byte alphanumeric field |
| MQCHAR48 | 48-byte alphanumeric field |
| MQCHAR64 | 64-byte alphanumeric field |
| MQCHAR128 | 128-byte alphanumeric field |
| MQCHAR256 | 256-byte alphanumeric field |
| MQFLOAT32 | 4-byte floating-point number |
| MQFLOAT64 | 8-byte floating-point number |
| MQHCONFIG | Configuration handle |
| MQHCONN | 10-digit signed integer |
| MQHMSG | Message handle that gives access to a message |
| MQHOBJ | 10-digit signed integer |
| MQINT8 | 8-bit signed integer |
| MQINT16 | 16-bit signed integer |
| MQINT32 | 32-bit signed integer |
| MQINT64 | 64-bit signed integer |
| MQLONG | 32-bit signed integer |
| MQPID | Process identifier |
| MQPTR | Pointer |

| *Table 572. Elementary data types (continued)* | |
|---|---|
| **Data type** | **Representation** |
| MQTID | Thread identifier |
| MQUINT8 | 8-bit unsigned integer |
| MQUINT16 | 16-bit unsigned integer |
| MQUINT32 | 32-bit unsigned integer |
| MQUINT64 | 64-bit unsigned integer |
| MQULONG | 32-bit unsigned integer |
| PMQACH | Pointer to a data structure of type MQACH |
| PMQAIR | Pointer to a data structure of type MQAIR |
| PMQAXC | Pointer to a data structure of type MQAXC |
| PMAXP | Pointer to a data structure of type MAXP |
| PMQBMHO | Pointer to a data structure of type MQBMHO |
| PMQBO | Pointer to a data structure of type MQBO |
| PMQBOOL | Pointer to data of type MQBOOL |
| PMQBYTE | Pointer to data of type MQBYTE |
| PMQBYTEn | Pointer to data of type MQBYTEn |
| PMQCBC | Pointer to a data structure of type MQCBC |
| PMQCBD | Pointer to a data structure of type MQCBD |
| PMQCHAR | Pointer to a data structure of type MQCHAR |
| PMQCHARV | Pointer to a data structure of type MQCHARV |
| PMQCHARn | Pointer to data of type MQCHARn |
| PMQCIH | Pointer to a data structure of type MQCIH |
| PMQCMHO | Pointer to a data structure of type MQCMHO |
| PMQCNO | Pointer to a data structure of type MQCNO |
| PMQCSP | Pointer to a data structure of type MQCSP |
| PMQCTLO | Pointer to a data structure of type MQCTLO |
| PMQDH | Pointer to a data structure of type MQDH |
| PMQDHO | Pointer to a data structure of type MQDHO |
| PMQDLH | Pointer to a data structure of type MQDLH |
| PMQDMHO | Pointer to a data structure of type MQDMHO |
| PMQDMPO | Pointer to a data structure of type MQDMPO |
| PMQEPH | Pointer to a data structure of type MQEPH |
| PMQFLOAT32 | Pointer to data of type MQFLOAT32 |
| PMQFLOAT64 | Pointer to data of type MQFLOAT64 |
| PMQFUNC | Pointer to a function |

*Table 572. Elementary data types (continued)*

| Data type | Representation |
|---|---|
| PMQGMO | Pointer to a data structure of type MQGMO |
| PMQHCONFIG | Pointer to data of type MQHCONFIG |
| PMQHCONN | Pointer to data of type MQHCONN |
| PMQHMSG | Pointer to data of type MQHMSG |
| PMQHOBJ | Pointer to data of type MQHOBJ |
| PMQIIH | Pointer to a data structure of type MQIIH |
| PMQIMPO | Pointer to a data structure of type MQIMPO |
| PMQINT8 | Pointer to data of type MQINT8 |
| PMQINT16 | Pointer to data of type MQINT16 |
| PMQINT32 | Pointer to data of type MQINT32 |
| PMQINT64 | Pointer to data of type MQINT64 |
| PMQLONG | Pointer to data of type MQLONG |
| PMQMD | Pointer to a data structure of type MQMD |
| PMQMDE | Pointer to a data structure of type MQMDE |
| PMQMD1 | Pointer to a data structure of type MQMD1 |
| PMQMD2 | Pointer to a data structure of type MQMD2 |
| PMQMHBO | Pointer to a data structure of type MQMHBO |
| PMQOD | Pointer to a data structure of type MQOD |
| PMQOR | Pointer to a data structure of type MQOR |
| PMQPD | Pointer to a data structure of type MQPD |
| PMQPID | Pointer to a process identifier MQPID |
| PMQPMO | Pointer to a data structure of type MQPMO |
| PMQPTR | Pointer to data of type MQPTR |
| PMQRFH | Pointer to a data structure of type MQRFH |
| PMQRFH2 | Pointer to a data structure of type MQRFH2 |
| PMQRMH | Pointer to a data structure of type MQRMH |
| PMQRR | Pointer to a data structure of type MQRR |
| PMQSCO | Pointer to a data structure of type MQSCO |
| PMQSD | Pointer to a data structure of type MQSD |
| PMQSMPO | Pointer to a data structure of type MQSMPO |
| PMQSRO | Pointer to a data structure of type MQSRO |
| PMQSTS | Pointer to a data structure of type MQSTS |
| PMQTID | Pointer to a thread identifier MQTID |
| PMQTM | Pointer to a data structure of type MQTM |

| Table 572. Elementary data types (continued) | |
|---|---|
| **Data type** | **Representation** |
| PMQTMC2 | Pointer to a data structure of type MQTMC2 |
| PMQUINT8 | Pointer to data of type MQUINT8 |
| PMQUINT16 | Pointer to data of type MQUINT16 |
| PMQUINT32 | Pointer to data of type MQUINT32 |
| PMQUINT64 | Pointer to data of type MQUINT64 |
| PMQULONG | Pointer to data of type MQULONG |
| PMQVOID | Pointer |
| PMQWIH | Pointer to a data structure of type MQWIH |
| PMQXQH | Pointer to a data structure of type MQXQH |

### *MQBOOL*

The MQBOOL data type represents a boolean value. The value 0 represents false. Any other value represents true.

An MQBOOL must be aligned as for the MQLONG data type.

### *MQBYTE - Byte*

The MQBYTE data type represents a single byte of data.

No particular interpretation is placed on the byte-it is treated as a string of bits, and not as a binary number or character. No special alignment is required.

An array of MQBYTE is sometimes used to represent an area of main storage with a nature that is not known to the queue manager. For example, the area might contain application message data or a structure. The boundary alignment of this area must be compatible with the nature of the data contained within it.

### *MQBYTEn - String of n bytes*

Each MQBYTEn data type represents a string of *n* bytes.

Where *n* can take one of the following values:

- 16, 24, 32, or 64.

Each byte is described by the MQBYTE data type. No special alignment is required.

If the data in the string is shorter than the defined length of the string, the data must be padded with nulls to fill the string.

When the queue manager returns byte strings to the application (for example, on the MQGET call), the queue manager always pads with nulls to the defined length of the string.

Constants are available that define the lengths of byte string fields.

### *MQCHAR - character*

The MQCHAR data type represents a single character.

The coded character set identifier of the character is that of the queue manager (see the *CodedCharSetId* attribute in topic CodedCharSetId ). No special alignment is required.

**Note:** Application message data specified on the MQGET, MQPUT, and MQPUT1 calls is described by the MQBYTE data type, not the MQCHAR data type.

### *MQCHARn - String of n characters*

Each MQCHARn data type represents a string of *n* characters.

Where *n* can take one of the following values:

- 4, 8, 12, 16, 20, 28, 32, 48, 64, 128, or 256

Each character is described by the MQCHAR data type. No special alignment is required.

If the data in the string is shorter than the defined length of the string, the data must be padded with blanks to fill the string. In some cases a null character can be used to end the string prematurely, instead of padding with blanks; the null character and characters following it are treated as blanks, up to the defined length of the string. The places where a null can be used are identified in the call and data type descriptions.

When the queue manager returns character strings to the application (for example, on the MQGET call), the queue manager always pads with blanks to the defined length of the string; the queue manager does not use the null character to delimit the string.

Constants are available that define the lengths of character string fields.

### *MQFLOAT32*

The MQFLOAT32 data type is a 32-bit floating-point number represented using the standard IEEE floating-point format.

An MQFLOAT32 must be aligned on a 4-byte boundary.

### *MQFLOAT64*

The MQFLOAT64 data type is a 64-bit floating-point number represented using the standard IEEE floating-point format.

An MQFLOAT64 must be aligned on an 8-byte boundary.

### *MQHCONFIG - configuration handle*

The MQHCONFIG data type represents a configuration handle, that is, the component that is being configured for a particular installable service. A configuration handle must be aligned on its natural boundary.

**Note:** Applications must test variables of this type for equality only.

### *MQHCONN - Connection handle*

The MQHCONN data type represents a connection handle, that is, the connection to a particular queue manager.

A connection handle must be aligned on its natural boundary.

**Note:** Applications must test variables of this type for equality only.

### *MQHMSG - Message handle*

The **MQHMSG** data type represents a message handle that gives access to a message.

A message handle must be aligned on an 8-byte boundary.

**Note:** Applications must test variables of this type for equality only.

### *MQHOBJ - Object handle*

The MQHOBJ data type represents an object handle that gives access to an object.

An object handle must be aligned on its natural boundary.

**Note:** Applications must test variables of this type for equality only.

### *MQINT8 - 8-bit signed integer*
The MQINT8 data type is an 8-bit signed integer that can take any value in the range -128 to +127, unless otherwise restricted by the context.

### *MQINT16 - 16-bit signed integer*
The MQINT16 data type is a 16-bit signed integer that can take any value in the range -32 768 to +32 767, unless otherwise restricted by the context.

An MQINT16 must be aligned on a 2-byte boundary.

### *MQINT32 - 32-bit integer*
The MQINT32 data type is a 32-bit signed integer.

It is equivalent to MQLONG.

### *MQINT64 - 64-bit integer*
The MQINT64 data type is a 64-bit signed integer that can take any value in the range -9 223 372 036 854 775 808 through +9 223 372 036 854 775 807, unless otherwise restricted by the context.

For COBOL, the valid range is limited to -999 999 999 999 999 999 through +999 999 999 999 999 999. An MQINT64 should be aligned on an 8-byte boundary.

### *MQLONG - Long integer*
The MQLONG data type is a 32-bit signed binary integer that can take any value in the range -2 147 483 648 through +2 147 483 647, unless otherwise restricted by the context, aligned on its natural boundary.

### *MQPID - process identifier*
The IBM MQ process identifier.

This is the same identifier used in IBM MQ trace and FFST dumps, but might be different from the operating system process identifier.

### *MQPTR - pointer*
The MQPTR data type is the address of data of any type. A pointer must be aligned on its natural boundary; this is a 16-byte boundary on IBM i.

Some programming languages support typed pointers; the MQI also uses these in a few cases.

### *MQTID - thread identifier*
The MQ thread identifier.

This is the same identifier used in MQ trace and FFST dumps, but might be different from the operating system thread identifier.

### *MQUINT8 - 8-bit unsigned integer*
The MQUINT8 data type is an 8-bit unsigned integer that can take any value in the range 0 to +255, unless otherwise restricted by the context.

### *MQUINT16 - 16-bit unsigned integer*
The MQUINT16 data type is a 16-bit unsigned integer that can take any value in the range 0 through +65 535, unless otherwise restricted by the context.

An MQUINT16 must be aligned on a 2-byte boundary.

### *MQUINT32 - 32-bit unsigned integer*

The MQUINT32 data type is a 32-bit unsigned integer. It is equivalent to MQULONG.

### *MQUINT64 - 64-bit unsigned integer*

The MQUINT64 data type is a 64-bit unsigned integer that can take any value in the range 0 through +18 446 744 073 709 551 615 unless otherwise restricted by the context.

For COBOL, the valid range is limited to 0 through +999 999 999 999 999 999. An MQUINT64 should be aligned on a 8-byte boundary.

### *MQULONG - 32-bit unsigned integer*

The MQULONG data type is a 32-bit unsigned binary integer that can take any value in the range 0 through +4 294 967 294, unless otherwise restricted by the context.

An MQULONG must be aligned on a 4-byte boundary.

### *PMQACH - pointer to a data structure of type MQACH*

A pointer to a data structure of type MQACH.

### *PMQAIR - pointer to a data structure of type MQAIR*

A pointer to a data structure of type MQAIR.

### *PMQAXC - pointer to a data structure of type MQAXC*

A pointer to a data structure of type MQAXC.

### *PMQAXP - pointer to a data structure of type MQAXP*

A pointer to a data structure of type MQAXP.

### *PMQBMHO - pointer to a data structure of type MQBMHO*

A pointer to a data structure of type MQBMHO.

### *PMQBO - pointer to a data structure of type MQBO*

A pointer to a data structure of type MQBO.

### *PMQBOOL - pointer to data of type MQBOOL*

A pointer to data of type MQBOOL.

A pointer to data of type MQBOOL.

### *PMQBYTE - pointer to a data type of MQBYTE*

A pointer to a data type of MQBYTE.

### *PMQBYTEn - pointer to a data structure of type MQBYTEn*

A pointer to a data structure of type MQBYTEn, where n can be 8, 12, 16, 24, 32, 40, 48 or 128.

***PMQCBC - pointer to a data structure of type MQCBC***
A pointer to a data structure of type MQCBC.

***PMQCBD - pointer to a data structure of type MQCBD***
A pointer to a data structure of type MQCBD.

***PMQCHAR - pointer to data of type MQCHAR***
A pointer to data of type MQCHAR.

***PMQCHARV - pointer to a data structure of type MQCHARV***
A pointer to a data structure of type MQCHARV.

***PMQCHARn - pointer to a data type of MQCHARn***
A pointer to a data type of MQCHARn, where n can be 4, 8, 12, 20, 28, 32, 64, 128, 256, 264.

***PMQCIH - pointer to a data structure of type of MQCIH***
A pointer to a data structure of type of MQCIH.

***PMQCMHO - pointer to a data structure of type MQCMHO***
A pointer to a data structure of type MQCMHO.

***PMQCNO - pointer to a data structure of type of MQCNO***
A pointer to a data structure of type of MQCNO.

***PMQCSP - pointer to a data structure of type MQCSP***
A pointer to a data structure of type MQCSP.

***PMQCTLO - pointer to a data structure of type MQCTLO***
A pointer to a data structure of type MQCTLO.

***PMQDH - pointer to a data structure of type MQDH***
A pointer to a data structure of type MQDH.

***PMQDHO - pointer to a data structure of type MQDHO***
A pointer to a data structure of type MQDHO.

***PMQDLH - pointer to a data structure of type of MQDLH***
A pointer to a data structure of type of MQDLH.

***PMQDMHO - pointer to a data structure of type MQDMHO***
A pointer to a data structure of type MQDMHO.

***PMQDMPO - pointer to a data structure of type MQDMPO***
A pointer to a data structure of type MQDMPO.

A pointer to a data structure of type MQDMPO.

***PMQEPH - pointer to a data structure of type MQEPH***
A pointer to a data structure of type MQEPH.

***PMQFLOAT32 - pointer to data of type MQFLOAT32***
A pointer to data of type MQFLOAT32.

***PMQFLOAT64 - pointer to data of type MQFLOAT64***
A pointer to data of type MQFLOAT64.

***PMQFUNC - pointer to a function***
A pointer to a function.

***PMQGMO - pointer to a data structure of type MQGMO***
A pointer to a data structure of type MQGMO.

***PMQHCONFIG - pointer to a data type of MQHCONFIG***
A pointer to a data type of MQHCONFIG.

***PMQHCONN - pointer to a data type of MQHCONN***
A pointer to a data type of MQHCONN.

***PMQHMSG - pointer to a data type of MQHMSG***
A pointer to a data type of MQHMSG.

***PMQHOBJ - pointer to data of type MQHOBJ***
A pointer to data of type MQSMPO.

### *PMQIIH - pointer to a data structure of type MQIIH*
A pointer to a data structure of type MQIIH.

### *PMQIMPO - pointer to a data structure of type MQIMPO*
A pointer to a data structure of type MQIMPO.

### *PMQINT8 - pointer to data of type MQINT8*
A pointer to data of type MQINT8.

### *PMQINT16 - pointer to data of type MQINT16*
A pointer to data of type MQINT16.

### *PMQINT32 - Pointer to data of type MQINT32*
The PMQINT32 data type is a pointer to data of type MQINT32. It is equivalent to PMQLONG.

### *PMQINT64 - Pointer to data of type MQINT64*
The PMQINT64 data type is a pointer to data of type MQINT64.

### *PMQLONG - pointer to data of type MQLONG*
A pointer to data of type MQLONG.

### *PMQMD - pointer to structure of type MQMD*
A pointer to structure of type MQMD.

### *PMQMDE - pointer to a data structure of type MQMDE*
A pointer to a data structure of type MQMDE.

### *PMQMDI - pointer to a data structure of type MQMDI*
A pointer to a data structure of type MQMDI.

### *PMQMD2 - pointer to a data structure of type MQMD2*
A pointer to a data structure of type MQMD2

### *PMQMHBO - pointer to a data structure of type MQMHBO*
A pointer to a data structure of type MQMHBO.

***PMQOD - pointer to a data structure of type MQOD***
A pointer to a data structure of type MQOD.

***PMQOR - pointer to a data structure of type MQOR***
A pointer to a data structure of type MQOR.

***PMQPD - pointer to a data structure of type MQPD***
A pointer to a data structure of type MQPD.

***PMQPID - pointer to a process identifier***
A pointer to a process identifier.

***PMQPMO - pointer to a data structure of type MQPMO***
A pointer to a data structure of type MQPMO.

***PMQPTR - pointer to data of type MQPTR***
A pointer to data of type MQPTR.

***PMQRFH - pointer to a data structure of type MQRFH***
A pointer to a data structure of type MQRFH.

***PMQRFH2 - pointer to a data structure of type MQRFH2***
A pointer to a data structure of type MQRFH2.

.

***PMQRMH - pointer to a data structure of type MQRMH***
A pointer to a data structure of type MQRMH.

***PMQRR - pointer to a data structure of type MQRR***
A pointer to a data structure of type MQRR.

***PMQSCO - pointer to a data structure of type MQSCO***
A pointer to a data structure of type MQSCO.

.

***PMQSD - pointer to a data structure of type MQSD***
A pointer to a data structure of type MQSD.

### *PMQSMPO - pointer to a data structure of type MQSMPO*
A pointer to a data structure of type MQSMPO.

### *PMQSRO - pointer to a data structure of type MQSRO*
A pointer to a data structure of type MQSRO.

### *PMQSTS - pointer to a data structure of type MQSTS*
A pointer to a data structure of type MQSTS.

### *PMQTID - pointer to a data structure of type MQTID*
A pointer to a data structure of type MQTID.

### *PMQTM - pointer to a data structure of type MQTM*
A pointer to a data structure of type MQTM.

### *PMQTMC2 - pointer to a data structure of type MQTMC2*
A pointer to a data structure of type MQTMC2.

### *PMQUINT8 - pointer to data of type MQUINT8*
A pointer to data of type MQUINT8.

### *PMQUINT16 - pointer to data of type MQUINT16*
A pointer to data of type MQUINT16.

### *PMQUINT32 - Pointer to data of type MQUINT32*
The PMQUINT32 data type is a pointer to data of type MQUINT32. It is equivalent to PMQULONG.

### *PMQUINT64 - Pointer to data of type MQUINT64*
The PMQUINT64 data type is a pointer to data of type MQUINT64.

### *PMQULONG - pointer to data of type MQULONG*
A pointer to data of type MQULONG.

### *PMQVOID - pointer*
A pointer.

### *PMQWIH - pointer to a data structure of type MQWIH*
A pointer to a data structure of type MQWIH.

### *PMQXQH - pointer to a data structure of type MQXQH*
A pointer to a data structure of type MQXQH.

## Language considerations

This topic contains information to help you use the MQI from the RPG programming language.

Some of these language considerations are:


- "COPY files" on page 980
- "Calls" on page 982
- "Call parameters" on page 982
- "Structures" on page 982
- "Named constants" on page 982
- "MQI procedures" on page 983
- "Threading considerations" on page 983
- "Commitment control" on page 983
- "Coding the bound calls" on page 984
- "Notational conventions" on page 985


## COPY files

Various COPY files are provided to assist with the writing of RPG application programs that use message queuing. There are three sets of COPY files:

- COPY files with names ending with the letter *G* are for use with programs that use static linkage. These files are initialized with the exceptions stated in "Structures" on page 982.
- COPY files with names ending with the letter *H* are for use with programs that use static linkage, but are **not** initialized.
- COPY files with names ending with the letter *R* are for use with programs that use dynamic linkage. These files are initialized with the exceptions stated in "Structures" on page 982.

The COPY files reside in QRPGLESRC in the QMQM library.

For each set of COPY files, there are two files containing named constants, and one file for each of the structures. The COPY files are summarized in Table 573 on page 980.

*Table 573. RPG COPY files*

| File name (static linkage, initialized, CMQ*G) | File name (static linkage, not initialized, CMQ*H) | File name (dynamic linkage, initialized, CMQ*R) | Contents |
|---|---|---|---|
| CMQBOG | CMQBOH | - | Begin options structure |
| CMQCDG | CMQCDH | CMQCDR | Channel definition structure |
| CMQCFBFG | CMQCFBFH | - | PCF bit filter parameter |
| CMQCFG | - | - | Constants for PCF and events |
| CMQCFBSG | CMQCFBSH | - | PCF byte string |

*Table 573. RPG COPY files (continued)*

| File name (static linkage, initialized, CMQ*G) | File name (static linkage, not initialized, CMQ*H) | File name (dynamic linkage, initialized, CMQ*R) | Contents |
|---|---|---|---|
| CMQCFGRG | CMQCFGRH | - | PCF group parameter |
| CMQCFIFG | CMQCFIFH | - | PCF integer filter parameter |
| CMQCFHG | CMQCFHH | - | PCF header |
| CMQCFILG | CMQCFILH | - | PCF integer list parameter structure |
| CMQCFING | CMQCFINH | - | PCF integer parameter structure |
| CMQCFSFG | CMQCFSFH | - | PCF string filter parameter |
| CMQCFSLG | CMQCFSLH | - | PCF string list parameter structure |
| CMQCFSTG | CMQCFSTH | - | PCF string parameter structure |
| CMQCFXLG | CMQCFXLH | - | PCF short name for CFIL64 |
| CMQCFXNG | CMQCFXNH | - | PCF short name for CFIN64 |
| CMQCIHG | CMQCIHH | - | CICS information header structure |
| CMQCNOG | CMQCNOH | - | Connect options structure |
| CMQCSPG | CMQCSPH | - | Security parameters |
| CMQCXPG | CMQCXPH | CMQCXPR | Channel exit parameter structure |
| CMQDHG | CMQDHH | CMQDHR | Distribution header structure |
| CMQDLHG | CMQDLHH | CMQDLHR | Dead letter header structure |
| CMQDXPG | CMQDXPH | CMQDXPR | Data conversion exit parameter structure |
| CMQEPHG | CMQEPHH | - | Embedded PCF header structure |
| CMQG | - | CMQR | Named constants for main MQI |
| CMQGMOG | CMQGMOH | CMQGMOR | Get message options structure |
| CMQIIHG | CMQIIHH | CMQIIHR | IMS information header structure |
| CMQMDEG | CMQMDEH | CMQMDER | Message descriptor extension structure |
| CMQMDG | CMQMDH | CMQMDR | Message descriptor structure |
| CMQMD1G | CMQMD1H | CMQMD1R | Message descriptor structure version 1 |
| CMQMD2G | CMQMD2H | - | Message descriptor structure version 2 |
| CMQODG | CMQODH | CMQODR | Object descriptor structure |
| CMQORG | CMQORH | CMQORR | Object record structure |
| CMQPMOG | CMQPMOH | CMQPMOR | Put message options structure |
| CMQPSG | - | - | Constants for publish/subscribe |
| CMQRFHG | CMQRFHH | - | Rules and formatting header structure |
| CMQRFH2G | CMQRFH2H | - | Rules and formatting header 2 structure |
| CMQRMHG | CMQRMHH | CMQRMHR | Reference message header structure |

| Table 573. RPG COPY files (continued) | | | |
|---|---|---|---|
| **File name (static linkage, initialized, CMQ*G)** | **File name (static linkage, not initialized, CMQ*H)** | **File name (dynamic linkage, initialized, CMQ*R)** | **Contents** |
| CMQRRG | CMQRRH | CMQRRR | Response record structure |
| CMQTMCG | CMQTMCH | CMQTMCR | Trigger message structure (character format) |
| CMQTMC2G | CMQTMC2H | CMQTMC2R | Trigger message structure (character format) version 2 |
| CMQTMG | CMQTMH | CMQTMR | Trigger message structure |
| CMQWIHG | CMQWIHH | - | Work information header structure |
| CMQXG | - | CMQXR | Named constants for data conversion exit |
| CMQXQHG | CMQXQHH | CMQXQHR | Transmission queue header structure |

## Calls

Calls are described using their individual names.

## Call parameters

Some parameters passed to the MQI can have more than one concurrent function. This is because the integer value passed is often tested on the setting of individual bits within the field, and not on its total value. This allows you to 'add' several functions together and pass them as a single parameter.

## Structures

All IBM MQ structures are defined with initial values for the fields, with the following exceptions:

- Any structure with a suffix of H.
- MQTMC
- MQTMC2

These initial values are defined in the relevant table for each structure.

The structure declarations do not contain DS statements. This allows the application to declare either a single data structure or a multiple-occurrence data structure, by coding the DS statement and then using the /COPY statement to copy in the remainder of the declaration:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7
D* Declare an MQMD data structure with 5 occurrences
DMYMD        DS                            5
D/COPY CMQMDR
```

## Named constants

There are many integer and character values that provide data interchange between your application program and the queue manager. To facilitate a more readable and consistent approach to using these values, named constants are defined for them. You can use these named constants and not the values they represent, as this improves the readability of the program source code.

When the COPY file CMQG is included in a program to define the constants, the RPG compiler will issue many severity-zero messages for the constants that are not used by the program; these messages are benign, and can safely be ignored.

## MQI procedures

When using the ILE bound calls, you must bind to the MQI procedures when you create your program. These procedures are exported from the following service programs as appropriate:

**QMQM/AMQZSTUB**
This service program provides compatibility bindings for applications written before MQSeries V5.1 that do not require access to any of the new capabilities provided in version 5.1. The signature of this service program matches that contained in version 4.2.1.

**QMQM/LIBMQM**
This service program contains the single-threaded bindings for version 5.1 and above. See the following section for special considerations when writing threaded applications.

**QMQM/LIBMQM_R**
This service program contains the multi-threaded bindings for version 5.1 and above. See the following section for special considerations when writing threaded applications.

**QMQM/LIBMQIC**
This service program is for binding non-threaded client applications.

**QMQM/LIBMQIC_R**
This service program is for binding threaded client applications.

Use the CRTPGM command to create your programs. For example, the following command creates a single-threaded program that uses the ILE bound calls:

```
CRTPGM PGM(MYPROGRAM) BNDSRVPGM(QMQM/LIBMQM)
```

## Threading considerations

The RPG compiler used for IBM i is part of the WebSphere Development Toolset and WebSphere Development Studio for IBM i and is known as the ILE RPG IV Compiler.

In general, RPG programs should not use the multi-threaded service programs. Exceptions are RPG programs created using the ILE RPG IV Compiler, and containing the THREAD(*SERIALIZE) keyword in the control specification. However, even though these programs are thread safe, careful consideration must be given to the overall application design, as THREAD(*SERIALIZE) forces serialization of RPG procedures at the module level, and this might have an adverse affect on overall performance.

Where RPG programs are used as data-conversion exits, they must be made thread-safe, and should be recompiled using the version 4.4 ILE RPG compiler or above, with THREAD(*SERIALIZE) specified in the control specification.

For further information about threading, see the *IBM i IBM MQ Development Studio: ILE RPG Reference*, and the *IBM i IBM MQ Development Studio: ILE RPG Programmer's Guide*.

## Commitment control

The MQI syncpoint functions MQCMIT and MQBACK are available to ILE RPG programs running in normal mode; these calls allow the program to commit and back out changes to MQ resources.

The MQCMIT and MQBACK calls are not available to ILE RPG programs running in compatibility mode. For these programs, you should use the operation codes COMMIT and ROLBK.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

## Coding the bound calls

MQI ILE procedures are listed in Table 574 on page 984.

*Table 574. ILE RPG bound calls supported by each service program*

| Name of call | LIBMQM and LIBMQM_R | AMQZSTUB | AMQVSTUB | LIBMQIC and LIBMQIC_R |
|---|---|---|---|---|
| MQBACK | Y | | | Y |
| MQBEGIN | Y | | | Y |
| MQCMIT | Y | | | Y |
| MQCLOSE | Y | Y | | Y |
| MQCONN | Y | Y | | Y |
| MQCONNX | Y | | | Y |
| MQDISC | Y | Y | | Y |
| MQGET | Y | Y | | Y |
| MQINQ | Y | Y | | Y |
| MQOPEN | Y | Y | | Y |
| MQPUT | Y | Y | | Y |
| MQPUT1 | Y | Y | | Y |
| MQSET | Y | Y | | Y |
| MQXCNVC | Y | | Y | Y |

To use these procedures you need to:

1. Define the external procedures in your 'D' specifications. These are all available within the COPY file member CMQG containing the named constants.
2. Use the CALLP operation code to call the procedure along with its parameters.

For example the MQOPEN call requires the inclusion of the following code:

```
D*------------------------------------------------------------------
D**  MQOPEN Call -- Open Object  (From COPY file CMQG)           **
D*------------------------------------------------------------------
D*
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQOPEN           PR                  EXTPROC('MQOPEN')
D* Connection handle
D HCONN                          10I 0 VALUE
D* Object descriptor
D OBJDSC                        224A
D* Options that control the action of MQOPEN
D OPTS                           10I 0 VALUE
D* Object handle
D HOBJ                           10I 0
D* Completion code
D CMPCOD                         10I 0
D* Reason code qualifying CMPCOD
D REASON                         10I 0
D*
```

To call the procedure, after initializing the various parameters, you need the following code:

```
...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+....8
    C                   CALLP     MQOPEN(HCONN : MQOD : OPTS : HOBJ :
    C                             CMPCOD : REASON)
```

Here, the structure MQOD is defined using the COPY member CMQODG which breaks it down into its components.

### Notational conventions

The latter topics in this section show how the:

- Calls should be invoked
- Parameters should be declared
- Various data types should be declared

In a number of cases, parameters are arrays or character strings with a size that is not fixed. For these, a lowercase "n" is used to represent a numeric constant. When the declaration for that parameter is coded, the "n" must be replaced by the numeric value required.

## MQAIR - Authentication information record

The MQAIR structure represents the authentication information record.

### Overview

**Purpose**: The MQAIR structure allows an application running as an IBM MQ client to specify information about an authenticator that is to be used for the client connection. The structure is an input parameter on the MQCONNX call.

**Character set and encoding**: Data in MQAIR must be in the character set given by the *CodedCharSetId* queue-manager attribute and encoding of the local queue manager given by ENNAT.


- "Fields" on page 985
- "Initial values" on page 987
- "RPG declaration" on page 987


### Fields

The MQAIR structure contains the following fields; the fields are described in **alphabetical order**:

**AICN (10-digit signed integer)**

This is either the host name or the network address of a host on which the LDAP server is running. This can be followed by an optional port number, enclosed in parentheses.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. If the value is not valid, the call fails with reason code RC2387.

The default port number is 389.

This is an input field. The length of this field is given by LNAICN. The initial value of this field is blank characters.

**AITYP (10-digit signed integer)**

This is the type of authentication information contained in the record.

The value must be:

**AITLDP**
Certificate revocation using LDAP server.

If the value is not valid, the call fails with reason code RC2386.

This is an input field. The initial value of this field is AITLDP.

**AIPW (10-digit signed integer)**

This is the password needed to access the LDAP CRL server.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. If the LDAP server does not require a password, or you omit the LDAP user name, *AIPW* must be null or blank. If you omit the LDAP user name and *AIPW* is not null or blank, the call fails with reason code RC2390.

This is an input field. The length of this field is given by LNLDPW. The initial value of this field blank characters.

**AILUL (10-digit signed integer)**

This is the length in bytes of the LDAP user name addressed by the *AILUP* or *AILUO* field. The value must be in the range zero through LNDISN. If the value is not valid, the call fails with reason code RC2389.

If the LDAP server involved does not require a user name, set this field to zero.

This is an input field. The initial value of this field is 0.

**AILUO (10-digit signed integer)**

This is the offset in bytes of the LDAP user name from the start of the MQAIR structure.

The offset can be positive or negative. The field is ignored if *LDAPUserNameLength* is zero.

You can use either *LDAPUserNamePtr* or *LDAPUserNameOffset* to specify the LDAP user name, but not both; see the description of the *LDAPUserNamePtr* field for details.

This is an input field. The initial value of this field is 0.

**AILUP (10-digit signed integer)**

This is the LDAP user name.

It consists of the Distinguished Name of the user who is attempting to access the LDAP CRL server. If the value is shorter than the length specified by *AILUL*, terminate the value with a null character, or pad it with blanks to the length *AILUL*. The field is ignored if *AILUL* is zero.

You can supply the LDAP user name in one of two ways:

- By using the pointer field *AILUP*

  In this case, the application can declare a string that is separate from the MQAIR structure, and set *AILUP* to the address of the string.

  Consider using *AILUP* for programming languages that support the pointer data type in a fashion that is portable to different environments (for example, the C programming language).

- By using the offset field *AILUO*

  In this case, the application must declare a compound structure containing the MQSCO structure followed by the array of MQAIR records followed by the LDAP user name strings, and set *AILUO* to the offset of the appropriate name string from the start of the MQAIR structure. Ensure that this value is correct, and has a value that can be accommodated within an MQLONG (the most restrictive programming language is COBOL, for which the valid range is -999 999 999 through +999 999 999).

  Consider using *AILUO* for programming languages that do not support the pointer data type, or that implement the pointer data type in a fashion that might not be portable to different environments (for example, the COBOL programming language).

Whichever technique is chosen, use only one of *AILUP* and *AILUO* ; the call fails with reason code RC2388.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

**AISID (10-digit signed integer)**

The value must be:

**AISIDV**
Identifier for the authentication information record.

This is always an input field. The initial value of this field is AISIDV.

**AIVER (10-digit signed integer)**

The value must be:

**AIVER1**
Version-1 authentication information record.

The following constant specifies the version number of the current version:

**AIRVERC**
Current version of authentication information record.

This is always an input field. The initial value of this field is AIVER1.

## Initial values

*Table 575. Initial values of fields in MQAIR for MQAIR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *AISID* | AISIDV | 'AIR¬' |
| *AIVER* | AIVERC | 1 |
| *AITYP* | AITLDP | 1 |
| *AICN* | None | Null string or blanks |
| *AILUP* | None | Null pointer or null bytes |
| *AILUO* | None | 0 |
| *AILUL* | None | 0 |
| *AIPW* | None | Null string or blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQAIR Structure
D*
D* Structure identifier
D  AISID                  1      4    INZ('AIR ')
D* Structure version number
D  AIVER                  5      8I 0 INZ(1)
D* Type of authentication information
D  AITYP                  9     12I 0 INZ(1)
D* Connection name of CRL LDAP server
D  AICN                  13    276    INZ
D* Address of LDAP user name
D  AILUP                277    292*   INZ(*NULL)
D* Offset of LDAP user name from start of MQAIR structure
D  AILUO                293    296I 0 INZ(0)
D* Length of LDAP user name
D  AILUL                297    300I 0 INZ(0)
D* Password to access LDAP server
D  AIPW                 301    332    INZ
```

## MQBMHO - Buffer to message handle options

Structure defining the buffer to message handle options.

### Overview

**Purpose**: The MQBMHO structure allows applications to specify options that control how message handles are produced from buffers. The structure is an input parameter on the MQBUFMH call.

**Character set and encoding**: Data in MQBMHO must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 988
- "Initial values" on page 989
- "RPG declaration" on page 989


### Fields

The MQBMHO structure contains the following fields; the fields are described in **alphabetical order**:

**BMSID (10-digit signed integer)**

Buffer to message handle structure - StrucId field.

This is the structure identifier. The value must be:

**BMSIDV**
Identifier for buffer to message handle structure.

This is always an input field. The initial value of this field is BMSIDV.

**BMVER (10-digit signed integer)**

Buffer to message handle structure - Version field.

This is the structure version number. The value must be:

**BMVER1**
Version number for buffer to message handle structure.

The following constant specifies the version number of the current version:

**BMVERVC**
Current version of buffer to message handle structure.

This is always an input field. The initial value of this field is BMVER1.

**BMOPT (10-digit signed integer)**

Buffer to message handle structure - Options field.

The value can be:

**BMDLPR**
Properties that are added to the message handle are deleted from the buffer. If the call fails no properties are deleted.

Default options: If you do not need the option described, use the following option:

**BMNONE**
No options specified.

This is always an input field. The initial value of this field is BMDLPR.

### Initial values

| *Table 576. Initial values of fields in MQBMHO* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *BMSID* | BMSIDV | 'BMHO' |
| *BMVER* | BMVER1 | 1 |
| *BMOPT* | BMNONE | 0 |

### RPG declaration

```
D* MQBMHO Structure
D*
D*
D* Structure identifier
D  BMSID                  1      4    INZ('BMHO')
D*
D* Structure version number
D  BMVER                  5      8I 0 INZ(1)
D*
D* Options that control the action of MQBUFMH
D  BMOPT                  9     12I 0 INZ(1)
```

## MQBO - Begin options

The MQBO structure allows the application to specify options relating to the creation of a unit of work.

### Overview

**Purpose**: The structure is an input/output parameter on the MQBEGIN call.

**Character set and encoding**: Data in MQBO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT.


- "Fields" on page 989
- "Initial values" on page 990
- "RPG declaration" on page 990


### Fields

The MQBO structure contains the following fields; the fields are described in **alphabetical order**:

**BOOPT (10-digit signed integer)**

Options that control the action of MQBEGIN.

The value must be:

**BONONE**
No options specified.

This is always an input field. The initial value of this field is BONONE.

**BOSID (4-byte character string)**

Structure identifier.

The value must be:

**BOSIDV**
Identifier for begin-options structure.

This is always an input field. The initial value of this field is BOSIDV.

**BOVER (10-digit signed integer)**

Structure version number.

The value must be:

**BOVER1**
Version number for begin-options structure.

The following constant specifies the version number of the current version:

**BOVERC**
Current version of begin-options structure.

This is always an input field. The initial value of this field is BOVER1.

## Initial values

*Table 577. Initial values of fields in MQBO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *BOSID* | BOSIDV | 'BO¬¬' |
| *BOVER* | BOVER1 | 1 |
| *BOOPT* | BONONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQBO Structure
D*
D* Structure identifier
D  BOSID                  1      4    INZ('BO  ')
D* Structure version number
D  BOVER                  5      8I 0 INZ(1)
D* Options that control the action of MQBEGIN
D  BOOPT                  9     12I 0 INZ(0)
```

# MQCBC - Callback context

Structure describing the callback routine.

## Overview

**Purpose**
The MQCBC structure is used to specify context information that is passed to a callback function.

The structure is an input/output parameter on the call to a message consumer routine.

**Version**
The current version of MQCBC is CBCV2.

**Character set and encoding**
Data in MQCBC is in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure is in the character set and encoding of the client.


- "Fields" on page 991
- "Initial values" on page 996
- "RPG declaration" on page 996

## Fields

The MQCBC structure contains the following fields; the fields are described in alphabetical order:

**CBCBUFFLEN (10 digit signed integer)**

The buffer can be larger than both the MaxMsgLength value defined for the consumer and the ReturnedLength value in the MQGMO.

Callback context structure - BufferLength field.

This is the length in bytes of the message buffer that has been passed to this function.

The actual message length is supplied in DataLength field.

The application can use the entire buffer for its own purposes for the duration of the callback function.

This is an input field to the message consumer function; it is not relevant to an exception handler function.

**CBCCALLBA (10 digit signed integer)**

Callback context structure - CallbackArea field.

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the CBDCALLBA field in the MQCBD structure, which is a parameter on the MQCB call used to define the callback function.

Changes to the *CBCCALLBA* are preserved across the invocations of the callback function for an *CBCHOBJ*. This field is not shared with callback functions for other handles.

This is an input/output field to the callback function. The initial value of this field is a null pointer or null bytes.

**CBCCALLT (10 digit signed integer)**

Callback Context structure - CallType field.

Field containing information about why this function has been called; the following are defined.

Message delivery call types: These call types contain information about a message. The *CBCLEN* and *CBCBUFFLEN* parameters are valid for these call types.

**CBCTMR**
The message consumer function has been invoked with a message that has been destructively removed from the object handle.

If the value of *CBCCC* is CCWARN, the value of the *Reason* field is RC2079 or one of the codes indicating a data conversion problem.

**CBCTMN**
The message consumer function has been invoked with a message that has not yet been destructively removed from the object handle. The message can be destructively removed from the object handle using the *MsgToken*.

The message might not have been removed because:

- The MQGMO options requested a browse operation, GMBR*
- The message is larger than the available buffer and the MQGMO options do not specify gmatm

If the value of *CBCCC* is CCWARN, the value of the *Reason* field is RC2080 or one of the codes indicating a data conversion problem.

Callback control call types: These call types contain information about the control of the callback and do not contain details about a message. These call types are requested using CBDOPT in the MQCBD structure.

The *CBCLEN* and *CBCBUFFLEN* parameters are not valid for these call types.

**CBCTRC**

The purpose of this call type is to allow the callback function to perform some initial setup.

The callback function is invoked is immediately after the callback is registered, that is, upon return from an MQCB call using a value for the *Operation* field of CBREG.

This call type is used both for message consumers and event handlers.

If requested, this is the first invocation of the callback function.

The value of the *CBCREA* field is RCNONE.

**CBCTSC**

The purpose of this call type is to allow the callback function to perform some setup when it is started, for example, reinstating resources that were cleaned up when it was previously stopped.

The callback function is invoked when the connection is started using either CTLSR or CTLSW.

If a callback function is registered within another callback function, this call type is invoked when the callback returns.

This call type is used for message consumers only.

The value of the *CBCREA* field is RCNONE.

**CBCTTC**

The purpose of this call type is to allow the callback function to perform some cleanup when it is stopped for a while, for example, cleaning up additional resources that have been acquired during the consuming of messages.

The callback function is invoked when an MQCTL call is issued using a value for the *Operation* field of CTLSP.

This call type is used for message consumers only.

The value of the *CBCREA* field is set to indicate the reason for stopping.

**CBCTDC**

The purpose of this call type is to allow the callback function to perform final cleanup at the end of the consume process. The callback function is invoked when the:

- Callback function is deregistered using an MQCB call with BCUNR.
- Queue is closed, causing an implicit deregister. In this instance the callback function is passed HOUNUH as the object handle.
- MQDISC call completes - causing an implicit close and, therefore, a deregister. In this case the connection is not disconnected immediately, and any ongoing transaction is not yet committed.

If any of these actions are taken inside the callback function itself, the action is invoked once the callback returns.

This call type is used both for message consumers and event handlers.

If requested, this is the last invocation of the callback function.

The value of the *CBCREA* field is set to indicate the reason for stopping.

**CBCTEC**

**Event handler function**

The event handler function has been invoked without a message when:

- An MQCTL call is issued with a value for the *Operation* field of CTLSP, or
- The queue manager or connection stops or quiesces.

This call can be used to take appropriate action for all callback functions.

- **Message consumer function**

The message consumer function has been invoked without a message when an error (*CBCCC* = CCFAIL) has been detected that is specific to the object handle; for example *CBCREA* code = RC2016 .

The value of the *CBCREA* field is set to indicate the reason for the call.

This is an input field. CBCTMR and CMCTMN are applicable only to message consumer functions.

**CBCCC (10 digit signed integer)**

Callback context structure - CompCode field.

This is the completion code. It indicates whether there were any problems consuming the message; it is one of the following:

**CCOK**
Successful completion

**CCWARN**
Warning (partial completion)

**CCFAIL**
Call failed

This is an input field. The initial value of this field is CCOK.

**CBCCONNAREA (10 digit signed integer)**

Callback context structure - ConnectionArea field.

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the ConnectionArea field in the MQCTLO structure, which is a parameter on the MQCTL call used to control the callback function.

Any changes made to this field by the callback functions are preserved across the invocations of the callback function. This area can be used to pass information that is to be shared by all callback functions. Unlike *CallbackArea*, this area is common across all callbacks for a connection handle.

This is an input and output field. The initial value of this field is a null pointer or null bytes.

**CBCLEN (10 digit signed integer)**

This is the length in bytes of the application data in the message. If the value is zero, it means that the message contains no application data.

The CBCLEN field contains the length of the message but not necessarily the length of the message data passed to the consumer. It could be that the message was truncated. Use the GMRL field in the MQGMO to determine how much data has been passed to the consumer.

If the reason code indicates the message has been truncated, you can use the CBCLEN field to determine how large the actual message is. This allows you to determine the size of the buffer required to accommodate the message data, and then issue an MQCB call to update the CBDMML in the MQCBD with an appropriate value.

If the GMCONV option is specified, the converted message could be larger than the value returned for DataLength. In such cases, the application probably needs to issue an MQCB call to update the CBDMML in the MQCBD to be greater than the value returned by the queue manager for DataLength.

To avoid message truncation problems, specify MaxMsgLength as CBDFM. This causes the queue manager to allocate a buffer for the full message length after data conversion. Be aware, however, that even if this option is specified, it is still possible that sufficient storage is not available to correctly process the request. Applications should always check the returned reason code. For example, if it is not possible to allocate sufficient storage to convert the message, the messages is returned to the application unconverted.

This is an input field to the message consumer function; it is not relevant to an event handler function.

**CBCFLG (10 digit signed integer)**

Flags containing information about this consumer.

The following option is defined:

**CBCFBE**
This flag can be returned if a previous MQCLOSE call using the COQSC option failed with a reason code of RC2458.

This code indicated that the last read ahead message is being returned and that the buffer is now empty. If the application issues another MQCLOSE call using the COQSC option, it succeeds.

Note, that an application is not guaranteed to be given a message with this flag set, as there might still be messages in the read-ahead buffer that do not match the current selection criteria. In this instance, the consumer function is invoked with the reason code RC2019 .

If the read ahead buffer is empty, the consumer is invoked with the CBCFBE flag and the reason code RC2518.

This is an input field to the message consumer function; it is not relevant to an event handler function.

**CBCHOBJ (10 digit signed integer)**

Callback context structure - CBCHOBJ field.

For a call to a message consumer, this is the handle for the object relating to the message consumer.

For an event handler, this value is HONONE

The application can use this handle and the message token in the Get Message Options block to get the message if a message has not been removed from the queue.

This is always an input field. The initial value of this field is HOUNUH

**CBCRCD (10 digit signed integer)**

**CBCRCD** indicates how long the queue manager waits before trying to reconnect. The field can be modified by an event handler to change the delay or stop reconnection altogether.

Use the **CBCRCD** field only if the value of the **Reason** field in the Callback Context is RC2545.

On entry to the event handler the value of **CBCRCD** is the number of milliseconds the queue manager is going to wait before making a reconnection attempt. Table 578 on page 994 lists the values that you can set to modify the behavior of the queue manager on return from the event handler.

*Table 578. **CBCRCD** values*

| Value | Description |
|---|---|
| -1 | Make no more reconnection attempts. An error is returned to the application. |
| 0 | Try to reconnect immediately. |
| >0 | Wait for this many milliseconds before trying the connection again. |

**CBCREA (10 digit signed integer)**

Callback context structure - Reason field.

This is the reason code qualifying the *CBCCC*

This is an input field. The initial value of this field is RCNONE.

**CBCSTATE (10 digit signed integer)**

An indication of the state of the current consumer. This field is of most value to an application when a nonzero reason code is passed to the consumer function.

You can use this field to simplify application programming because you do not need to code behavior for each reason code.

This is an input field. The initial value of this field is CSNONE

| State | Queue manager action | Value of constant |
|---|---|---|
| *CSNONE*<br>This reason code represents a normal call with no additional reason information | None; this is the normal operation. | 0 |
| *CSSUST*<br>These reason codes represent temporary conditions. | The callback routine is called to report the condition and then suspended. After a period the system might attempt the operation again, which can lead to the same condition being raised again. | 1 |
| *CSSUSU*<br>These reason codes represent conditions where the callback needs to act to resolve the condition. | The consumer is suspended and the callback routine is called to report the condition. The callback routine should resolve the condition if possible and either RESUME or close down the connection. | 2 |
| *CSSUS*<br>These reason codes represent failures that prevent further message callbacks. | The queue manager automatically suspends the callback function. If the callback function is resumed it is likely to receive the same reason code again. | 3 |
| *CSSTOP*<br>These reason codes represent the end of message consumption. | Delivered to the exception handler and to callbacks that specified CBDTC. No further messages can be consumed. | 4 |

**CBCSID (10 digit signed integer)**

Callback context structure - StrucId field.

This is the structure identifier; the value must be:

**CBCSI**
Identifier for callback context structure.

This is always an input field. The initial value of this field is CBCSI.

**CBCVER (10 digit signed integer)**

Callback context structure - Version field.

This is the structure version number; the value must be:

**CBCV1**
Version-1 callback context structure.

The following constant specifies the version number of the current version:

**CBCCV**
Current version of the callback context structure.

This is always an input field. The initial value of this field is CBCV1.

## Initial values

*Table 579. Initial values of fields in MQCBC*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CBCSID* | CBCSI | 'CBC¬' |
| *CBCVER* | CBCV1 | 1 |
| *CBCCALLT* | None | 0 |
| *CBCHOBJ* | HOUNUH | -1 |
| *CBCCALLBA* | None | Null pointer or null bytes |
| *CBCCONNAREA* | None | Null pointer or null bytes |
| *CBCCC* | CCOK | 0 |
| *CBCREA* | RCNONE | 0 |
| *CBCSTATE* | CSNONE | 0 |
| *CBCLEN* | None | 0 |
| *CBCBUFFLEN* | None | 0 |
| *CBCFLG* | None | 0 |
| *CBCRCD* | none | 0 |

**Note:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D* MQCBC Structure
D*
D*
D* Structure identifier
D  CBCSID                 1      4    INZ('CBC ')
D*
D* Structure version number
D  CBCVER                 5      8I 0 INZ(1)
D*
D* Why Function was called
D  CBCCALLT               9     12I 0 INZ(0)
D*
D* Object Handle
D  CBCHOBJ               13     16I 0 INZ(-1)
D*
D* Callback data passed to the function
D  CBCCALLBA             17     32*   INZ(*NULL)
D*
D* MQCTL Data area passed to the function
D  CBCCONNAREA           33     48*   INZ(*NULL)
D*
D* Completion Code
D  CBCCC                 49     52I 0 INZ(0)
D*
D* Reason Code
D  CBCREA                53     56I 0 INZ(0)
D*
D* Consumer State
D  CBCSTATE              57     60I 0 INZ(0)
D*
D* Message Data Length
D  CBCLEN                61     64I 0 INZ(0)
D*
D* Buffer Length
D  CBCBUFFLEN            65     68I 0 INZ(0)
```

```
     D*
     ** Flags containing information about
     D* this consumer
     D  CBCFLG               69     72I 0 INZ(0)
     D* Ver:1 **
     D* Number of milliseconds before reconnect attempt
     D  CBCRCD               73     76I 0 INZ(0)
     D* Ver:2 **
     D*
```

## MQCBD - Callback descriptor

Structure specifying the callback function.

### Overview

**Purpose**: The MQCBD structure is used to specify a callback function and the options controlling its use by the queue manager.

The structure is an input parameter on the MQCB call.

**Version**: The current version of MQCBD is CBDV1.

**Character set and encoding**: Data in MQCBD must be in the character set and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and ENNAT. However, if the application is running as an IBM MQ MQI client, the structure must be in the character set and encoding of the client.


- "Fields" on page 997
- "Initial values" on page 1001
- "RPG declaration" on page 1001


### Fields

The MQCBD structure contains the following fields; the fields are described in **alphabetical order**:

**CBDCALLBA (10-digit signed integer)**

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the field in the MQCBD structure, which is a parameter on the callback function declaration.

The value is used only on an *Operation* having a value CBREG, with no currently defined callback, it does not replace a previous definition.

This is an input and output field to the callback function. The initial value of this field is a null pointer or null bytes.

**CBDCALLBF (10-digit signed integer)**

The callback function is invoked as a function call.

Use this field to specify a pointer to the callback function.

You *must* specify either *CallbackFunction* or *CallbackName*. If you specify both, the reason code RC2486 is returned.

If neither *CallbackName* nor *CallbackFunction* is not set, the call fails with the reason code RC2486.

This option is not supported in the following environments:

- CICS on z/OS
- Programming languages and compilers that do not support function-pointer references

In such situations, the call fails with the reason code RC2486.

This is an input field. The initial value of this field is a null pointer or null bytes.

**CBDCALLBN (10-digit signed integer)**

The callback function is invoked as a dynamically linked program.

You *must* specify either *CallbackFunction* or *CallbackName*. If you specify both, the reason code RC2486 is returned.

If either *CallbackName* or *CallbackFunction* is not true, the call fails with the reason code RC2486.

The module is loaded when the first callback routine to use is registered, and unloaded when the last callback routine to use it deregisters.

Except where noted in the following text, the name is left-aligned within the field, with no embedded blanks; the name itself is padded with blanks to the length of the field. In the descriptions that follow, square brackets ([]) denote optional information:

**IBMi**
The callback name can be one of the following formats:

- Library "/" Program
- Library "/" ServiceProgram "("FunctionName")"

For example, `MyLibrary/MyProgram(MyFunction)`.

The library name can be *LIBL. Both the library and program names are limited to a maximum of 10 characters.

**UNIX systems**
The callback name is the name of a dynamically loadable module or library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path:

```
[path]library(function)
```

If the path is not specified the system search path is used.

The name is limited to a maximum of 128 characters.

**Windows**
The callback name is the name of a dynamic-link library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path and drive:

```
[d:][path]library(function)
```

If the drive and path are not specified the system search path is used.

The name is limited to a maximum of 128 characters.

**z/OS**
The callback name is the name of a load module that is valid for specification on the EP parameter of the LINK or LOAD macro.

The name is limited to a maximum of 8 characters.

**z/OS CICS**
The callback name is the name of a load module that is valid for specification on the PROGRAM parameter of the EXEC CICS LINK command macro.

The name is limited to a maximum of 8 characters.

The program can be defined as remote using the REMOTESYTEM option of the installed PROGRAM definition or by the dynamic routing program.

The remote CICS region must be connected to IBM MQ if the program is to use IBM MQ API calls. Note, however, that the field in the MQCBC structure is not valid in a remote system.

If a failure occurs trying to load *CallbackName*, one of the following error codes is returned to the application:

- RC2495
- RC2496
- RC2497

A message is also written to the error log containing the name of the module for which the load was attempted, and the failing reason code from the operating system.

This is an input field. The initial value of this field is a null string or blanks.

**CBDCALLBT (10-digit signed integer)**

This is the type of the callback function. The value must be one of:

**CBTMC**
Defines this callback as a message consumer function.

A message consumer callback function is called when a message, meeting the selection criteria specified, is available on an object handle and the connection is started.

**CBTEH**
Defines this callback as the asynchronous event routine; it is not driven to consume messages for a handle.

*Hobj* is not required on the MQCB call defining the event handler and is ignored if specified.

The event handler is called for conditions that affect the whole message consumer environment. The consumer function is invoked without a message when an event, for example, a queue manager or connection stopping, or quiescing, occurs. It is not called for conditions that are specific to a single message consumer, for example, RC2016.

Events are delivered to the application, regardless of whether the connection is started or stopped, except in the following environments:

- CICS on z/OS environment
- nonthreaded applications

If the caller does not pass one of these values, the call fails with a reason code of RC2483

This is always an input field. The initial value of this field is CBTMC.

**CBDMML (10-digit signed integer)**

This is the length in bytes of the longest message that can be read from the handle and given to the callback routine. If a message has a longer length, the callback routine receives *MaxMsgLength* bytes of the message, and reason code:

- RC2080 or
- RC2079 if you specified GMATM.

The actual message length is supplied in the "CBCLEN (10 digit signed integer)" on page 993 field of the MQCBC structure.

The following special value is defined:

**CBDFM**
The buffer length is adjusted by the system to return messages without truncation.

If insufficient memory is available to allocate a buffer to receive the message, the system calls the callback function with an RC2071 reason code.

If, for example, you request data conversion, and there is insufficient memory available to convert the message data, the unconverted message is passed to the callback function.

This is an input field. The initial value of the *MaxMsgLength* field is CBDFM.

**CBDOPT (10-digit signed integer)**

Callback descriptor structure - Options field.

Any one, or all, of the following can be specified. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations). Combinations that are not valid are noted; any other combinations are valid.

**CBDFQ**
The MQCB call fails if the queue manager is in the quiescing state.

On z/OS, this option also forces the MQCB call to fail if the connection (for a CICS or IMS application) is in the quiescing state.

Specify GMFIQ, in the MQGMO options passed on the MQCB call, to cause notification to message consumers when they are quiescing.

**Control options**: The following options control whether the callback function is called, without a message, when the state of the consumer changes:

**CBDRC**
The callback function is invoked with call type CBCTRC

.

**CBDSC**
The callback function is invoked with call type CBCTSC.

**CBDTC**
The callback function is invoked with call type CBCTTC.

**CBDDC**
The callback function is invoked with call type CBCTDC.

See "CBCCALLT (10 digit signed integer)" on page 991 for further details about these call types.

**Default option**: If you do not need any of the options described, use the following option:

**CBDNO**
Use this value to indicate that no other options have been specified; all options assume their default values.

CBDNO is defined to aid program documentation; it is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of the *Options* field is CBDNO.

**CBDSID (10-digit signed integer)**

Callback descriptor structure - StrucId field.

This is the structure identifier; the value must be:

**CBDSI**
Identifier for callback descriptor structure.

This is always an input field. The initial value of this field is CBDSI.

**CBDVER (10-digit signed integer)**

Callback descriptor structure - Version field.

This is the structure version number; the value must be:

**CBDV1**
Version-1 callback descriptor structure.

The following constant specifies the version number of the current version:

**CBDCV**
Current version of callback descriptor structure.

This is always an input field. The initial value of this field is CBDV1.

## Initial values

*Table 580. Initial values of fields in MQCBD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | CBDSI | 'CBD¬' |
| *Version* | CBDV1 | 1 |
| *CallBackType* | CBTMC | 1 |
| *Options* | CBDNO | 0 |
| *CallbackArea* | None | Null bytes |
| *CallbackFunction* | None | Null bytes |
| *CallbackName* | None | Blanks |
| *MaxMsgLength* | CBDFM | -1 |

**Note:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D* MQCBD Structure
D*
D*
D* Structure identifier
D  CBDSID                 1      4    INZ('CBD ')
D*
D* Structure version number
D  CBDVER                 5      8I 0 INZ(1)
D*
D* Callback function type
D  CBDCALLBT              9     12I 0 INZ(1)
D*
** Options controlling message
D* consumption
D  CBDOPT                13     16I 0 INZ(0)
D*
D* User data passed to the function
D  CBDCALLBA             17     32*
D*
D* FP: Callback function pointer
D  CBDCALLBF             33     48*
D*
D* Callback name
D  CBDCALLBN             49    176    INZ('\0')
D*
D* Maximum message length
D  CBDMML               177    180I 0 INZ(-1)
```

# MQCHARV - Variable Length String

Use the MQCHARV structure to describe a variable length string.

## Overview

**Character set and encoding**: Data in the MQCHARV must be in the encoding of the local queue manager that is given by ENNAT and the character set of the VCHRC field within the structure. If the application

is running as an IBM MQ MQI client, the structure must be in the encoding of the client. Some character sets have a representation that depends on the encoding. If VCHRC is one of these character sets, the encoding used is the same encoding as that of the other fields in the MQCHARV. The character set identified by VSCCSID can be a double-byte character set (DBCS).

**Usage**: The MQCHARV structure addresses data that might be discontiguous with the structure containing it. To address this data, fields declared with the pointer data type can be used.


- "Fields" on page 1002
- "Initial values" on page 1003
- "RPG declaration" on page 1003
- "Redefinition of CSAPL" on page 1003


## Fields

The MQCHARV structure contains the following fields; the fields are described in **alphabetical order**:

**VCHRC (10-digit signed integer)**

This is the character set identifier of the variable length string addressed by the VCHRP or VCHRO field.

The initial value of this field is CSAPL. This is defined by IBM MQ to indicate that it should be changed by the queue manager to the true character set identifier of the queue manager. This is in the same way as CSQM behaves. As a result, the value CSAPL is never associated with a variable length string. The initial value of this field can be changed by defining a different value for the constant CSAPL for your compile unit by the appropriate means for your application's programming language.

**VCHRL (10-digit signed integer)**

The length in bytes of the variable length string addressed by the VCHRP or VCHRO field.

The initial value of this field is 0. The value must be either greater than or equal to zero or the following special value which is recognized:

**VSNLT**

If VSNLT is not specified, VCHRL bytes are included as part of the string. If null characters are present they do not delimit the string.

If VSNLT is specified, the string is delimited by the first null encountered in the string. The null itself is not included as part of that string.

**Note:** The null character used to terminate a string if VSNLT is specified is a null from the code set specified by VCHRC.

For example, in UTF-16 (UCS-2 CCSIDs 1200 and 13488), this is the 2-byte Unicode encoding where a null is represented by a 16 bit number of all zeros. In UTF-16 it is common to find single bytes set to all zero which are part of characters (7-bit ASCII characters for example), but the strings will only be null terminated when two 'zero' bytes are found on an even byte boundary. It is possible to get two 'zero' bytes on an odd boundary when they are each part of valid characters. For example, x'01' x'00' x'00' x'30' represents two valid Unicode characters and does not null terminate the string.

**VCHRO (10-digit signed integer)**

The offset in bytes of the variable length string from the start of the MQCHARV, or the structure containing it.

When the MQCHARV structure is embedded within another structure, this value is the offset in bytes of the variable length string from the start of the structure that contains this MQCHARV structure. When the MQCHARV structure is not embedded within another structure, for example, if it is specified as a parameter on a function call, the offset is relative to the start of the MQCHARV structure.

The offset can be positive or negative. You can use either the VCHRP or VCHRO field to specify the variable length string, but not both.

The initial value of this field is 0.

**VCHRP (pointer)**

This is a pointer to the variable length string.

You can use either the VCHRP or VCHRO field to specify the variable length string, but not both.

The initial value of this field is a null pointer or null bytes.

**VCHRS (10-digit signed integer)**

The size in bytes of the buffer addressed by the VCHRP or VCHRO field.

When the MQCHARV structure is used as an output field on a function call, this field must be initialized with the length of the buffer provided. If the value of VCHRL is greater than VCHRS then only VCHRS bytes of data will be returned to the caller in the buffer.

The value must be greater than or equal to zero or the following special value which is recognized:

**VSUSL**
If VSUSL is specified, the length of the buffer is taken from the VCHRL field in the MQCHARV structure. This special value is not appropriate when the structure is used as an output field and a buffer is provided. This is the initial value of this field.

## Initial values

| Field name | Name of constant | Value of constant |
|---|---|---|
| *VCHRP* | None | Null pointer or null bytes. |
| *VCHRO* | None | 0 |
| *VCHRS* | VSUSL | -1 |
| *VCHRL* | None | 0 |
| *VCHRC* | CSAPL | -3 |

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQCHARV Structure
D*
D* Address of variable length string
D VCHRP                   1     16*
D* Offset of variable length string
D VCHRO                  17     20I 0
D* Size of buffer
D VCHRS                  21     24I 0
D* Length of variable length string
D VCHRL                  25     28I 0
D* CCSID of variable length string
D VCHRC                  29     32I 0
```

## Redefinition of CSAPL

Unlike the programming languages supported on other platforms, RPG does not have a way of redefining a defined constant, so you must set each VCHRC specifically if you want to use a value other than CSAPL.

## MQCIH - CICS bridge header

The MQCIH structure describes the information that can be present at the start of a message sent to the CICS bridge through IBM MQ for z/OS.

### Overview

**Format name**: FMCICS.

**Version**: The current version of MQCIH is CIVER2. Fields that exist only in the more-recent version of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQCIH, with the initial value of the *CIVER* field set to CIVER2.

**Character set and encoding**: Special conditions apply to the character set and encoding used for the MQCIH structure and application message data:

- Applications that connect to the queue manager that owns the CICS bridge queue must provide an MQCIH structure that is in the character set and encoding of the queue manager. This is because data conversion of the MQCIH structure is not performed in this case.
- Applications that connect to other queue managers can provide an MQCIH structure that is in any of the supported character sets and encodings; conversion of the MQCIH is performed by the receiving message channel agent connected to the queue manager that owns the CICS bridge queue.

  **Note:** There is one exception to this. If the queue manager that owns the CICS bridge queue is using CICS for distributed queuing, the MQCIH must be in the character set and encoding of the queue manager that owns the CICS bridge queue.
- The application message data following the MQCIH structure must be in the same character set and encoding as the MQCIH structure. The *CICSI* and *CIENC* fields in the MQCIH structure cannot be used to specify the character set and encoding of the application message data.

  A data-conversion exit must be provided by the user to convert the application message data if the data is not one of the built-in formats supported by the queue manager.

**Usage**: If the values required by the application are the same as the initial values shown in Table 582 on page 1013, and the bridge is running with AUTH=LOCAL or AUTH=IDENTIFY, the MQCIH structure can be omitted from the message. In all other cases, the structure must be present.

The bridge accepts either a version-1 or a version-2 MQCIH structure, but for 3270 transactions a version-2 structure must be used.

The application must ensure that fields documented as "request" fields have appropriate values in the message sent to the bridge; these fields are input to the bridge.

Fields documented as "response" fields are set by the CICS bridge in the reply message that the bridge sends to the application. Error information is returned in the *CIRET*, *CIFNC*, *CICC*, *CIREA*, and *CIAC* fields, but not all of them are set in all cases. Table 581 on page 1004 shows which fields are set for different values of *CIRET*.

*Table 581. Contents of error information fields in MQCIH structure*

| ***CIRET*** | ***CIFNC*** | ***CICC*** | ***CIREA*** | ***CIAC*** |
|---|---|---|---|---|
| CRC000 | - | - | - | - |
| CRC003 | - | - | FBC* | - |
| CRC002 CRC008 | IBM MQ call name | IBM MQ *CMPCOD* | IBM MQ *REASON* | - |
| CRC001 CRC006 CRC007 CRC009 | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | - |
| CRC004 CRC005 | - | - | - | CICS ABCODE |

- "Fields" on page 1005
- "Initial values" on page 1013
- "RPG declaration" on page 1014


## Fields

The MQCIH structure contains the following fields; the fields are described in **alphabetical order**:

**CIAC (4-byte character string)**

Abend code.

The value returned in this field is significant only if the *CIRET* field has the value CRC005 or CRC004. If it does, *CIAC* contains the CICS ABCODE value.

This is a response field. The length of this field is given by LNABNC. The initial value of this field is 4 blank characters.

This is an indicator specifying whether ADS descriptors should be sent on SEND and RECEIVE BMS requests. The following values are defined:

**ADNONE**
Do not send or receive ADS descriptor.

**ADSEND**
Send ADS descriptor.

**ADRECV**
Receive ADS descriptor.

**ADMSGF**
Use message format for the ADS descriptor.

This causes the ADS descriptor to be sent or received using the long form of the ADS descriptor. The long form has fields that are aligned on 4-byte boundaries.

The *CIADS* field should be set as follows:

- If ADS descriptors are *not* being used, set the field to ADNONE.
- If ADS descriptors *are* being used, and with the *same* CCSID in each environment, set the field to the sum of ADSEND and ADRECV.
- If ADS descriptors *are* being used, but with *different* CCSIDs in each environment, set the field to the sum of ADSEND, ADRECV, and ADMSGF.

This is a request field used only for 3270 transactions. The initial value of this field is ADNONE.

**CIADS (10-digit signed integer)**

Send/receive ADS descriptor.

This is an indicator specifying whether ADS descriptors should be sent on SEND and RECEIVE BMS requests. The following values are defined:

**ADNONE**
Do not send or receive ADS descriptor.

**ADSEND**
Send ADS descriptor.

**ADRECV**
Receive ADS descriptor.

**ADMSGF**
Use message format for the ADS descriptor.

This causes the ADS descriptor to be sent or received using the long form of the ADS descriptor. The long form has fields that are aligned on 4-byte boundaries.

The *CIADS* field should be set as follows:

- If ADS descriptors are *not* being used, set the field to ADNONE.
- If ADS descriptors *are* being used, and with the *same* CCSID in each environment, set the field to the sum of ADSEND and ADRECV.
- If ADS descriptors *are* being used, but with *different* CCSIDs in each environment, set the field to the sum of ADSEND, ADRECV, and ADMSGF.

This is a request field used only for 3270 transactions. The initial value of this field is ADNONE.

**CIAI (4-byte character string)**

AID key.

This is the initial value of the AID key when the transaction is started. It is a 1-byte value, left-aligned.

This is a request field used only for 3270 transactions. The length of this field is given by LNATID. The initial value of this field is 4 blanks.

**CIAUT (8-byte character string)**

Password or passticket.

This is a password or passticket. If user-identifier authentication is active for the CICS bridge, *CIAUT* is used with the user identifier in the MQMD identity context to authenticate the sender of the message.

This is a request field. The length of this field is given by LNAUTH. The initial value of this field is 8 blanks.

**CICC (10-digit signed integer)**

IBM MQ completion code or CICS EIBRESP.

The value returned in this field is dependent on *CIRET* ; see Table 581 on page 1004.

This is a response field. The initial value of this field is CCOK.

**CICNC (4-byte character string)**

Abend transaction code.

This is the abend code to be used to terminate the transaction (normally a conversational transaction that is requesting more data). Otherwise this field is set to blanks.

This is a request field used only for 3270 transactions. The length of this field is given by LNCNCL. The initial value of this field is 4 blanks.

**CICP (10-digit signed integer)**

Cursor position.

This is the initial cursor position when the transaction is started. Later, for conversational transactions, the cursor position is in the RECEIVE vector.

This is a request field used only for 3270 transactions. The initial value of this field is 0. This field is not present if *CIVER* is less than CIVER2.

**CICSI (10-digit signed integer)**

Reserved.

This is a reserved field; its value is not significant. The initial value of this field is 0.

**CICT (10-digit signed integer)**

Whether task can be conversational.

This is an indicator specifying whether the task should be allowed to issue requests for more information, or should abend. The value must be one of the following:

**CTYES**
Task is conversational.

**CTNO**
Task is not conversational.

This is a request field used only for 3270 transactions. The initial value of this field is CTNO.

**CIENC (10-digit signed integer)**

Reserved.

This is a reserved field; its value is not significant. The initial value of this field is 0.

**CIEO (10-digit signed integer)**

Offset of error in message.

This is the position of invalid data detected by the bridge exit. This field provides the offset from the start of the message to the location of the invalid data.

This is a response field used only for 3270 transactions. The initial value of this field is 0. This field is not present if *CIVER* is less than CIVER2.

**CIFAC (8-byte bit string)**

Bridge facility token.

This is an 8-byte bridge facility token. The purpose of a bridge facility token is to allow multiple transactions in a pseudoconversation to use the same bridge facility (virtual 3270 terminal). In the first, or only, message in a pseudoconversation, a value of FCNONE should be set; this tells CICS to allocate a new bridge facility for this message. A bridge facility token is returned in response messages when a nonzero *CIFKT* is specified on the input message. Subsequent input messages can then use the same bridge facility token.

The following special value is defined:

**FCNONE**
No BVT token specified.

This is both a request and a response field used only for 3270 transactions. The length of this field is given by LNFAC. The initial value of this field is FCNONE.

**CIFKT (10-digit signed integer)**

Bridge facility release time.

This is the length of time in seconds that the bridge facility will be kept after the user transaction has ended. For nonconversational transactions, the value should be zero.

This is a request field used only for 3270 transactions. The initial value of this field is 0.

**CIFL (4-byte character string)**

Terminal emulated attributes.

This is the name of an installed terminal that is to be used as a model for the bridge facility. A value of blanks means that *CIFL* is taken from the bridge transaction profile definition, or a default value is used.

This is a request field used only for 3270 transactions. The length of this field is given by LNFACL. The initial value of this field is 4 blanks.

**CIFLG (10-digit signed integer)**

Flags.

The value must be:

**CIFNON**
No flags.

This is a request field. The initial value of this field is CIFNON.

**CIFMT (8-byte character string)**

IBM MQ format name of data that follows MQCIH.

This specifies the IBM MQ format name of the data that follows the MQCIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

This format name is also used for the reply message, if the *CIRFM* field has the value FMNONE.

- For DPL requests, *CIFMT* must be the format name of the COMMAREA.
- For 3270 requests, *CIFMT* must be CSQCBDCI, and *CIRFM* must be CSQCBDC0.

The data-conversion exits for these formats must be installed on the queue manager where they are to run.

If the request message results in the generation of an error reply message, the error reply message has a format name of FMSTR.

This is a request field. The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**CIFNC (4-byte character string)**

IBM MQ call name or CICS EIBFN function.

The value returned in this field is dependent on *CIRET* ; see Table 581 on page 1004. The following values are possible when *CIFNC* contains an IBM MQ call name:

**CFCONN**
MQCONN call.

**CFGET**
MQGET call.

**CFINQ**
MQINQ call.

**CFOPEN**
MQOPEN call.

**CFPUT**
MQPUT call.

**CFPUT1**
MQPUT1 call.

**CFNONE**
No call.

This is a response field. The length of this field is given by LNFUNC. The initial value of this field is CFNONE.

**CIGWI (10-digit signed integer)**

Wait interval for MQGET call issued by bridge task.

This field is applicable only when *CIUOW* has the value CUFRST. It allows the sending application to specify the approximate time in milliseconds that the MQGET calls issued by the bridge should wait for second and subsequent request messages for the unit of work started by this message. This overrides the default wait interval used by the bridge. The following special values may be used:

**WIDFLT**
Default wait interval.

This causes the CICS bridge to wait for the period specified when the bridge was started.

**WIULIM**
Unlimited wait interval.

This is a request field. The initial value of this field is WIDFLT.

**CIII (10-digit signed integer)**

Reserved.

This is a reserved field. The value must be 0. This field is not present if *CIVER* is less than CIVER2.

**CILEN (10-digit signed integer)**

Length of MQCIH structure.

The value must be one of the following:

**CILEN1**
Length of version-1 CICS information header structure.

**CILEN2**
Length of version-2 CICS information header structure.

The following constant specifies the length of the current version:

**CILENC**
Length of current version of CICS information header structure.

This is a request field. The initial value of this field is CILEN2.

**CILT (10-digit signed integer)**

Link type.

This indicates the type of object that the bridge should try to link. The value must be one of the following:

**LTPROG**
DPL program.

**LTTRAN**
3270 transaction.

This is a request field. The initial value of this field is LTPROG.

**CINTI (4-byte character string)**

Next transaction to attach.

This is the name of the next transaction returned by the user transaction (typically by EXEC CICS RETURN TRANSID). If there is no next transaction, this field is set to blanks.

This is a response field used only for 3270 transactions. The length of this field is given by LNTRID. The initial value of this field is 4 blanks.

**CIODL (10-digit signed integer)**

Output COMMAREA data length.

This is the length of the user data to be returned to the client in a reply message. This length includes the 8-byte program name. The length of the COMMAREA passed to the linked program is the maximum of this field and the length of the user data in the request message, minus 8.

**Note:** The length of the user data in a message is the length of the message *excluding* the MQCIH structure.

If the length of the user data in the request message is smaller than *CIODL*, the DATALENGTH option of the LINK command is used; this allows the LINK to be function-shipped efficiently to another CICS region.

The following special value can be used:

**OLINPT**
Output length is same as input length.

This value might be needed even if no reply is requested, in order to ensure that the COMMAREA passed to the linked program is of sufficient size.

This is a request field used only for DPL programs. The initial value of this field OLINPT.

**CIREA (10-digit signed integer)**

IBM MQ reason or feedback code, or CICS EIBRESP2.

The value returned in this field is dependent on *CIRET* ; see Table 581 on page 1004.

This is a response field. The initial value of this field is RCNONE.

**CIRET (10-digit signed integer)**

Return code from bridge.

This is the return code from the CICS bridge describing the outcome of the processing performed by the bridge. The *CIFNC*, *CICC*, *CIREA*, and *CIAC* fields may contain additional information (see Table 581 on page 1004 ). The value is one of the following:

**CRC000**
(0, X'000') No error.

**CRC001**
(1, X'001') EXEC CICS statement detected an error.

**CRC002**
(2, X'002') IBM MQ call detected an error.

**CRC003**
(3, X'003') CICS bridge detected an error.

**CRC004**
(4, X'004') CICS bridge ended abnormally.

**CRC005**
(5, X'005') Application ended abnormally.

**CRC006**
(6, X'006') Security error occurred.

**CRC007**
(7, X'007') Program not available.

**CRC008**
(8, X'008') Second or later message within current unit of work not received within specified time.

**CRC009**
(9, X'009') Transaction not available.

This is a response field. The initial value of this field is CRC000.

**CIRFM (8-byte character string)**

IBM MQ format name of reply message.

This is the IBM MQ format name of the reply message that will be sent in response to the current message. The rules for coding this are the same as those for the *MDFMT* field in MQMD.

This is a request field used only for DPL programs. The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**CIRSI (4-byte character string)**

Reserved.

This is a reserved field. The value must be 4 blanks. The length of this field is given by LNRSID.

**CIRS1 (8-byte character string)**

Reserved.

This is a reserved field. The value must be 8 blanks.

**CIRS2 (8-byte character string)**

Reserved.

This is a reserved field. The value must be 8 blanks.

**CIRS3 (8-byte character string)**

Reserved.

This is a reserved field. The value must be 8 blanks.

**CIRS4 (10-digit signed integer)**

Reserved.

This is a reserved field. The value must be 0. This field is not present if *CIVER* is less than CIVER2.

**CIRTI (4-byte character string)**

Reserved.

This is a reserved field. The value must be 4 blanks. The length of this field is given by LNTRID.

**CISC (4-byte character string)**

Transaction start code.

This is an indicator specifying whether the bridge emulates a terminal transaction or a START transaction. The value must be one of the following:

**SCSTRT**
Start.

**SCDATA**
Start data.

**SCTERM**
Terminate input.

**SCNONE**
None.

In the response from the bridge, this field is set to the start code appropriate to the next transaction ID contained in the *CINTI* field. The following start codes are possible in the response:

- SCSTRT
- SCDATA
- SCTERM

For CICS Transaction Server Version 1.2, this field is a request field only; its value in the response is undefined.

For CICS Transaction Server Version 1.3 and subsequent releases, this is both a request and a response field.

This field is used only for 3270 transactions. The length of this field is given by LNSTCO. The initial value of this field is SCNONE.

**CISID (4-byte character string)**

Structure identifier.

The value must be:

**CISIDV**
Identifier for CICS information header structure.

This is a request field. The initial value of this field is CISIDV.

**CITES (10-digit signed integer)**

Status at end of task.

This field shows the status of the user transaction at end of task. One of the following values is returned:

**TENOSY**
Not synchronized.

The user transaction has not yet completed and has not syncpointed. The *MDMT* field in MQMD is MTRQST in this case.

**TECMIT**
Commit unit of work.

The user transaction has not yet completed, but has syncpointed the first unit of work. The *MDMT* field in MQMD is MTDGRM in this case.

**TEBACK**
Back out unit of work.

The user transaction has not yet completed. The current unit of work will be backed out. The *MDMT* field in MQMD is MTDGRM in this case.

**TEENDT**
End task.

The user transaction has ended (or abended). The *MDMT* field in MQMD is MTRPLY in this case.

This is a response field used only for 3270 transactions. The initial value of this field is TENOSY.

**CITI (4-byte character string)**

Transaction to attach.

If *CILT* has the value LTTRAN, *CITI* is the transaction identifier of the user transaction to be run; a nonblank value must be specified in this case.

If *CILT* has the value LTPROG, *CITI* is the transaction code under which all programs within the unit of work are to be run. If the value specified is blank, the CICS DPL bridge default transaction code (CKBP) is used. If the value is nonblank, it must have been defined to CICS as a local TRANSACTION with an initial program of CSQCBP00. This field is applicable only when *CIUOW* has the value CUFRST or CUONLY.

This is a request field. The length of this field is given by LNTRID. The initial value of this field is 4 blanks.

**CIUOW (10-digit signed integer)**

Unit-of-work control.

This controls the unit-of-work processing performed by the CICS bridge. You can request the bridge to run a single transaction, or one or more programs within a unit of work. The field indicates whether the CICS bridge should start a unit of work, perform the requested function within the current unit of work, or end the unit of work by committing it or backing it out. Various combinations are supported, to optimize the data transmission flows.

The value must be one of the following:

**CUONLY**
Start unit of work, perform function, then commit the unit of work (DPL and 3270).

**CUCONT**
Additional data for the current unit of work (3270 only).

**CUFRST**
Start unit of work and perform function (DPL only).

**CUMIDL**
Perform function within current unit of work (DPL only).

**CULAST**
Perform function, then commit the unit of work (DPL only).

**CUCMIT**
Commit the unit of work (DPL only).

**CUBACK**
Back out the unit of work (DPL only).

This is a request field. The initial value of this field is CUONLY.

**CIVER (10-digit signed integer)**

Structure version number.

The value must be one of the following:

**CIVER1**
Version-1 CICS information header structure.

**CIVER2**
Version-2 CICS information header structure.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**CIVERC**
Current version of CICS information header structure.

This is a request field. The initial value of this field is CIVER2.

## Initial values

*Table 582. Initial values of fields in MQCIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CISID* | CISIDV | 'CIH¬' |
| *CIVER* | CIVER2 | 2 |
| *CILEN* | CILEN2 | 180 |
| *CIENC* | None | 0 |
| *CICSI* | None | 0 |
| *CIFMT* | FMNONE | Blanks |
| *CIFLG* | CIFNON | 0 |
| *CIRET* | CRC000 | 0 |
| *CICC* | CCOK | 0 |
| *CIREA* | RCNONE | 0 |
| *CIUOW* | CUONLY | 273 |
| *CIGWI* | WIDFLT | -2 |
| *CILT* | LTPROG | 1 |
| *CIODL* | OLINPT | -1 |
| *CIFKT* | None | 0 |
| *CIADS* | ADNONE | 0 |

| Table 582. Initial values of fields in MQCIH (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *CICT* | CTNO | 0 |
| *CITES* | TENOSY | 0 |
| *CIFAC* | FCNONE | Nulls |
| *CIFNC* | CFNONE | Blanks |
| *CIAC* | None | Blanks |
| *CIAUT* | None | Blanks |
| *CIRS1* | None | Blanks |
| *CIRFM* | FMNONE | Blanks |
| *CIRSI* | None | Blanks |
| *CIRTI* | None | Blanks |
| *CITI* | None | Blanks |
| *CIFL* | None | Blanks |
| *CIAI* | None | Blanks |
| *CISC* | SCNONE | Blanks |
| *CICNC* | None | Blanks |
| *CINTI* | None | Blanks |
| *CIRS2* | None | Blanks |
| *CIRS3* | None | Blanks |
| *CICP* | None | 0 |
| *CIEO* | None | 0 |
| *CIII* | None | 0 |
| *CIRS4* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQCIH Structure
D*
D* Structure identifier
D  CISID                  1      4    INZ('CIH ')
D* Structure version number
D  CIVER                  5      8I 0 INZ(2)
D* Length of MQCIH structure
D  CILEN                  9     12I 0 INZ(180)
D* Reserved
D  CIENC                 13     16I 0 INZ(0)
D* Reserved
D  CICSI                 17     20I 0 INZ(0)
D* MQ format name of data that followsMQCIH
D  CIFMT                 21     28    INZ('        ')
D* Flags
D  CIFLG                 29     32I 0 INZ(0)
```

```
     D* Return code from bridge
     D  CIRET                 33     36I 0 INZ(0)
     D* MQ completion code or CICSEIBRESP
     D  CICC                  37     40I 0 INZ(0)
     D* MQ reason or feedback code, or CICSEIBRESP2
     D  CIREA                 41     44I 0 INZ(0)
     D* Unit-of-work control
     D  CIUOW                 45     48I 0 INZ(273)
     D* Wait interval for MQGET call issuedby bridge task
     D  CIGWI                 49     52I 0 INZ(-2)
     D* Link type
     D  CILT                  53     56I 0 INZ(1)
     D* Output COMMAREA data length
     D  CIODL                 57     60I 0 INZ(-1)
     D* Bridge facility release time
     D  CIFKT                 61     64I 0 INZ(0)
     D* Send/receive ADS descriptor
     D  CIADS                 65     68I 0 INZ(0)
     D* Whether task can beconversational
     D  CICT                  69     72I 0 INZ(0)
     D* Status at end of task
     D  CITES                 73     76I 0 INZ(0)
     D* Bridge facility token
     D  CIFAC                 77     84    INZ(X'00000000000000-
     D                                     00')
     D* MQ call name or CICS EIBFNfunction
     D  CIFNC                 85     88    INZ('    ')
     D* Abend code
     D  CIAC                  89     92    INZ
     D* Password or passticket
     D  CIAUT                 93    100    INZ
     D* Reserved
     D  CIRS1                101    108    INZ
     D* MQ format name of reply message
     D  CIRFM                109    116    INZ('        ')
     D* Remote CICS system id to use
     D  CIRSI                117    120    INZ
     D* CICS RTRANSID to use
     D  CIRTI                121    124    INZ
     D* Transaction to attach
     D  CITI                 125    128    INZ
     D* Terminal emulated attributes
     D  CIFL                 129    132    INZ
     D* AID key
     D  CIAI                 133    136    INZ
     D* Transaction start code
     D  CISC                 137    140    INZ('    ')
     D* Abend transaction code
     D  CICNC                141    144    INZ
     D* Next transaction to attach
     D  CINTI                145    148    INZ
     D* Reserved
     D  CIRS2                149    156    INZ
     D* Reserved
     D  CIRS3                157    164    INZ
     D* Cursor position
     D  CICP                 165    168I 0 INZ(0)
     D* Offset of error in message
     D  CIEO                 169    172I 0 INZ(0)
     D* Reserved
     D  CIII                 173    176I 0 INZ(0)
     D* Reserved
     D  CIRS4                177    180I 0 INZ(0)
     D*
```

## MQCMHO - Create message handle options

The **MQCMHO** structure allows applications to specify options that control how message handles are created.

### Overview

#### Purpose

The structure is an input parameter on the **MQCRTMH** call.

**Character set and encoding**
Data in **MQCMHO** must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1016
- "Initial values" on page 1017
- "RPG declaration" on page 1017


## Fields

The MQCMHO structure contains the following fields; the fields are described in alphabetical order:

**CMOPT (10 digit signed integer)**

One of the following options can be specified:

**CMVAL**

When **MQSETMP** is called to set a property in this message handle, the property name is validated to ensure that it:

- contains no invalid characters.
- does not begin "JMS" or "usr.JMS" except for the following:
  - JMSCorrelationID
  - JMSReplyTo
  - JMSType
  - JMSXGroupID
  - JMSXGroupSeq

  These names are reserved for JMS properties.
- is not one of the following keywords, in any mixture of upper or lowercase:
  - "AND"
  - "BETWEEN"
  - "ESCAPE"
  - "FALSE"
  - "IN"
  - "IS"
  - "LIKE"
  - "NOT"
  - "NULL"
  - "OR"
  - "TRUE"
- does not begin "Body." or "Root." (except for "Root.MQMD.").

If the property is MQ-defined ("mq.*") and the name is recognized, the property descriptor fields are set to the correct values for the property. If the property is not recognized, the *Support* field of the property descriptor is set to **PDSUPO** (for more information, see PDSUP ).

**CMDEFV**

This specifies that the default level of validation of property names occurs.

The default level of validation is equivalent to that specified by **CMVAL**.

In a future release an administrative option might be defined which will change the level of validation that will occur when **CMDEFV** is defined.

This is the default value.

**CMNOVA**

No validation on the property name occurs. See the description of **CMVAL**.

**Default option:** If none of the options previously described in this section is required, the following option can be used:

**CMNONE**

All options assume their default values. Use this value to indicate that no other options have been specified. **CMNONE** aids program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

This is always an input field. The initial value of this field is **CMDEFV**.

**CMSID (10 digit signed integer)**

This is the structure identifier; the value must be:

**CMSIDV**
Identifier for create message handle options structure.

This is always an input field. The initial value of this field is **CMSIDV**.

**CMVER (10 digit signed integer)**

This is the structure version number; the value must be:

**CMVER1**
Version-1 create message handle options structure.

The following constant specifies the version number of the current version:

**CMVERC**
Current version of create message handle options structure.

This is always an input field. The initial value of this field is **CMVER1**.

## Initial values

*Table 583. Initial values of fields in MQCMHO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CMSID* | CMSIDV | 'CMHO' |
| *CMVER* | CMVER1 | 1 |
| *CMOPT* | CMDEFV | 0 |

## RPG declaration

```
D* MQCMHO Structure
D*
D*
D* Structure identifier
D  CMSID                  1      4    INZ('CMHO')
D*
D* Structure version number
D  CMVER                  5      8I 0 INZ(1)
D*
```

```
     D* Options that control the action of MQCRTMH
     D  CMOPT                 9     12I 0 INZ(0)
```

## MQCNO - Connect options

The MQCNO structure allows the application to specify options relating to the connection to the local queue manager.

### Overview

**Purpose**: The structure is an input/output parameter on the MQCONNX call.

**Version**: The current version of MQCNO is CNVER5. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQCNO that is supported by the environment, but with the initial value of the *CNVER* field set to CNVER1. To use fields that are not present in the version-1 structure, the application must set the *CNVER* field to the version number of the version required.

**Character set and encoding**: Data in MQCNO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT.


- "Fields" on page 1018
- "Initial values" on page 1022
- "RPG declaration" on page 1023


### Fields

The MQCNO structure contains the following fields; the fields are described in **alphabetical order**:

**CNCCO (10-digit signed integer)**

This is the offset in bytes of an MQCD channel definition structure from the start of the MQCNO structure.

**CNCCP (pointer)**

This is a pointer to an MQCD channel definition structure.

**CNCONID (24-byte character string)**

Unique connection identifier. This field allows the queue manager to reliably identify an application process by assigning it a unique identifier when it first connects to the queue manager.

Applications use the connection identifier for correlation purposes when making PUT and GET calls. All connections are assigned an identifier by the queue manager, no matter how the connection was established.

It is possible to use the connection identifier to force the end of a long running unit of work. To do this, specifying the connection identifier using the PCF command 'Stop Connection', or the MQSC command STOP CONN. For more information about using these commands, see the related links.

The initial value of the field is 24 null bytes.

**CNCT (128-byte bit string)**

This is a tag that the queue manager associates with the resources that are affected by the application during this connection.

Queue-manager connection tag.

Each application or application instance must use a different value for the tag, so that the queue manager can correctly serialize access to the affected resources. See the descriptions of the CN*CT* options for further details. The tag ceases to be valid when the application terminates, or issues the MQDISC call.

Use the following special value if no tag is required:

**CTNONE**
No connection tag specified.

The value is binary zero for the length of the field.

This is an input field. The length of this field is given by LNCTAG. The initial value of this field is CTNONE. This field is ignored if *CNVER* is less than CNVER3.

Use the field ConnTag when connecting to a z/OS queue manager.

**CNOPT (10 digit signed integer)**

Options that control the action of MQCONNX.

**Binding options**

The binding options control the type of IBM MQ binding that is used; specify only one of these options:

**CNSBND**
Standard binding.

The standard binding option causes the application and the local queue manager agent to run in separate units of execution, typically in separate processes. The arrangement maintains the integrity of the queue manager; that is, it protects the queue manager from errant programs.

Use CNSBND in situations where the application might not have been fully tested, or might be unreliable or untrustworthy. CNSBND is the default.

CNSBND is defined to aid program documentation. Do not use this option with any other option controlling the type of binding used; but because its value is zero, such use cannot be detected.

This option is supported in all environments.

**CNFBND**
Fast path binding.

The fast path binding option causes the application and the local queue manager agent to be part of the same unit of execution. Fast path is in contrast to the standard binding, where the application and the local-queue manager agent run in separate units of execution.

CNFBND is ignored if the queue manager does not support this type of binding; processing continues as though the option had not been specified.

CNFBND can be of advantage in situations where multiple processes consume more resources than the overall resource used by the application. An application that uses the fast path binding is known as a *trusted application*.

Consider the following important points when deciding whether to use the fast path binding:

- **Using the CNFBND option does not prevent an application altering or corrupting messages and other data areas belonging to the queue manager. Use this option only in situations where you have fully evaluated these issues.**
- The application must not use asynchronous signals or timer interrupts (such as `sigkill`) with CNFBND. There are also restrictions on the use of shared memory segments.
- The application must not have more than one thread connected to the queue manager at any one time.
- The application must use the MQDISC call to disconnect from the queue manager.
- The application must finish before ending the queue manager with the `endmqm` command.

The following points apply to the use of CNFBND in the environments indicated:

- On IBM i, the job must run under user profile QMQM that belongs to the QMQMADM group. Also, the program must not terminate abnormally, otherwise unpredictable results might occur.

For more information about the implications of using trusted applications, see Connecting to a queue manager using the MQCONNX call and Restrictions for trusted applications.

**CNSHBD**
Shared Bindings.

The shared bindings option causes the application and the local queue manager agent to run in separate units of execution, typically in separate processes. The arrangement maintains the integrity of the queue manager; that is, it protects the queue manager from errant programs. However some resources are shared between the application and the local queue manager agent. CNSHBD is ignored if the queue manager does not support this type of binding. Processing continues as though the option had not been specified.

**CNIBND**
Isolated Bindings.

The isolated bindings option causes the application and the local queue manager agent to run in separate units of execution, typically in separate processes. The arrangement maintains the integrity of the queue manager; that is, it protects the queue manager from errant programs. The application process and the local queue manager agent are isolated from each other in that they do not share resources. CNIBND is ignored if the queue manager does not support this type of binding. Processing continues as though the option had not been specified.

**Handle-sharing options**

The following options control the sharing of handles between different threads (units of parallel processing) within the same process. Only one of these options can be specified.

**CNHSN**
No handle sharing between threads.

The no handle sharing between threads option indicates that connection and object handles can be used only by the thread that caused the handle to be allocated; that is, the thread that issued the MQCONN, MQCONNX, or MQOPEN call. The handles cannot be used by other threads belonging to the same process.

**CNHSB**
Serial handle sharing between threads, with call blocking.

The serial handle sharing between threads, with call blocking, option indicates that connection and object handles allocated by one thread of a process can be used by other threads belonging to the same process. However, only one thread at a time can use any particular handle, that is, only serial use of a handle is permitted. If a thread tries to use a handle that is already in use by another thread, the call blocks (waits) until the handle becomes available.

**CNHSNB**
Serial handle sharing between threads, without call blocking.

The serial handle sharing between threads, *without* call blocking, option is the same as the " *with* blocking" option, except that, if the handle is in use by another thread, the call completes immediately with CCFAIL and RC2219 instead of blocking until the handle becomes available.

A thread can have zero or one nonshared handles, plus zero or more shared handles:

- Each MQCONN or MQCONNX call that specifies CNHSN returns a new nonshared handle on the first call, and the same nonshared handle on subsequent calls (assuming no intervening MQDISC call). The reason code is RC2002 for the second and later calls.
- Each MQCONNX call that specifies CNHSB or CNHSNB returns a new shared handle on each call.

Object handles inherit the same sharing properties as the connection handle specified on the MQOPEN call that created the object handle. Also, units of work inherit the same sharing properties as the connection handle used to start the unit of work; if the unit of work is started

in one thread using a shared handle, the unit of work can be updated in another thread using the same handle.

If you do not specify a handle-sharing option, the default is determined by the environment:

- In the Microsoft Transaction Server (MTS) environment, the default is the same as CNHSB.
- In other environments, the default is the same as CNHSN.

**Reconnection options**

Reconnection options determine if a connection is reconnectable. Only client connections are reconnectable.

**CNRCDF**
The reconnection option is resolved to its default value. If no default is set, the value of this option resolves to DISABLED. The value of the option is passed to the server, and can be queried by **PCF** and **MQSC**.

**CNRC**
The application can be reconnected to any queue manager consistent with the value of the MQCONNX **QMNAME** parameter. Use the CNRC option only if there is no affinity between the client application and the queue manager with which it initially established a connection. The value of the option is passed to the server, and can be queried by **PCF** and **MQSC**.

**CNRCD**
The application cannot be reconnected. The value of the option is *not* passed to the server.

**CNRCQM**
The application can only be reconnected to the queue manager with which it originally connected. Use this value if a client can be reconnected, but there is an affinity between the client application, and the queue manager with which it originally established a connection. Choose this value if you want a client to automatically reconnect to the standby instance of a highly available queue manager. The value of the option is passed to the server, and can be queried by **PCF** and **MQSC**.

Use the options CNRC, CNRCD, and CNRCQM only for client connections. If the options are used for a binding connection, MQCONNX fails with completion code, MQCC_FAILED and reason code, MQRC_OPTIONS_ERROR.

**Default option**: If none of the options described is required, the following option can be used:

**CNNONE**
No options are specified.

CNNONE is defined to aid program documentation. It is not intended that this option is used with any other CN* option, but because its value is zero, such use cannot be detected.

**CNSCO (10-digit signed integer)**

This is the offset in bytes of an MQSCO structure from the start of the MQCNO structure.

This field is ignored if *CNVER* is less than CNVER4.

**CNSCP (pointer)**

This is the address of an MQSCO structure.

This field is ignored if *CNVER* is less than CNVER4.

**CNSECPO (10-digit signed integer)**

Security parameters offset. The offset of the MQCSP structure used for specifying a user ID and password.

The value may be positive or negative. The initial value of this field is 0.

This field is ignored if *CNVER* is less than CNVER5.

**CNSECPP (pointer)**

Security parameters pointer. Address of the MQCSP structure used for specifying a user ID and a password.

The initial value of this field is a null pointer or null bytes.

This field is ignored if *CNVER* is less than CNVER5.

**CNSID (4-byte character string)**

The structure identifier for the MQCNO structure.

The value must be:

**CNSIDV**
Identifier for connect-options structure.

This is always an input field. The initial value of this field is CNSIDV.

**CNVER (10-digit signed integer)**

The structure version number for the MQCNO structure.

The value must be:

**CNVER5**
Version-5 connect-options structure.

This version is supported in all environments.

The following constant specifies the version number of the current version:

**CNVERC**
Current version of connect-options structure.

This is always an input field. The initial value of this field is CNVER5.

## Initial values

*Table 584. Initial values of fields in MQCNO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CNSID* | CNSIDV | 'CNO¬ |
| *CNVER* | CNVER5 | 1 |
| *CNOPT* | CNNONE | 0 |
| *CNCCO* | None | 0 |
| *CNCCP* | None | Null pointer or null bytes |
| *CNCT* | CTNONE | Nulls |
| *CNSCP* | None | Null pointer or null bytes |
| *CNSCO* | None | 0 |
| *CNCONID* | None | Nulls |
| *CNSECPO* | None | 0 |
| *CNSECPP* | None | Null pointer or null bytes |

**Notes:**

1. The symbol ¬ represents a single blank character.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQCNO Structure
D*
D* Structure identifier
D  CNSID                  1      4    INZ('CNO ')
D* Structure version number
D  CNVER                  5      8I 0 INZ(1)
D* Options that control the action ofMQCONNX
D  CNOPT                  9     12I 0 INZ(0)
D* Offset of MQCD structure for clientconnection
D  CNCCO                 13     16I 0 INZ(0)
D* Address of MQCD structure for clientconnection
D  CNCCP                 17     32*   INZ(*NULL)
D* Queue-manager connection tag
D  CNCT                  33    160    INZ(X'00000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     0000000000000000000000-
D                                     ')
D* Address of MQSCO structure forclient connection
D  CNSCP                 161    176*   INZ(*NULL)
D* Offset of MQSCO structure for clientconnection
D  CNSCO                 177    180I 0 INZ(0)
D* Unique Connection Identifier
D  CNCONID               181    204    INZ(X'00000000000000-
D                                     0000000000000000000000-
D                                     000000000000')
D* Offset of MQCSP structure
D  CNSECPO               205    208I 0 INZ(0)
D* Address of MQCSP structure
D  CNSECPP               209    224*   INZ(*NULL)
```

## MQCSP - Security parameters

Summary of the MQCSP structure for IBM MQ for IBM i.

### Overview

**Purpose**: The MQCSP structure enables the authorization service to authenticate a user ID and password. You specify the MQCSP connection security parameters structure on an MQCONNX call.

**Character set and encoding**: Data in MQCSP must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT.


- "Fields" on page 1023
- "Initial values" on page 1025
- "RPG declaration" on page 1025


### Fields

The MQCSP structure contains the following fields; the fields are described in **alphabetical order**:

**CSAUTHT (10-digit signed integer)**

This is the type of authentication to perform.

Valid values are:

**CSAN**
Do not use user ID and password fields.

**CSAUIAP**
Authenticate user ID and password fields.

This is an input field. The initial value of this field is CSAN.

**CSCPPL (10-digit signed integer)**

This is the length of the password to be used in authentication.

The maximum length of the password is not dependent on the platform. If the length of the password is greater than that allowed, the authentication request fails with an RC2035.

This is an input field. The initial value of this field is 0.

**CSCPPO (10-digit signed integer)**

This is the offset in bytes of the password to be used in authentication.

The offset can be positive or negative.

This is an input field. The initial value of this field is 0.

**CSCPPP (pointer)**

This is the address of the password to be used in authentication.

This is an input field. The initial value of this field is the null pointer.

**CSCSPUIL (10-digit signed integer)**

This is the length of the user ID to be used in authentication.

The maximum length of the user ID is not dependent on the platform. If the length of the user ID is greater than that allowed, the authentication request fails with an RC2035.

This is an input field. The initial value of this field is 0.

**CSCSPUIO (10-digit signed integer)**

This is the offset in bytes of the user ID to be used in authentication.

The offset can be positive or negative.

This is an input field. The initial value of this field is 0.

**CSCSPUIP (pointer)**

This is the address of the user ID to be used in authentication.

This is an input field. The initial value of this field is the null pointer. This field is ignored if CSVER is less than CSVER5.

**CSRE1 (4-byte character string)**

A reserved field, required for pointer alignment on IBM i.

This is an input field. The initial value of this field is all null.

**CSRS2 (8-byte character string)**

A reserved field, required for pointer alignment on IBM i.

This is an input field. The initial value of this field is all null.

**CSSID (4-byte character string)**

Structure identifier.

The value must be:

**CSSIDV**
Identifier for the security parameters structure.

**CSVER (10-digit signed integer)**

Structure version number.

The value must be:

**CSVER1**
Version-1 security parameters structure.

The following constant specifies the version number of the current version:

**CSVERC**
Current version of security parameters structure.

This is always an input field. The initial value of this field is CSVER1.

## Initial values

*Table 585. Initial values of fields in MQCNO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *CSSID* | CSSIDV | 'CSP¬' |
| *CSVER* | CSVER1 | 1 |
| *CSAUTHT* | None | 0 |
| *CSRE1* | None | Nulls |
| *CSCSPUIP* | None | Null pointer |
| *CSCSPUIO* | None | 0 |
| *CSCSPUIL* | None | 0 |
| *CSRS2* | None | Nulls |
| *CSCPPP* | None | Null pointer |
| *CSCPPO* | None | 0 |
| *CSCPPL* | None | 0 |

**Note:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
      D*
      D* MQCSP Structure
      D*
      D* Structure identifier
      D  CSSID                  1      4    INZ('CSP ')
      D* Structure version number
      D  CSVER                  5      8I 0 INZ(1)
      D* Type of authentication
      D  CSAUTHT                9     12I 0 INZ(0)
      D* Reserved
      D  CSRE1                 13     16    INZ(X'00000000')
      D* Address of user ID
      D  CSCSPUIP              17     32*   INZ(*NULL)
      D* Offset of user ID
      D  CSCSPUIO              33     36I 0 INZ(0)
      D* Length of user ID
      D  CSCSPUIL              37     40I 0 INZ(0)
      D* Reserved
      D  CSRS2                 41     48    INZ(X'0000000000000000')
      D* Address of password
```

```
      D  CSCPPP                 49     64*   INZ(*NULL)
      D* Offset of password
      D  CSCPPO                 65     68I 0 INZ(0)
      D* Length of password
      D  CSCPPL                 69     72I 0 INZ(0)
```

## MQCTLO - Control callback options structure

Structure specifying the control callback function.

### Overview

**Purpose**

The MQCTLO structure is used to specify options relating to a control callbacks function.

The structure is an input and output parameter on the MQCTL call.

**Version**

The current version of MQCTLO is CTLV1.

**Character set and encoding**

Data in MQCTLO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.


- "Fields" on page 1026
- "Initial values" on page 1027
- "RPG declaration" on page 1027


### Fields

The MQCTLO structure contains the following fields; the fields are described in alphabetical order:

**COCONNAREA (10 digit signed integer)**

Control options structure - ConnectionArea field.

This is a field that is available for the callback function to use.

The queue manager makes no decisions based on the contents of this field and it is passed unchanged from the CBCCONNAREA field in the MQCBC structure, which is a parameter on the MQCB call.

This field is ignored for all operations other than CTLSR and CTLSW.

This field is an input and output field to the callback function. The initial value of this field is a null pointer or null bytes.

**COOPT (10 digit signed integer)**

Options that control the action of MQCTLO.

**CTLFQ**

Force the MQCTLO call to fail if the queue manager or connection is in the quiescing state.

Specify GMFIQ, in the MQGMO options passed on the MQCB call, to cause notification to message consumers when they are quiescing.

**CTLTHR**

This option informs the system that the application requires that all message consumers, for the same connection, are called on the same thread.

**Default option**: If you do not need any of the options described, use the following option:

**CTLNO**
Use this value to indicate that no other options have been specified; all options assume their default values. CTLNO is defined to aid program documentation; it is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of the *COOPT* field is CTLNO.

**CORSV (10 digit signed integer)**

This is a reserved field. The initial value of this field is a blank character.

**COSID (10 digit signed integer)**

Control options structure - StrucId field.

This is the structure identifier; the value must be:

**CTLSI**
Identifier for Control Options structure.

This is always an input field. The initial value of this field is CTLSI.

**COVER (10 digit signed integer)**

Control options structure - Version field.

This is the structure version number; the value must be:

**CTLV1**
Version-1 Control options structure.

The following constant specifies the version number of the current version:

**CTLCV**
Current version of Control options structure.

This is always an input field. The initial value of this field is CTLV1.

## Initial values

*Table 586. Initial values of fields in MQCTLO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *COSID* | CTLSI | 'CTLO' |
| *COVER* | CTLV1 | 1 |
| *COOPT* | CTLNO | Nulls |
| *CORSV* | Reserved field | |
| *COCONNAREA* | None | Null pointer or null bytes |

## RPG declaration

```
D* MQCTLO Structure
D*
D* Structure identifier
D  COSID                  1      4    INZ('CTLO')
D*
D* Structure version number
D  COVER                  5      8I 0 INZ(1)
D*
D* Options that control the action of MQCTL
D  COOPT                  9     12I 0 INZ(0)
D*
D* Reserved
D  CORSV                 13     16I 0 INZ(-1)
D*
```

```
     D* MQCTL Data area passed to the function
     D  COCONNAREA            17     32*   INZ(*NULL)
```

## MQDH - Distribution header

The MQDH structure describes the additional data that is present in a message when that message is a distribution-list message stored on a transmission queue.

### Overview

**Purpose**: A distribution-list message is a message that is sent to multiple destination queues. The additional data consists of the MQDH structure followed by an array of MQOR records and an array of MQPMR records.

This structure is for use by specialized applications that put messages directly on transmission queues, or which remove messages from transmission queues (for example: message channel agents).

This structure should *not* be used by normal applications which simply want to put messages to distribution lists. Those applications should use the MQOD structure to define the destinations in the distribution list, and the MQPMO structure to specify message properties or receive information about the messages sent to the individual destinations.

**Character set and encoding**: Data in MQDH must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT for the C programming language.

The character set and encoding of the MQDH must be set into the *MDCSI* and *MDENC* fields in:

- The MQMD (if the MQDH structure is at the start of the message data), or
- The header structure that precedes the MQDH structure (all other cases).

**Usage**: When an application puts a message to a distribution list, and some or all of the destinations are remote, the queue manager prefixes the application message data with the MQXQH and MQDH structures, and places the message on the relevant transmission queue. The data therefore occurs in the following sequence when the message is on a transmission queue:

- MQXQH structure
- MQDH structure plus arrays of MQOR and MQPMR records
- Application message data

Depending on the destinations, more than one such message might be generated by the queue manager, and placed on different transmission queues. In this case, the MQDH structures in those messages identify different subsets of the destinations defined by the distribution list opened by the application.

An application that puts a distribution-list message directly on a transmission queue must conform to the sequence described previously, and must ensure that the MQDH structure is correct. If the MQDH structure is not valid, the queue manager may choose to fail the MQPUT or MQPUT1 call with reason code RC2135.

Messages can be stored on a queue in distribution-list form only if the queue is defined as being able to support distribution list messages (see the *DistLists* queue attribute described in "Attributes for queues" on page 1335 ). If an application puts a distribution-list message directly on a queue that does not support distribution lists, the queue manager splits the distribution list message into individual messages, and places those on the queue instead.


- "Fields" on page 1028
- "Initial values" on page 1031
- "RPG declaration" on page 1032


### Fields

The MQDH structure contains the following fields; the fields are described in **alphabetical order**:

**DHCNT (10-digit signed integer)**

Number of MQOR records present.

This defines the number of destinations. A distribution list must always contain at least one destination, so *DHCNT* must always be greater than zero.

The initial value of this field is 0.

**DHCSI (10-digit signed integer)**

Character set identifier of data that follows the MQOR and MQPMR records.

This specifies the character set identifier of the data that follows the arrays of MQOR and MQPMR records; it does not apply to character data in the MQDH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

**DHENC (10-digit signed integer)**

Numeric encoding of data that follows the MQOR and MQPMR records.

This specifies the numeric encoding of the data that follows the arrays of MQOR and MQPMR records; it does not apply to numeric data in the MQDH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is 0.

**DHFLG (10-digit signed integer)**

General flags.

The following flag can be specified:

**DHFNEW**
Generate new message identifiers.

This flag indicates that a new message identifier is to be generated for each destination in the distribution list. This can be set only when there are no put-message records present, or when the records are present but they do not contain the *PRMID* field.

Using this flag defers generation of the message identifiers until the last possible moment, namely the moment when the distribution-list message is finally split into individual messages. This minimizes the amount of control information that must flow with the distribution-list message.

When an application puts a message to a distribution list, the queue manager sets DHFNEW in the MQDH it generates when both of the following are true:

- There are no put-message records provided by the application, or the records provided do not contain the *PRMID* field.
- The *MDMID* field in MQMD is MINONE, or the *PMOPT* field in MQPMO includes PMNMID

If no flags are needed, the following can be specified:

**DHFNON**
No flags.

This constant indicates that no flags have been specified. DHFNON is defined to aid program documentation. It is not intended that this constant is used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is DHFNON.

**DHFMT (8-byte character string)**

Format name of data that follows the MQOR and MQPMR records.

This specifies the format name of the data that follows the arrays of MQOD and MQPMR records (whichever occurs last).

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The initial value of this field is FMNONE.

**DHLEN (10-digit signed integer)**

Length of MQDH structure plus following MQOR and MQPMR records.

This is the number of bytes from the start of the MQDH structure to the start of the message data following the arrays of MQOR and MQPMR records. The data occurs in the following sequence:

- MQDH structure
- Array of MQOR records
- Array of MQPMR records
- Message data

The arrays of MQOR and MQPMR records are addressed by offsets contained within the MQDH structure. If these offsets result in unused bytes between one or more of the MQDH structure, the arrays of records, and the message data, those unused bytes must be included in the value of *DHLEN*, but the content of those bytes is not preserved by the queue manager. It is valid for the array of MQPMR records to precede the array of MQOR records.

The initial value of this field is 0.

**DHORO (10-digit signed integer)**

Offset of first MQOR record from start of MQDH.

This field gives the offset in bytes of the first record in the array of MQOR object records containing the names of the destination queues. There are *DHCNT* records in this array. These records (plus any bytes skipped between the first object record and the previous field) are included in the length given by the *DHLEN* field.

A distribution list must always contain at least one destination, so *DHORO* must always be greater than zero.

The initial value of this field is 0.

**DHPRF (10-digit signed integer)**

Flags indicating which MQPMR fields are present.

Zero or more of the following flags can be specified:

**PFMID**
Message-identifier field is present.

**PFCID**
Correlation-identifier field is present.

**PFGID**
Group-identifier field is present.

**PFFB**
Feedback field is present.

**PFACC**
Accounting-token field is present.

If no MQPMR fields are present, the following can be specified:

**PFNONE**
No put-message record fields are present.

PFNONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is PFNONE.

**DHPRO (10-digit signed integer)**

Offset of first MQPMR record from start of MQDH.

This field gives the offset in bytes of the first record in the array of MQPMR put message records containing the message properties. If present, there are *DHCNT* records in this array. These records (plus any bytes skipped between the first put message record and the previous field) are included in the length given by the *DHLEN* field.

Put message records are optional; if no records are provided, *DHPRO* is zero, and *DHPRF* has the value PFNONE.

The initial value of this field is 0.

**DHSID (4-byte character string)**

Structure identifier.

The value must be:

**DHSIDV**
Identifier for distribution header structure.

The initial value of this field is DHSIDV.

**DHVER (10-digit signed integer)**

Structure version number.

The value must be:

**DHVER1**
Version number for distribution header structure.

The following constant specifies the version number of the current version:

**DHVERC**
Current version of distribution header structure.

The initial value of this field is DHVER1.

## Initial values

*Table 587. Initial values of fields in MQDH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *DHSID* | DHSIDV | 'DH¬¬' |
| *DHVER* | DHVER1 | 1 |
| *DHLEN* | None | 0 |
| *DHENC* | None | 0 |
| *DHCSI* | CSUNDF | 0 |
| *DHFMT* | FMNONE | Blanks |

| Table 587. Initial values of fields in MQDH (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *DHFLG* | DHFNON | 0 |
| *DHPRF* | PFNONE | 0 |
| *DHCNT* | None | 0 |
| *DHORO* | None | 0 |
| *DHPRO* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQDH Structure
D*
D* Structure identifier
D  DHSID                  1      4    INZ('DH  ')
D* Structure version number
D  DHVER                  5      8I 0 INZ(1)
D* Length of MQDH structure plusfollowing MQOR and MQPMR records
D  DHLEN                  9     12I 0 INZ(0)
D* Numeric encoding of data that followsthe MQOR and MQPMR records
D  DHENC                 13     16I 0 INZ(0)
D* Character set identifier of data thatfollows the MQOR and MQPMR
D* records
D  DHCSI                 17     20I 0 INZ(0)
D* Format name of data that follows theMQOR and MQPMR records
D  DHFMT                 21     28    INZ('        ')
D* General flags
D  DHFLG                 29     32I 0 INZ(0)
D* Flags indicating which MQPMR fieldsare present
D  DHPRF                 33     36I 0 INZ(0)
D* Number of MQOR records present
D  DHCNT                 37     40I 0 INZ(0)
D* Offset of first MQOR record from startof MQDH
D  DHORO                 41     44I 0 INZ(0)
D* Offset of first MQPMR record fromstart of MQDH
D  DHPRO                 45     48I 0 INZ(0)
```

# MQDLH - Dead-letter header

## Overview

**Purpose**

The MQDLH structure describes the information that prefixes the application message data of messages on the dead-letter (undelivered-message) queue. A message can arrive on the dead-letter queue because the queue manager or message channel agent redirected it to the queue. An application might put the message directly on the queue.

**Format name**

FMDLH

**Character set and encoding**

The MQDLH might be at the start of the application message data. If so, the fields in the MQDLH structure are in the character set and encoding given by the MDCSI and MDENC fields. If not, the character set and encoding are set by the MDCSI and MDENC fields in the header structure that precedes the MQDLH.

The character set must be one that has single-byte characters for the characters that are valid in queue names.

**Usage**

Applications that put messages directly on the dead-letter queue must prefix the message data with an MQDLH structure, and initialize the fields with appropriate values. However, the queue manager does not require that an MQDLH structure is present, or that valid values are specified for the fields.

If a message is too long to put on the dead-letter queue, the application must consider doing one of the following things:

- Truncate the message data to fit on the dead-letter queue.
- Record the message on auxiliary storage and place an exception report message on the dead-letter queue indicating the message is too long.
- Discard the message and return an error to its originator. If the message is a critical message. Discard the message only if it is known that the originator still has a copy of the message. For example, a message received by a message channel agent from a communication channel.

Which of the choices is appropriate depends on the design of the application.

The queue manager performs special processing when a message which is a segment is put with an MQDLH structure at the front. See the description of the MQMDE structure for further details.


- "Putting messages on the dead-letter queue" on page 1033
- "Getting messages from the dead-letter queue" on page 1034
- "Fields" on page 1034
- "Initial values" on page 1037
- "RPG declaration" on page 1038


## Putting messages on the dead-letter queue

If a message is put on the dead-letter queue, the MQMD structure used for the MQPUT or MQPUT1 call must be identical to the MQMD associated with the message. The MQMD is typically the one returned by the MQGET call, except for the following cases:

- The MDCSI and MDENC fields must be set to whatever character set and encoding are used for fields in the MQDLH structure.
- The MDFMT field must be set to FMDLH to indicate that the data begins with an MQDLH structure.
- The context fields, MDACC, MDAID, MDAOD, MDPAN, MDPAT, MDPD, MDPT, and MDUID must be set by using a context option appropriate to the circumstances:
  - An application putting on the dead-letter queue a message that is not related to any preceding message must use the PMDEFC option. The PMDEFC option causes the queue manager to set all of the context fields in the message descriptor to their default values.
  - A server application putting on the dead-letter queue a message it received must use the PMPASA option, in order to preserve the original context information.
  - A server application putting on the dead-letter queue a reply to message it received must use the PMPASI option. The PMPASI option preserves the identity information but sets the origin information to be that of the server application.
  - A message channel agent putting on the dead-letter queue a message it received from its communication channel must use the PMSETA option. The PMSETA option preserves the original context information.

In the MQDLH structure itself, the fields must be set as follows:

- The DLCSI, DLENC, and *DLFMT* fields must be set to the values that describe the data that follows the MQDLH structure. These values are typically the values from the original message descriptor.

- The context fields DLPAT, DLPAN, DLPD, and DLPT must be set to values appropriate to the application that is putting the message on the dead-letter queue. These values are not related to the original message.
- Other fields must be set as appropriate.

The application must ensure that all fields have valid values, and that character fields are padded with blanks to the defined length of the field. The character data must not be terminated prematurely by using a null character. The queue manager does not convert the null and subsequent characters to blanks in the MQDLH structure.

## Getting messages from the dead-letter queue

Applications that get messages from the dead-letter queue must verify that the messages begin with an MQDLH structure. The application can determine whether an MQDLH structure is present by examining the MDFMT field in the message descriptor MQMD. If the field has the value FMDLH, the message data begins with an MQDLH structure. Messages on the dead-letter queue might be truncated if they were originally too long for the queue they were intended for.

## Fields

The MQDLH structure contains the following fields; the fields are described in alphabetical order:

**DLCSI (10-digit signed integer)**

Character set identifier of data that follows MQDLH.

DLCSI specifies the character set identifier of the data that follows the MQDLH structure. The data is typically from the original message. It does not apply to character data in the MQDLH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data following this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the MDPAT field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

**DLDM (48-byte character string)**

Name of original destination queue manager.

This is the name of the queue manager that was the original destination for the message.

The length of this field is given by LNQMN. The initial value of this field is 48 blank characters.

**DLDQ (48-byte character string)**

Name of original destination queue.

This is the name of the message queue that was the original destination for the message.

The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**DLENC (10-digit signed integer)**

Numeric encoding of data that follows MQDLH.

DLENC specifies the numeric encoding of the data that follows the MQDLH structure. The data is typically from the original message. It does not apply to numeric data in the MQDLH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is 0.

**DLFMT (8-byte character string)**

Format name of data that follows MQDLH.

This specifies the format name of the data that follows the MQDLH structure (typically the data from the original message).

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as the rules for the MDFMT field in MQMD.

The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**DLPAN (28-byte character string)**

Name of application that put message on dead-letter (undelivered-message) queue.

The format of the name depends on the DLPAT field. See the description of the MDPAN field in "MQMD - Message descriptor" on page 1077.

If it is the queue manager that redirects the message to the dead-letter queue, DLPAN contains the first 28 characters of the queue manager name. The name is padded with blanks if necessary.

The length of this field is given by LNPAN. The initial value of this field is 28 blank characters.

**DLPAT (10-digit signed integer)**

Type of application that put message on dead-letter (undelivered-message) queue.

This field has the same meaning as the MDPAT field in the message descriptor MQMD (see "MQMD - Message descriptor" on page 1077 for details).

If it is the queue manager that redirects the message to the dead-letter queue, DLPAT has the value ATQM.

The initial value of this field is 0.

**DLPD (8-byte character string)**

Date when message was put on dead-letter (undelivered-message) queue.

The format used for the date when this field is generated by the queue manager is:

- YYYYMMDD

where the characters represent:

**YYYY**
year (four numeric digits)

**MM**
month of year (01 through 12)

**DD**
day of month (01 through 31)

Greenwich Mean Time (GMT) is used for the DLPD and DLPT fields, subject to the system clock being set accurately to GMT.

The length of this field is given by LNPDAT. The initial value of this field is eight blank characters.

**DLPT (8-byte character string)**

Time when message was put on the dead-letter (undelivered-message) queue.

The format used for the time when this field is generated by the queue manager is:

- HHMMSSTH

where the characters represent (in order):

**HH**
hours (00 through 23)

**MM**
minutes (00 through 59)

**SS**
seconds (00 through 59; see note later in this topic)

**T**
tenths of a second (0 through 9)

**H**
hundredths of a second (0 through 9)

**Note:** If the system clock is synchronized to an accurate time standard, it is possible for 60 or 61 to be returned for the seconds in DLPT. The extra second occurs when leap seconds are inserted into the global time standard.

Greenwich Mean Time (GMT) is used for the DLPD and DLPT fields, subject to the system clock being set accurately to GMT.

The length of this field is given by LNPTIM. The initial value of this field is eight blank characters.

**DLREA (10-digit signed integer)**

Reason message arrived on dead-letter (undelivered-message) queue.

This identifies the reason why the message was placed on the dead-letter queue instead of on the original destination queue. It must be one of the FB* or RC* values (for example, RC2053). See the description of the *MDFB* field in "MQMD - Message descriptor" on page 1077 for details of the common FB* values that can occur.

If the value is in the range FBIFST through FBILST, the actual IMS error code can be determined by subtracting FBIERR from the value of the *DLREA* field.

Some FB* values occur only in this field. They relate to repository messages, trigger messages, or transmission-queue messages that are transferred to the dead-letter queue. These values are:

**FBABEG**
Application cannot be started.

An application processing a trigger message was unable to start the application named in the TMAI field of the trigger message; see "MQTM - Trigger message" on page 1201.

**FBATYP**
Application type error.

An application processing a trigger message was unable to start the application because the TMAT field of the trigger message is not valid; see "MQTM - Trigger message" on page 1201.

**FBBOCD**
Cluster-receiver channel deleted.

The message was on a cluster transmission queue intended for a cluster queue that was opened with the FBIERR option. The remote cluster-receiver channel to be used to transmit the message to the destination queue was deleted before the message could be sent. Because FBIERR was specified, only the channel selected when the queue was opened can be used to transmit the message. As this channel is not longer available, the message was placed on the dead-letter queue.

**FBNARM**
Message is not a repository message.

**FBSBCX**
Message stopped by channel auto-definition exit.

**FBSBMX**
Message stopped by channel message exit.

**FBTM**
MQTM structure not valid or missing.

The MDFMT field in MQMD specifies FMTM, but the message does not begin with a valid MQTM structure. For example, the *TMSID* mnemonic eye-catcher might not be valid. The *TMVER* might not be recognized. The length of the trigger message might be insufficient to contain the MQTM structure.

**FBXQME**
Message on transmission queue not in correct format.

A message channel agent found that a message on the transmission queue is not in the correct format. The message channel agent puts the message on the dead-letter queue using this feedback code.

The initial value of this field is RCNONE.

**DLSID (4-byte character string)**

Structure identifier.

The value must be:

**DLSIDV**
Identifier for dead-letter header structure.

The initial value of this field is DLSIDV.

**DLVER (10-digit signed integer)**

Structure version number.

The value must be:

**DLVER1**
Version number for dead-letter header structure.

The following constant specifies the version number of the current version:

**DLVERC**
Current version of dead-letter header structure.

The initial value of this field is DLVER1.

## Initial values

*Table 588. Initial values of fields in MQDLH.*

Lists the names of the MQDLH constants and their values.

| Field name | Name of constant | Value of constant |
|---|---|---|
| DLSID | DLSIDV | 'DLH¬' |
| DLVER | DLVER1 | 1 |
| DLREA | RCNONE | 0 |
| DLDQ | None | Blanks |
| DLDM | None | Blanks |
| DLENC | None | 0 |
| DLCSI | CSUNDF | 0 |
| DLFMT | FMNONE | Blanks |
| DLPAT | None | 0 |

*Table 588. Initial values of fields in MQDLH.*

Lists the names of the MQDLH constants and their values.

*(continued)*

| Field name | Name of constant | Value of constant |
|---|---|---|
| DLPAN | None | Blanks |
| DLPD | None | Blanks |
| DLPT | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQDLH Structure
D*
D* Structure identifier
D  DLSID                  1      4    INZ('DLH ')
D* Structure version number
D  DLVER                  5      8I 0 INZ(1)
D* Reason message arrived on dead-letter(undelivered-message) queue
D  DLREA                  9     12I 0 INZ(0)
D* Name of original destination queue
D  DLDQ                  13     60    INZ
D* Name of original destination queuemanager
D  DLDM                  61    108    INZ
D* Numeric encoding of data that followsMQDLH
D  DLENC                109    112I 0 INZ(0)
D* Character set identifier of data thatfollows MQDLH
D  DLCSI                113    116I 0 INZ(0)
D* Format name of data that followsMQDLH
D  DLFMT                117    124    INZ('        ')
D* Type of application that put messageon dead-letter
D* (undelivered-message)queue
D  DLPAT                125    128I 0 INZ(0)
D* Name of application that put messageon dead-letter
D* (undelivered-message)queue
D  DLPAN                129    156    INZ
D* Date when message was put ondead-letter (undelivered-message)queue
D  DLPD                 157    164    INZ
D* Time when message was put on thedead-letter (undelivered-message)queue
D  DLPT                 165    172    INZ
```

## MQDMHO - Delete message handle options

The **MQDMHO** structure allows applications to specify options that control how message handles are deleted.

### Overview

**Purpose**: The structure is an input parameter on the **MQDLTMH** call.

**Character set and encoding**: Data in **MQDMHO** must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1039
- "Initial values" on page 1039
- "RPG declaration" on page 1039

## Fields

The MQDMHO structure contains the following fields; the fields are described in **alphabetical order**:

**DMOPT (10-digit signed integer)**

The value must be:

**DMNONE**

No options specified.

This is always an input field. The initial value of this field is **DMNONE**.

**DMSID (10-digit signed integer)**

This is the structure identifier; the value must be:

**DMSIDV**

Identifier for delete message handle options structure.

This is always an input field. The initial value of this field is **DMSIDV**.

**DMVER (10-digit signed integer)**

This is the structure version number; the value must be:

**DMVER1**
Version-1 delete message handle options structure.

The following constant specifies the version number of the current version:

**DMVERC**
Current version of delete message handle options structure.

This is always an input field. The initial value of this field is **DMVER1**.

## Initial values

*Table 589. Initial values of fields in MQDMHO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *DMSID* | DMSIDV | 'DMHO' |
| *DMVER* | DMVER1 | 1 |
| *DMOPT* | DMNONE | 0 |

## RPG declaration

```
D* MQDMHO Structure
D*
D*
D* Structure identifier
D  DMSID                  1      4    INZ('DMHO')
D*
D* Structure version number
D  DMVER                  5      8I 0 INZ(1)
D*
D* Options that control the action of MQDLTMH
D  DMOPT                  9     12I 0 INZ(0)
```

## MQDMPO - Delete message property options

Structure defining the delete message property options.

### Overview

**Purpose**: The MQDMPO structure allows applications to specify options that control how properties of messages are deleted. The structure is an input parameter on the MQDLTMP call.

**Character set and encoding**: Data in MQDMPO must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1040
- "Initial values" on page 1041
- "RPG declaration" on page 1041


### Fields

The MQDMPO structure contains the following fields; the fields are described in alphabetic order:

**DPOPT (10-digit signed integer)**

Delete message property options structure - DPOPT field.

**Location options:** The following options relate to the relative location of the property compared to the property cursor.

**DPDELF**
Deletes the first property that matches the specified name.

**DPDELC**
Deletes the property pointed to by the property cursor; that is the property that was last inquired by using either the IPINQF or the IPINQN option.

The property cursor is reset when the message handle is reused. It is also reset when the message handle is specified in the *HMSG* field of the MQGMO on an MQGET call, or MQPMO structure on an MQPUT call.

The property cursor is reset when the message handle is reused, or when the message handle is specified in the *HMSG* field of the MQGMO structure on an MQGET structure on an MQGET call or MQPMO structure on an MQPUT call.

The call fails with completion code CCFAIL and reason RC2471 if this option is used when the property cursor has not yet been established. It also fails with these codes if the property pointed to by the property cursor has already been deleted..

If neither of these options is required, the following option can be used:

**DPNONE**
No options specified.

The initial value of this input field is DPDELF.

**DPSID (10-digit signed integer)**

Delete message property options structure - DPSID field.

This is the structure identifier. The value must be:

**DPSIDV**
Identifier for delete message property options structure.

This field is always an input field. The initial value of this field is DPSIDV.

**DPVER (10-digit signed integer)**

Delete message property options structure - DPVER field.

This is the structure version number. The value must be:

**DPVER1**
Version number for delete message property options structure.

The following constant specifies the version number of the current version:

**DPVERC**
Current version of delete message property options structure.

This field is always an input field. The initial value of this field is DPVER1.

## Initial values

*Table 590. Initial values of fields in MQDPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *DPSID* | DPSIDV | 'DMPO' |
| *DPVER* | DPVER1 | 1 |
| *DPOPT* | Options that control the action of MQDLTMP | DPNONE |

## RPG declaration

```
D* MQDMPO Structure
D*
D*
D* Structure identifier
D  DPSID                  1      4    INZ('DMPO')
D*
D* Structure version number
D  DPVER                  5      8I 0 INZ(1)
D*
** Options that control the action of
D* MQDLTMP
D  DPOPT                  9     12I 0 INZ(0)
```

# MQEPH - Embedded PCF header

## Overview

**Purpose**
The MQEPH structure describes the additional data that is present in a message when that message is a programmable command format (PCF) message. The *EPPFH* field defines the PCF parameters that follow this structure and this allows you to follow the PCF message data with other headers.

**Format name**
EPFMT

**Character set and encoding**
Data in MQEPH must be in the character set and encoding of the local queue manager; this is given by the *CCSID* queue-manager attribute.

Set the character set and encoding of the MQEPH into the *MDCSI* and *MDENC* fields in:

- The MQMD (if the MQEPH structure is at the start of the message data), or
- The header structure that precedes the MQEPH structure (all other cases).

**Usage**

You cannot use MQEPH structures to send commands to the command server or any other queue manager PCF-accepting server.

Similarly, the command server or any other queue manager PCF-accepting server do not generate responses or events containing MQEPH structures.


- "Fields" on page 1042
- "Initial values" on page 1043
- "RPG declaration" on page 1044


## Fields

The MQEPH structure contains the following fields; the fields are described in **alphabetical order**:

**EPCSI (10-digit signed integer)**

This is the character set identifier of the data that follows the MQEPH structure and the associated PCF parameters; it does not apply to character data in the MQEPH structure itself.

The initial value of this field is EPCUND.

**EPENC (10-digit signed integer)**

This is the numeric encoding of the data that follows the MQEPH structure and the associated PCF parameters; it does not apply to character data in the MQEPH structure itself.

The initial value of this field is 0.

**EPFLG (10-digit signed integer)**

The following values are available:

**EPNONE**
No flags have been specified. *MDCSI* EPNONE is defined to aid program documentation. It is not intended that this constant be used with any other, but as its value is zero, such use cannot be detected.

**EPCSEM**
The character set of the parameters containing character data is specified individually within the *CCSID* field in each structure. The character set of the *EPSID* and *EPFMT* fields are defined by the *CCSID* in the header structure that precedes the MQEPH structure, or by the *MDCSI* field in the MQMD if the MQEPH is at the start of the message.

The initial value of this field is EPNONE.

**EPFMT (8-byte character string)**

This is the format name of the data that follows the MQEPH structure and the associated PCF parameters.

The initial value of this field is EPFMNO.

**EPLEN (10-digit signed integer)**

This is the amount of data preceding the next header structure. It includes:

- The length of the MQEPH header
- The length of all PCF parameters following the header
- Any blank padding following those parameters

EPLEN must be a multiple of 4.

The fixed-length part of the structure is defined by EPSTLF.

The initial value of this field is 68.

**EPPCFH (MQCFH)**

This is the programmable command format (PCF) header, defining the PCF parameters that follow the MQEPH structure. This enables you to follow the PCF message data with other headers.

The PCF header is initially defined with the following values:

*Table 591. Initial values of fields in EPPCFH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *EP3TYP* | CFTNON | 0 |
| *EP3LEN* | FHLENV | 36 |
| *EP3VER* | FHVER3 | 3 |
| *EP3CMD* | CMNONE | 0 |
| *EP3SEQ* | None | 1 |
| *EP3CTL* | CFCLST | 1 |
| *EEP3CC* | CCOK | 0 |
| *EP3REA* | RCNONE | 0 |
| *EP3CNT* | None | 0 |

The application must change EP3TYP from CFTNON to a valid structure type for the use it is making of the embedded PCF header.

**EPSID (4-byte character string)**

The value must be:

**EPSTID**
Identifier for the Embedded PCF header structure.

The initial value of this field is EPSTID.

**EPVER (10-digit signed integer)**

The value can be:

**EPVER1**
Version number for embedded PCF header structure.

The following constant specifies the version number of the current version:

**EPVER3**
Current version of embedded PCF header structure.

The initial value of this field is EPVER3.

## Initial values

*Table 592. Initial values of fields in MQEPH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *EPSID* | EPSTID | 'EP¬¬' |
| *EPVER* | EPVER1 | 1 |
| *EPLEN* | EPSTLF | 68 |
| *EPENC* | None | 0 |
| *EPCSI* | EPCUND | 0 |

| Table 592. Initial values of fields in MQEPH (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *EPFMT* | EPFMNO | Blanks |
| *EPFLG* | EPNONE | 0 |
| *EPPCFH* | Names and values as defined in Table 591 on page 1043 | 0 |

**Note:**

1. The symbol ¬ represents a single blank character.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQEPH Structure
D*
D* Structure identifier
D  EPSID                  1      4
D* Structure version number
D  EPVER                  5      8I 0
D* Total lenght of MQEPH including MQCFHand parameter structures
D* that follow
D  EPLEN                  9     12I 0
D* Numeric encoding of data that follows last PCF parameter structure
D  EPENC                 13     16I 0
D* Character set identifier of data that follows last PCF parameter
D* structure
D  EPCSI                 17     20I 0
D* Format name of data that follows last PCF parameter structure
D  EPFMT                 21     28
D* Flags
D  EPFLG                 29     32I 0
D* Programmable Command Format Header
D  EP3TYP                33     36I 0
D  EP3LEN                37     40I 0
D  EP3VER                41     44I 0
D  EP3CMD                45     48I 0
D  EP3SEQ                49     52I 0
D  EP3CTL                53     56I 0
D  EP3CC                 57     60I 0
D  EP3REA                61     64I 0
D  EP3CNT                65     68I 0
```

## MQGMO - Get-message options

The MQGMO structure allows the application to specify options that control how messages are removed from queues.

### Overview

**Purpose**

The structure is an input/output parameter on the MQGET call.

**Version**

The current version of MQGMO is GMVER4. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQGMO that is supported by the environment, but with the initial value of the *GMVER* field set to GMVER1. To use fields that are not present in the version-1 structure, the application must set the *GMVER* field to the version number of the version required.

**Character set and encoding**
Data in MQGMO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.


- "Fields" on page 1045
- "Initial values" on page 1064
- "RPG declaration" on page 1065


## Fields

The MQGMO structure contains the following fields; the fields are described in alphabetical order:

**GMGST (1 byte character string)**

Flag indicating whether message retrieved is in a group.

It has one of the following values:

**GSNIG**
Message is not in a group.

**GSMIG**
Message is in a group, but is not the last in the group.

**GSLMIG**
Message is the last in the group.

This value is also the value returned if the group consists of only one message.

This field is an output field. The initial value of this field is GSNIG. This field is ignored if *GMVER* is less than GMVER2.

**GMMH (10 digit signed integer)**

Message Handle

If the GMPRAQ option is specified and the PRPCTL queue attribute is not set to PRPRFH then this is the handle to a message which is populated with the properties of the message being retrieved from the queue. The handle is created by an MQCRTMH call. Any properties already associated with the handle are cleared before retrieving a message.

The following value can also be specified:
MQHM_NONE
No message handle supplied.

No message descriptor is required on the MQGET call if a valid message handle is supplied and used on output to contain the message properties, the message descriptor associated with the message handle is used for input fields.

If a message descriptor is specified on the MQGET call, it always takes precedence over the message descriptor associated with a message handle.

If GMPRRF is specified, or the GMPRAQ is specified and the PRPCTL queue attribute is PRPRFH then the call fails with reason code RC2026 when no message descriptor parameter is specified.

On return from the MQGET call, the properties and message descriptor associated with this message handle are updated to reflect the state of the message retrieved (as well as the message descriptor if one was supplied on the MQGET call). The properties of the message can then be inquired using the MQINQMP call.

Except for message descriptor extensions, when present, a property that can be inquired with the MQINQMP call is not contained in the message data; if the message on the queue contained properties in the message data these are removed from the message data before the data is returned to the application.

If no message handle is provided or Version is less than GMVER4 then you must supply a valid message descriptor on the MQGET call. Any message properties (except those properties contained in the message descriptor) are returned in the message data subject to the value of the property options in the MQGMO structure and the PRPCTL queue attribute.

This field is an always an input field. The initial value of this field is HMNONE. This field is ignored if *GMVER* is less than GMVER4.

**GMMO (10 digit signed integer)**

Options controlling selection criteria used for MQGET.

These options allow the application to choose which fields in the *MSGDSC* parameter is used to select the message returned by the MQGET call. The application sets the required options in this field, and then sets the corresponding fields in the *MSGDSC* parameter to the values required for those fields. Only messages that have those values in the MQMD for the message are candidates for retrieval using that *MSGDSC* parameter on the MQGET call. Fields for which the corresponding match option is not specified are ignored when selecting the message to be returned. If no selection criteria are to be used on the MQGET call (that is, any message is acceptable), *GMMO* should be set to MONONE.

If GMLOGO is specified, only certain messages are eligible for return by the next MQGET call:

- If there is no current group or logical message, only messages that have *MDSEQ* equal to 1 and *MDOFF* equal to 0 are eligible for return. In this situation, one or more of the following options can be used to select which of the eligible messages is the one returned:
  - MOMSGI
  - MOCORI
  - MOGRPI
- If there is a current group or logical message, only the next message in the group or next segment in the logical message is eligible for return, and this cannot be altered by specifying MO* options.

In both cases, match options which are not applicable can still be specified, but the value of the relevant field in the *MSGDSC* parameter must match the value of the corresponding field in the message to be returned; the call fails with reason code RC2247 is this condition is not satisfied.

*GMMO* is ignored if either GMMUC or GMBRWC is specified.

One or more of the following options can be specified:

**MOMSGI**
Retrieve message with specified message identifier.

This option specifies that the message to be retrieved must have a message identifier that matches the value of the *MDMID* field in the *MSGDSC* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the correlation identifier).

If this option is not specified, the *MDMID* field in the *MSGDSC* parameter is ignored, and any message identifier matches.

**Note:** The message identifier MINONE is a special value that matches any message identifier in the MQMD for the message. Therefore, specifying MOMSGI with MINONE is the same as not specifying MOMSGI.

**MOCORI**
Retrieve message with specified correlation identifier.

This option specifies that the message to be retrieved must have a correlation identifier that matches the value of the *MDCID* field in the *MSGDSC* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the message identifier).

If this option is not specified, the *MDCID* field in the *MSGDSC* parameter is ignored, and any correlation identifier matches.

**Note:** The correlation identifier CINONE is a special value that matches any correlation identifier in the MQMD for the message. Therefore, specifying MOCORI with CINONE is the same as not specifying MOCORI.

**MOGRPI**
Retrieve message with specified group identifier.

This option specifies that the message to be retrieved must have a group identifier that matches the value of the *MDGID* field in the *MSGDSC* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the correlation identifier).

If this option is not specified, the *MDGID* field in the *MSGDSC* parameter is ignored, and any group identifier matches.

**Note:** The group identifier GINONE is a special value that matches any group identifier in the MQMD for the message. Therefore, specifying MOGRPI with GINONE is the same as not specifying MOGRPI.

**MOSEQN**
Retrieve message with specified message sequence number.

This option specifies that the message to be retrieved must have a message sequence number that matches the value of the *MDSEQ* field in the *MSGDSC* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the group identifier).

If this option is not specified, the *MDSEQ* field in the *MSGDSC* parameter is ignored, and any message sequence number matches.

**MOOFFS**
Retrieve message with specified offset.

This option specifies that the message to be retrieved must have an offset that matches the value of the *MDOFF* field in the *MSGDSC* parameter of the MQGET call. This match is in addition to any other matches that might apply (for example, the message sequence number).

If this option is not specified, the *MDOFF* field in the *MSGDSC* parameter is ignored, and any offset matches.

If none of the options described is specified, the following option can be used:

**MONONE**
No matches.

This option specifies that no matches are to be used in selecting the message to be returned; therefore, all messages on the queue are eligible for retrieval (but subject to control by the GMAMSA, GMASGA, and GMCMPM options).

MONONE is defined to aid program documentation. It is not intended that this option in used with any other MO* option, but as its value is zero, such use cannot be detected.

This field is an input field. The initial value of this field is MOMSGI with MOCORI. This field is ignored if *GMVER* is less than GMVER2.

**Note:** The initial value of the *GMMO* field is defined for compatibility with earlier version queue managers. However, when reading a series of messages from a queue without using selection criteria, this initial value requires the application to reset the *MDMID* and *MDCID* fields to MINONE and CINONE before each MQGET call. The need to reset *MDMID* and *MDCID* can be avoided by setting *GMVER* to GMVER2, and *GMMO* to MONONE.

### GMOPT (10 digit signed integer)

Options that control the action of MQGET.

Zero or more of the following described options can be specified. If more than one is required the values can be added (do not add the same constant more than once). Combinations of options that are not valid are noted; all other combinations are valid.

**Wait options**: The following options relate to waiting for messages to arrive on the queue:

**GMWT**
Wait for message to arrive.

The application is to wait until a suitable message arrives. The maximum time the application waits is specified in *GMWI*.

If MQGET requests are inhibited, or MQGET requests become inhibited while waiting, the wait is canceled and the call completes with CCFAIL and reason code RC2016, regardless of whether there are suitable messages on the queue.

This option can be used with the GMBRWF or GMBRWN options.

If several applications are waiting on the same shared queue, the application, or applications, that are activated when a suitable message arrives are described later in this section.

**Note:** In the following description, a browse MQGET call is one which specifies one of the browse options, but not GMLK; an MQGET call specifying the GMLK option is treated as a nonbrowse call.

- If one or more nonbrowse MQGET calls is waiting, but no browse MQGET calls are waiting, one is activated.
- If one or more browse MQGET calls is waiting, but no nonbrowse MQGET calls are waiting, all are activated.
- If one or more nonbrowse MQGET calls, and one or more browse MQGET calls are waiting, one nonbrowse MQGET call is activated, and none, some, or all the browse MQGET calls. (The number of browse MQGET calls activated cannot be predicted, because it depends on the scheduling considerations of the operating system, and other factors.)

If more than one nonbrowse MQGET call is waiting on the same queue, only one is activated; in this situation the queue manager attempts to give priority to waiting nonbrowse calls in the following order:

1. Specific get-wait requests that can be satisfied only by certain messages, for example, ones with a specific *MDMID* or *MDCID* (or both).
2. General get-wait requests that can be satisfied by any message.

The following points must be noted:

- Within the first category, no additional priority is given to more specific get-wait requests, for example those that specify both *MDMID* and *MDCID*.
- Within either category, it cannot be predicted which application is selected. In particular, the application waiting longest is not necessarily the one selected.
- Path length, and priority-scheduling considerations of the operating system, can mean that a waiting application of lower operating system priority than expected retrieves the message.
- It might also happen that an application that is not waiting retrieves the message in preference to one that is.

GMWT is ignored if specified with GMBRWC or GMMUC; no error is raised.

**GMNWT**
Return immediately if no suitable message.

The application is not to wait if no suitable message is available. This is the opposite of the GMWT option, and is defined to aid program documentation. It is the default if neither is specified.

**GMFIQ**
Fail if queue manager is quiescing.

This option forces the MQGET call to fail if the queue manager is in the quiescing state.

If this option is specified together with GMWT, and the wait is outstanding at the time the queue manager enters the quiescing state:

- The wait is canceled and the call returns completion code CCFAIL with reason code RC2161 .

If GMFIQ is not specified and the queue manager enters the quiescing state, the wait is not canceled.

**Syncpoint options**: The following options relate to the participation of the MQGET call within a unit of work:

**GMSYP**
Get message with syncpoint control.

The request is to operate within the normal unit-of-work protocols. The message is marked as being unavailable to other applications, but it is deleted from the queue only when the unit of work is committed. The message is made available again if the unit of work is backed out.

If this option or GMNSYP is not specified, the get request is not within a unit of work.

This option is not valid with any of the following options:

- GMBRWF
- GMBRWC
- GMBRWN
- GMLK
- GMNSYP
- GMPSYP
- GMUNLK

**GMPSYP**
Get message with syncpoint control if message is persistent.

The request is to operate within the normal unit-of-work protocols, but only if the message retrieved is persistent. A persistent message has the value PEPER in the *MDPER* field in MQMD.

- If the message is persistent, the queue manager processes the call as though the application had specified GMSYP.
- If the message is not persistent, the queue manager processes the call as though the application had specified GMNSYP (see the following section for details).

This option is not valid with any of the following options:

- GMBRWF
- GMBRWC
- GMBRWN
- GMCMPM
- GMNSYP
- GMSYP
- GMUNLK

**GMNSYP**
Get message without syncpoint control.

The request is to operate outside the normal unit-of-work protocols. The message is deleted from the queue immediately (unless this is a browse request). The message cannot be made available again by backing out the unit of work.

This option is assumed if GMBRWF or GMBRWN is specified.

If this option and GMSYP are not specified, the get request is not within a unit of work.

This option is not valid with any of the following options:

- GMSYP
- GMPSYP

**Browse options**: The following options relate to browsing messages on the queue:

**GMBRWF**
Browse from start of queue.

When a queue is opened with the OOBRW option, a browse cursor is established, positioned logically before the first message on the queue. Subsequent MQGET calls specifying the GMBRWF, GMBRWN, or GMBRWC option can be used to retrieve messages from the queue nondestructively. The browse cursor marks the position, within the messages on the queue, from which the next MQGET call with GMBRWN searches for a suitable message.

An MQGET call with GMBRWF causes the previous position of the browse cursor to be ignored. The first message on the queue that satisfies the conditions specified in the message descriptor is retrieved. The message remains on the queue, and the browse cursor is positioned on this message.

After this call, the browse cursor is positioned on the message that has been returned. If the message is removed from the queue before the next MQGET call with GMBRWN is issued, the browse cursor remains at the position in the queue that the message occupied, even though that position is now empty.

The GMMUC option can then be used with a nonbrowse MQGET call if required, to remove the message from the queue.

The browse cursor is not moved by a nonbrowse MQGET call using the same *HOBJ* handle. Nor is it moved by a browse MQGET call that returns a completion code of CCFAIL, or a reason code of RC2080 .

The GMLK option can be specified together with this option, to cause the message that is browsed to be locked.

GMBRWF can be specified with any valid combination of the GM* and MO* options that control the processing of messages in groups and segments of logical messages.

If GMLOGO is specified, the messages are browsed in logical order. If that option is omitted, the messages are browsed in physical order. When GMBRWF is specified, it is possible to switch between logical order and physical order, but subsequent MQGET calls using GMBRWN must browse the queue in the same order as the most recent call that specified GMBRWF for the queue handle.

The group and segment information that the queue manager retains for MQGET calls that browse messages on the queue, is separate from the group and segment information that the queue manager retains for MQGET calls that remove messages from the queue. When GMBRWF is specified, the queue manager ignores the group and segment information for browsing, and scans the queue as though there were no current group and no current logical message. If theMQGET call is successful (completion code CCOK or CCWARN), the group and segment information for browsing is set to that of the message returned; if the call fails, the group and segment information remains the same as it was before the call.

This option is not valid with any of the following options:

- GMBRWC
- GMBRWN
- GMMUC
- GMSYP
- GMPSYP
- GMUNLK

It is also an error if the queue was not opened for browse.

**GMBRWN**
Browse from current position in queue.

The browse cursor is advanced to the next message on the queue that satisfies the selection criteria specified on the MQGET call. The message is returned to the application, but remains on the queue.

After a queue has been opened for browse, the first browse call using the handle has the same effect whether it specifies the GMBRWF or GMBRWN option.

If the message is removed from the queue before the next MQGET call with GMBRWN is issued, the browse cursor logically remains at the position in the queue that the message occupied, even though that position is now empty.

Messages are stored on the queue in one of two ways:

- FIFO within priority (MSPRIO), or
- FIFO regardless of priority (MSFIFO)

The *MsgDeliverySequence* queue attribute indicates which method applies (see "Attributes for queues" on page 1335 for details).

If the queue has a *MsgDeliverySequence* of MSPRIO, and a message arrives on the queue that is of a higher priority than the one currently pointed to by the browse cursor, that message is not found during the current sweep of the queue using GMBRWN. It can only be found after the browse cursor has been reset with GMBRWF (or by reopening the queue).

The GMMUC option can later be used with a nonbrowse MQGET call if required, to remove the message from the queue.

The browse cursor is not moved by nonbrowse MQGET calls using the same *HOBJ* handle.

The GMLK option can be specified together with this option, to cause the message that is browsed to be locked.

GMBRWN can be specified with any valid combination of the GM* and MO* options that control the processing of messages in groups and segments of logical messages.

If GMLOGO is specified, the messages are browsed in logical order. If that option is omitted, the messages are browsed in physical order. When GMBRWF is specified, it is possible to switch between logical order and physical order, but subsequent MQGET calls using GMBRWN must browse the queue in the same order as the most recent call that specified GMBRWF for the queue handle. The call fails with reason code RC2259 if this condition is not satisfied.

**Note:** Special care is needed if an MQGET call is used to browse beyond the end of a message group (or logical message not in a group) when GMLOGO is not specified. For example, if the last message in the group happens to precede the first message in the group on the queue, using GMBRWN to browse beyond the end of the group, specifying MOSEQN with *MDSEQ* set to 1 (to find the first message of the next group) would return again the first message in the group already browsed. This could happen immediately, or a number of MQGET calls later (if there are intervening groups).

The possibility of an infinite loop can be avoided by opening the queue twice for browse:

- Use the first handle to browse only the first message in each group.
- Use the second handle to browse only the messages within a specific group.
- Use the MO* options to move the second browse cursor to the position of the first browse cursor, before browsing the messages in the group.
- Do not use GMBRWN to browse beyond the end of a group.

The group and segment information that the queue manager retains for MQGET calls that browse messages on the queue, is separate from the group and segment information that it retains for MQGET calls that remove messages from the queue.

This option is not valid with any of the following options:

- GMBRWF

- GMBRWC
- GMMUC
- GMSYP
- GMPSYP
- GMUNLK

It is also an error if the queue was not opened for browse.

**GMBRWC**
Browse message under browse cursor.

This option causes the message pointed to by the browse cursor to be retrieved nondestructively, regardless of the MO* options specified in the *GMMO* field in MQGMO.

The message pointed to by the browse cursor is the one that was last retrieved using either the GMBRWF or the GMBRWN option. The call fails if neither of these calls has been issued for this queue since it was opened, or if the message that was under the browse cursor has since been retrieved destructively.

The position of the browse cursor is not changed by this call.

The GMMUC option can then be used with a nonbrowse MQGET call if required, to remove the message from the queue.

The browse cursor is not moved by a nonbrowse MQGET call using the same *HOBJ* handle. Nor is it moved by a browse MQGET call that returns a completion code of CCFAIL, or a reason code of RC2080.

If GMBRWC is specified with GMLK:

- If there is already a message locked, it must be the one under the cursor, so that is returned without unlocking and relocking it; the message remains locked.
- If there is no locked message, the message under the browse cursor (if there is one) is locked and returned to the application; if there is no message under the browse cursor the call fails.

If GMBRWC is specified without GMLK:

- If there is already a message locked, it must be the one under the cursor. This message is returned to the application and then unlocked. Because the message is now unlocked, there is no guarantee that it can be browsed again, or retrieved destructively (it might be retrieved destructively by another application getting messages from the queue).
- If there is no locked message, the message under the browse cursor (if there is one) is returned to the application; if there is no message under the browse cursor the call fails.

If GMCMPM is specified with GMBRWC, the browse cursor must identify a message with a *MDOFF* field in MQMD that is zero. If this condition is not satisfied, the call fails with reason code RC2246 .

The group and segment information that the queue manager retains for MQGET calls that browse messages on the queue, is separate from the group and segment information that it retains for MQGET calls that remove messages from the queue.

This option is not valid with any of the following options:

- GMBRWF
- GMBRWN
- GMMUC
- GMSYP
- GMPSYP
- GMUNLK

It is also an error if the queue was not opened for browse.

**GMMUC**
Get message under browse cursor.

This option causes the message pointed to by the browse cursor to be retrieved, regardless of the MO* options specified in the *GMMO* field in MQGMO. The message is removed from the queue.

The message pointed to by the browse cursor is the one that was last retrieved using either the GMBRWF or the GMBRWN option.

If GMCMPM is specified with GMMUC, the browse cursor must identify a message with a *MDOFF* field in MQMD that is zero. If this condition is not satisfied, the call fails with reason code RC2246 .

This option is not valid with any of the following options:

- GMBRWF
- GMBRWC
- GMBRWN
- GMUNLK

It is also an error if the queue was not opened both for browse and for input. If the browse cursor is not currently pointing to a retrievable message, an error is returned by the MQGET call.

**Lock options**: The following options relate to locking messages on the queue:

**GMLK**
Lock message.

This option locks the message that is browsed, so that the message becomes invisible to any other handle open for the queue. The option can be specified only if one of the following options is also specified:

- GMBRWF
- GMBRWN
- GMBRWC

Only one message can be locked per queue handle, but this can be a logical message or a physical message:

- If GMCMPM is specified, all the message segments that make up the logical message are locked to the queue handle (if they are all present on the queue and available for retrieval).
- If GMCMPM is not specified, only a single physical message is locked to the queue handle. If this message happens to be a segment of a logical message, the locked segment prevents other applications using GMCMPM to retrieve or browse the logical message.

The locked message is always the one under the browse cursor, and the message can be removed from the queue by a later MQGET call that specifies the GMMUC option. Other MQGET calls using the queue handle can also remove the message (for example, a call that specifies the message identifier of the locked message).

If the call returns completion code CCFAIL, or CCWARN with reason code RC2080, no message is locked.

If the application decides not to remove the message from the queue, the lock is released by:

- Issuing another MQGET call for this handle, with either GMBRWF or GMBRWN specified (with or without GMLK); the message is unlocked if the call completes with CCOK or CCWARN, but remains locked if the call completes with CCFAIL. However, the following exceptions apply:
  - The message is not unlocked if CCWARN is returned with RC2080.
  - The message is unlocked if CCFAIL is returned with RC2033.

  If GMLK is also specified, the message returned is locked. If GMLK is not specified, there is no locked message after the call.

If GMWT is specified, and no message is immediately available, the unlock on the original message occurs before the start of the wait (providing the call is otherwise free from error).

- Issuing another MQGET call for this handle, with GMBRWC (without GMLK); the message is unlocked if the call completes with CCOK or CCWARN, but remains locked if the call completes with CCFAIL. However, the following exception applies:
  - The message is not unlocked if CCWARN is returned with RC2080.
- Issuing another MQGET call for this handle with GMUNLK.
- Issuing an MQCLOSE call for this handle (either explicitly, or implicitly by the application ending).

No special open option is required to specify this option, other than OOBRW, which is needed in order to specify the accompanying browse option.

This option is not valid with any of the following options:

- GMSYP
- GMPSYP
- GMUNLK

**GMUNLK**
Unlock message.

The message to be unlocked must have been previously locked by an MQGET call with the GMLK option. If there is no message locked for this handle, the call completes with CCWARN and RC2209 .

The *MSGDSC*, *BUFLEN*, *BUFFER*, and *DATLEN* parameters are not checked or altered if GMUNLK is specified. No message is returned in *BUFFER*.

No special open option is required to specify this option (although OOBRW is needed to issue the lock request in the first place).

This option is not valid with any options except the following:

- GMNWT
- GMNSYP

Both of these options are assumed whether specified or not.

**Message-data options**: The following options relate to the processing of the message data when the message is read from the queue:

**GMATM**
Allow truncation of message data.

If the message buffer is too small to hold the complete message, this option allows the MQGET call to fill the buffer with as much of the message as the buffer can hold, issue a warning completion code, and complete its processing. This means:

- When browsing messages, the browse cursor is advanced to the returned message.
- When removing messages, the returned message is removed from the queue.
- Reason code RC2079 is returned if no other error occurs.

Without this option, the buffer is still filled with as much of the message as it can hold, a warning completion code is issued, but processing is not completed. This means:

- When browsing messages, the browse cursor is not advanced.
- When removing messages, the message is not removed from the queue.
- Reason code RC2080 is returned if no other error occurs.

**GMCONV**
Convert message data.

This option requests that the application data in the message is converted, to conform to the *MDCSI* and *MDENC* values specified in the *MSGDSC* parameter on the MQGET call, before the data is copied to the *BUFFER* parameter.

The *MDFMT* field specified when the message was put is assumed by the conversion process to identify the nature of the data in the message. Conversion of the message data is by the queue manager for built-in formats, and by a user-written exit for other formats.

- If conversion is performed successfully, the *MDCSI* and *MDENC* fields specified in the *MSGDSC* parameter are unchanged on return from the MQGET call.
- If conversion cannot be performed successfully (but the MQGET call otherwise completes without error), the message data is returned unconverted, and the *MDCSI* and *MDENC* fields in *MSGDSC* are set to the values for the unconverted message. The completion code is CCWARN in this case.

In either case, therefore, these fields describe the character-set identifier and encoding of the message data that is returned in the *BUFFER* parameter.

See the *MDFMT* field described in "MQMD - Message descriptor" on page 1077 for a list of format names for which the queue manager performs the conversion.

**Group and segment options**: The following options relate to the processing of messages in groups and segments of logical messages. These definitions might be of help in understanding the options:

**Physical message**
This is the smallest unit of information that can be placed on or removed from a queue; it often corresponds to the information specified or retrieved on a single MQPUT, MQPUT1, or MQGET call. Every physical message has its own message descriptor (MQMD). Generally, physical messages are distinguished by differing values for the message identifier (*MDMID* field in MQMD), although this is not enforced by the queue manager.

**Logical message**
This is a single unit of application information. In the absence of system constraints, a logical message would be the same as a physical message. But where logical messages are large, system constraints might make it advisable or necessary to split a logical message into two or more physical messages, called segments.

A logical message that has been segmented consists of two or more physical messages that have the same nonnull group identifier (*MDGID* field in MQMD), and the same message sequence number (*MDSEQ* field in MQMD). The segments are distinguished by differing values for the segment offset (*MDOFF* field in MQMD), which gives the offset of the data in the physical message from the start of the data in the logical message. Because each segment is a physical message, the segments in a logical message typically have differing message identifiers.

A logical message that has not been segmented, but for which segmentation has been permitted by the sending application, also has a nonnull group identifier, although in this case there is only one physical message with that group identifier if the logical message does not belong to a message group. Logical messages for which segmentation has been inhibited by the sending application have a null group identifier (GINONE), unless the logical message belongs to a message group.

**Message group**
This is a set of one or more logical messages that have the same nonnull group identifier. The logical messages in the group are distinguished by differing values for the message sequence number, which is an integer in the range 1 through n, where n is the number of logical messages in the group. If one or more of the logical messages is segmented, there are more than n physical messages in the group.

**GMLOGO**
Messages in groups and segments of logical messages are returned in logical order.

This option controls the order in which messages are returned by successive MQGET calls for the queue handle. The option must be specified on each of those calls in order to have an effect.

If GMLOGO is specified for successive MQGET calls for the queue handle, messages in groups are returned in the order given by their message sequence numbers, and segments of logical messages are returned in the order given by their segment offsets. This order might be different from the order in which those messages and segments occur on the queue.

**Note:** Specifying GMLOGO has no adverse consequences on messages that do not belong to groups and that are not segments. In effect, such messages are treated as though each belonged to a message group consisting of only one message. Thus it is perfectly safe to specify GMLOGO when retrieving messages from queues that might contain a mixture of messages in groups, message segments, and unsegmented messages not in groups.

To return the messages in the required order, the queue manager retains the group and segment information between successive MQGET calls. This information identifies the current message group and current logical message for the queue handle, the current position within the group and logical message, and whether the messages are being retrieved within a unit of work. Because the queue manager retains this information, the application does not need to set the group and segment information before each MQGET call. Specifically, it means that the application does not need to set the *MDGID*, *MDSEQ*, and *MDOFF* fields in MQMD. However, the application does need to set the GMSYP or GMNSYP option correctly on each call.

When the queue is opened, there is no current message group and no current logical message. A message group becomes the current message group when a message that has the MFMIG flag is returned by the MQGET call. With GMLOGO specified on successive calls, that group remains the current group until a message is returned that has:

- MFLMIG without MFSEG (that is, the last logical message in the group is not segmented), or
- MFLMIG with MFLSEG (that is, the message returned is the last segment of the last logical message in the group).

When such a message is returned, the message group is terminated, and on successful completion of that MQGET call there is no longer a current group. In a similar way, a logical message becomes the current logical message when a message that has the MFSEG flag is returned by the MQGET call, and that logical message is terminated when the message that has the MFLSEG flag is returned.

If no selection criteria are specified, successive MQGET calls return (in the correct order) the messages for the first message group on the queue, then the messages for the second message group, and so on, until there are no more messages available. It is possible to select the particular message groups returned by specifying one or more of the following options in the *GMMO* field:

- MOMSGI
- MOCORI
- MOGRPI

However, these options are effective only when there is no current message group or logical message; see the *GMMO* field described in this topic.

Table 593 on page 1057 shows the values of the *MDMID*, *MDCID*, *MDGID*, *MDSEQ*, and *MDOFF* fields that the queue manager looks for when attempting to find a message to return on the MQGET call. This applies both to removing messages from the queue, and browsing messages on the queue. The columns in the table have the following meanings:

**LOG ORD**
Indicates whether the GMLOGO option is specified on the call.

**Cur grp**
Indicates whether a current message group exists before the call.

**Cur log msg**
Indicates whether a current logical message exists before the call.

**Other columns**
Show the values that the queue manager looks for. "Previous" denotes the value returned for the field in the previous message for the queue handle.

*Table 593. MQGET options relating to messages in groups and segments of logical messages*

| Options you specify | Group and log-msg status before call | | Values the queue manager looks for | | | | |
|---|---|---|---|---|---|---|---|
| **LOG ORD** | **Cur grp** | **Cur log msg** | *MDMID* | *MDCID* | *MDGID* | *MDSEQ* | *MDOFF* |
| Yes | No | No | Controlled by *GMMO* | Controlled by *GMMO* | Controlled by *GMMO* | 1 | 0 |
| Yes | No | Yes | Any message identifier | Any correlation identifier | Previous group identifier | 1 | Previous offset + previous segment length |
| Yes | Yes | No | Any message identifier | Any correlation identifier | Previous group identifier | Previous sequence number + 1 | 0 |
| Yes | Yes | Yes | Any message identifier | Any correlation identifier | Previous group identifier | Previous sequence number | Previous offset + previous segment length |
| No | Either | Either | Controlled by *GMMO* | Controlled by *GMMO* | Controlled by *GMMO* | Controlled by *GMMO* | Controlled by *GMMO* |

When multiple message groups are present on the queue and eligible for return, the groups are returned in the order determined by the position on the queue of the first segment of the first logical message in each group (that is, the physical messages that have message sequence numbers of 1, and offsets of 0, determine the order in which eligible groups are returned).

The GMLOGO option affects units of work as follows:

- If the first logical message or segment in a group is retrieved within a unit of work, all the other logical messages and segments in the group must be retrieved within a unit of work, if the same queue handle is used. However, they need not be retrieved within the same unit of work. This allows a message group consisting of many physical messages to be split across two or more consecutive units of work for the queue handle.
- If the first logical message or segment in a group is *not* retrieved within a unit of work, none of the other logical messages and segments in the group can be retrieved within a unit of work, if the same queue handle is used.

If these conditions are not satisfied, the MQGET call fails with reason code RC2245 .

When GMLOGO is specified, the MQGMO supplied on the MQGET call must not be less than GMVER2, and the MQMD must not be less than MDVER2. If this condition is not satisfied, the call fails with reason code RC2256 or RC2257 , as appropriate.

If GMLOGO is not specified for successive MQGET calls for the queue handle, messages are returned without regard for whether they belong to message groups, or whether they are segments of logical messages. This means that messages or segments from a particular group or logical message might be returned out of order, or they might be intermingled with messages or segments from other groups or logical messages, or with messages that are not in groups and are not segments. In this situation, the particular messages that are returned by successive MQGET calls is controlled by the MO* options specified on those calls (see the *GMMO* field described in "MQGMO - Get-message options" on page 1044 for details of these options).

This is the technique that can be used to restart a message group or logical message in the middle, after a system failure has occurred. When the system restarts, the application can set the *MDGID*, *MDSEQ*, *MDOFF*, and *GMMO* fields to the appropriate values, and then issue the MQGET call

with GMSYP or GMNSYP set as needed, but without specifying GMLOGO. If this call is successful, the queue manager retains the group and segment information, and subsequent MQGET calls using that queue handle can specify GMLOGO as normal.

The group and segment information that the queue manager retains for the MQGET call is separate from the group and segment information that it retains for the MQPUT call. In addition, the queue manager retains separate information for:

- MQGET calls that remove messages from the queue.
- MQGET calls that browse messages on the queue.

For any given queue handle, the application is free to mix MQGET calls that specify GMLOGO with MQGET calls that do not, but the following points must be noted:

- If GMLOGO is not specified, each successful MQGET call causes the queue manager to set the saved group and segment information to the values corresponding to the message returned; this replaces the existing group and segment information retained by the queue manager for the queue handle. Only the information appropriate to the action of the call (browse or remove) is modified.
- If GMLOGO is not specified, the call does not fail if there is a current message group or logical message; the call might however succeed with a CCWARN completion code. Table 594 on page 1058 shows the various cases that can arise. In these cases, if the completion code is not CCOK, the reason code is one of the following:
  - RC2241
  - RC2242
  - RC2245

  **Note:** The queue manager does not check the group and segment information when browsing a queue, or when closing a queue that was opened for browse but not input; in those cases the completion code is always CCOK (assuming no other errors).

*Table 594. Outcome when MQGET or MQCLOSE call is not consistent with group and segment information*

| Current call is | Previous call was MQGET with GMLOGO | Previous call was MQGET without GMLOGO |
|---|---|---|
| MQGET with GMLOGO | CCFAIL | CCFAIL |
| MQGET without GMLOGO | CCWARN | CCOK |
| MQCLOSE with an unterminated group or logical message | CCWARN | CCOK |

Applications that simply want to retrieve messages and segments in logical order are recommended to specify GMLOGO, as this is the simplest option to use. This option relieves the application of the need to manage the group and segment information, because the queue manager manages that information. However, specialized applications might need more control than provided by the GMLOGO option, and this can be achieved by not specifying that option. If this is done, the application must ensure that the *MDMID*, *MDCID*, *MDGID*, *MDSEQ*, and *MDOFF* fields in MQMD, and the MO* options in *GMMO* in MQGMO, are set correctly, before each MQGET call.

For example, an application that wants to forward physical messages that it receives, without regard for whether those messages are in groups or segments of logical messages, should not specify GMLOGO. This is because in a complex network with multiple paths between sending and receiving queue managers, the physical messages might arrive out of order. By not specifying GMLOGO and the corresponding PMLOGO on the MQPUT call, the forwarding application can retrieve and forward each physical message as soon as it arrives, without having to wait for the next one in logical order to arrive.

GMLOGO can be specified with any of the other GM* options, and with various of the MO* options in appropriate circumstances.

**GMCMPM**

Only complete logical messages are retrievable.

This option specifies that only a complete logical message can be returned by the MQGET call. If the logical message is segmented, the queue manager reassembles the segments and returns the complete logical message to the application; the fact that the logical message was segmented is not apparent to the application retrieving it.

**Note:** This is the only option that causes the queue manager to reassemble message segments. If not specified, segments are returned individually to the application if they are present on the queue (and they satisfy the other selection criteria specified on the MQGET call). Applications that do not want to receive individual segments should therefore always specify GMCMPM.

To use this option, the application must provide a buffer which is large enough to accommodate the complete message, or specify the GMATM option.

If the queue contains segmented messages with some of the segments missing (perhaps because they have been delayed in the network and have not yet arrived), specifying GMCMPM prevents the retrieval of segments belonging to incomplete logical messages. However, those message segments still contribute to the value of the *CurrentQDepth* queue attribute; this means that there might be no retrievable logical messages, even though *CurrentQDepth* is greater than zero.

For persistent messages, the queue manager can reassemble the segments only within a unit of work:

- If the MQGET call is operating within a user-defined unit of work, that unit of work is used. If the call fails part way through the reassembly process, the queue manager reinstates on the queue any segments that were removed during reassembly. However, the failure does not prevent the unit of work being committed successfully.
- If the call is operating outside a user-defined unit of work, and there is no user-defined unit of work in existence, the queue manager creates a unit of work just for the duration of the call. If the call is successful, the queue manager commits the unit of work automatically (the application does not need to do this). If the call fails, the queue manager backs out the unit of work.
- If the call is operating outside a user-defined unit of work, but a user-defined unit of work does exist, the queue manager is unable to perform reassembly. If the message does not require reassembly, the call can still succeed. But if the message does require reassembly, the call fails with reason code RC2255 .

For nonpersistent messages, the queue manager does not require a unit of work to be available in order to perform reassembly.

Each physical message that is a segment has its own message descriptor. For the segments constituting a single logical message, most of the fields in the message descriptor is the same for all segments in the logical message - typically it is only the *MDMID*, *MDOFF*, and *MDMFL* fields that differ between segments in the logical message. However, if a segment is placed on a dead-letter queue at an intermediate queue manager, the DLQ handler retrieves the message specifying the GMCONV option, and this might result in the character set or encoding of the segment being changed. If the DLQ handler successfully sends the segment on its way, the segment might have a character set or encoding that differs from the other segments in the logical message when the segment finally arrives at the destination queue manager.

A logical message consisting of segments in which the *MDCSI*, *MDENC*, or both fields differ cannot be reassembled by the queue manager into a single logical message. Instead, the queue manager reassembles and returns the first few consecutive segments at the start of the logical message that have the same character-set identifiers and encodings, and the MQGET call completes with completion code CCWARN and reason code RC2243 or RC2244 , as appropriate. This happens regardless of whether GMCONV is specified. To retrieve the remaining segments, the application

must reissue the MQGET call without the GMCMPM option, retrieving the segments one by one. GMLOGO can be used to retrieve the remaining segments in order.

It is also possible for an application which puts segments to set other fields in the message descriptor to values that differ between segments. However, there is no advantage in doing this if the receiving application uses GMCMPM to retrieve the logical message. When the queue manager reassembles a logical message, it returns in the message descriptor the values from the message descriptor for the first segment; the only exception is the *MDMFL* field, which the queue manager sets to indicate that the reassembled message is the only segment.

If GMCMPM is specified for a report message, the queue manager performs special processing. The queue manager checks the queue to see if all the report messages of that report type relating to the different segments in the logical message are present on the queue. If they are, they can be retrieved as a single message by specifying GMCMPM. For this to be possible, either the report messages must be generated by a queue manager or MCA which supports segmentation, or the originating application must request at least 100 bytes of message data (that is, the appropriate RO*D or RO*F options must be specified). If less than the full amount of application data is present for a segment, the missing bytes are replaced by nulls in the report message returned.

If GMCMPM is specified with GMMUC or GMBRWC, the browse cursor must be positioned on a message with a *MDOFF* field in MQMD that has a value of 0. If this condition is not satisfied, the call fails with reason code RC2246 .

GMCMPM implies GMASGA, which need not therefore be specified.

GMCMPM can be specified with any of the other GM* options apart from GMPSYP, and with any of the MO* options apart from MOOFFS.

**GMAMSA**
All messages in group must be available.

This option specifies that messages in a group become available for retrieval only when all messages in the group are available. If the queue contains message groups with some of the messages missing (perhaps because they have been delayed in the network and have not yet arrived), specifying GMAMSA prevents retrieval of messages belonging to incomplete groups. However, those messages still contribute to the value of the *CurrentQDepth* queue attribute; this means that there might be no retrievable message groups, even though *CurrentQDepth* is greater than zero. If there are no other messages that are retrievable, reason code RC2033 is returned after the specified wait interval (if any) has expired.

The processing of GMAMSA depends on whether GMLOGO is also specified:

- If both options are specified, GMAMSA affects *only* when there is no current group or logical message. If there *is* a current group or logical message, GMAMSA is ignored. This means that GMAMSA can remain on when processing messages in logical order.
- If GMAMSA is specified without GMLOGO, GMAMSA always has an effect. This means that the option must be turned off after the first message in the group has been removed from the queue, in order to be able to remove the remaining messages in the group.

Successful completion of an MQGET call specifying GMAMSA means that at the time that the MQGET call was issued, all the messages in the group were on the queue. However, be aware that other applications are still able to remove messages from the group (the group is not locked to the application that retrieves the first message in the group).

If this option is not specified, messages belonging to groups can be retrieved even when the group is incomplete.

GMAMSA implies GMASGA, which need not therefore be specified.

GMAMSA can be specified with any of the other GM* options, and with any of the MO* options.

**GMASGA**
All segments in a logical message must be available.

This option specifies that segments in a logical message become available for retrieval only when all segments in the logical message are available. If the queue contains segmented messages with some of the segments missing (perhaps because they have been delayed in the network and have not yet arrived), specifying GMASGA prevents retrieval of segments belonging to incomplete logical messages. However those segments still contribute to the value of the *CurrentQDepth* queue attribute; this means that there might be no retrievable logical messages, even though *CurrentQDepth* is greater than zero. If there are no other messages that are retrievable, reason code RC2033 is returned after the specified wait interval (if any) has expired.

The processing of GMASGA depends on whether GMLOGO is also specified:

- If both options are specified, GMASGA has an effect only when there is no current logical message. If there is a current logical message, GMASGA is ignored. This means that GMASGA can remain on when processing messages in logical order.
- If GMASGA is specified without GMLOGO, GMASGA always has an effect. This means that the option must be turned off after the first segment in the logical message has been removed from the queue, in order to be able to remove the remaining segments in the logical message.

If this option is not specified, message segments can be retrieved even when the logical message is incomplete.

While both GMCMPM and GMASGA require all segments to be available before any of them can be retrieved, the former returns the complete message, whereas the latter allows the segments to be retrieved one by one.

If GMASGA is specified for a report message, the queue manager performs special processing. The queue manager checks the queue to see if there is at least one report message for each of the segments that make up the complete logical message. If there is, the GMASGA condition is satisfied. However, the queue manager does not check the type of the report messages present, and so there might be a mixture of report types in the report messages relating to the segments of the logical message. As a result, the success of GMASGA does not imply that GMCMPM succeeds. If there is a mixture of report types present for the segments of a particular logical message, those report messages must be retrieved one by one.

GMASGA can be specified with any of the other GM* options, and with any of the MO* options.

**Default option**: If none of the options described are required, the following option can be used:

**GMNONE**
No options specified.

This value can be used to indicate that no other options have been specified; all options assume their default values. GMNONE is defined to aid program documentation; it is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

The initial value of the *GMOPT* field is GMNWT.

**GMRE1 (1 byte character string)**

Reserved.

This is a reserved field. The initial value of this field is a blank character. This field is ignored if *GMVER* is less than GMVER2.

**GMRL (10 digit signed integer)**

Length of message data returned (bytes).

This is an output field that is set by the queue manager to the length in bytes of the message data returned by the MQGET call in the *BUFFER* parameter. If the queue manager does not support this capability, *GMRL* is set to the value RLUNDF.

When messages are converted between encodings or character sets, the message data can sometimes change size. On return from the MQGET call:

- If *GMRL* is not RLUNDF, the number of bytes of message data returned is given by *GMRL*.

- If *GMRL* has the value RLUNDF, the number of bytes of message data returned is typically given by the smaller of *BUFLEN* and *DATLEN*, but can be less than this if the MQGET call completes with reason code RC2079 . If this happens, the insignificant bytes in the *BUFFER* parameter are set to nulls.

The following special value is defined:

**RLUNDF**
Length of returned data not defined.

The initial value of this field is RLUNDF. This field is ignored if *GMVER* is less than GMVER3.

**GMRQN (48 byte character string)**

Resolved name of destination queue.

This is an output field which is set by the queue manager to the local name of the queue from which the message was retrieved, as defined to the local queue manager. This is different from the name used to open the queue if:

- An alias queue was opened (in which case, the name of the local queue to which the alias resolved is returned), or
- A model queue was opened (in which case, the name of the dynamic local queue is returned).

The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**GMRS2 (1 byte character string)**

Reserved.

This is a reserved field. The initial value of this field is a blank character. This field is ignored if *GMVER* is less than GMVER4.

**GMSEG (1 byte character string)**

Flag indicating whether further segmentation is allowed for the message retrieved.

It has one of the following values:

**SEGIHB**
Segmentation not allowed.

**SEGALW**
Segmentation allowed.

This is an output field. The initial value of this field is SEGIHB. This field is ignored if *GMVER* is less than GMVER2.

**GMSG1 (10 digit signed integer)**

Signal.

This is a reserved field; its value is not significant. The initial value of this field is 0.

**GMSG2 (10 digit signed integer)**

Signal identifier.

This is a reserved field; its value is not significant.

**GMSID (4 byte character string)**

Structure identifier.

The value must be:

**GMSIDV**
Identifier for get-message options structure.

This field is always an input field. The initial value of this field is GMSIDV.

**GMSST (1 byte character string)**

Flag indicating whether message retrieved is a segment of a logical message.

It has one of the following values:

**SSNSEG**
Message is not a segment.

**SSSEG**
Message is a segment, but is not the last segment of the logical message.

**SSLSEG**
Message is the last segment of the logical message.

This is also the value returned if the logical message consists of only one segment.

This field is an output field. The initial value of this field is SSNSEG. This field is ignored if *GMVER* is less than GMVER2.

**GMTOK (16 byte bit string)**

Message token.

This is a reserved field; its value is not significant. The following special value is defined:

**MTKNON**
No message token.

The value is binary zero for the length of the field.

The length of this field is given by LNMTOK. The initial value of this field is MTKNON. This field is ignored if *GMVER* is less than GMVER3.

**GMVER (10 digit signed integer)**

Structure version number.

The value must be one of the following:

**GMVER1**
Version-1 get-message options structure.

**GMVER2**
Version-2 get-message options structure.

**GMVER3**
Version-3 get-message options structure.

**GMVER4**
Version-4 get-message options structure.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**GMVERC**
Current version of get-message options structure.

This field is always an input field. The initial value of this field is GMVER1.

**GMVER (10 digit signed integer)**

Structure version number.

The value must be one of the following:

**GMVER1**
Version-1 get-message options structure.

**GMVER2**
Version-2 get-message options structure.

**GMVER3**
Version-3 get-message options structure.

**GMVER4**
Version-4 get-message options structure.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**GMVERC**
Current version of get-message options structure.

This field is always an input field. The initial value of this field is GMVER1.

**GMWI (10 digit signed integer)**

Wait interval.

This is the approximate time, expressed in milliseconds, that the MQGET call waits for a suitable message to arrive (that is, a message satisfying the selection criteria specified in the *MSGDSC* parameter of the MQGET call; see the *MDMID* field described in "MQMD - Message descriptor" on page 1077 for more details). If no suitable message has arrived after this time has elapsed, the call completes with CCFAIL and reason code RC2033.

*GMWI* is used with the GMWT option. It is ignored if this option is not specified. If it is specified, *GMWI* must be greater than or equal to zero, or the following special value:

**WIULIM**
Unlimited wait interval.

The initial value of this field is 0.

## Initial values

*Table 595. Initial values of fields in MQGMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *GMSID* | GMSIDV | 'GMO¬' |
| *GMVER* | GMVER1 | 1 |
| *GMOPT* | GMNWT | 0 |
| *GMWI* | None | 0 |
| *GMSG1* | None | 0 |
| *GMSG2* | None | 0 |
| *GMRQN* | None | Blanks |
| *GMMO* | MOMSGI + MOCORI | 3 |
| *GMGST* | GSNIG | '¬' |
| *GMSST* | SSNSEG | '¬' |
| *GMSEG* | SEGIHB | '¬' |
| *GMRE1* | None | '¬' |
| *GMTOK* | MTKNON | Nulls |
| *GMRL* | RLUNDF | -1 |
| *GMRS2* | None | '¬' |
| *GMMH* | HMNONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQGMO Structure
D*
D* Structure identifier
D  GMSID                  1      4    INZ('GMO ')
D* Structure version number
D  GMVER                  5      8I 0 INZ(1)
D* Options that control the action ofMQGET
D  GMOPT                  9     12I 0 INZ(0)
D* Wait interval
D  GMWI                  13     16I 0 INZ(0)
D* Signal
D  GMSG1                 17     20I 0 INZ(0)
D* Signal identifier
D  GMSG2                 21     24I 0 INZ(0)
D* Resolved name of destination queue
D  GMRQN                 25     72    INZ
D* Options controlling selection criteriaused for MQGET
D  GMMO                  73     76I 0 INZ(3)
D* Flag indicating whether messageretrieved is in a group
D  GMGST                 77     77    INZ(' ')
D* Flag indicating whether messageretrieved is a segment of a
D* logicalmessage
D  GMSST                 78     78    INZ(' ')
D* Flag indicating whether furthersegmentation is allowed for themessage
D* retrieved
D  GMSEG                 79     79    INZ(' ')
D* Reserved
D  GMRE1                 80     80    INZ
D* Message token
D  GMTOK                 81     96    INZ(X'00000000000000-
D                                     000000000000000000')
D* Length of message data returned(bytes)
D  GMRL                  97    100I 0 INZ(-1)
D* Reserved
D  GMRS2                101    104I 0 INZ(0)
D* Message handle
D  GMMH                 105    112I 0 INZ(0)
```

## MQIIH - IMS information header

The MQIIH structure describes the information that must be present at the start of a message sent to the IMS bridge through IBM MQ for z/OS.

### Overview

**Format name**: FMIMS.

**Character set and encoding**: Special conditions apply to the character set and encoding used for the MQIIH structure and application message data:

- Applications that connect to the queue manager that owns the IMS bridge queue must provide an MQIIH structure that is in the character set and encoding of the queue manager. This is because data conversion of the MQIIH structure is not performed in this case.
- Applications that connect to other queue managers can provide an MQIIH structure that is in any of the supported character sets and encodings; conversion of the MQIIH is performed by the receiving message channel agent connected to the queue manager that owns the IMS bridge queue.

  **Note:** There is one exception to this. If the queue manager that owns the IMS bridge queue is using CICS for distributed queuing, the MQIIH must be in the character set and encoding of the queue manager that owns the IMS bridge queue.
- The application message data following the MQIIH structure must be in the same character set and encoding as the MQIIH structure. The *IICSI* and *IIENC* fields in the MQIIH structure cannot be used to specify the character set and encoding of the application message data.

A data-conversion exit must be provided by the user to convert the application message data if the data is not one of the built-in formats supported by the queue manager.


- "Authenticating passtickets for IMS bridge applications" on page 1066
- "Fields" on page 1066
- "Initial values" on page 1069
- "RPG declaration" on page 1069


## Authenticating passtickets for IMS bridge applications

It is now possible for IBM MQ administrators to specify the application name to be used for authenticating passtickets, for IMS bridge applications. To do this, the application name is specified as a new attribute PTKTAPPL for the STGCLASS object definition, as a 1 to 8 character alphanumeric string.

A blank value means that authentication occurs as with previous releases of IBM MQ, that is, no application name flows on the authentication request, and the MVSxxxx value to is used instead.

A value of 1 - 8 alphanumeric characters must follow the rules for passticket application names as described in the RACF publications.

IBM MQ Administrators and RACF administrators must both agree on the valid application names to be used. The RACF administrator must create a profile in the PTKTDATA class giving READ access to the user IDs of all applications that are to be granted access. The IBM MQ administrator must create or alter the required STGCLASS definitions that specify the application name to be used for passticket authentication.

For related information, see the *Script (MQSC) Command Reference*.

## Fields

The MQIIH structure contains the following fields; the fields are described in **alphabetical order**:

**IIAUT (8-byte character string)**

RACF password or passticket.

This is optional; if specified, it is used with the user ID in the MQMD security context to build a UTOKEN that is sent to IMS to provide a security context. If it is not specified, the user ID is used without verification. This depends on the setting of the RACF switches, which may require an authenticator to be present.

This is ignored if the first byte is blank or null. The following special value may be used:

**IAUNON**
No authentication.

The length of this field is given by LNAUTH. The initial value of this field is IAUNON.

**IICMT (1-byte character string)**

Commit mode.

See the *OTMA Reference* for more information about IMS commit modes. The value must be one of the following:

**ICMCTS**
Commit then send.

This mode implies double queuing of output, but shorter region occupancy times. Fast-path and conversational transactions cannot run with this mode.

**ICMSTC**
Send then commit.

The initial value of this field is ICMCTS.

**IICSI (10-digit signed integer)**

Reserved.

This is a reserved field; its value is not significant. The initial value of this field is 0.

**IIENC (10-digit signed integer)**

Reserved.

This is a reserved field; its value is not significant. The initial value of this field is 0.

**IIFLG (10-digit signed integer)**

Flags.

The value must be:

**IINONE**
No flags.

The initial value of this field is IINONE.

**IIFMT (8-byte character string)**

IBM MQ format name of data that follows MQIIH.

This specifies the IBM MQ format name of the data that follows the MQIIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**IILEN (10-digit signed integer)**

Length of MQIIH structure.

The value must be:

**IILEN1**
Length of IMS information header structure.

The initial value of this field is IILEN1.

**IILTO (8-byte character string)**

Logical terminal override.

This is placed in the IO PCB field. It is optional; if it is not specified the TPIPE name is used. It is ignored if the first byte is blank, or null.

The length of this field is given by LNLTOV. The initial value of this field is 8 blank characters.

**IIMMN (8-byte character string)**

Message format services map name.

This is placed in the IO PCB field. It is optional. On input it represents the MID, on output it represents the MOD. It is ignored if the first byte is blank or null.

The length of this field is given by LNMFMN. The initial value of this field is 8 blank characters.

**IIRFM (8-byte character string)**

IBM MQ format name of reply message.

This is the IBM MQ format name of the reply message that will be sent in response to the current message. The rules for coding this are the same as those for the *MDFMT* field in MQMD.

The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**IIRSV (1-byte character string)**

Reserved.

This is a reserved field; it must be blank.

**IISEC (1-byte character string)**

Security scope.

This indicates the required IMS security processing. The following values are defined:

**ISSCHK**
Check security scope.

An ACEE is built in the control region, but not in the dependent region.

**ISSFUL**
Full security scope.

A cached ACEE is built in the control region and a non-cached ACEE is built in the dependent region. If you use ISSFUL, you must ensure that the user ID for which the ACEE is built has access to the resources used in the dependent region.

If ISSCHK and ISSFUL are not specified for this field, ISSCHK is assumed.

The initial value of this field is ISSCHK.

**IISID (4-byte character string)**

Structure identifier.

The value must be:

**IISIDV**
Identifier for IMS information header structure.

The initial value of this field is IISIDV.

**IITID (16-byte bit string)**

Transaction instance identifier.

This field is used by output messages from IMS so is ignored on first input. If *IITST* is set to ITSIC, this must be provided in the next input, and all subsequent inputs, to enable IMS to correlate the messages to the correct conversation. The following special value may be used:

**ITINON**
No transaction instance id.

The length of this field is given by LNTIID. The initial value of this field is ITINON.

**IITST (1-byte character string)**

Transaction state.

This indicates the IMS conversation state. This is ignored on first input because no conversation exists. On subsequent inputs it indicates whether a conversation is active or not. On output it is set by IMS. The value must be one of the following:

**ITSIC**
In conversation.

**ITSNIC**
Not in conversation.

**ITSARC**
Return transaction state data in architected form.

This value is used only with the IMS `/DISPLAY TRAN` command. It causes the transaction state data to be returned in the IMS architected form instead of character form. See Writing IMS transaction programs through IBM MQ for further details.

The initial value of this field is ITSNIC.

**IIVER (10-digit signed integer)**

Structure version number.

The value must be:

**IIVER1**
Version number for IMS information header structure.

The following constant specifies the version number of the current version:

**IIVERC**
Current version of IMS information header structure.

The initial value of this field is IIVER1.

## Initial values

*Table 596. Initial values of fields in MQIIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *IISID* | IISIDV | 'IIH¬' |
| *IIVER* | IIVER1 | 1 |
| *IILEN* | IILEN1 | 84 |
| *IIENC* | None | 0 |
| *IICSI* | None | 0 |
| *IIFMT* | FMNONE | Blanks |
| *IIFLG* | IINONE | 0 |
| *IILTO* | None | Blanks |
| *IIMMN* | None | Blanks |
| *IIRFM* | FMNONE | Blanks |
| *IIAUT* | IAUNON | Blanks |
| *IITID* | ITINON | Nulls |
| *IITST* | ITSNIC | '¬' |
| *IICMT* | ICMCTS | '0' |
| *IISEC* | ISSCHK | 'C' |
| *IIRSV* | None | '¬' |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     D*
     D* MQIIH Structure
     D*
     D* Structure identifier
     D  IISID                  1      4    INZ('IIH ')
     D* Structure version number
     D  IIVER                  5      8I 0 INZ(1)
     D* Length of MQIIH structure
     D  IILEN                  9     12I 0 INZ(84)
```

```
     D* Reserved
     D  IIENC                 13     16I 0 INZ(0)
     D* Reserved
     D  IICSI                 17     20I 0 INZ(0)
     D* MQ format name of data that followsMQIIH
     D  IIFMT                 21     28    INZ('        ')
     D* Flags
     D  IIFLG                 29     32I 0 INZ(0)
     D* Logical terminal override
     D  IILTO                 33     40    INZ
     D* Message format services map name
     D  IIMMN                 41     48    INZ
     D* MQ format name of reply message
     D  IIRFM                 49     56    INZ('        ')
     D* RACF password or passticket
     D  IIAUT                 57     64    INZ('        ')
     D* Transaction instance identifier
     D  IITID                 65     80    INZ(X'00000000000000-
     D                                     000000000000000000')
     D* Transaction state
     D  IITST                 81     81    INZ(' ')
     D* Commit mode
     D  IICMT                 82     82    INZ('0')
     D* Security scope
     D  IISEC                 83     83    INZ('C')
     D* Reserved
     D  IIRSV                 84     84    INZ
```

## MQIMPO - Inquire message property options

The MQIMPO structure allows applications to specify options that control how properties of messages are inquired.

### Overview

**Purpose**: The structure is an input parameter on the MQINQMP call.

**Character set and encoding**: Data in MQIMPO must be in the character set of the application and encoding of the application (ENNAT).

- "Fields" on page 1070
- "Initial values" on page 1076
- "RPG declaration" on page 1076

### Fields

The MQIMPO structure contains the following fields; the fields are described in **alphabetical order**:

**IPOPT (10-digit signed integer)**

The following options control the action of MQINQMP. You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations). Combinations of options that are not valid are noted; all other combinations are valid.

**Value data options:** The following options relate to the processing of the value data when the property is retrieved from the message.

**IPCVAL**
This option requests that the value of the property be converted to conform to the *IPREQCSI* and *IPREQENC* values specified before the MQINQMP call returns the property value in the *Value* area.

- If conversion is successful, the *IPRETCSI* and *IPRETENC* fields are set to the same as *IPREQCSI* and *IPREQENC* on return from the MQINQMP call.

- If conversion fails, but the MQINQMP call otherwise completes without error, the property value is returned unconverted.

  If the property is a string, the *IPRETCSI* and *IPRETENC* fields are set to the character set and encoding of the unconverted string.

  The completion code is CCWARN in this case, with reason code RC2466. The property cursor is advanced to the returned property.

If the property value expands during conversion, and exceeds the size of the *Value* parameter, the value is returned unconverted, with completion code CCFAIL; the reason code is set to RC2469.

The *DataLength* parameter of the MQINQMP call returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

This option also requests that:

- If the property name contains a wildcard, and
- The *IPRETNAMECHRP* field is initialized with an address or offset for the returned name,

then the returned name is converted to conform to the *IPREQCSI* and *IPREQENC* values.

- If conversion is successful, the *VSCCSID* field of *IPRETNAMECHRP* and the encoding of the returned name are set to the input value of *IPREQCSI* and *IPREQENC*.
- If conversion fails, but the MQINQMP call otherwise completes without error or warning, the returned name is unconverted. The completion code is CCWARN in this case, with reason code RC2492.

  The property cursor is advanced to the returned property. RC2466 is returned if both the value and the name are not converted.

If the returned name expands during conversion, and exceeds the size of the *VSBufsize* field of the *RequestedName*, the returned string is left unconverted, with completion code CCFAIL and the reason code is set to RC2465.

The *VSLength* field of the MQCHARV structure returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

**IPCTYP**

This option requests that the value of the property be converted from its current data type, into the data type specified on the *Type* parameter of the MQINQMP call.

- If conversion is successful, the *Type* parameter is unchanged on return of the MQINQMP call.
- If conversion fails, but the MQINQMP call otherwise completes without error, the call fails with reason RC2470. The property cursor is unchanged.

If the conversion of the data type causes the value to expand during conversion, and the converted value exceeds the size of the *Value* parameter, the value is returned unconverted, with completion code CCFAIL and the reason code is set to RC2469.

The *DataLength* parameter of the MQINQMP call returns the length that the property value would have converted to, in order to allow the application to determine the size of the buffer required to accommodate the converted property value. The property cursor is unchanged.

If the value of the *Type* parameter of the MQINQMP call is not valid, the call fails with reason RC2473.

If the requested data type conversion is not supported, the call fails with reason RC2470. The following data type conversions are supported:

| Property data type | Supported target data types |
|---|---|
| TYPBOL | TYPSTR, TYPI8, TYPI16, TYPI32, TYPI64 |
| TYPBST | TYPSTR |
| TYPI8 | TYPSTR, TYPI16, TYPI32, TYPI64 |
| TYPI16 | TYPSTR, TYPI32, TYPI64 |
| TYPI32 | TYPSTR, TYPI64 |
| TYPI64 | TYPSTR |
| TYPF32 | TYPSTR, TYPF64 |
| TYPF64 | TYPSTR |
| TYPSTR | TYPBOL, TYPI8, TYPI16, TYPI32, TYPI64, TYPF32, TYPF64 |
| TYPNUL | None |

The general rules governing the supported conversions are as follows:

- Numeric property values can be converted from one data type to another, provided that no data is lost during the conversion.

  For example, the value of a property with data type TYPI32 can be converted into a value with data type TYPI64, but cannot be converted into a value with data type TYPI16.
- A property value of any data type can be converted into a string.
- A string property value can be converted to any other data type provided the string is formatted correctly for the conversion. If an application attempts to convert a string property value that is not formatted correctly, IBM MQ returns reason code RC2472.
- If an application attempts a conversion that is not supported, IBM MQ returns reason code RC2470.

The specific rules for converting a property value from one data type to another are as follows:

- When converting a TYPBOL property value to a string, the value TRUE is converted to the string "TRUE", and the value false is converted to the string "FALSE".
- When converting a TYPBOL property value to a numeric data type, the value TRUE is converted to one, and the value FALSE is converted to zero.
- When converting a string property value to a TYPBOL value, the string "TRUE" , or "1" , is converted to TRUE, and the string "FALSE", or "0", is converted to FALSE.

  Note that the terms "TRUE" and "FALSE" are not case sensitive.

  Any other string cannot be converted; IBM MQ returns reason code RC2472.
- When converting a string property value to a value with data type TYPI8, TYPI16, TYPI32 or TYPI64, the string must have the following format:

```
[blanks][sign]digits
```

  The meanings of the components of the string are as follows:

  **blanks**
  Optional leading blank characters

  **sign**
  An optional plus sign (+) or minus sign (-) character.

  **digits**
  A contiguous sequence of digit characters (0-9). At least one digit character must be present.

After the sequence of digit characters, the string can contain other characters that are not digit characters, but the conversion stops as soon as the first of these characters is reached. The string is assumed to represent a decimal integer.

IBM MQ returns reason code RC2472 if the string is not formatted correctly.

- When converting a string property value to a value with data type TYPF32 or TYPF64, the string must have the following format:

```
[blanks][sign]digits[.digits][e_char[e_sign]e_digits]
```

The meanings of the components of the string are as follows:

**blanks**
Optional leading blank characters

**sign**
An optional plus sign (+) or minus sign (-) character.

**digits**
A contiguous sequence of digit characters (0-9). At least one digit character must be present.

**e_char**
An exponent character, which is either "E" or "e".

**e_sign**
An optional plus sign (+) or minus sign (-) character for the exponent.

**e_digits**
A contiguous sequence of digit characters (0-9) for the exponent. At least one digit character must be present if the string contains an exponent character.

After the sequence of digit characters, or the optional characters representing an exponent, the string can contain other characters that are not digit characters, but the conversion stops as soon as the first of these characters is reached. The string is assumed to represent a decimal floating point number with an exponent that is a power of 10.

IBM MQ returns reason code RC2472 if the string is not formatted correctly.

- When converting a numeric property value to a string, the value is converted to the string representation of the value as a decimal number, not the string containing the ASCII character for that value. For example, the integer 65 is converted to the string "65", not the string "A".
- When converting a byte string property value to a string, each byte is converted to the two hexadecimal characters that represent the byte. For example, the byte array {0xF1, 0x12, 0x00, 0xFF} is converted to the string "F11200FF".

**IPQLEN**
Query the type and length of the property value. The length is returned in the *DataLength* parameter of the MQINQMP call. The property value is not returned.

If a *ReturnedName* buffer is specified, the *VSLength* field of the MQCHARV structure is filled in with the length of the property name. The property name is not returned.

**Iteration options:** The following options relate to iterating over properties, using a name with a wildcard character

**IPINQF**
Inquire on the first property that matches the specified name. After this call, a cursor is established on the property that is returned.

This is the default value.

The IPINQC option can subsequently be used with an MQINQMP call, if required, to inquire on the same property again.

Note that there is only one property cursor; therefore, if the property name, specified in the MQINQMP call, changes the cursor is reset.

This option is not valid with either of the following options:

IPINQN
IPINQC

**IPINQN**
Inquires on the next property that matches the specified name, continuing the search from the property cursor. The cursor is advanced to the property that is returned.

If this is the first MQINQMP call for the specified name, then the first property that matches the specified name is returned.

The IPINQC option can subsequently be used with an MQINQMP call if required, to inquire on the same property again.

If the property under the cursor has been deleted, MQINQMP returns the next matching property following the one that has been deleted.

If a property is added that matches the wildcard, while an iteration is in progress, the property might or might not be returned during the completion of the iteration. The property is returned once the iteration restarts using IPINQF.

A property matching the wildcard that was deleted, while the iteration was in progress, is not returned subsequent to its deletion.

This option is not valid with either of the following options:

IPINQF
IPINQC

**IPINQC**
Retrieve the value of the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired, using either the IPINQF or the IPINQN option.

The property cursor is reset when the message handle is reused, when the message handle is specified in the *MsgHandle* field of the MQGMO on an MQGET call, or when the message handle is specified in *OriginalMsgHandle* or *NewMsgHandle* fields of the MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established, or if the property pointed to by the property cursor has been deleted, the call fails with completion code CCFAIL and reason RC2471.

This option is not valid with either of the following options:

IPINQF
IPINQN

If none of the options previously described is required, the following option can be used:

**IPNONE**
Use this value to indicate that no other options have been specified; all options assume their default values.

IPNONE aids program documentation; it is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

This is always an input field. The initial value of this field is IPINQF.

**IPREQCSI (10-digit signed integer)**

The character set that the inquired property value is to be converted into if the value is a character string. This is also the character set into which the *ReturnedName* is to be converted when IPCVAL or IPCTYP is specified.

The initial value of this field is CSAPL.

**IPREQENC (10-digit signed integer)**

This is the encoding into which the inquired property value is to be converted when IPCVAL or IPCTYP is specified.

The initial value of this field is ENNAT.

**IPRE1 (10-digit signed integer)**

This is a reserved field. The initial value of this field is a blank character.

**IPRETCSI (10-digit signed integer)**

On output, this is the character set of the value returned if the *Type* parameter of the MQINQMP call is TYPSTR.

If the IPCVAL option is specified and conversion was successful, the *ReturnedCCSID* field, on return, is the same value as the value passed in.

The initial value of this field is zero.

**IPRETENC (10-digit signed integer)**

On output, this is the encoding of the value returned.

If the IPCVAL option is specified and conversion was successful, the *ReturnedEncoding* field, on return, is the same value as the value passed in.

The initial value of this field is ENNAT.

**IPRETNAMCHRP (10-digit signed integer)**

The actual name of the inquired property.

On input a string buffer can be passed in using the *VSPtr* or *VSOffset* field of the MQCHARV structure. The length of the string buffer is specified using the *VSBufsize* field of the MQCHARV structure.

On return from the MQINQMP call, the string buffer is completed with the name of the property that was inquired, provided the string buffer was long enough to fully contain the name. The *VSLength* field of the MQCHARV structure is filled in with the length of the property name. The *VSCCSID* field of the MQCHARV structure is filled in to indicate the character set of the returned name, whether or not conversion of the name failed.

This is an input/output field. The initial value of this field is MQCHARV_DEFAULT.

**IPSID (10-digit signed integer)**

This is the structure identifier. The value must be:

**IPSIDV**
Identifier for inquire message property options structure.

This is always an input field. The initial value of this field is IPSIDV.

**IPTYP (10-digit signed integer)**

A string representation of the data type of the property.

If the property was specified in an MQRFH2 header and the MQRFH2 dt attribute is not recognized, this field can be used to determine the data type of the property. *TypeString* is returned in coded character set 1208 (UTF-8), and is the first eight bytes of the value of the dt attribute of the property that failed to be recognized

This is always an output field. The initial value of this field is the null string in the C programming language, and 8 blank characters in other programming languages.

**IPVER (10-digit signed integer)**

This is the structure version number. The value must be:

**IPVER1**
Version number for inquire message property options structure.

The following constant specifies the version number of the current version:

**IPVERC**
Current version of inquire message property options structure.

This is always an input field. The initial value of this field is IPVER1.

## Initial values

*Table 597. Initial values of fields in MQIPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *IPSID* | IPSIDV | 'IMPO' |
| *IPVER* | IPVER1 | 1 |
| *IPOPT* | IPINQF | |
| *IPREQENC* | ENNAT | |
| *IPREQCSI* | CSAPL | |
| *IPRETENC* | ENNAT | |
| *IPRETCSI* | 0 | |
| *IPRE1* | 0 | |
| *IPRETNAMCHRP* | | |
| *IPTYP* | | blanks |

## RPG declaration

```
D* MQIMPO Structure
D*
D*
D* Structure identifier
D IPSID         1   4  INZ('IMPO')
D*
D* Structure version number
D IPVER         5   8I 0 INZ(1)
D*
** Options that control the action of
D* MQINQMP
D IPOPT         9   12I 0 INZ(0)
D*
D* Requested encoding of Value
D IPREQENC       13   16I 0 INZ(273)
D*
** Requested character set identifier
D* of Value
```

```
D IPREQCSI       17   20I 0 INZ(-3)
D*
D* Returned encoding of Value
D IPRETENC       21   24I 0 INZ(273)
D*
** Returned character set identifier of
D* Value
D IPRETCSI       25   28I 0 INZ(0)
D*
D* Reserved
D IPRE1         29   32I 0 INZ(0)
D*
D* Returned property name
D* Address of variable length string
D IPRETNAMCHRP     33   48*  INZ(*NULL)
D* Offset of variable length string
D IPRETNAMCHRO     49   52I 0 INZ(0)
D* Size of buffer
D IPRETNAMVSBS     53   56I 0 INZ(-1)
D* Length of variable length string
D IPRETNAMCHRL     57   60I 0 INZ(0)
D* CCSID of variable length string
D IPRETNAMCHRC     61   64I 0 INZ(-3)
D*
D* Property data type as a string
D IPTYP         65   72  INZ
```

# MQMD - Message descriptor

## Overview

**Purpose**: The MQMD structure contains the control information that accompanies the application data when a message travels between the sending and receiving applications. The structure is an input/output parameter on the MQGET, MQPUT, and MQPUT1 calls.

**Version**: The current version of MQMD is MDVER2. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQMD that is supported by the environment, but with the initial value of the *MDVER* field set to MDVER1. To use fields that are not present in the version-1 structure, the application must set the *MDVER* field to the version number of the version required.

A declaration for the version-1 structure is available with the name MQMD1.

**Character set and encoding**: Data in MQMD must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ MQI client, the structure must be in the character set and encoding of the client.

If the sending and receiving queue managers use different character sets or encodings, the data in MQMD is converted automatically. It is not necessary for the application to convert the MQMD.


- "Using different versions of MQMD" on page 1077
- "Message context" on page 1078
- "Message expiry" on page 1078
- "Fields" on page 1078
- "Initial values" on page 1118
- "RPG declaration" on page 1119


## Using different versions of MQMD

A version-2 MQMD is generally equivalent to using a version-1 MQMD and prefixing the message data with an MQMDE structure. However, if all of the fields in the MQMDE structure have their default values, the MQMDE can be omitted. A version-1 MQMD plus MQMDE are used as described later in this section.

- On the MQPUT and MQPUT1 calls, if the application provides a version-1 MQMD, the application can optionally prefix the message data with an MQMDE, setting the *MDFMT* field in MQMD to FMMDE to indicate that an MQMDE is present. If the application does not provide an MQMDE, the queue manager assumes default values for the fields in the MQMDE.

  **Note:** Several of the fields that exist in the version-2 MQMD but not the version-1 MQMD are input/output fields on the MQPUT and MQPUT1 calls. However, the queue manager does *not* return any values in the equivalent fields in the MQMDE on output from the MQPUT and MQPUT1 calls; if the application requires those output values, it must use a version-2 MQMD.
- On the MQGET call, if the application provides a version-1 MQMD, the queue manager prefixes the message returned with an MQMDE, but only if one or more of the fields in the MQMDE has a non-default value. The *MDFMT* field in MQMD will have the value FMMDE to indicate that an MQMDE is present.

The default values that the queue manager used for the fields in the MQMDE are the same as the initial values of those fields, shown in Table 598 on page 1118.

When a message is on a transmission queue, some of the fields in MQMD are set to particular values; see "MQXQH - Transmission-queue header" on page 1211 for details.

## Message context

Certain fields in MQMD contain the message context. Typically:

- **Identity** context relates to the application that *originally* put the message
- **Origin** context relates to the application that *most recently* put the message
- **User** context relates to the application that *originally* put the message.

These two applications can be the same application, but they can also be different applications (for example, when a message is forwarded from one application to another).

Although identity and origin context usually have the meanings described previously, the content of both types of context fields in MQMD actually depends on the PM* options that are specified when the message is put. As a result, identity context does not necessarily relate to the application that originally put the message, and origin context does not necessarily relate to the application that most recently put the message - it depends on the design of the application suite.

There is one class of application that never alters message context, namely the message channel agent (MCA). MCAs that receive messages from remote queue managers use the context option PMSETA on the MQPUT or MQPUT1 call. This allows the receiving MCA to preserve exactly the message context that travelled with the message from the sending MCA. However, the result is that the origin context does not relate to the application that most recently put the message (the receiving MCA), but instead relates to an earlier application that put the message (possibly the originating application itself).

For more information see Message context.

## Message expiry

Messages that have expired on a loaded queue (a queue that has been opened) are automatically removed from the queue within a reasonable period of time after their expiry. Some other new features of this release of IBM MQ can lead to loaded queues being scanned less frequently than in the previous product version, however expired messages on loaded queues are always removed within a reasonable period of their expiry.

## Fields

The MQMD structure contains the following fields; the fields are described in alphabetical order:

**MDACC (32-byte bit string)**

Accounting token.

This is part of the **identity context** of the message. For more information about message context, see Message context and Controlling context information.

*MDACC* allows an application to cause work done as a result of the message to be appropriately charged. The queue manager treats this information as a string of bits and does not check its content.

When the queue manager generates this information, it is set as follows:

- The first byte of the field is set to the length of the accounting information present in the bytes that follow; this length is in the range zero through 30, and is stored in the first byte as a binary integer.
- The second and subsequent bytes (as specified by the length field) are set to the accounting information appropriate to the environment.
  - On z/OS the accounting information is set to:
    - For z/OS batch, the accounting information from the JES JOB card or from a JES ACCT statement in the EXEC card (comma separators are changed to X'FF'). This information is truncated, if necessary, to 31 bytes.
    - For TSO, the user's account number.
    - For CICS, the LU 6.2 unit of work identifier (UEPUOWDS) (26 bytes).
    - For IMS, the 8-character PSB name concatenated with the 16-character IMS recovery token.
  - On IBM i, the accounting information is set to the accounting code for the job.
  - On HP Integrity NonStop Server, and UNIX systems, the accounting information is set to the numeric user identifier, in ASCII characters.
  - On Windows, the accounting information is set to a Windows NT security identifier (SID) in a compressed format. The SID uniquely identifies the user identifier stored in the *MDUID* field. When the SID is stored in the *MDACC* field, the 6-byte Identifier Authority (located in the third and subsequent bytes of the SID) is omitted. For example, if the Windows NT SID is 28 bytes long, 22 bytes of SID information are stored in the *MDACC* field.
- The last byte is set to the accounting-token type, one of the following values:

  **ATTCIC**
  CICS LUOW identifier.

  **ATTDOS**
  PC DOS default accounting token.

  **ATTWNT**
  Windows security identifier.

  **ATT400**
  IBM i accounting token.

  **ATTUNX**
  UNIX systems numeric identifier.

  **ATTUSR**
  User-defined accounting token.

  **ATTUNK**
  Unknown accounting-token type.

  The accounting-token type is set to an explicit value only in the following environments: AIX, HP-UX, IBM i, Solaris, Windows, plus IBM MQ MQI clients connected to these systems. In other environments, the accounting-token type is set to the value ATTUNK. In these environments the *MDPAT* field can be used to deduce the type of accounting token received.
- All other bytes are set to binary zero.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETI or PMSETA is specified in the *PMO* parameter. If neither PMSETI nor PMSETA is specified, this field is ignored on input and is an output-only field. For more information on message context, see Message context and Controlling context information.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDACC* that was transmitted with the message if it was put to a queue. This will be the value of *MDACC* that is kept with the message if it is retained (see description of PMRET in "MQPMO - Put-message options" on page 1140 for more details about retained publications) but is not used as the *MDACC* when the message is sent as a publication to subscribers since they provide a value to override *MDACC* in all publications sent to them. If the message has no context, the field is entirely binary zero.

This is an output field for the MQGET call.

This field is not subject to any translation based on the character set of the queue manager-the field is treated as a string of bits, and not as a string of characters.

The queue manager does nothing with the information in this field. The application must interpret the information if it wants to use the information for accounting purposes.

The following special value may be used for the *MDACC* field:

**ACNONE**
No accounting token is specified.

The value is binary zero for the length of the field.

The length of this field is given by LNACCT. The initial value of this field is ACNONE.

**MDAID (32-byte character string)**

Application data relating to identity.

This is part of the **identity context** of the message. For more information about message context, see Message context and Controlling context information.

*MDAID* is information that is defined by the application suite, and can be used to provide additional information about the message or its originator. The queue manager treats this information as character data, but does not define the format of it. When the queue manager generates this information, it is entirely blank.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETI or PMSETA is specified in the *PMO* parameter. If a null character is present, the null and any following characters are converted to blanks by the queue manager. If neither PMSETI nor PMSETA is specified, this field is ignored on input and is an output-only field. For more information on message context, see Message context and Controlling context information.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDAID* that was transmitted with the message if it was put to a queue. This will be the value of *MDAID* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDAID* when the message is sent as a publication to subscribers since they provide a value to override *MDAID* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by LNAIDD. The initial value of this field is 32 blank characters.

**MDAOD (4-byte character string)**

Application data relating to origin.

This is part of the **origin context** of the message. For more information about message context, see Message context and Controlling context information.

*MDAOD* is information that is defined by the application suite that can be used to provide additional information about the origin of the message. For example, it could be set by applications running with suitable user authority to indicate whether the identity data is trusted.

The queue manager treats this information as character data, but does not define the format of it. When the queue manager generates this information, it is entirely blank.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETA is specified in the *PMO* parameter. Any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If PMSETA is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDAOD* that was transmitted with the message if it was put to a queue. This will be the value of *MDAOD* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDAOD* when the message is sent as a publication to subscribers since they provide a value to override *MDAOD* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by LNAORD. The initial value of this field is 4 blank characters.

**MDBOC (10-digit signed integer)**

Backout counter.

This is a count of the number of times the message has been previously returned by the MQGET call as part of a unit of work, and subsequently backed out. It is provided as an aid to the application in detecting processing errors that are based on message content. The count excludes MQGET calls that specified any of the GMBRW* options.

The accuracy of this count is affected by the *HardenGetBackout* queue attribute; see "Attributes for queues" on page 1335.

This is an output field for the MQGET call. It is ignored for the MQPUT and MQPUT1 calls. The initial value of this field is 0.

**MDCID (24-byte bit string)**

Correlation identifier.

This is a byte string that the application can use to relate one message to another, or to relate the message to other work that the application is performing. The correlation identifier is a permanent property of the message, and persists across restarts of the queue manager. Because the correlation identifier is a byte string and not a character string, the correlation identifier is *not* converted between character sets when the message flows from one queue manager to another.

For the MQPUT and MQPUT1 calls, the application can specify any value. The queue manager transmits this value with the message and delivers it to the application that issues the get request for the message.

If the application specifies PMNCID, the queue manager generates a unique correlation identifier which is sent with the message, and also returned to the sending application on output from the MQPUT or MQPUT1 call.

This generated correlation identifier is kept with the message if it is retained and is used as the correlation identifier when the message is sent as a publication to subscribers who specify CINONE in the *SDCID* field in the MQSD passed on the MQSUB call.

See "MQPMO - Put-message options" on page 1140 for more details about retained publications

When the queue manager or a message channel agent generates a report message, it sets the *MDCID* field in the way specified by the *MDREP* field of the original message, either ROCMTC or ROPCI. Applications which generate report messages should also do this.

For the MQGET call, *MDCID* is one of the five fields that can be used to select a particular message to be retrieved from the queue. See the description of the *MDMID* field for details of how to specify values for this field.

Specifying CINONE as the correlation identifier has the same effect as *not* specifying MOCORI, that is, *any* correlation identifier will match.

If the GMMUC option is specified in the *GMO* parameter on the MQGET call, this field is ignored.

On return from an MQGET call, the *MDCID* field is set to the correlation identifier of the message returned (if any).

The following special values may be used:

**CINONE**
No correlation identifier is specified.

The value is binary zero for the length of the field.

**CINEWS**
Message is the start of a new session.

This value is recognized by the CICS bridge as indicating the start of a new session, that is, the start of a new sequence of messages.

For the MQGET call, this is an input/output field. For the MQPUT and MQPUT1 calls, this is an input field if PMNCID is *not* specified, and an output field if PMNCID *is* specified. The length of this field is given by LNCID. The initial value of this field is CINONE.

**MDCSI (10-digit signed integer)**

This specifies the character set identifier of character data in the message.

**Note:** Character data in MQMD and the other IBM MQ data structures that are parameters on calls must be in the character set of the queue manager. This is defined by the queue manager's *CodedCharSetId* attribute; see "Attributes for the queue manager" on page 1366 for details of this attribute.

The following special values can be used:

**CSQM**
Queue manager's character set identifier.

Character data in the message is in the queue manager's character set.

On the MQPUT and MQPUT1 calls, the queue manager changes this value in the MQMD sent with the message to the true character-set identifier of the queue manager. As a result, the value CSQM is never returned by the MQGET call.

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the message is in the same character set as this structure; this is the queue manager's character set. (For MQMD only, CSINHT has the same meaning as CSQM).

The queue manager changes this value in the MQMD sent with the message to the actual character-set identifier of MQMD. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

**CSEMBD**
Embedded character set identifier.

Character data in the message is in a character set with the identifier that is contained within the message data itself. There can be any number of character-set identifiers embedded within the message data, applying to different parts of the data. This value must be used for PCF messages that contain data in a mixture of character sets. PCF messages have a format name of FMPCF.

Specify this value only on the MQPUT and MQPUT1 calls. If it is specified on the MQGET call, it prevents conversion of the message.

On the MQPUT and MQPUT1 calls, the queue manager changes the values CSQM and CSINHT in the MQMD sent with the message as described previously, but does not change the MQMD specified on the MQPUT or MQPUT1 call. No other check is carried out on the value specified.

Applications that retrieve messages should compare this field against the value the application is expecting; if the values differ, the application may need to convert character data in the message.

If the GMCONV option is specified on the MQGET call, this field is an input/output field. The value specified by the application is the coded character-set identifier to which the message data should be converted if necessary. If conversion is successful or unnecessary, the value is unchanged (except that the value CSQM or CSINHT is converted to the actual value). If conversion is unsuccessful, the value after the MQGET call represents the coded character-set identifier of the unconverted message that is returned to the application.

Otherwise, this is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is CSQM.

**MDENC (10-digit signed integer)**

Numeric encoding of message data.

This specifies the numeric encoding of numeric data in the message; it does not apply to numeric data in the MQMD structure itself. The numeric encoding defines the representation used for binary integers, packed-decimal integers, and floating-point numbers.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that the field is valid. The following special value is defined:

**ENNAT**
Native machine encoding.

The encoding is the default for the programming language and machine on which the application is running.

**Note:** The value of this constant depends on the programming language and environment. For this reason, applications must be compiled using the header, macro, COPY, or INCLUDE files appropriate to the environment in which the application will run.

Applications that put messages should normally specify ENNAT. Applications that retrieve messages should compare this field against the value ENNAT; if the values differ, the application may need to convert numeric data in the message. The GMCONV option can be used to request the queue manager to convert the message as part of the processing of the MQGET call.

If the GMCONV option is specified on the MQGET call, this field is an input/output field. The value specified by the application is the encoding to which the message data should be converted if necessary. If conversion is successful or unnecessary, the value is unchanged. If conversion is unsuccessful, the value after the MQGET call represents the encoding of the unconverted message that is returned to the application.

In other cases, this is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is ENNAT.

**MDEXP (10-digit signed integer)**

Message lifetime.

This is a period of time expressed in tenths of a second, set by the application that puts the message. The message becomes eligible to be discarded if it has not been removed from the destination queue before this period of time elapses.

The value is decremented to reflect the time the message spends on the destination queue, and also on any intermediate transmission queues if the put is to a remote queue. It may also be decremented by message channel agents to reflect transmission times, if these are significant. Likewise, an application forwarding this message to another queue might decrement the value if necessary, if it has retained the message for a significant time. However, the expiration time is treated as approximate, and the value need not be decremented to reflect small time intervals.

When the message is retrieved by an application using the MQGET call, the *MDEXP* field represents the amount of the original expiry time that still remains.

After a message's expiry time has elapsed, it becomes eligible to be discarded by the queue manager. In the current implementations, the message is discarded when a browse or nonbrowse MQGET call occurs that would have returned the message had it not already expired. For example, a nonbrowse

MQGET call with the *GMMO* field in MQGMO set to MONONE reading from a FIFO ordered queue will cause all the expired messages to be discarded up to the first unexpired message. With a priority ordered queue, the same call will discard expired messages of higher priority and messages of an equal priority that arrived on the queue before the first unexpired message.

A message that has expired is never returned to an application (either by a browse or a non-browse MQGET call), so the value in the *MDEXP* field of the message descriptor after a successful MQGET call is either greater than zero, or the special value EIULIM.

If a message is put on a remote queue, the message may expire (and be discarded) while it is on an intermediate transmission queue, before the message reaches the destination queue.

A report is generated when an expired message is discarded, if the message specified one of the ROEXP* report options. If none of these options is specified, no such report is generated; the message is assumed to be no longer relevant after this time period (perhaps because a later message has superseded it).

Any other program that discards messages based on expiry time must also send an appropriate report message if one was requested.

**Note:**

1. If a message is put with an *MDEXP* time of zero, the MQPUT or MQPUT1 call fails with reason code RC2013; no report message is generated in this case.
2. Since a message with an expiry time that has elapsed may not actually be discarded until later, there may be messages on a queue that have passed their expiry time, and which are not therefore eligible for retrieval. These messages nevertheless count towards the number of messages on the queue for all purposes, including depth triggering.
3. An expiration report is generated, if requested, when the message is actually discarded, not when it becomes eligible for discarding.
4. Discarding of an expired message, and the generation of an expiration report if requested, are never part of the application's unit of work, even if the message was scheduled for discarding as a result of an MQGET call operating within a unit of work.
5. If a nearly-expired message is retrieved by an MQGET call within a unit of work, and the unit of work is subsequently backed out, the message may become eligible to be discarded before it can be retrieved again.
6. If a nearly-expired message is locked by an MQGET call with GMLK, the message may become eligible to be discarded before it can be retrieved by an MQGET call with GMMUC; reason code RC2034 is returned on this subsequent MQGET call if that happens.
7. When a request message with an expiry time greater than zero is retrieved, the application can take one of the following actions when it sends the reply message:
   - Copy the remaining expiry time from the request message to the reply message.
   - Set the expiry time in the reply message to an explicit value greater than zero.
   - Set the expiry time in the reply message to EIULIM.

   The action to take depends on the design of the application suite. However, the default action for putting messages to a dead-letter (undelivered-message) queue should be to preserve the remaining expiry time of the message, and to continue to decrement it.
8. Trigger messages are always generated with EIULIM.
9. A message (normally on a transmission queue) which has a *MDFMT* name of FMXQH has a second message descriptor within the MQXQH. It therefore has two *MDEXP* fields associated with it. The following additional points should be noted in this case:
   - When an application puts a message on a remote queue, the queue manager places the message initially on a local transmission queue, and prefixes the application message data with an MQXQH structure. The queue manager sets the values of the two *MDEXP* fields to be the same as that specified by the application.

If an application puts a message directly on a local transmission queue, the message data must already begin with an MQXQH structure, and the format name must be FMXQH (but the queue manager does not enforce this). In this case the application need not set the values of these two *MDEXP* fields to be the same. (The queue manager does not check that the *MDEXP* field within the MQXQH contains a valid value, or even that the message data is long enough to include it.)

- When a message with a *MDFMT* name of FMXQH is retrieved from a queue (whether this is a normal or a transmission queue), the queue manager decrements *both* these *MDEXP* fields with the time spent waiting on the queue. No error is raised if the message data is not long enough to include the *MDEXP* field in the MQXQH.
- The queue manager uses the *MDEXP* field in the separate message descriptor (that is, not the one in the message descriptor embedded within the MQXQH structure) to test whether the message is eligible for discarding.
- If the initial values of the two *MDEXP* fields were different, it is therefore possible for the *MDEXP* time in the separate message descriptor when the message is retrieved to be greater than zero (so the message is not eligible for discarding), while the time according to the *MDEXP* field in the MQXQH has elapsed. In this case the *MDEXP* field in the MQXQH is set to zero.

The following special value is recognized:

**EIULIM**
Unlimited lifetime.

The message has an unlimited expiration time.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is EIULIM.

**MDFB (10-digit signed integer)**

Feedback or reason code.

This is used with a message of type MTRPRT to indicate the nature of the report, and is only meaningful with that type of message. The field can contain one of the FB* values, or one of the RC* values. Feedback codes are grouped as follows:

**FBNONE**
No feedback provided.

**FBSFST**
Lowest value for system-generated feedback.

**FBSLST**
Highest value for system-generated feedback.

The range of system-generated feedback codes FBSFST through FBSLST includes the general feedback codes listed later in this section(FB*), and also the reason codes (RC*) that can occur when the message cannot be put on the destination queue.

**FBAFST**
Lowest value for application-generated feedback.

**FBALST**
Highest value for application-generated feedback.

Applications that generate report messages should not use feedback codes in the system range (other than FBQUIT), unless they want to simulate report messages generated by the queue manager or message channel agent.

On the MQPUT or MQPUT1 calls, the value specified must either be FBNONE, or be within the system range or application range. This is checked whatever the value of *MDMT*.

**General feedback codes**:

**FBCOA**
Confirmation of arrival on the destination queue (see ROCOA).

**FBCOD**
Confirmation of delivery to the receiving application (see ROCOD).

**FBEXP**
Message expired.

Message was discarded because it had not been removed from the destination queue before its expiry time had elapsed.

**FBPAN**
Positive action notification (see ROPAN).

**FBNAN**
Negative action notification (see RONAN).

**FBQUIT**
Application should end.

This can be used by a workload scheduling program to control the number of instances of an application program that are running. Sending an MTRPRT message with this feedback code to an instance of the application program indicates to that instance that it should stop processing. However, adherence to this convention is a matter for the application; it is not enforced by the queue manager.

**IMS-bridge feedback codes**: When the IMS bridge receives a nonzero IMS-OTMA sense code, the IMS bridge converts the sense code from hexadecimal to decimal, adds the value FBIERR (300), and places the result in the *MDFB* field of the reply message. This results in the feedback code having a value in the range FBIFST (301) through FBILST (399) when an IMS-OTMA error has occurred.

The following feedback codes can be generated by the IMS bridge:

**FBDLZ**
Data length zero.

A segment length was zero in the application data of the message.

**FBDLN**
Data length negative.

A segment length was negative in the application data of the message.

**FBDLTB**
Data length too big.

A segment length was too big in the application data of the message.

**FBBUFO**
Buffer overflow.

The value of one of the length fields would cause the data to overflow the message buffer.

**FBLOB1**
Length in error by one.

The value of one of the length fields was one byte too short.

**FBIIH**
MQIIH structure not valid or missing.

The *MDFMT* field in MQMD specifies FMIMS, but the message does not begin with a valid MQIIH structure.

**FBNAFI**
User ID not authorized for use in IMS.

The user ID contained in the message descriptor MQMD, or the password contained in the *IIAUT* field in the MQIIH structure, failed the validation performed by the IMS bridge. As a result the message was not passed to IMS.

**FBIERR**
Unexpected error returned by IMS.

An unexpected error was returned by IMS. Consult the IBM MQ error log on the system on which the IMS bridge resides for more information about the error.

**FBIFST**
Lowest value for IMS-generated feedback.

IMS-generated feedback codes occupy the range FBIFST (300) through FBILST (399). The IMS-OTMA sense code itself is *MDFB* minus FBIERR.

**FBILST**
Highest value for IMS-generated feedback.

**CICS-bridge feedback codes**: The following feedback codes can be generated by the CICS bridge:

**FBCAAB**
Application abended.

The application program specified in the message abended. This feedback code occurs only in the *DLREA* field of the MQDLH structure.

**FBCANS**
Application cannot be started.

The EXEC CICS LINK for the application program specified in the message failed. This feedback code occurs only in the *DLREA* field of the MQDLH structure.

**FBCBRF**
CICS bridge terminated abnormally without completing normal error processing.

**FBCCSE**
Character set identifier not valid.

**FBCIHE**
CICS information header structure missing or not valid.

**FBCCAE**
Length of CICS commarea not valid.

**FBCCIE**
Correlation identifier not valid.

**FBCDLQ**
Dead-letter queue not available.

The CICS bridge task was unable to copy a reply to this request to the dead-letter queue. The request was backed out.

**FBCENE**
Encoding not valid.

**FBCINE**
CICS bridge encountered an unexpected error.

This feedback code occurs only in the *DLREA* field of the MQDLH structure.

**FBCNTA**
User identifier not authorized or password not valid.

This feedback code occurs only in the *DLREA* field of the MQDLH structure.

**FBCUBO**
Unit of work backed out.

The unit of work was backed out, for one of the following reasons:

- A failure was detected while processing another request within the same unit of work.
- A CICS abend occurred while the unit of work was in progress.

**FBCUWE**
Unit-of-work control field *CIUOW* not valid.

**MQ reason codes**: For exception report messages, *MDFB* contains an MQ reason code. Among possible reason codes are:

**RC2051**
(2051, X'803') Put calls inhibited for the queue.

**RC2053**
(2053, X'805') Queue already contains maximum number of messages.

**RC2035**
(2035, X'7F3') Not authorized for access.

**RC2056**
(2056, X'808') No space available on disk for queue.

**RC2048**
(2048, X'800') Queue does not support persistent messages.

**RC2031**
(2031, X'7EF') Message length greater than maximum for queue manager.

**RC2030**
(2030, X'7EE') Message length greater than maximum for queue.

This is an output field for the MQGET call, and an input field for MQPUT and MQPUT1 calls. The initial value of this field is FBNONE.

**MDFMT (8-byte character string)**

Format name of message data.

This is a name that the sender of the message may use to indicate to the receiver the nature of the data in the message. Any characters that are in the queue manager's character set may be specified for the name, but it is recommended that the name be restricted to the following:

- Uppercase A through Z
- Numeric digits 0 through 9

If other characters are used, it may not be possible to translate the name between the character sets of the sending and receiving queue managers.

The name should be padded with blanks to the length of the field, or a null character used to terminate the name before the end of the field; the null and any subsequent characters are treated as blanks. Do not specify a name with leading or embedded blanks. For the MQGET call, the queue manager returns the name padded with blanks to the length of the field.

The queue manager does not check that the name complies with the recommendations described previously.

Names beginning "MQ" in upper, lower, and mixed case have meanings that are defined by the queue manager; you should not use names beginning with these letters for your own formats. The queue manager built-in formats are:

**FMNONE**
No format name.

The nature of the data is undefined. This means that the data cannot be converted when the message is retrieved from a queue using the GMCONV option.

If GMCONV is specified on the MQGET call, and the character set or encoding of data in the message differs from that specified in the *MSGDSC* parameter, the message is returned with the following completion and reason codes (assuming no other errors):

- Completion code CCWARN and reason code RC2110 if the FMNONE data is at the beginning of the message.

- Completion code CCOK and reason code RCNONE if the FMNONE data is at the end of the message (that is, preceded by one or more MQ header structures). The MQ header structures are converted to the requested character set and encoding in this case.

**FMADMN**
Command server request/reply message.

The message is a command-server request or reply message in programmable command format (PCF). Messages of this format can be converted if the GMCONV option is specified on the MQGET call. For more information about using programmable command format messages, see Using Programmable Command Formats.

**FMCICS**
CICS information header.

The message data begins with the CICS information header MQCIH, which is followed by the application data. The format name of the application data is given by the *CIFMT* field in the MQCIH structure.

**FMCMD1**
Type 1 command reply message.

The message is an MQSC command-server reply message containing the object count, completion code, and reason code. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMCMD2**
Type 2 command reply message.

The message is an MQSC command-server reply message containing information about the object(s) requested. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMDLH**
Dead-letter header.

The message data begins with the dead-letter header MQDLH. The data from the original message immediately follows the MQDLH structure. The format name of the original message data is given by the *DLFMT* field in the MQDLH structure; see "MQDLH - Dead-letter header" on page 1032 for details of this structure. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

COA and COD reports are not generated for messages which have a *MDFMT* of FMDLH.

**FMDH**
Distribution-list header.

The message data begins with the distribution-list header MQDH; this includes the arrays of MQOR and MQPMR records. The distribution-list header may be followed by additional data. The format of the additional data (if any) is given by the *DHFMT* field in the MQDH structure; see "MQDH - Distribution header" on page 1028 for details of this structure. Messages with format FMDH can be converted if the GMCONV option is specified on the MQGET call.

**FMEVNT**
Event message.

The message is an MQ event message that reports an event that occurred. Event messages have the same structure as programmable commands; for more information about this structure, see Structures for commands and responses. For information about events, see Event monitoring.

Version-1 event messages can be converted if the GMCONV option is specified on the MQGET call.

**FMIMS**
IMS information header.

The message data begins with the IMS information header MQIIH, which is followed by the application data. The format name of the application data is given by the *IIFMT* field in the MQIIH

structure. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMIMVS**
IMS variable string.

The message is an IMS variable string, which is a string of the form `llzzccc`, where:

**ll**
is a 2-byte length field specifying the total length of the IMS variable string item. This length is equal to the length of `ll` (2 bytes), plus the length of `zz` (2 bytes), plus the length of the character string itself. `ll` is a 2-byte binary integer in the encoding specified by the *MDENC* field.

**zz**
is a 2-byte field containing flags that are significant to IMS. `zz` is a byte string consisting of two 1-byte bit string fields, and is transmitted without change from sender to receiver (that is, `zz` is not subject to any conversion).

**ccc**
is a variable-length character string containing `ll-4` characters. `ccc` is in the character set specified by the *MDCSI* field.

Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMMDE**
Message-descriptor extension.

The message data begins with the message-descriptor extension MQMDE, and is optionally followed by other data (usually the application message data). The format name, character set, and encoding of the data which follows the MQMDE is given by the *MEFMT*, *MECSI*, and *MEENC* fields in the MQMDE. See "MQMDE - Message descriptor extension" on page 1120 for details of this structure. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMPCF**
User-defined message in programmable command format (PCF).

The message is a user-defined message that conforms to the structure of a programmable command format (PCF) message. Messages of this format can be converted if the GMCONV option is specified on the MQGET call. See Using Programmable Command Formats for more information about using programmable command format messages.

**FMRMH**
Reference message header.

The message data begins with the reference message header MQRMH, and is optionally followed by other data. The format name, character set, and encoding of the data is given by the *RMFMT*, *RMCSI*, and *RMENC* fields in the MQRMH. See "MQRMH - Reference message header" on page 1167 for details of this structure. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMRFH**
Rules and formatting header.

The message data begins with the rules and formatting header MQRFH, and is optionally followed by other data. The format name, character set, and encoding of the data (if any) is given by the *RFFMT*, *RFCSI*, and *RFENC* fields in the MQRFH. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMRFH2**
Rules and formatting header version 2.

The message data begins with the version-2 rules and formatting header MQRFH2, and is optionally followed by other data. The format name, character set, and encoding of the optional

data (if any) is given by the *RF2FMT*, *RF2CSI*, and *RF2ENC* fields in the MQRFH2. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMSTR**
Message consisting entirely of characters.

The application message data can be either an SBCS string (single-byte character set), or a DBCS string (double-byte character set). Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMTM**
Trigger message.

The message is a trigger message, described by the MQTM structure; see "MQTM - Trigger message" on page 1201 for details of this structure. Messages of this format can be converted if the GMCONV option is specified on the MQGET call.

**FMWIH**
Work information header.

The message data begins with the work information header MQWIH, which is followed by the application data. The format name of the application data is given by the *WIFMT* field in the MQWIH structure.

**FMXQH**
Transmission queue header.

The message data begins with the transmission queue header MQXQH. The data from the original message immediately follows the MQXQH structure. The format name of the original message data is given by the *MDFMT* field in the MQMD structure which is part of the transmission queue header MQXQH. See "MQXQH - Transmission-queue header" on page 1211 for details of this structure.

COA and COD reports are not generated for messages which have a *MDFMT* of FMXQH.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**MDGID (24-byte bit string)**

Group identifier.

This is a byte string that is used to identify the particular message group or logical message to which the physical message belongs. *MDGID* is also used if segmentation is allowed for the message. In all of these cases, *MDGID* has a non-null value, and one or more of the following flags is set in the *MDMFL* field:

- MFMIG
- MFLMIG
- MFSEG
- MFLSEG
- MFSEGA

If none of these flags is set, *MDGID* has the special null value GINONE.

This field need not be set by the application on the MQPUT or MQGET call if:

- On the MQPUT call, PMLOGO is specified.
- On the MQGET call, MOGRPI is *not* specified.

Consider using these calls for messages that are not report messages. However, if the application requires more control, or the call is MQPUT1, the application must ensure that *MDGID* is set to an appropriate value.

Message groups and segments can be processed correctly only if the group identifier is unique. For this reason, *applications should not generate their own group identifiers* ; instead, applications should do one of the following:

- If PMLOGO is specified, the queue manager automatically generates a unique group identifier for the first message in the group or segment of the logical message, and uses that group identifier for the remaining messages in the group or segments of the logical message, so the application does not need to take any special action. Consider using this procedure.
- If PMLOGO is *not* specified, the application should request the queue manager to generate the group identifier, by setting *MDGID* to GINONE on the first MQPUT or MQPUT1 call for a message in the group or segment of the logical message. The group identifier returned by the queue manager on output from that call should then be used for the remaining messages in the group or segments of the logical message. If a message group contains segmented messages, the same group identifier must be used for all segments and messages in the group.

  When PMLOGO is not specified, messages in groups and segments of logical messages can be put in any order (for example, in reverse order), but the group identifier must be allocated by the *first* MQPUT or MQPUT1 call that is issued for any of those messages.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value detailed in PMOPT. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message if the object opened is a single queue and not a distribution list, but leaves it unchanged if the object opened is a distribution list. In the latter case, if the application needs to know the group identifiers generated, the application must provide MQPMR records containing the *PRGID* field.

On input to the MQGET call, the queue manager uses the value detailed in Table 1. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The following special value is defined:

**GINONE**
No group identifier specified.

The value is binary zero for the length of the field. This is the value that is used for messages that are not in groups, not segments of logical messages, and for which segmentation is not allowed.

The length of this field is given by LNGID. The initial value of this field is GINONE. This field is ignored if *MDVER* is less than MDVER2.

**MDMFL (10-digit signed integer)**

Message flags.

These are flags that specify attributes of the message, or control its processing. The flags are divided into the following categories:

- Segmentation flag
- Status flags

These are described in turn.

**Segmentation flags**: When a message is too big for a queue, an attempt to put the message on the queue usually fails. Segmentation is a technique whereby the queue manager or application splits the message into smaller pieces called segments, and places each segment on the queue as a separate physical message. The application which retrieves the message can either retrieve the segments one by one, or request the queue manager to reassemble the segments into a single message which is returned by the MQGET call. The latter is achieved by specifying the GMCMPM option on the MQGET call, and supplying a buffer that is big enough to accommodate the complete message. (See "MQGMO - Get-message options" on page 1044 for details of the GMCMPM option.) Segmentation of a message can occur at the sending queue manager, at an intermediate queue manager, or at the destination queue manager.

You can specify one of the following to control the segmentation of a message:

**MFSEGI**
Segmentation inhibited.

This option prevents the message being broken into segments by the queue manager. If specified for a message that is already a segment, this option prevents the segment being broken into smaller segments.

The value of this flag is binary zero. This is the default.

**MFSEGA**
Segmentation allowed.

This option allows the message to be broken into segments by the queue manager. If specified for a message that is already a segment, this option allows the segment to be broken into smaller segments. MFSEGA can be set without either MFSEG or MFLSEG being set.

When the queue manager segments a message, the queue manager turns on the MFSEG flag in the copy of the MQMD that is sent with each segment, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call. For the last segment in the logical message, the queue manager also turns on the MFLSEG flag in the MQMD that is sent with the segment.

**Note:** Care is needed when messages are put with MFSEGA but without PMLOGO. If the message is:

- Not a segment, and
- Not in a group, and
- Not being forwarded,

the application must remember to reset the *MDGID* field to GINONE before *each* MQPUT or MQPUT1 call, in order to cause a unique group identifier to be generated by the queue manager for each message. If this is not done, unrelated messages could inadvertently end up with the same group identifier, which might lead to incorrect processing subsequently. See the descriptions of the *MDGID* field and the PMLOGO option for more information about when the *MDGID* field must be reset.

The queue manager splits messages into segments as necessary in order to ensure that the segments (plus any header data that may be required) fit on the queue. However, there is a lower limit for the size of a segment generated by the queue manager, and only the last segment created from a message can be smaller than this limit. (The lower limit for the size of an application-generated segment is one byte.) Segments generated by the queue manager may be of unequal length. The queue manager processes the message as follows:

- User-defined formats are split on boundaries which are multiples of 16 bytes. This means that the queue manager will not generate segments that are smaller than 16 bytes (other than the last segment).
- Built-in formats other than FMSTR are split at points appropriate to the nature of the data present. However, the queue manager never splits a message in the middle of an MQ header structure. This means that a segment containing a single MQ header structure cannot be split further by the queue manager, and as a result the minimum possible segment size for that message is greater than 16 bytes.

  The second or later segment generated by the queue manager will begin with one of the following:

  – An MQ header structure
  – The start of the application message data
  – Part-way through the application message data
- FMSTR is split without regard for the nature of the data present (SBCS, DBCS, or mixed SBCS/DBCS). When the string is DBCS or mixed SBCS/DBCS, this may result in segments which cannot be converted from one character set to another. The queue manager never splits FMSTR messages into segments that are smaller than 16 bytes (other than the last segment).

- The *MDFMT*, *MDCSI*, and *MDENC* fields in the MQMD of each segment are set by the queue manager to describe correctly the data present at the *start* of the segment; the format name will be either the name of a built-in format, or the name of a user-defined format.
- The *MDREP* field in the MQMD of segments with *MDOFF* greater than zero are modified as follows:
  - For each report type, if the report option is RO*D, but the segment cannot possibly contain any of the first 100 bytes of user data (that is, the data following any MQ header structures that may be present), the report option is changed to RO*.

The queue manager follows the previously rules, but otherwise splits messages unpredictably; do not make assumptions about where a message is split

For *persistent* messages, the queue manager can perform segmentation only within a unit of work:

- If the MQPUT or MQPUT1 call is operating within a user-defined unit of work, that unit of work is used. If the call fails partway through the segmentation process, the queue manager removes any segments that were placed on the queue as a result of the failing call. However, the failure does not prevent the unit of work being committed successfully.
- If the call is operating outside a user-defined unit of work, and there is no user-defined unit of work in existence, the queue manager creates a unit of work just for the duration of the call. If the call is successful, the queue manager commits the unit of work automatically (the application does not need to do this). If the call fails, the queue manager backs out the unit of work.
- If the call is operating outside a user-defined unit of work, but a user-defined unit of work *does* exist, the queue manager is unable to perform segmentation. If the message does not require segmentation, the call can still succeed. But if the message *does* require segmentation, the call fails with reason code RC2255.

For *nonpersistent* messages, the queue manager does not require a unit of work to be available in order to perform segmentation.

Special consideration must be given to data conversion of messages which may be segmented:

- If data conversion is performed only by the receiving application on the MQGET call, and the application specifies the GMCMPM option, the data-conversion exit will be passed the complete message for the exit to convert, and the fact that the message was segmented will not be apparent to the exit.
- If the receiving application retrieves one segment at a time, the data-conversion exit will be invoked to convert one segment at a time. The exit must therefore be capable of converting the data in a segment independently of the data in any of the other segments.

  If the nature of the data in the message is such that arbitrary segmentation of the data on 16-byte boundaries may result in segments which cannot be converted by the exit, or the format is FMSTR and the character set is DBCS or mixed SBCS/DBCS, the sending application should itself create and put the segments, specifying MFSEGI to suppress further segmentation. In this way, the sending application can ensure that each segment contains sufficient information to allow the data-conversion exit to convert the segment successfully.
- If sender conversion is specified for a sending message channel agent (MCA), the MCA converts only messages which are not segments of logical messages; the MCA never attempts to convert messages which are segments.

This flag is an input flag on the MQPUT and MQPUT1 calls, and an output flag on the MQGET call. On the latter call, the queue manager also echoes the value of the flag to the *GMSEG* field in MQGMO.

The initial value of this flag is MFSEGI.

**Status flags**: These are flags that indicate whether the physical message belongs to a message group, is a segment of a logical message, both, or neither. One or more of the following can be specified on the MQPUT or MQPUT1 call, or returned by the MQGET call:

**MFMIG**
Message is a member of a group.

**MFLMIG**
Message is the last logical message in a group.

If this flag is set, the queue manager turns on MFMIG in the copy of MQMD that is sent with the message, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call.

It is valid for a group to consist of only one logical message. If this is the case, MFLMIG is set, but the *MDSEQ* field has the value one.

**MFSEG**
Message is a segment of a logical message.

When MFSEG is specified without MFLSEG, the length of the application message data in the segment ( *excluding* the lengths of any MQ header structures that may be present) must be at least one. If the length is zero, the MQPUT or MQPUT1 call fails with reason code RC2253.

**MFLSEG**
Message is the last segment of a logical message.

If this flag is set, the queue manager turns on MFSEG in the copy of MQMD that is sent with the message, but does not alter the settings of these flags in the MQMD provided by the application on the MQPUT or MQPUT1 call.

It is valid for a logical message to consist of only one segment. If this is the case, MFLSEG is set, but the *MDOFF* field has the value zero.

When MFLSEG is specified, it is permissible for the length of the application message data in the segment ( *excluding* the lengths of any header structures that may be present) to be zero.

The application must ensure that these flags are set correctly when putting messages. If PMLOGO is specified, or was specified on the preceding MQPUT call for the queue handle, the settings of the flags must be consistent with the group and segment information retained by the queue manager for the queue handle. The following conditions apply to *successive* MQPUT calls for the queue handle when PMLOGO is specified:

- If there is no current group or logical message, all of these flags (and combinations of them) are valid.
- Once MFMIG has been specified, it must remain on until MFLMIG is specified. The call fails with reason code RC2241 if this condition is not satisfied.
- Once MFSEG has been specified, it must remain on until MFLSEG is specified. The call fails with reason code RC2242 if this condition is not satisfied.
- Once MFSEG has been specified without MFMIG, MFMIG must remain *off* until after MFLSEG has been specified. The call fails with reason code RC2242 if this condition is not satisfied.

Table 1 shows the valid combinations of the flags, and the values used for various fields.

These flags are input flags on the MQPUT and MQPUT1 calls, and output flags on the MQGET call. On the latter call, the queue manager also echoes the values of the flags to the *GMGST* and *GMSST* fields in MQGMO.

**Default flags**: The following can be specified to indicate that the message has default attributes:

**MFNONE**
No message flags (default message attributes).

This inhibits segmentation, and indicates that the message is not in a group and is not a segment of a logical message. MFNONE is defined to aid program documentation. It is not intended that this flag be used with any other, but as its value is zero, such use cannot be detected.

The *MDMFL* field is partitioned into subfields; for details see “Report options and message flags” on page 1399.

The initial value of this field is MFNONE. This field is ignored if *MDVER* is less than MDVER2.

**MDMID (24-byte bit string)**

Message identifier.

This is a byte string that is used to distinguish one message from another. Generally, no two messages should have the same message identifier, although this is not disallowed by the queue manager. The message identifier is a permanent property of the message, and persists across restarts of the queue manager. Because the message identifier is a byte string and not a character string, the message identifier is *not* converted between character sets when the message flows from one queue manager to another.

For the MQPUT and MQPUT1 calls, if MINONE or PMNMID is specified by the application, the queue manager generates a unique message identifier [4] when the message is put, and places it in the message descriptor sent with the message. The queue manager also returns this message identifier in the message descriptor belonging to the sending application. The application can use this value to record information about particular messages, and to respond to queries from other parts of the application.

If the message is being put to a topic, the queue manager generates unique message identifiers as necessary for each message published. If PMNMID is specified by the application, the queue manager generates a unique message identifier to return on output. If MINONE is specified by the application, the value of the *MDMID* field in the MQMD is unchanged on return from the call.

See the description of PMRET in PMOPT for more details about retained publications.

If the message is being put to a distribution list, the queue manager generates unique message identifiers as necessary, but the value of the *MDMID* field in MQMD is unchanged on return from the call, even if MINONE or PMNMID was specified. If the application needs to know the message identifiers generated by the queue manager, the application must provide MQPMR records containing the *PRMID* field.

The sending application can also specify a particular value for the message identifier, other than MINONE; this stops the queue manager generating a unique message identifier. An application that is forwarding a message can use this facility to propagate the message identifier of the original message.

The queue manager does not itself make any use of this field except to:

- Generate a unique value if requested, as described previously
- Deliver the value to the application that issues the get request for the message
- Copy the value to the *MDCID* field of any report message that it generates about this message (depending on the *MDREP* options)

When the queue manager or a message channel agent generates a report message, it sets the *MDMID* field in the way specified by the *MDREP* field of the original message, either RONMI or ROPMI. Applications that generate report messages should also do this.

For the MQGET call, *MDMID* is one of the five fields that can be used to select a particular message to be retrieved from the queue. Normally the MQGET call returns the next message on the queue, but if a particular message is required, this can be obtained by specifying one or more of the five selection criteria, in any combination; these fields are:

- *MDMID*

[4] An *MDMID* generated by the queue manager consists of a 4-byte product identifier ( AMQ¬ or CSQ¬ in either ASCII or EBCDIC, where ¬ represents a single blank character), followed by a product-specific implementation of a unique string. In IBM MQ this contains the first 12 characters of the queue manager name, and a value derived from the system clock. All queue managers that can intercommunicate must therefore have names that differ in the first 12 characters, to ensure that message identifiers are unique. The ability to generate a unique string also depends upon the system clock not being changed backward. To eliminate the possibility of a message identifier generated by the queue manager duplicating one generated by the application, the application should avoid generating identifiers with initial characters in the range A through I in ASCII or EBCDIC (X'41' through X'49' and X'C1' through X'C9'). However, the application is not prevented from generating identifiers with initial characters in these ranges.

- *MDCID*
- *MDGID*
- *MDSEQ*
- *MDOFF*

The application sets one or more of these field to the values required, and then sets the corresponding MO* match options in the *GMMO* field in MQGMO to indicate that those fields should be used as selection criteria. Only messages that have the specified values in those fields are candidates for retrieval. The default for the *GMMO* field (if not altered by the application) is to match both the message identifier and the correlation identifier.

Normally, the message returned is the *first* message on the queue that satisfies the selection criteria. But if GMBRWN is specified, the message returned is the *next* message that satisfies the selection criteria; the scan for this message starts with the message *following* the current cursor position.

**Note:** The queue is scanned sequentially for a message that satisfies the selection criteria, so retrieval times will be slower than if no selection criteria are specified, especially if many messages have to be scanned before a suitable one is found.

See Table 1 for more information about how selection criteria are used in various situations.

Specifying MINONE as the message identifier has the same effect as *not* specifying MOMSGI, that is, *any* message identifier will match.

This field is ignored if the GMMUC option is specified in the *GMO* parameter on the MQGET call.

On return from an MQGET call, the *MDMID* field is set to the message identifier of the message returned (if any).

The following special value may be used:

**MINONE**
No message identifier is specified.

The value is binary zero for the length of the field.

This is an input/output field for the MQGET, MQPUT, and MQPUT1 calls. The length of this field is given by LNMID. The initial value of this field is MINONE.

**MDMT (10-digit signed integer)**

Message type.

This indicates the type of the message. Message types are grouped as follows:

**MTSFST**
Lowest value for system-defined message types.

**MTSLST**
Highest value for system-defined message types.

The following values are currently defined within the system range:

**MTDGRM**
Message not requiring a reply.

The message is one that does not require a reply.

**MTRQST**
Message requiring a reply.

The message is one that requires a reply.

The name of the queue to which the reply should be sent must be specified in the *MDRQ* field. The *MDREP* field indicates how the *MDMID* and *MDCID* of the reply are to be set.

**MTRPLY**
Reply to an earlier request message.

The message is the reply to an earlier request message (MTRQST). The message should be sent to the queue indicated by the *MDRQ* field of the request message. The *MDREP* field of the request should be used to control how the *MDMID* and *MDCID* of the reply are set.

**Note:** The queue manager does not enforce the request-reply relationship; this is an application responsibility.

**MTRPRT**
Report message.

The message is reporting on some expected or unexpected occurrence, usually related to some other message (for example, a request message was received which contained data that was not valid). The message should be sent to the queue indicated by the *MDRQ* field of the message descriptor of the original message. The *MDFB* field should be set to indicate the nature of the report. The *MDREP* field of the original message can be used to control how the *MDMID* and *MDCID* of the report message should be set.

Report messages generated by the queue manager or message channel agent are always sent to the *MDRQ* queue, with the *MDFB* and *MDCID* fields set as described previously.

Other values within the system range may be defined in future versions of the MQI, and are accepted by the MQPUT and MQPUT1 calls without error.

Application-defined values can also be used. They must be within the following range:

**MTAFST**
Lowest value for application-defined message types.

**MTALST**
Highest value for application-defined message types.

For the MQPUT and MQPUT1 calls, the *MDMT* value must be within either the system-defined range or the application-defined range; if it is not, the call fails with reason code RC2029.

This is an output field for the MQGET call, and an input field for MQPUT and MQPUT1 calls. The initial value of this field is MTDGRM.

**MDOFF (10-digit signed integer)**

Offset of data in physical message from start of logical message.

This is the offset in bytes of the data in the physical message from the start of the logical message of which the data forms part. This data is called a *segment*. The offset is in the range 0 through 999 999 999. A physical message which is not a segment of a logical message has an offset of zero.

This field need not be set by the application on the MQPUT or MQGET call if:

- On the MQPUT call, PMLOGO is specified.
- On the MQGET call, MOOFFS is *not* specified.

These are the recommended ways of using these calls for messages that are not report messages. However, if the application does not comply with these conditions, or the call is MQPUT1, the application must ensure that *MDOFF* is set to an appropriate value.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value detailed in Table 1. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message.

For a report message reporting on a segment of a logical message, the *MDOLN* field (provided it is not OLUNDF) is used to update the offset in the segment information retained by the queue manager.

On input to the MQGET call, the queue manager uses the value detailed in Table 1. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The initial value of this field is zero. This field is ignored if *MDVER* is less than MDVER2.

**MDOLN (10-digit signed integer)**

Length of original message.

This field is of relevance only for report messages that are segments. It specifies the length of the message segment to which the report message relates; it does not specify the length of the logical message of which the segment forms part, nor the length of the data in the report message.

**Note:** When generating a report message for a message that is a segment, the queue manager and message channel agent copy into the MQMD for the report message the *MDGID*, *MDSEQ*, *MDOFF*, and *MDMFL*, fields from the original message. As a result, the report message is also a segment. Applications that generate report messages are recommended to do the same, and to ensure that the *MDOLN* field is set correctly.

The following special value is defined:

**OLUNDF**
Original length of message not defined.

*MDOLN* is an input field on the MQPUT and MQPUT1 calls, but the value provided by the application is accepted only in particular circumstances:

- If the message being put is a segment and is also a report message, the queue manager accepts the value specified. The value must be:
  - Greater than zero if the segment is not the last segment
  - Not less than zero if the segment is the last segment
  - Not less than the length of data present in the message

  If these conditions are not satisfied, the call fails with reason code RC2252.
- If the message being put is a segment but not a report message, the queue manager ignores the field and uses the length of the application message data instead.
- In all other cases, the queue manager ignores the field and uses the value OLUNDF instead.

This is an output field on the MQGET call.

The initial value of this field is OLUNDF. This field is ignored if *MDVER* is less than MDVER2.

**MDPAN (28-byte character string)**

Name of application that put the message.

This is part of the **origin context** of the message. For more information about message context, see Message context and Controlling context information.

The format of the *MDPAN* depends on the value of *MDPAT*.

When this field is set by the queue manager (that is, for all options except PMSETA), it is set to value which is determined by the environment:

- On z/OS, the queue manager uses:
  - For z/OS batch, the 8-character job name from the JES JOB card
  - For TSO, the 7-character TSO user identifier
  - For CICS, the 8-character applid, followed by the 4-character tranid
  - For IMS, the 8-character IMS system identifier, followed by the 8-character PSB name
  - For XCF, the 8-character XCF group name, followed by the 16-character XCF member name
  - For a message generated by a queue manager, the first 28 characters of the queue manager name
  - For distributed queuing without CICS, the 8-character jobname of the channel initiator followed by the 8-character name of the module putting to the dead-letter queue followed by an 8-character task identifier.

  - For MQSeries Java language bindings processing with IBM MQ for z/OS the 8-character jobname of the address space created for the UNIX System Services environment. Typically, this will be a TSO user identifier with a single numeric character appended.

  The name or names are each padded to the right with blanks, as is any space in the remainder of the field. Where there is more than one name, there is no separator between them.
- On PC DOS, and Windows systems, the queue manager uses:
  - For a CICS application, the CICS transaction name
  - For a non-CICS application, the rightmost 28 characters of the fully-qualified name of the executable
- On IBM i, the queue manager uses the fully-qualified job name.
- On HP Integrity NonStop Server, the queue manager uses: the rightmost 28 characters of the fully-qualified name of the executable, if this is available to the queue manager, and blanks otherwise
- On UNIX systems, the queue manager uses:
  - For a CICS application, the CICS transaction name
  - For a non-CICS application, the rightmost 14 characters of the fully-qualified name of the executable if this is available to the queue manager, and blanks otherwise (for example, on AIX )
- On VSE/ESA, the queue manager uses the 8-character applid, followed by the 4-character tranid.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETA is specified in the *PMO* parameter. Any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If PMSETA is not specified, this field is ignored on input and is an output-only field.

This is an output field for the MQGET call. The length of this field is given by LNPAN. The initial value of this field is 28 blank characters.

**MDPAT (10-digit signed integer)**

Type of application that put the message.

This is part of the **origin context** of the message. For more information about message context, see Message context and Controlling context information.

*MDPAT* may have one of the following standard types. User-defined types can also be used but should be restricted to values in the range ATUFST through ATULST.

**ATAIX**
AIX application (same value as ATUNIX).

**ATBRKR**
Broker.

**ATCICS**
CICS transaction.

**ATCICB**
CICS bridge.

**ATVSE**
CICS/VSE transaction.

**ATDOS**
IBM MQ MQI client application on PC DOS.

**ATDQM**
Distributed queue manager agent.

**ATGUAR**
Tandem Guardian application (same value as ATNSK).

**ATIMS**
IMS application.

**ATIMSB**
IMS bridge.

**ATJAVA**
Java.

**ATMVS**
MVS or TSO application (same value as ATZOS).

**ATNOTE**
Lotus Notes Agent application.

**ATNSK**
Tandem NonStop Kernel application.

**AT390**
OS/390 application (same value as ATZOS).

**AT400**
IBM i application.

**ATQM**
Queue manager.

**ATUNIX**
UNIX application.

**ATVOS**
Stratus VOS application.

**ATWIN**
16-bit Windows application.

**ATWINT**
32-bit Windows application.

**ATXCF**
XCF.

**ATZOS**
z/OS application.

**ATDEF**
Default application type.

This is the default application type for the platform on which the application is running.

**Note:** The value of this constant is environment-specific.

**ATUNK**
Unknown application type.

This value can be used to indicate that the application type is unknown, even though other context information is present.

**ATUFST**
Lowest value for user-defined application type.

**ATULST**
Highest value for user-defined application type.

The following special value can also occur:

**ATNCON**
No context information present in message.

This value is set by the queue manager when a message is put with no context (that is, the PMNOC context option is specified).

When a message is retrieved, *MDPAT* can be tested for this value to decide whether the message has context (it is recommended that *MDPAT* is never set to ATNCON, by an application using PMSETA, if any of the other context fields are nonblank).

**ATSIB**
Indicates a message originated in another IBM MQ messaging product and arrived via the SIB (Service Integration Bus) bridge.

When the queue manager generates this information as a result of an application put, the field is set to a value that is determined by the environment. Note that on IBM i, it is set to AT400; the queue manager never uses ATCICS on IBM i.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETA is specified in the *PMO* parameter. If PMSETA is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDPAT* that was transmitted with the message if it was put to a queue. This will be the value of *MDPAT* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDPAT* when the message is sent as a publication to subscribers since they provide a value to override *MDPAT* in all publications sent to them. If the message has no context, the field is set to ATNCON.

This is an output field for the MQGET call. The initial value of this field is ATNCON.

**MDPD (8-byte character string)**

Date when message was put.

This is part of the **origin context** of the message. For more information about message context, see Message context and Controlling context information.

The format used for the date when this field is generated by the queue manager is:

- YYYYMMDD

where the characters represent:

**YYYY**
year (four numeric digits)

**MM**
month of year (01 through 12)

**DD**
day of month (01 through 31)

Greenwich Mean Time (GMT) is used for the *MDPD* and *MDPT* fields, subject to the system clock being set accurately to GMT.

If the message was put as part of a unit of work, the date is that when the message was put, and not the date when the unit of work was committed.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETA is specified in the *PMO* parameter. The contents of the field are not checked by the queue manager, except that any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If PMSETA is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDPD* that was transmitted with the message if it was put to a queue. This will be the value of *MDPD* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDPD* when the message is sent as a publication to subscribers since they provide a value to override *MDPD* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by LNPDAT. The initial value of this field is 8 blank characters.

**MDPER (10-digit signed integer)**

Message persistence.

This indicates whether the message survives system failures and restarts of the queue manager. For the MQPUT and MQPUT1 calls, the value must be one of the following:

**PEPER**
Message is persistent.

This means that the message survives system failures and restarts of the queue manager. Once the message has been put, and the putter's unit of work committed (if the message is put as part of a unit of work), the message is preserved on auxiliary storage. It remains there until the message is removed from the queue, and the getter's unit of work committed (if the message is retrieved as part of a unit of work).

When a persistent message is sent to a remote queue, a store-and-forward mechanism is used to hold the message at each queue manager along the route to the destination, until the message is known to have arrived at the next queue manager.

Persistent messages cannot be placed on:

- Temporary dynamic queues
- Shared queues where the coupling facility structure level is less than three, or the coupling facility structure is not recoverable.

Persistent messages can be placed on permanent dynamic queues, predefined queues, and shared queues where the coupling facility structure level is 3, and the coupling facility is recoverable.

**PENPER**
Message is not persistent.

This means that the message does not normally survive system failures or restarts of the queue manager. This applies even if an intact copy of the message is found on auxiliary storage during restart of the queue manager.

In the special case of shared queues, nonpersistent messages *do* survive restarts of queue managers in the queue-sharing group, but do not survive failures of the coupling facility used to store messages on the shared queues.

**PEQDEF**
Message has default persistence.

- If the queue is a cluster queue, the persistence of the message is taken from the *DefPersistence* attribute defined at the *destination* queue manager that owns the particular instance of the queue on which the message is placed. Usually, all of the instances of a cluster queue have the same value for the *DefPersistence* attribute, although this is not mandated.

  The value of *DefPersistence* is copied into the *MDPER* field when the message is placed on the destination queue. If *DefPersistence* is changed subsequently, messages that have already been placed on the queue are not affected.
- If the queue is not a cluster queue, the persistence of the message is taken from the *DefPersistence* attribute defined at the *local* queue manager, even if the destination queue manager is remote.

  If there is more than one definition in the queue-name resolution path, the default persistence is taken from the value of this attribute in the *first* definition in the path. This could be:

  – An alias queue
  – A local queue
  – A local definition of a remote queue
  – A queue manager alias
  – A transmission queue (for example, the *DefXmitQName* queue)

The value of *DefPersistence* is copied into the *MDPER* field when the message is put. If *DefPersistence* is changed subsequently, messages that have already been put are not affected.

Both persistent and nonpersistent messages can exist on the same queue.

When replying to a message, applications should normally use for the reply message the persistence of the request message.

For an MQGET call, the value returned is either PEPER or PENPER.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is PEQDEF.

**MDPRI (10-digit signed integer)**

Message priority.

For the MQPUT and MQPUT1 calls, the value must be greater than or equal to zero; zero is the lowest priority. The following special value can also be used:

**PRQDEF**
Default priority for queue.

- If the queue is a cluster queue, the priority for the message is taken from the *DefPriority* attribute as defined at the *destination* queue manager that owns the particular instance of the queue on which the message is placed. Usually, all of the instances of a cluster queue have the same value for the *DefPriority* attribute, although this is not mandated.

  The value of *DefPriority* is copied into the *MDPRI* field when the message is placed on the destination queue. If *DefPriority* is changed subsequently, messages that have already been placed on the queue are not affected.
- If the queue is not a cluster queue, the priority for the message is taken from the *DefPriority* attribute as defined at the *local* queue manager, even if the destination queue manager is remote.

  If there is more than one definition in the queue-name resolution path, the default priority is taken from the value of this attribute in the *first* definition in the path. This could be:

  – An alias queue
  – A local queue
  – A local definition of a remote queue
  – A queue manager alias
  – A transmission queue (for example, the *DefXmitQName* queue)

  The value of *DefPriority* is copied into the *MDPRI* field when the message is put. If *DefPriority* is changed subsequently, messages that have already been put are not affected.

The value returned by the MQGET call is always greater than or equal to zero; the value PRQDEF is never returned.

If a message is put with a priority greater than the maximum supported by the local queue manager (this maximum is given by the *MaxPriority* queue manager attribute), the message is accepted by the queue manager, but placed on the queue at the queue manager's maximum priority; the MQPUT or MQPUT1 call completes with CCWARN and reason code RC2049. However, the *MDPRI* field retains the value specified by the application which put the message.

When replying to a message, applications should normally use for the reply message the priority of the request message. In other situations, specifying PRQDEF allows priority tuning to be carried out without changing the application.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is PRQDEF.

**MDPT (8-byte character string)**

Time when message was put.

This is part of the **origin context** of the message. For more information about message context, see Message context and Controlling context information.

The format used for the time when this field is generated by the queue manager is:

- HHMMSSTH

where the characters represent (in order):

**HH**
hours (00 through 23)

**MM**
minutes (00 through 59)

**SS**
seconds (00 through 59; see note )

**T**
tenths of a second (0 through 9)

**H**
hundredths of a second (0 through 9)

**Note:** If the system clock is synchronized to a very accurate time standard, it is possible on rare occasions for 60 or 61 to be returned for the seconds in *MDPT*. This happens when leap seconds are inserted into the global time standard.

Greenwich Mean Time (GMT) is used for the *MDPD* and *MDPT* fields, subject to the system clock being set accurately to GMT.

If the message was put as part of a unit of work, the time is that when the message was put, and not the time when the unit of work was committed.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETA is specified in the *PMO* parameter. The contents of the field are not checked by the queue manager, except that any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If PMSETA is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDPT* that was transmitted with the message if it was put to a queue. This will be the value of *MDPT* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDPT* when the message is sent as a publication to subscribers since they provide a value to override *MDPT* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by LNPTIM. The initial value of this field is 8 blank characters.

**MDREP (10-digit signed integer)**

Options for report messages.

A report message is a message about another message, used to inform an application about expected or unexpected events that relate to the original message. The *MDREP* field enables the application sending the original message to specify which report messages are required, whether the application message data is to be included in them, and also (for both reports and replies) how the message and correlation identifiers in the report or reply message are to be set. Any or all (or none) of the following types of report message can be requested:

- Exception
- Expiration
- Confirm on arrival (COA)

- Confirm on delivery (COD)
- Positive action notification (PAN)
- Negative action notification (NAN)

If more than one type of report message is required, or other report options are needed, the values can be added together (do not add the same constant more than once).

The application that receives the report message can determine the reason the report was generated by examining the *MDFB* field in the MQMD; see the *MDFB* field for more details.

The use of report options when putting a message to a topic can cause zero, one or many report messages to be generated and sent to the application. This is because the publication message may be sent to zero, one or many subscribing applications.

**Exception options**: You can specify one of the following options to request an exception report message.

**ROACTIVITY**

Activity reports required

This report option enables an activity report to be generated, whenever a message with this report option set is processed by supporting applications.

Messages with this report option set must be accepted by any queue manager, even if they do not 'understand' the option. This allows the report option to be set on any user message, even if they are processed by previous queue managers. To achieve this, the report option is placed in the ROAUM subfield.

If a process (either a queue manager or a user process) performs an Activity on a message with ROACT set, it can choose to generate and put an activity report.

The activity report option allows the route of any message to be traced throughout a queue manager network. The report option can be specified on any current user message and instantly they can begin to calculate the route of the message through the network. If the application generating the message cannot switch on activity reports, it can be turned on by using an API crossing exit supplied by queue manager administrators.

Several conditions are applicable to activity reports:

1. The route will be less detailed if there are fewer queue managers in the network which are able to generate activity reports.
2. The activity reports may not be easily 'orderable' in order to determine the route taken.
3. The activity reports may not be able to find a route to their requested destination.

**ROEXC**

Exception reports required.

This type of report can be generated by a message channel agent when a message is sent to another queue manager and the message cannot be delivered to the specified destination queue. For example, the destination queue or an intermediate transmission queue might be full, or the message might be too big for the queue.

Generation of the exception report message depends on the persistence of the original message, and the speed of the message channel (normal or fast) through which the original message travels:

- For all persistent messages, and for nonpersistent messages traveling through normal message channels, the exception report is generated *only* if the action specified by the sending application for the error condition can be completed successfully. The sending application can specify one of the following actions to control the disposition of the original message when the error condition arises:
  - RODLQ (this causes the original message to be placed on the dead-letter queue).

– RODISC (this causes the original message to be discarded).

If the action specified by the sending application cannot be completed successfully, the original message is left on the transmission queue, and no exception report message is generated.

- For nonpersistent messages traveling through fast message channels, the original message is removed from the transmission queue and the exception report generated *even if* the specified action for the error condition cannot be completed successfully. For example, if RODLQ is specified, but the original message cannot be placed on the dead-letter queue because (say) that queue is full, the exception report message is generated and the original message discarded.

  See Message persistence for more information about normal and fast message channels.

An exception report is not generated if the application that put the original message can be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call.

Applications can also send exception reports, to indicate that a message that it has received cannot be processed (for example, because it is a debit transaction that would cause the account to exceed its credit limit).

Message data from the original message is not included with the report message.

Do not specify more than one of ROEXC, ROEXCD, and ROEXCF.

**ROEXCD**
Exception reports with data required.

This is the same as ROEXC, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of ROEXC, ROEXCD, and ROEXCF.

**ROEXCF**
Exception reports with full data required.

This is the same as ROEXC, except that all of the application message data from the original message is included in the report message.

Do not specify more than one of ROEXC, ROEXCD, and ROEXCF.

**Expiration options**: You can specify one of the following options to request an expiration report message.

**ROEXP**
Expiration reports required.

This type of report is generated by the queue manager if the message is discarded before delivery to an application because its expiry time has passed (see the *MDEXP* field). If this option is not set, no report message is generated if a message is discarded for this reason (even if one of the ROEXC* options is specified).

Message data from the original message is not included with the report message.

Do not specify more than one of ROEXP, ROEXPD, and ROEXPF.

**ROEXPD**
Expiration reports with data required.

This is the same as ROEXP, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of ROEXP, ROEXPD, and ROEXPF.

**ROEXPF**
Expiration reports with full data required.

This is the same as ROEXP, except that all of the application message data from the original message is included in the report message.

Do not specify more than one of ROEXP, ROEXPD, and ROEXPF.

**Confirm-on-arrival options**: You can specify one of the following options to request a confirm-on-arrival report message.

**ROCOA**
Confirm-on-arrival reports required.

This type of report is generated by the queue manager that owns the destination queue, when the message is placed on the destination queue. Message data from the original message is not included with the report message.

If the message is put as part of a unit of work, and the destination queue is a local queue, the COA report message generated by the queue manager becomes available for retrieval only if and when the unit of work is committed.

A COA report is not generated if the *MDFMT* field in the message descriptor is FMXQH or FMDLH. This prevents a COA report being generated if the message is put on a transmission queue, or is undeliverable and put on a dead-letter queue.

Do not specify more than one of ROCOA, ROCOAD, and ROCOAF.

**ROCOAD**
Confirm-on-arrival reports with data required.

This is the same as ROCOA, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

Do not specify more than one of ROCOA, ROCOAD, and ROCOAF.

**ROCOAF**
Confirm-on-arrival reports with full data required.

This is the same as ROCOA, except that all of the application message data from the original message is included in the report message.

Do not specify more than one of ROCOA, ROCOAD, and ROCOAF.

**Discard and expiry options**: You can specify the following option to set the expiry time and discard flag for report messages.

**ROPDAE**
Set report message expiry time and discard flag.

This option ensures that report messages and reply messages inherit the expiry time and discard flag (whether to discard or not), from their original messages. With this option set, report and reply messages:

1. Inherit the RODISC flag (if it was set).
2. Inherit the remaining expiry time of the message, if the message is not an expiry report. If the message is an expiry report, the expiry time is set to 60 seconds.

With this option set, the following applies:

**Note:**

1. Report and reply messages are generated with a discard flag and an expiry value, and cannot remain within the system.
2. Trace route messages are prevented from reaching destination queues on non-trace route enabled queue managers.

3. Queues are prevented from being filled with reports that cannot be delivered, if communications links are broken.
4. Command server responses inherit the remaining expiry of the request.

**Confirm-on-delivery options**: You can specify one of the following options to request a confirm-on-delivery report message.

**ROCOD**
Confirm-on-delivery reports required.

This type of report is generated by the queue manager when an application retrieves the message from the destination queue in a way that causes the message to be deleted from the queue. Message data from the original message is not included with the report message.

If the message is retrieved as part of a unit of work, the report message is generated within the same unit of work, so that the report is not available until the unit of work is committed. If the unit of work is backed out, the report is not sent.

A COD report is not generated if the *MDFMT* field in the message descriptor is FMDLH. This prevents a COD report being generated if the message is undeliverable and put on a dead-letter queue.

ROCOD is not valid if the destination queue is an XCF queue.

Do not specify more than one of ROCOD, ROCODD, and ROCODF.

**ROCODD**
Confirm-on-delivery reports with data required.

This is the same as ROCOD, except that the first 100 bytes of the application message data from the original message are included in the report message. If the original message contains one or more MQ header structures, they are included in the report message, in addition to the 100 bytes of application data.

If GMATM is specified on the MQGET call for the original message, and the message retrieved is truncated, the amount of application message data placed in the report message is the minimum of:

- The length of the original message
- 100 bytes.

ROCODD is not valid if the destination queue is an XCF queue.

Do not specify more than one of ROCOD, ROCODD, and ROCODF.

**ROCODF**
Confirm-on-delivery reports with full data required.

This is the same as ROCOD, except that all of the application message data from the original message is included in the report message.

ROCODF is not valid if the destination queue is an XCF queue.

Do not specify more than one of ROCOD, ROCODD, and ROCODF.

**Action-notification options**: You can specify one or both of the following options to request that the receiving application send a positive-action or negative-action report message.

**ROPAN**
Positive action notification reports required.

This type of report is generated by the application that retrieves the message and acts upon it. It indicates that the action requested in the message has been performed successfully. The application generating the report determines whether any data is to be included with the report.

Other than conveying this request to the application retrieving the message, the queue manager takes no action based upon this option. It is the responsibility of the retrieving application to generate the report if appropriate.

**RONAN**
Negative action notification reports required.

This type of report is generated by the application that retrieves the message and acts upon it. It indicates that the action requested in the message has *not* been performed successfully. The application generating the report determines whether any data is to be included with the report. For example, it may be desirable to include some data indicating why the request could not be performed.

Other than conveying this request to the application retrieving the message, the queue manager takes no action based upon this option. It is the responsibility of the retrieving application to generate the report if appropriate.

Determination of which conditions correspond to a positive action and which correspond to a negative action is the responsibility of the application. However, it is recommended that if the request has been only partially performed, a NAN report rather than a PAN report should be generated if requested. It is also recommended that every possible condition should correspond to either a positive action, or a negative action, but not both.

**Message-identifier options**: You can specify one of the following options to control how the *MDMID* of the report message (or of the reply message) is to be set.

**RONMI**
New message identifier.

This is the default action, and indicates that if a report or reply is generated as a result of this message, a new *MDMID* is to be generated for the report or reply message.

**ROPMI**
Pass message identifier.

If a report or reply is generated as a result of this message, the *MDMID* of this message is to be copied to the *MDMID* of the report or reply message.

The *MsgId* of a publication message will be different for each subscriber that receives a copy of the publication and therefore the *MsgId* copied into the report or reply message will be different for each one.

If this option is not specified, RONMI is assumed.

**Correlation-identifier options**: You can specify one of the following options to control how the *MDCID* of the report message (or of the reply message) is to be set.

**ROCMTC**
Copy message identifier to correlation identifier.

This is the default action, and indicates that if a report or reply is generated as a result of this message, the *MDMID* of this message is to be copied to the *MDCID* of the report or reply message.

The *MsgId* of a publication message will be different for each subscriber that receives a copy of the publication and therefore the *MsgId* copied into the *CorrelId* of the report or reply message will be different for each one.

**ROPCI**
Pass correlation identifier.

If a report or reply is generated as a result of this message, the *MDCID* of this message is to be copied to the *MDCID* of the report or reply message.

The *MDCID* of a publication message will be specific to a subscriber unless it uses the SOSCID option and sets the *SCDIC* field in the MQSD to CINONE. Therefore it is possible that the *MDCID* copied into the *MDCID* of the report or reply message will be different for each one.

If this option is not specified, ROCMTC is assumed.

Servers replying to requests or generating report messages are recommended to check whether the ROPMI or ROPCI options were set in the original message. If they were, the servers should take the

action described for those options. If neither is set, the servers should take the corresponding default action.

: You can specify one of the following options to control the disposition of the original message when it cannot be delivered to the destination queue. These options apply only to those situations that would result in an exception report message being generated if one had been requested by the sending application. The application can set the disposition options independently of requesting exception reports.

**RODLQ**
Place message on dead-letter queue.

This is the default action, and indicates that the message should be placed on the dead-letter queue, if the message cannot be delivered to the destination queue. This happens in the following situations:

- When the application that put the original message cannot be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call. An exception report message is generated, if one was requested by the sender.
- When the application that put the original message was putting to a topic

An exception report message will be generated, if one was requested by the sender.

**RODISC**
Discard message.

This indicates that the message should be discarded if it cannot be delivered to the destination queue. This happens in the following situations:

- When the application that put the original message cannot be notified synchronously of the problem by means of the reason code returned by the MQPUT or MQPUT1 call. An exception report message is generated, if one was requested by the sender.
- When the application that put the original message was putting to a topic

An exception report message will be generated, if one was requested by the sender.

If it is desired to return the original message to the sender, without the original message being placed on the dead-letter queue, the sender should specify RODISC with ROEXCF.

**Default option**: You can specify the following if no report options are required:

**RONONE**
No reports required.

This value can be used to indicate that no other options have been specified. RONONE is defined to aid program documentation. It is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

**General information**:

1. All report types required must be specifically requested by the application sending the original message. For example, if a COA report is requested but an exception report is not, a COA report is generated when the message is placed on the destination queue, but no exception report is generated if the destination queue is full when the message arrives there. If no *MDREP* options are set, no report messages are generated by the queue manager or message channel agent (MCA).

   Some report options can be specified even though the local queue manager does not recognize them; this is useful when the option is to be processed by the *destination* queue manager. See “Report options and message flags” on page 1399 for more details.

   If a report message is requested, the name of the queue to which the report should be sent must be specified in the *MDRQ* field. When a report message is received, the nature of the report can be determined by examining the *MDFB* field in the message descriptor.
2. If the queue manager or MCA that generates a report message is unable to put the report message on the reply queue (for example, because the reply queue or transmission queue is full), the report

message is placed instead on the dead-letter queue. If that *also* fails, or there is no dead-letter queue, the action taken depends on the type of the report message:

- If the report message is an exception report, the message which caused the exception report to be generated is left on its transmission queue; this ensures that the message is not lost.
- For all other report types, the report message is discarded and processing continues normally. This is done because either the original message has already been delivered safely (for COA or COD report messages), or is no longer of any interest (for an expiration report message).

Once a report message has been placed successfully on a queue (either the destination queue or an intermediate transmission queue), the message is no longer subject to special processing; it is treated just like any other message.

3. When the report is generated, the *MDRQ* queue is opened and the report message put using the authority of the *MDUID* in the MQMD of the message causing the report, except in the following cases:

   - Exception reports generated by a receiving MCA are put with whatever authority the MCA used when it tried to put the message causing the report. The *CDPA* channel attribute determines the user identifier used.
   - COA reports generated by the queue manager are put with whatever authority was used when the message causing the report was put on the queue manager generating the report. For example, if the message was put by a receiving MCA using the MCA's user identifier, the queue manager puts the COA report using the MCA's user identifier.

   Applications generating reports should normally use the same authority as they would have used to generate a reply; this should normally be the authority of the user identifier in the original message.

   If the report has to travel to a remote destination, senders and receivers can decide whether to accept it, in the same way as they do for other messages.

4. If a report message with data is requested:

   - The report message is always generated with the amount of data requested by the sender of the original message. If the report message is too big for the reply queue, the processing described previously occurs; the report message is never truncated in order to fit on the reply queue.
   - If the *MDFMT* of the original message is FMXQH, the data included in the report does not include the MQXQH. The report data starts with the first byte of the data beyond the MQXQH in the original message. This occurs whether the queue is a transmission queue.

5. If a COA, COD, or expiration report message is received at the reply queue, it is guaranteed that the original message arrived, was delivered, or expired, as appropriate. However, if one or more of these report messages is requested and is *not* received, the reverse cannot be assumed, since one of the following may have occurred:

   a. The report message is held up because a link is down.
   b. The report message is held up because a blocking condition exists at an intermediate transmission queue or at the reply queue (for example, the queue is full or inhibited for puts).
   c. The report message is on a dead-letter queue.
   d. When the queue manager was attempting to generate the report message, it was unable to put it on the appropriate queue, and was also unable to put it on the dead-letter queue, so the report message could not be generated.
   e. A failure of the queue manager occurred between the action being reported (arrival, delivery or expiry), and generation of the corresponding report message. (This does not happen for COD report messages if the application retrieves the original message within a unit of work, as the COD report message is generated within the same unit of work.)

   Exception report messages may be held up in the same way for reasons 1, 2, and 3 previously. However, when an MCA is unable to generate an exception report message (the report message cannot be put either on the reply queue or the dead-letter queue), the original message remains

on the transmission queue at the sender, and the channel is closed. This occurs irrespective of whether the report message was to be generated at the sending or the receiving end of the channel.

6. If the original message is temporarily blocked (resulting in an exception report message being generated and the original message being put on a dead-letter queue), but the blockage clears and an application then reads the original message from the dead-letter queue and puts it again to its destination, the following may occur:
   - Even though an exception report message has been generated, the original message eventually arrives successfully at its destination.
   - More than one exception report message is generated in respect of a single original message, since the original message may encounter another blockage later.

**Report messages when putting to a topic**:

1. Reports can be generated when putting a message to a topic. This message will be sent to all subscribers to the topic, which could be zero, one or many. This should be taken into account when choosing to use report options as many report messages could be generated as a result.
2. When putting a message to a topic, there may be many destination queues that are to be given a copy of the message. If some of these destination queues have a problem, such as queue full, then the successful completion of the MQPUT depends on the setting of NPMSGDLV or PMSGDLV (depending on the persistence of the message). If the setting is such that message delivery to the destination queue must be successful (for example, it is a persistent message to a durable subscriber and PMSGDLV is set to ALL or ALLDUR), then success is defined as one of the following criteria being met:
   - Successful put to the subscriber queue
   - Use of RODLQ and a successful put to the Dead-letter queue if the subscriber queue cannot take the message
   - Use of RODISC if the subscriber queue cannot take the message.

**Report messages for message segments**:

1. Report messages can be requested for messages that have segmentation allowed (see the description of the MFSEGA flag). If the queue manager finds it necessary to segment the message, a report message can be generated for each of the segments that subsequently encounters the relevant condition. Applications should therefore be prepared to receive multiple report messages for each type of report message requested. The *MDGID* field in the report message can be used to correlate the multiple reports with the group identifier of the original message, and the *MDFB* field used to identify the type of each report message.
2. If GMLOGO is used to retrieve report messages for segments, be aware that reports of *different types* may be returned by the successive MQGET calls. For example, if both COA and COD reports are requested for a message that is segmented by the queue manager, the MQGET calls for the report messages may return the COA and COD report messages interleaved in an unpredictable fashion. This can be avoided by using the GMCMPM option (optionally with GMATM). GMCMPM causes the queue manager to reassemble report messages that have the same report type. For example, the first MQGET call might reassemble all of the COA messages relating to the original message, and the second MQGET call might reassemble all of the COD messages. Which is reassembled first depends on which type of report message happens to occur first on the queue.
3. Applications that themselves put segments can specify different report options for each segment. However, the following points should be noted:
   - If the segments are retrieved using the GMCMPM option, only the report options in the *first* segment are honored by the queue manager.
   - If the segments are retrieved one by one, and most of them have one of the ROCOD* options, but at least one segment does not, it will not be possible to use the GMCMPM option to retrieve the report messages with a single MQGET call, or use the GMASGA option to detect when all of the report messages have arrived.

4. In an MQ network, it is possible for the queue managers to have differing capabilities. If a report message for a segment is generated by a queue manager or MCA that does not support segmentation, the queue manager or MCA will not by default include the necessary segment information in the report message, and this may make it difficult to identify the original message that caused the report to be generated. This difficulty can be avoided by requesting data with the report message, that is, by specifying the appropriate RO*D or RO*F options. However, be aware that if RO*D is specified, *less than* 100 bytes of application message data may be returned to the application which retrieves the report message, if the report message is generated by a queue manager or MCA that does not support segmentation.

**Contents of the message descriptor for a report message**: When the queue manager or message channel agent (MCA) generates a report message, it sets the fields in the message descriptor to the following values, and then puts the message in the normal way.

| Field in MQMD | Value used |
|---|---|
| *MDSID* | MDSIDV |
| *MDVER* | MDVER2 |
| *MDREP* | RONONE |
| *MDMT* | MTRPRT |
| *MDEXP* | EIULIM |
| *MDFB* | As appropriate for the nature of the report (FBCOA, FBCOD, FBEXP, or an RC* value) |
| *MDENC* | Copied from the original message descriptor |
| *MDCSI* | Copied from the original message descriptor |
| *MDFMT* | Copied from the original message descriptor |
| *MDPRI* | Copied from the original message descriptor |
| *MDPER* | Copied from the original message descriptor |
| *MDMID* | As specified by the report options in the original message descriptor |
| *MDCID* | As specified by the report options in the original message descriptor |
| *MDBOC* | 0 |
| *MDRQ* | Blanks |
| *MDRM* | Name of queue manager |
| *MDUID* | As set by the PMPASI option |
| *MDACC* | As set by the PMPASI option |
| *MDAID* | As set by the PMPASI option |
| *MDPAT* | ATQM, or as appropriate for the message channel agent |
| *MDPAN* | First 28 bytes of the queue manager name or message channel agent name. For report messages generated by the IMS bridge, this field contains the XCF group name and XCF member name of the IMS system to which the message relates. |
| *MDPD* | Date when report message is sent |
| *MDPT* | Time when report message is sent |
| *MDAOD* | Blanks |
| *MDGID* | Copied from the original message descriptor |

| Field in MQMD | Value used |
|---|---|
| *MDSEQ* | Copied from the original message descriptor |
| *MDOFF* | Copied from the original message descriptor |
| *MDMFL* | Copied from the original message descriptor |
| *MDOLN* | Copied from the original message descriptor if not OLUNDF, and set to the length of the original message data otherwise |

An application generating a report is recommended to set similar values, except for the following:

- The *MDRM* field can be set to blanks (the queue manager will change this to the name of the local queue manager when the message is put).
- The context fields should be set using the option that would have been used for a reply, normally PMPASI.

**Analyzing the report field**: The *MDREP* field contains subfields; because of this, applications that need to check whether the sender of the message requested a particular report should use one of the techniques described in "Analyzing the report field" on page 1401.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The initial value of this field is RONONE.

**MDRM (48-byte character string)**

Name of reply queue manager.

This is the name of the queue manager to which the reply message or report message should be sent. *MDRQ* is the local name of a queue that is defined on this queue manager.

If the *MDRM* field is blank, the local queue manager looks up the *MDRQ* name in its queue definitions. If a local definition of a remote queue exists with this name, the *MDRM* value in the transmitted message is replaced by the value of the *RemoteQMgrName* attribute from the definition of the remote queue, and this value will be returned in the message descriptor when the receiving application issues an MQGET call for the message. If a local definition of a remote queue does not exist, the *MDRM* that is transmitted with the message is the name of the local queue manager.

If the name is specified, it may contain trailing blanks; the first null character and characters following it are treated as blanks. Otherwise, however, no check is made that the name satisfies the naming rules for queue managers, or that this name is known to the sending queue manager; this is also true for the name transmitted, if the *MDRM* is replaced in the transmitted message.

If a reply-to queue is not required, it is recommended (although this is not checked) that the *MDRM* field should be set to blanks; the field should not be left uninitialized.

For the MQGET call, the queue manager always returns the name padded with blanks to the length of the field.

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by LNQMN. The initial value of this field is 48 blank characters.

**MDRQ (48-byte character string)**

Name of reply queue.

This is the name of the message queue to which the application that issued the get request for the message should send MTRPLY and MTRPRT messages. The name is the local name of a queue that is defined on the queue manager identified by *MDRM*. This queue should not be a model queue, although the sending queue manager does not verify this when the message is put.

For the MQPUT and MQPUT1 calls, this field must not be blank if the *MDMT* field has the value MTRQST, or if any report messages are requested by the *MDREP* field. However, the value specified (or substituted) is passed on to the application that issues the get request for the message, whatever the message type.

If the *MDRM* field is blank, the local queue manager looks up the *MDRQ* name in its own queue definitions. If a local definition of a remote queue exists with this name, the *MDRQ* value in the transmitted message is replaced by the value of the *RemoteQName* attribute from the definition of the remote queue, and this value will be returned in the message descriptor when the receiving application issues an MQGET call for the message. If a local definition of a remote queue does not exist, *MDRQ* is unchanged.

If the name is specified, it may contain trailing blanks; the first null character and characters following it are treated as blanks. Otherwise, however, no check is made that the name satisfies the naming rules for queues; this is also true for the name transmitted, if the *MDRQ* is replaced in the transmitted message. The only check made is that a name has been specified, if the circumstances require it.

If a reply-to queue is not required, it is recommended (although this is not checked) that the *MDRQ* field should be set to blanks; the field should not be left uninitialized.

For the MQGET call, the queue manager always returns the name padded with blanks to the length of the field.

If a message that requires a report message cannot be delivered, and the report message also cannot be delivered to the queue specified, both the original message and the report message go to the dead-letter (undelivered-message) queue (see the *DeadLetterQName* attribute described in "Attributes for the queue manager" on page 1366 ).

This is an output field for the MQGET call, and an input field for the MQPUT and MQPUT1 calls. The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**MDSEQ (10-digit signed integer)**

Sequence number of logical message within group.

Sequence numbers start at 1, and increase by 1 for each new logical message in the group, up to a maximum of 999 999 999. A physical message which is not in a group has a sequence number of 1.

This field need not be set by the application on the MQPUT or MQGET call if:

- On the MQPUT call, PMLOGO is specified.
- On the MQGET call, MOSEQN is *not* specified.

These are the recommended ways of using these calls for messages that are not report messages. However, if the application requires more control, or the call is MQPUT1, the application must ensure that *MDSEQ* is set to an appropriate value.

On input to the MQPUT and MQPUT1 calls, the queue manager uses the value detailed in Table 1. On output from the MQPUT and MQPUT1 calls, the queue manager sets this field to the value that was sent with the message.

On input to the MQGET call, the queue manager uses the value detailed in Table 1. On output from the MQGET call, the queue manager sets this field to the value for the message retrieved.

The initial value of this field is one. This field is ignored if *MDVER* is less than MDVER2.

**MDSID (4-byte character string)**

Structure identifier.

The value must be:

**MDSIDV**
Identifier for message descriptor structure.

This is always an input field. The initial value of this field is MDSIDV.

**MDUID (12-byte character string)**

User identifier.

This is part of the **identity context** of the message. For more information about message context, see Message context and Controlling context information.

*MDUID* specifies the user identifier of the application that originated the message. The queue manager treats this information as character data, but does not define the format of it.

After a message has been received, *MDUID* can be used in the *ODAU* field of the *OBJDSC* parameter of a subsequent MQOPEN or MQPUT1 call, so that the authorization check is performed for the *MDUID* user instead of the application performing the open.

When the queue manager generates this information for an MQPUT or MQPUT1 call, the queue manager uses a user identifier determined from the environment.

When the user identifier is determined from the environment:

- On z/OS, the queue manager uses:
  - For batch, the user identifier from the JES JOB card or started task
  - For TSO, the log on user identifier
  - For CICS, the user identifier associated with the task
  - For IMS, the user identifier depends on the type of application:
    - For:
      - Nonmessage BMP regions
      - Nonmessage IFP regions
      - Message BMP and message IFP regions that have *not* issued a successful GU call

      the queue manager uses the user identifier from the region JES JOB card or the TSO user identifier. If these are blank or null, it uses the name of the program specification block (PSB).
    - For:
      - Message BMP and message IFP regions that *have* issued a successful GU call
      - MPP regions

      the queue manager uses one of:
      - The signed-on user identifier associated with the message
      - The logical terminal (LTERM) name
      - The user identifier from the region JES JOB card
      - The TSO user identifier
      - The PSB name
- On IBM i, the queue manager uses the name of the user profile associated with the application job.
- On HP Integrity NonStop Server, the queue manager uses the MQSeries principal that is defined for the Tandem user identifier in the MQSeries principal database.
- On UNIX systems, the queue manager uses:
  - The application's logon name
  - The effective user identifier of the process if no logon is available
  - The user identifier associated with the transaction, if the application is a CICS transaction
- On VSE/ESA, this is a reserved field.
- On Windows, the queue manager uses the first 12 characters of the logged-on user name.

For the MQPUT and MQPUT1 calls, this is an input/output field if PMSETI or PMSETA is specified in the *PMO* parameter. Any information following a null character within the field is discarded. The null character and any following characters are converted to blanks by the queue manager. If PMSETI or PMSETA is not specified, this field is ignored on input and is an output-only field.

After the successful completion of an MQPUT or MQPUT1 call, this field contains the *MDUID* that was transmitted with the message if it was put to a queue. This will be the value of *MDUID* that is kept with the message if it is retained (see description of PMRET for more details about retained publications) but is not used as the *MDUID* when the message is sent as a publication to subscribers since they

provide a value to override *MDUID* in all publications sent to them. If the message has no context, the field is entirely blank.

This is an output field for the MQGET call. The length of this field is given by LNUID. The initial value of this field is 12 blank characters.

**MDVER (10-digit signed integer)**

Structure version number.

The value must be one of the following:

**MDVER1**
Version-1 message descriptor structure.

**MDVER2**
Version-2 message descriptor structure.

**Note:** When a version-2 MQMD is used, the queue manager performs additional checks on any MQ header structures that may be present at the beginning of the application message data; for further details see the usage notes for the MQPUT call.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MDVERC**
Current version of message descriptor structure.

This is always an input field. The initial value of this field is MDVER1.

## Initial values

*Table 598. Initial values of fields in MQMD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *MDSID* | MDSIDV | 'MD¬¬' |
| *MDVER* | MDVER1 | 1 |
| *MDREP* | RONONE | 0 |
| *MDMT* | MTDGRM | 8 |
| *MDEXP* | EIULIM | -1 |
| *MDFB* | FBNONE | 0 |
| *MDENC* | ENNAT | Depends on environment |
| *MDCSI* | CSQM | 0 |
| *MDFMT* | FMNONE | Blanks |
| *MDPRI* | PRQDEF | -1 |
| *MDPER* | PEQDEF | 2 |
| *MDMID* | MINONE | Nulls |
| *MDCID* | CINONE | Nulls |
| *MDBOC* | None | 0 |
| *MDRQ* | None | Blanks |
| *MDRM* | None | Blanks |
| *MDUID* | None | Blanks |

| *Table 598. Initial values of fields in MQMD (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *MDACC* | ACNONE | Nulls |
| *MDAID* | None | Blanks |
| *MDPAT* | ATNCON | 0 |
| *MDPAN* | None | Blanks |
| *MDPD* | None | Blanks |
| *MDPT* | None | Blanks |
| *MDAOD* | None | Blanks |
| *MDGID* | GINONE | Nulls |
| *MDSEQ* | None | 1 |
| *MDOFF* | None | 0 |
| *MDMFL* | MFNONE | 0 |
| *MDOLN* | OLUNDF | -1 |
| **Notes:**<br>1. The symbol ¬ represents a single blank character. | | |

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQMD Structure
D*
D* Structure identifier
D  MDSID                  1      4    INZ('MD  ')
D* Structure version number
D  MDVER                  5      8I 0 INZ(1)
D* Options for report messages
D  MDREP                  9     12I 0 INZ(0)
D* Message type
D  MDMT                  13     16I 0 INZ(8)
D* Message lifetime
D  MDEXP                 17     20I 0 INZ(-1)
D* Feedback or reason code
D  MDFB                  21     24I 0 INZ(0)
D* Numeric encoding of message data
D  MDENC                 25     28I 0 INZ(273)
D* Character set identifier of messagedata
D  MDCSI                 29     32I 0 INZ(0)
D* Format name of message data
D  MDFMT                 33     40    INZ('        ')
D* Message priority
D  MDPRI                 41     44I 0 INZ(-1)
D* Message persistence
D  MDPER                 45     48I 0 INZ(2)
D* Message identifier
D  MDMID                 49     72    INZ(X'00000000000000-
D                                     000000000000000000000-
D                                     000000000000')
D* Correlation identifier
D  MDCID                 73     96    INZ(X'00000000000000-
D                                     000000000000000000000-
D                                     000000000000')
D* Backout counter
D  MDBOC                 97    100I 0 INZ(0)
D* Name of reply queue
D  MDRQ                 101    148    INZ
D* Name of reply queue manager
```

```
     D  MDRM                 149    196    INZ
     D* User identifier
     D  MDUID                197    208    INZ
     D* Accounting token
     D  MDACC                209    240    INZ(X'00000000000000-
     D                                     0000000000000000000000-
     D                                     0000000000000000000000-
     D                                     000000')
     D* Application data relating toidentity
     D  MDAID                241    272    INZ
     D* Type of application that put themessage
     D  MDPAT                273    276I 0 INZ(0)
     D* Name of application that put themessage
     D  MDPAN                277    304    INZ
     D* Date when message was put
     D  MDPD                 305    312    INZ
     D* Time when message was put
     D  MDPT                 313    320    INZ
     D* Application data relating toorigin
     D  MDAOD                321    324    INZ
     D* Group identifier
     D  MDGID                325    348    INZ(X'00000000000000-
     D                                     0000000000000000000000-
     D                                     000000000000')
     D* Sequence number of logical messagewithin group
     D  MDSEQ                349    352I 0 INZ(1)
     D* Offset of data in physical messagefrom start of logical message
     D  MDOFF                353    356I 0 INZ(0)
     D* Message flags
     D  MDMFL                357    360I 0 INZ(0)
     D* Length of original message
     D  MDOLN                361    364I 0 INZ(-1)
```

## MQMDE - Message descriptor extension

### Overview

**Purpose**: The MQMDE structure describes the data that sometimes occurs preceding the application message data. The structure contains those MQMD fields that exist in the version-2 MQMD, but not in the version-1 MQMD.

**Format name**: FMMDE.

**Character set and encoding**: Data in MQMDE must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT for the C programming language.

The character set and encoding of the MQMDE must be set into the *MDCSI* and *MDENC* fields in:

- The MQMD (if the MQMDE structure is at the start of the message data), or
- The header structure that precedes the MQMDE structure (all other cases).

If the MQMDE is not in the queue manager's character set and encoding, the MQMDE is accepted but not honored, that is, the MQMDE is treated as message data.

**Usage**: Normal applications should use a version-2 MQMD, in which case they will not encounter an MQMDE structure. However, specialized applications, and applications that continue to use a version-1 MQMD, may encounter an MQMDE in some situations. The MQMDE structure can occur in the following circumstances:

- Specified on the MQPUT and MQPUT1 calls
- Returned by the MQGET call
- In messages on transmission queues


- "MQMDE specified on MQPUT and MQPUT1 calls" on page 1121
- "MQMDE returned by MQGET call" on page 1121
- "MQMDE in messages on transmission queues" on page 1122
- "Fields" on page 1122

- “Initial values” on page 1124
- “RPG declaration” on page 1124

## MQMDE specified on MQPUT and MQPUT1 calls

On the MQPUT and MQPUT1 calls, if the application provides a version-1 MQMD, the application can optionally prefix the message data with an MQMDE, setting the *MDFMT* field in MQMD to FMMDE to indicate that an MQMDE is present. If the application does not provide an MQMDE, the queue manager assumes default values for the fields in the MQMDE. The default values that the queue manager uses are the same as the initial values for the structure - see Table 600 on page 1124.

If the application provides a version-2 MQMD *and* prefixes the application message data with an MQMDE, the structures are processed as shown in Table 599 on page 1121.

*Table 599. Queue-manager action when MQMDE specified on MQPUT or MQPUT1*

| MQMD version | Values of version-2 fields | Values of corresponding fields in MQMDE | Action taken by queue manager |
|---|---|---|---|
| 1 | - | Valid | MQMDE is honored |
| 2 | Default | Valid | MQMDE is honored |
| 2 | Not default | Valid | MQMDE is treated as message data |
| 1 or 2 | Any | Not valid | Call fails with an appropriate reason code |
| 1 or 2 | Any | MQMDE is in the wrong character set or encoding, or is an unsupported version | MQMDE is treated as message data |

There is one special case. If the application uses a version-2 MQMD to put a message that is a segment (that is, the MFSEG or MFLSEG flag is set), and the format name in the MQMD is FMDLH, the queue manager generates an MQMDE structure and inserts it *between* the MQDLH structure and the data that follows it. In the MQMD that the queue manager retains with the message, the version-2 fields are set to their default values.

Several of the fields that exist in the version-2 MQMD but not the version-1 MQMD are input/output fields on MQPUT and MQPUT1. However, the queue manager does *not* return any values in the equivalent fields in the MQMDE on output from the MQPUT and MQPUT1 calls; if the application requires those output values, it must use a version-2 MQMD.

## MQMDE returned by MQGET call

On the MQGET call, if the application provides a version-1 MQMD, the queue manager prefixes the message returned with an MQMDE, but only if one or more of the fields in the MQMDE has a nondefault value. The queue manager sets the *MDFMT* field in MQMD to the value FMMDE to indicate that an MQMDE is present.

If the application provides an MQMDE at the start of the *BUFFER* parameter, the MQMDE is ignored. On return from the MQGET call, it is replaced by the MQMDE for the message (if one is needed), or overwritten by the application message data (if the MQMDE is not needed).

If an MQMDE is returned by the MQGET call, the data in the MQMDE is typically in the queue manager's character set and encoding. However the MQMDE may be in some other character set and encoding if:

- The MQMDE was treated as data on the MQPUT or MQPUT1 call (see Table 599 on page 1121 for the circumstances that can cause this).

- The message was received from a remote queue manager connected by a TCP connection, and the receiving message channel agent (MCA) was not set up correctly (see Security of IBM MQ for IBM i objects for further information).

## MQMDE in messages on transmission queues

Messages on transmission queues are prefixed with the MQXQH structure, which contains within it a version-1 MQMD. An MQMDE may also be present, positioned between the MQXQH structure and application message data, but it will typically be present only if one or more of the fields in the MQMDE has a nondefault value.

Other IBM MQ header structures can also occur between the MQXQH structure and the application message data. For example, when the dead-letter header MQDLH is present, and the message is not a segment, the order is:

- MQXQH (containing a version-1 MQMD)
- MQMDE
- MQDLH
- Application message data

## Fields

The MQMDE structure contains the following fields; the fields are described in **alphabetical order**:

**MECSI (10-digit signed integer)**

Character-set identifier of data that follows MQMDE.

This specifies the character set identifier of the data that follows the MQMDE structure; it does not apply to character data in the MQMDE structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that this field is valid. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

**MEENC (10-digit signed integer)**
MEENC (10-digit signed integer)

This specifies the numeric encoding of the data that follows the MQMDE structure; it does not apply to numeric data in the MQMDE structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that the field is valid. See the *MDENC* field described in “MQMD - Message descriptor” on page 1077 for more information about data encodings.

The initial value of this field is ENNAT.

**MEFLG (10-digit signed integer)**

General flags.

The following flag can be specified:

**MEFNON**
No flags.

The initial value of this field is MEFNON.

**MEFMT (8-byte character string)**

Format name of data that follows MQMDE.

This specifies the format name of the data that follows the MQMDE structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The queue manager does not check that this field is valid. See the *MDFMT* field described in "MQMD - Message descriptor" on page 1077 for more information about format names.

The initial value of this field is FMNONE.

**MEGID (24-byte bit string)**

Group identifier.

See the *MDGID* field described in "MQMD - Message descriptor" on page 1077. The initial value of this field is GINONE.

**MELEN (10-digit signed integer)**

Length of MQMDE structure.

The following value is defined:

**MELEN2**
Length of version-2 message descriptor extension structure.

The initial value of this field is MELEN2.

**MEMFL (10-digit signed integer)**

Message flags.

See the *MDMFL* field described in "MQMD - Message descriptor" on page 1077. The initial value of this field is MFNONE.

**MEOFF (10-digit signed integer)**

Offset of data in physical message from start of logical message.

See the *MDOFF* field described in "MQMD - Message descriptor" on page 1077. The initial value of this field is 0.

**MEOLN (10-digit signed integer)**

Length of original message.

See the *MDOLN* field described in "MQMD - Message descriptor" on page 1077. The initial value of this field is OLUNDF.

**MESEQ (10-digit signed integer)**

Sequence number of logical message within group.

See the *MDSEQ* field described in "MQMD - Message descriptor" on page 1077. The initial value of this field is 1.

**MESID (4-byte character string)**

Structure identifier.

The value must be:

**MESIDV**
Identifier for message descriptor extension structure.

The initial value of this field is MESIDV.

**MEVER (10-digit signed integer)**

Structure version number.

The value must be:

**MEVER2**
Version-2 message descriptor extension structure.

The following constant specifies the version number of the current version:

**MEVERC**
Current version of message descriptor extension structure.

The initial value of this field is MEVER2.

## Initial values

*Table 600. Initial values of fields in MQMDE*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *MESID* | MESIDV | 'MDE¬' |
| *MEVER* | MEVER2 | 2 |
| *MELEN* | MELEN2 | 72 |
| *MEENC* | ENNAT | Depends on environment |
| *MECSI* | CSUNDF | 0 |
| *MEFMT* | FMNONE | Blanks |
| *MEFLG* | MEFNON | 0 |
| *MEGID* | GINONE | Nulls |
| *MESEQ* | None | 1 |
| *MEOFF* | None | 0 |
| *MEMFL* | MFNONE | 0 |
| *MEOLN* | OLUNDF | -1 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQMDE Structure
D*
D* Structure identifier
D  MESID                  1      4    INZ('MDE ')
D* Structure version number
D  MEVER                  5      8I 0 INZ(2)
D* Length of MQMDE structure
D  MELEN                  9     12I 0 INZ(72)
D* Numeric encoding of data that followsMQMDE
D  MEENC                 13     16I 0 INZ(273)
D* Character-set identifier of data thatfollows MQMDE
D  MECSI                 17     20I 0 INZ(0)
D* Format name of data that followsMQMDE
D  MEFMT                 21     28    INZ('        ')
D* General flags
```

```
D  MEFLG                 29     32I 0 INZ(0)
D* Group identifier
D  MEGID                 33     56    INZ(X'00000000000000-
D                                     00000000000000000000-
D                                     000000000000')
D* Sequence number of logical messagewithin group
D  MESEQ                 57     60I 0 INZ(1)
D* Offset of data in physical messagefrom start of logical message
D  MEOFF                 61     64I 0 INZ(0)
D* Message flags
D  MEMFL                 65     68I 0 INZ(0)
D* Length of original message
D  MEOLN                 69     72I 0 INZ(-1)
```

## MQMHBO - Message handle to buffer options

Structure defining the message handle to buffer options

### Overview

**Purpose**: The MQMHBO structure allows applications to specify options that control how buffers are produced from message handles. The structure is an input parameter on the MQMHBUF call.

**Character set and encoding**: Data in MQMHBO must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1125
- "Initial values" on page 1126
- "RPG declaration" on page 1126


### Fields

The MQMHBO structure contains the following fields; the fields are described in **alphabetical order**:

**MBOPT (10-digit signed integer)**

Message handle to buffer options structure - MBOPT field.

These options control the action of MQMHBUF.

You must specify the following option:

**MBPRRF**
When converting properties from a message handle into a buffer, convert them into the MQRFH2 format.

Optionally, you can also specify the following option. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**MBDLPR**
Properties that are added to the buffer are deleted from the message handle. If the call fails no properties are deleted.

This is always an input field. The initial value of this field is MBPRRF.

**MBSID (10-digit signed integer)**

Message handle to buffer options structure - MBSID field.

This is the structure identifier. The value must be:

**MBSIDV**
Identifier for message handle to buffer options structure.

This is always an input field. The initial value of this field isMBSIDV.

**MBVER (10-digit signed integer)**

This is the structure version number. The value must be:

**MBVER1**
Version number for message handle to buffer options structure.

The following constant specifies the version number of the current version:

**MBVERC**
Current version of message handle to buffer options structure.

This is always an input field. The initial value of this field is MBVER1.

### Initial values

*Table 601. Initial values of fields in MQMHBO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *MVSID* | MBSIDV | 'MHBO' |
| *MBVER* | MBVER1 | 1 |
| *MBOPT* | MBPRRF | |

**Notes:**

1. The value Null string or blanks denotes a blank character.

### RPG declaration

```
D* MQMHBO Structure
D*
D*
D* Structure identifier
D  MBSID                  1      4    INZ('MHBO')
D*
D* Structure version number
D  MBVER                  5      8I 0 INZ(1)
D*
D* Options that control the action of MQMHBUF
D  MBOPT                  9     12I 0 INZ(1)
```

## MQOD - Object descriptor

The MQOD structure is used to specify an object by name.

### Overview

**Purpose**: The following types of object are valid:

- Queue or distribution list
- Namelist
- Process definition
- Queue manager
- Topic

The structure is an input/output parameter on the MQOPEN and MQPUT1 calls.

**Version**: The current version of MQOD is ODVER4. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQOD that is supported by the environment, but with the initial value of the *ODVER* field set to ODVER1. To use fields that are not present in the

version-1 structure, the application must set the *ODVER* field to the version number of the version required.

To open a distribution list, *ODVER* must be ODVER2 or greater.

**Character set and encoding**: Data in MQOD must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.


- "Fields" on page 1127
- "Initial values" on page 1134
- "RPG declaration" on page 1135


## Fields

The MQOD structure contains the following fields; the fields are described in **alphabetical order**:

**ODASI (40-byte bit string)**

Alternate security identifier.

This is a security identifier that is passed with the *ODAU* to the authorization service to allow appropriate authorization checks to be performed. *ODASI* is used only if:

- OOALTU is specified on the MQOPEN call, or
- PMALTU is specified on the MQPUT1 call,

*and* the *ODAU* field is not entirely blank up to the first null character or the end of the field.

The *ODASI* field has the following structure:

- The first byte is a binary integer containing the length of the significant data that follows; the value excludes the length byte itself. If no security identifier is present, the length is zero.
- The second byte indicates the type of security identifier that is present; the following values are possible:

  **SITWNT**
  Windows security identifier.

  **SITNON**
  No security identifier.
- The third and subsequent bytes up to the length defined by the first byte contain the security identifier itself.
- Remaining bytes in the field are set to binary zero.

The following special value may be used:

**SINONE**
No security identifier specified.

The value is binary zero for the length of the field.

This is an input field. The length of this field is given by LNSCID. The initial value of this field is SINONE. This field is ignored if *ODVER* is less than ODVER3.

**ODAU (12-byte character string)**

Alternate user identifier.

If OOALTU is specified for the MQOPEN call, or PMALTU for the MQPUT1 call, this field contains an alternate user identifier that is to be used to check the authorization for the open, in place of the user identifier that the application is currently running under. Some checks, however, are still carried out with the current user identifier (for example, context checks).

If OOALTU and PMALTU are not specified and this field is entirely blank up to the first null character or the end of the field, the open can succeed only if no user authorization is needed to open this object with the options specified.

If neither OOALTU nor PMALTU is specified, this field is ignored.

This is an input field. The length of this field is given by LNUID. The initial value of this field is 12 blank characters.

**ODDN (48-byte character string)**

Dynamic queue name.

This is the name of a dynamic queue that is to be created by the MQOPEN call. This is of relevance only when *ODON* specifies the name of a model queue; in all other cases *ODDN* is ignored.

The characters that are valid in the name are the same as those for *ODON*, except that an asterisk is also valid. A name that is blank (or one in which only blanks are shown before the first null character) is not valid if *ODON* is the name of a model queue.

If the last nonblank character in the name is an asterisk ( `*`), the queue manager replaces the asterisk with a string of characters that guarantees that the name generated for the queue is unique at the local queue manager. To allow a sufficient number of characters for this, the asterisk is valid only in positions 1 through 33. There must be no characters other than blanks or a null character following the asterisk.

It is valid for the asterisk to occur in the first character position, in which case the name consists solely of the characters generated by the queue manager.

This is an input field. The length of this field is given by LNQN. The initial value of this field is `'AMQ.*'`, padded with blanks.

**ODIDC (10-digit signed integer)**

Number of queues that failed to open.

This is the number of queues in the distribution list that failed to open successfully. If present, this field is also set when opening a single queue which is not in a distribution list.

**Note:** If present, this field is set *only* if the *CMPCOD* parameter on the MQOPEN or MQPUT1 call is CCOK or CCWARN; it is *not* set if the *CMPCOD* parameter is CCFAIL.

This is an output field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODKDC (10-digit signed integer)**

Number of local queues opened successfully.

This is the number of queues in the distribution list that resolve to local queues and that were opened successfully. The count does not include queues that resolve to remote queues (even though a local transmission queue is used initially to store the message). If present, this field is also set when opening a single queue which is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODMN (48-byte character string)**

Object queue manager name.

This is the name of the queue manager on which the *ODON* object is defined. The characters that are valid in the name are the same as those for *ODON* (see previously). A name that is entirely blank up to the first null character or the end of the field denotes the queue manager to which the application is connected (the local queue manager).

The following points apply to the types of object indicated:

- If *ODOT* is OTTOP, OTNLST, OTPRO, or OTQM, *ODMN* must be blank or the name of the local queue manager.
- If *ODON* is the name of a model queue, the queue manager creates a dynamic queue with the attributes of the model queue, and returns in the *ODMN* field the name of the queue manager on which the queue is created; this is the name of the local queue manager. A model queue can be specified only on the MQOPEN call; a model queue is not valid on the MQPUT1 call.
- If *ODON* is the name of a cluster queue, and *ODMN* is blank, the actual destination of messages sent using the queue handle returned by the MQOPEN call is chosen by the queue manager (or cluster workload exit, if one is installed) as follows:
  - If OOBNDO is specified, the queue manager selects an instance of the cluster queue during the processing of the MQOPEN call, and all messages put using this queue handle are sent to that instance.
  - If OOBNDN is specified, the queue manager may choose a different instance of the destination queue (residing on a different queue manager in the cluster) for each successive MQPUT call that uses this queue handle.

  If the application needs to send a message to a *specific* instance of a cluster queue (that is, a queue instance that resides on a particular queue manager in the cluster), the application should specify the name of that queue manager in the *ODMN* field. This forces the local queue manager to send the message to the specified destination queue manager.
- If the object being opened is a distribution list (that is, *ODREC* is greater than zero), *ODMN* must be blank or the null string. If this condition is not satisfied, the call fails with reason code RC2153.

This is an input/output field for the MQOPEN call when *ODON* is the name of a model queue, and an input-only field in all other cases. The length of this field is given by LNQMN. The initial value of this field is 48 blank characters.

**ODON (48-byte character string)**

Object name.

This is the local name of the object as defined on the queue manager identified by *ODMN*. The name can contain the following characters:

- Uppercase alphabetic characters (A - Z)
- Lowercase alphabetic characters (a - z)
- Numeric digits (0 - 9)
- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but may contain trailing blanks. A null character can be used to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply in the environments indicated:

- On systems that use EBCDIC Katakana, lowercase characters cannot be used.
- On IBM i, names containing lowercase characters, forward slash, or percent, must be enclosed in quotation marks when specified on commands. These quotation marks must not be specified for names that occur as fields in structures or as parameters on calls.

The following points apply to the types of object indicated:

- If *ODON* is the name of a model queue, the queue manager creates a dynamic queue with the attributes of the model queue, and returns in the *ODON* field the name of the queue created. A model queue can be specified only on the MQOPEN call; a model queue is not valid on the MQPUT1 call.
- If the object being opened is a distribution list (that is, *ODREC* is present and greater than zero), *ODON* must be blank or the null string. If this condition is not satisfied, the call fails with reason code RC2152.
- If *ODOT* is OTQM, special rules apply; in this case the name must be entirely blank up to the first null character or the end of the field.

- If ODON is the name of an alias queue with TARGTYPE(TOPIC), a security check is first made on the named alias queue, as is normal for the use of alias queues. If this security check is successful, this MQOPEN call will continue and behaves like an MQOPEN of an OTTOP, including making a security check against the administrative topic object.

This is an input/output field for the MQOPEN call when *ODON* is the name of a model queue, and an input-only field in all other cases. The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

The full topic name can be built from two different fields: *ODON* and *ODOS*. For details of how these two fields are used, see "Using topic strings" on page 560.

**ODORO (10-digit signed integer)**

Offset of first object record from start of MQOD.

This is the offset in bytes of the first MQOR object record from the start of the MQOD structure. The offset can be positive or negative. *ODORO* is used only when a distribution list is being opened. The field is ignored if *ODREC* is zero.

When a distribution list is being opened, an array of one or more MQOR object records must be provided in order to specify the names of the destination queues in the distribution list. This can be done in one of two ways:

- By using the offset field *ODORO*

  In this case, the application should declare its own structure containing an MQOD followed by the array of MQOR records (with as many array elements as are needed), and set *ODORO* to the offset of the first element in the array from the start of the MQOD. Care must be taken to ensure that this offset is correct.

- By using the pointer field *ODORP*

  In this case, the application can declare the array of MQOR structures separately from the MQOD structure, and set *ODORP* to the address of the array.

Whichever technique is chosen, one of *ODORO* and *ODORP* must be used; the call fails with reason code RC2155 if both are zero, or both are nonzero.

This is an input field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODORP (pointer)**

Address of first object record.

This is the address of the first MQOR object record. *ODORP* is used only when a distribution list is being opened. The field is ignored if *ODREC* is zero.

This is an input field. The initial value of this field is the null pointer. Either *ODORP* or *ODORO* can be used to specify the object records, but not both; see the description of the *ODORO* field previously for details. If *ODORP* is not used, it must be set to the null pointer or null bytes. This field is ignored if *ODVER* is less than ODVER2.

**ODOS (MQCHARV)**

ODOS specifies the long object name to be used.

This field is referenced only for certain values of *ODOT*. See the description of *ODOT* for details of which values indicate that this field is used.

If *ODOS* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2441.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

The full topic name can be built from two different fields: *ODON* and *ODOS*. For details of how these two fields are used, see "Using topic strings" on page 560. This field is ignored if *ODVER* is less than ODVER4.

**ODOT (10-digit signed integer)**

Object type.

Type of object being named in *ODON*. Possible values are:

**OTQ**
Queue. The name of the object is found in *ODON*.

**OTNLST**
Namelist. The name of the object is found in *ODON*.

**OTPRO**
Process definition. The name of the object is found in *ODON*.

**OTQM**
Queue manager. The name of the object is found in *ODON*.

**OTTOP**
Topic. The full topic name can be built from two different fields: *ODON* and *ODOS*.

For details of how those two fields are used, see "Using topic strings" on page 560.

If the object identified by the *ODON* field cannot be found, the call will fail with reason code RC2425 even if there is a string specified in *ODOS*.

This is always an input field. The initial value of this field is OTQ.

**ODREC (10-digit signed integer)**

Number of object records present.

This is the number of MQOR object records that have been provided by the application. If this number is greater than zero, it indicates that a distribution list is being opened, with *ODREC* being the number of destination queues in the list. It is valid for a distribution list to contain only one destination.

The value of *ODREC* must not be less than zero, and if it is greater than zero *ODOT* must be OTQ; the call fails with reason code RC2154 if these conditions are not satisfied.

This is an input field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODRMN (48-byte character string)**

Resolved queue manager name.

This is the name of the destination queue manager after name resolution has been performed by the local queue manager. The name returned is the name of the queue manager that owns the queue identified by *ODRQN*. *ODRMN* can be the name of the local queue manager.

If *ODRQN* is a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *ODRMN* is the name of the queue-sharing group. If the queue is owned by some other queue-sharing group, *ODRQN* can be the name of the queue-sharing group or the name of a queue manager that is a member of the queue-sharing group (the nature of the value returned is determined by the queue definitions that exist at the local queue manager).

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *ODRMN* is set to blanks:

- Not a queue
- A queue, but not opened for browse, input, or output
- A cluster queue with OOBNDN specified (or with OOBNDQ in effect when the *DefBind* queue attribute has the value BNDNOT)
- A distribution list

This is an output field. The length of this field is given by LNQN. The initial value of this field is the null string in C, and 48 blank characters in other programming languages. This field is ignored if *ODVER* is less than ODVER3.

**ODRO (MQCHARV)**

ODRO is the long object name after the queue manager resolves the name provided in *ODON*.

This field is returned only for certain types of objects, topics, and queue aliases which reference a topic object.

If the long object name is provided in *ODOS* and nothing is provided in *ODON*, the value returned in this field is the same as provided in *ODOS*.

If this field is omitted (that is ODRO.VSBufSize is zero), the *ODRO* is not returned, but the length is returned in ODRO.VSLength. If the length is shorter than the full *ODRO* then it is truncated and returns as many of the rightmost characters as can fit in the provided length.

If *ODRO* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2520. This field is ignored if *ODVER* is less than ODVER4.

**ODRQN (48-byte character string)**

Resolved queue name.

This is the name of the destination queue after name resolution has been performed by the local queue manager. The name returned is the name of a queue that exists on the queue manager identified by *ODRMN*.

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *ODRQN* is set to blanks:

- Not a queue
- A queue, but not opened for browse, input, or output
- A distribution list
- An alias queue that references a topic object (refer to "ODRO (MQCHARV)" on page 1132 instead)

This is an output field. The length of this field is given by LNQN. The initial value of this field is the null string in C, and 48 blank characters in other programming languages. This field is ignored if *ODVER* is less than ODVER3.

**ODRRO (10-digit signed integer)**

Offset of first response record from start of MQOD.

This is the offset in bytes of the first MQRR response record from the start of the MQOD structure. The offset can be positive or negative. *ODRRO* is used only when a distribution list is being opened. The field is ignored if *ODREC* is zero.

When a distribution list is being opened, an array of one or more MQRR response records can be provided in order to identify the queues that failed to open (*RRCC* field in MQRR), and the reason for each failure (*RRREA* field in MQRR). The data is returned in the array of response records in the same order as the queue names occur in the array of object records. The queue manager sets the response records only when the outcome of the call is mixed (that is, some queues were opened successfully while others failed, or all failed but for differing reasons); reason code RC2136 from the call indicates this case. If the same reason code applies to all queues, that reason is returned in the *REASON* parameter of the MQOPEN or MQPUT1 call, and the response records are not set. Response records are optional, but if they are supplied there must be *ODREC* of them.

The response records can be provided in the same way as the object records, either by specifying an offset in *ODRRO*, or by specifying an address in *ODRRP* ; see the description of *ODORO* previously for details of how to do this. However, no more than one of *ODRRO* and *ODRRP* can be used; the call fails with reason code RC2156 if both are nonzero.

For the MQPUT1 call, these response records are used to return information about errors that occur when the message is sent to the queues in the distribution list, as well as errors that occur when the queues are opened. The completion code and reason code from the put operation for a queue replace those from the open operation for that queue only if the completion code from the latter was CCOK or CCWARN.

This is an input field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODRRP (pointer)**

Address of first response record.

This is the address of the first MQRR response record. *ODRRP* is used only when a distribution list is being opened. The field is ignored if *ODREC* is zero.

Either *ODRRP* or *ODRRO* can be used to specify the response records, but not both; see the previous description of the *ODRRO* field for details. If *ODRRP* is not used, it must be set to the null pointer or null bytes.

This is an input field. The initial value of this field is the null pointer. This field is ignored if *ODVER* is less than ODVER2.

**ODSID (4-byte character string)**

Structure identifier.

The value must be:

**ODSIDV**
Identifier for object descriptor structure.

This is always an input field. The initial value of this field is ODSIDV.

**ODSS (MQCHARV)**

ODSS contains the string used to provide the selection criteria used when retrieving messages off a queue.

*ODSS* must not be provided in the following cases:

- If *ODOT* is not OTQ
- If the queue being opened is not being opened using one of the input options, OOINP*

If *ODSS* is provided in these cases, the call fails with reason code RC2516.

If *ODSS* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2519. This field is ignored if *ODVER* is less than ODVER4.

**ODUDC (10-digit signed integer)**

Number of remote queues opened successfully

This is the number of queues in the distribution list that resolve to remote queues and that were opened successfully. If present, this field is also set when opening a single queue which is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is ignored if *ODVER* is less than ODVER2.

**ODVER (10-digit signed integer)**

Structure version number.

The value must be one of the following:

**ODVER1**
Version-1 object descriptor structure.

**ODVER2**
Version-2 object descriptor structure.

**ODVER3**
Version-3 object descriptor structure.

**ODVER4**
Version-4 object descriptor structure.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**ODVERC**
Current version of object descriptor structure.

This is always an input field. The initial value of this field is ODVER1.

## Initial values

*Table 602. Initial values of fields in MQOD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *ODSID* | ODSIDV | 'OD¬¬' |
| *ODVER* | ODVER1 | 1 |
| *ODOT* | OTQ | 1 |
| *ODON* | None | Blanks |
| *ODMN* | None | Blanks |
| *ODDN* | None | 'AMQ.*' |
| *ODAU* | None | Blanks |
| *ODREC* | None | 0 |
| *ODKDC* | None | 0 |
| *ODUDC* | None | 0 |
| *ODIDC* | None | 0 |
| *ODORO* | None | 0 |
| *ODRRO* | None | 0 |
| *ODORP* | None | Null pointer or null bytes |
| *ODRRP* | None | Null pointer or null bytes |
| *ODASI* | SINONE | Nulls |
| *ODRQN* | None | Blanks |
| *ODRMN* | None | Blanks |
| *ODOS* | As defined for MQCHARV | As defined for MQCHARV |
| *ODRO* | As provided in *ODOS* | As provided in *ODOS* |
| *ODSS* | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQOD Structure
D*
D*
D* Structure identifier
D  ODSID                  1      4    INZ('OD  ')
D*
D* Structure version number
D  ODVER                  5      8I 0 INZ(1)
D*
D* Object type
D  ODOT                   9     12I 0 INZ(1)
D*
D* Object name
D  ODON                  13     60    INZ
D*
D* Object queue manager name
D  ODMN                  61    108    INZ
D*
D* Dynamic queue name
D  ODDN                 109    156    INZ('AMQ.*')
D*
D* Alternate user identifier
D  ODAU                 157    168    INZ
D*
** Number of object records
D* present
D  ODREC                169    172I 0 INZ(0)
D*
** Number of local queues opened
D* successfully
D  ODKDC                173    176I 0 INZ(0)
D*
** Number of remote queues opened
D* successfully
D  ODUDC                177    180I 0 INZ(0)
D*
** Number of queues that failed to
D* open
D  ODIDC                181    184I 0 INZ(0)
D*
** Offset of first object record
D* from start of MQOD
D  ODORO                185    188I 0 INZ(0)
D*
** Offset of first response record
D* from start of MQOD
D  ODRRO                189    192I 0 INZ(0)
D*
D* Address of first object record
D  ODORP                193    208*   INZ(*NULL)
D*
** Address of first response
D* record
D  ODRRP                209    224*   INZ(*NULL)
D*
D* Alternate security identifier
D  ODASI                225    264    INZ(X'00000000000000000-
D                                     0000000000000000000000000-
D                                     0000000000000000000000000-
D                                     0000000000000')
D*
D* Resolved queue name
D  ODRQN                265    312    INZ
D*
D* Resolved queue manager name
D  ODRMN                313    360    INZ
D*
D* reserved field
D  ODRE1                361    364I 0 INZ(0)
D*
D* reserved field
D  ODRS2                365    368I 0 INZ(0)
D*
D* Object long name
D* Address of variable length string
D  ODOSCHRP             369    384*   INZ(*NULL)
```

```
     D* Offset of variable length string
     D  ODOSCHRO             385    388I 0 INZ(0)
     D* Size of buffer
     D  ODOSVSBS             389    392I 0 INZ(-1)
     D* Length of variable length string
     D  ODOSCHRL             393    396I 0 INZ(0)
     D* CCSID of variable length string
     D  ODOSCHRC             397    400I 0 INZ(-3)
     D*
     D* Message Selector
     D* Address of variable length string
     D  ODSSCHRP             401    416*   INZ(*NULL)
     D* Offset of variable length string
     D  ODSSCHRO             417    420I 0 INZ(0)
     D* Size of buffer
     D  ODSSVSBS             421    424I 0 INZ(-1)
     D* Length of variable length string
     D  ODSSCHRL             425    428I 0 INZ(0)
     D* CCSID of variable length string
     D  ODSSCHRC             429    432I 0 INZ(-3)
     D*
     D* Resolved long object name
     D* Address of variable length string
     D  ODRSOCHRP            433    448*   INZ(*NULL)
     D* Offset of variable length string
     D  ODRSOCHRO            449    452I 0 INZ(0)
     D* Size of buffer
     D  ODRSOVSBS            453    456I 0 INZ(-1)
     D* Length of variable length string
     D  ODRSOCHRL            457    460I 0 INZ(0)
     D* CCSID of variable length string
     D  ODRSOCHRC            461    464I 0 INZ(-3)
     D*
     D* Alias queue resolved object type
     D  ODRT                 465    468I 0 INZ(0)
```

## MQOR - Object record

The MQOR structure is used to specify the queue name and queue manager name of a single destination queue.

### Overview

**Purpose**: MQOR is an input structure for the MQOPEN and MQPUT1 calls.

**Character set and encoding**: Data in MQOR must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQOPEN call, it is possible to open a list of queues; this list is called a *distribution list*. Each message put using the queue handle returned by that MQOPEN call is placed on each of the queues in the list, if the queue was opened successfully.


- "Fields" on page 1136
- "Initial values" on page 1137
- "RPG declaration" on page 1137


### Fields

The MQOR structure contains the following fields; the fields are described in **alphabetical order**:

**ORMN (48-byte character string)**

Object queue manager name.

This is the same as the *ODMN* field in the MQOD structure (see MQOD for details).

This is always an input field. The initial value of this field is 48 blank characters.

**ORON (48-byte character string)**

Object name.

This is the same as the *ODON* field in the MQOD structure (see MQOD for details), except that:

- It must be the name of a queue.
- It must not be the name of a model queue.

This is always an input field. The initial value of this field is 48 blank characters.

## Initial values

*Table 603. Initial values of fields in MQOR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *ORON* | None | Blanks |
| *ORMN* | None | Blanks |

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQOR Structure
D*
D* Object name
D  ORON                   1     48    INZ
D* Object queue manager name
D  ORMN                  49     96    INZ
```

# MQPD - Property descriptor

The **MQPD** is used to define the attributes of a property.

## Overview

**Purpose**: The structure is an input/output parameter on the MQSETMP call and an output parameter on the MQINQMP call.

**Character set and encoding**: Data in MQPD must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1137
- "Initial values" on page 1140
- "RPG declaration" on page 1140


## Fields

The MQPD structure contains the following fields; the fields are described in **alphabetical order**:

**PDCT (10-digit signed integer)**

This describes what message context the property belongs to.

When a queue manager receives a message containing an IBM MQ-defined property that the queue manager recognizes as being incorrect. the queue manager corrects the value of the *PDCT* field.

The following option can be specified:

**PDUSC**
The property is associated with the user context.

No special authorization is required to be able to set a property associated with the user context using the MQSETMP call.

On a IBM WebSphere MQ 7.0 queue manager, a property associated with the user context is saved as described for OOSAVA. An MQPUT call with PMPASA specified, causes the property to be copied from the saved context into the new message.

If the option previously described is not required, the following option can be used:

**PDNOC**
The property is not associated with a message context.

An unrecognized value is rejected with a *PDREA* code of RC2482.

This is an input/output field to the MQSETMP call and an output field from the MQINQMP call. The initial value of this field is PDNOC.

**PDCPYOPT (10-digit signed integer)**

This describes which type of messages the property should be copied into.

This is an output only field for recognized IBM MQ-defined properties; IBM MQ sets the appropriate value.

When a queue manager receives a message containing an IBM MQ-defined property that the queue manager recognizes as being incorrect. the queue manager corrects the value of the *CopyOptions* field.

You can specify one or more of these options. To specify more than one option, either add the values together (do not add the same constant more than once), or combine the values using the bitwise OR operation (if the programming language supports bit operations).

**COPFOR**
This property is copied into a message being forwarded.

**COPPUB**
This property is copied into the message received by a subscriber when a message is being published.

**COPREP**
This property is copied into a reply message.

**COPRP**
This property is copied into a report message.

**COPALL**
This property is copied into all types of subsequent messages.

**COPNON**
This property is not copied into a message.

**Default option:** The following option can be specified to supply the default set of copy options:

**COPDEF**
This property is copied into a message being forwarded, into a report message, or into a message received by a subscriber when a message is being published.

This is equivalent to specifying the combination of options COPFOR, plus COPRP, plus COPPUB.

If none of the options described previously are required, use the following option:

**COPNON**
Use this value to indicate that no other copy options have been specified; programmatically no relationship exists between this property and subsequent messages. This is always returned for message descriptor properties.

This is an input/output field to the MQSETMP call and an output field from the MQINQMP call. The initial value of this field is COPDEF.

**PDOPT (10-digit signed integer)**

The value must be:

**PDNONE**
No options specified

This is always an input field. The initial value of this field is PDNONE.

**PDSID (10-digit signed integer)**

This is the structure identifier; the value must be:

**PSIDV**
Identifier for property descriptor structure.

This is always an input field. The initial value of this field is **PSIDV**.

**PDSUP (10-digit signed integer)**

This field describes what level of support for the message property is required of the queue manager, in order for the message containing this property to be put to a queue. This applies only to IBM MQ-defined properties; support for all other properties is optional.

The field is automatically set to the correct value when the IBM MQ-defined property is known by the queue manager. If the property is not recognized, PDSUPO is assigned. When a queue manager receives a message containing an IBM MQ-defined property that the queue manager recognizes as being incorrect. the queue manager corrects the value of the *PDSUP* field.

When setting an IBM MQ-defined property using the MQSETMP call on a message handle where the CMNOVA option was set, *PDSUP* becomes an input field. This allows an application to put an IBM MQ-defined property, with the correct value, where the property is unsupported by the connected queue manager, but where the message is intended to be processed on another queue manager.

The value PDSUPO is always assigned to properties that are not IBM MQ-defined properties.

If a IBM WebSphere MQ 7.0 queue manager, that supports message properties, receives a property that contains an unrecognized *PDSUP* value, the property is treated as if:

- PDSUPR was specified if any of the unrecognized values are contained in the PDRUM.
- PDSUPL was specified if any of the unrecognized values are contained in the PDAUXM
- PDSUPO was specified otherwise.

One of the following values is returned by the MQINQMP call, or one of the values can be specified, when using the MQSETMP call on a message handle where the CMNOVA option is set:

**PDSUPO**
The property is accepted by a queue manager even if it is not supported. The property can be discarded in order for the message to flow to a queue manager that does not support message properties. This value is also assigned to properties that are not IBM MQ-defined.

**PDSUPR**
Support for the property is required. The message is rejected by a queue manager that does not support the IBM MQ-defined property. The MQPUT or MQPUT1 call fails with completion code CCFAIL and reason code RC2490.

**PDSUPL**
The message is rejected by a queue manager that does not support the IBM MQ-defined property if the message is destined for a local queue. The MQPUT or MQPUT1 call fails with completion code CCFAIL and reason code RC2490.

The MQPUT or MQPUT1 call succeeds if the message is destined for a remote queue manager.

This is an output field on the MQINQMP call and an input field on the MQSETMP call if the message handle was created with the CMNOVA option set. The initial value of this field is PDSUPO.

**PDVER (10-digit signed integer)**

This is the structure version number; the value must be:

**PDVER1**
Version-1 property descriptor structure.

The following constant specifies the version number of the current version:

**PDVERC**
Current version of property descriptor structure.

This is always an input field. The initial value of this field is **PDVER1**.

## Initial values

*Table 604. Initial values of fields in MQPD*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *PDSID* | PDSIDV | 'PD' |
| *PDVER* | PDVER1 | 1 |
| *PDOPT* | PDNONE | 0 |
| *PDSUP* | PDSUPO | 0 |
| *PDCT* | PDNOC | 0 |
| *PDCPYOPT* | COPDEF | 0 |

## RPG declaration

```
D* MQDMHO Structure
D*
D*
D* Structure identifier
D  DMSID                  1      4    INZ('DMHO')
D*
D* Structure version number
D  DMVER                  5      8I 0 INZ(1)
D*
D* Options that control the action of MQDLTMH
D  DMOPT                  9     12I 0 INZ(0)
```

# MQPMO - Put-message options

The MQPMO structure allows the application to specify options that control how messages are placed on queues or published to topics.

## Overview

**Purpose**
The structure is an input/output parameter on the MQPUT and MQPUT1 calls.

**Version**
The current version of MQPMO is PMVER2. Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions that follow.

The COPY file provided contains the most recent version of MQPMO that is supported by the environment, but with the initial value of the *PMVER* field set to PMVER1. To use fields that are not

present in the version-1 structure, the application must set the *PMVER* field to the version number of the version required.

**Character set and encoding**
Data in MQPMO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.


- "Fields" on page 1141
- "Initial values" on page 1154
- "RPG declaration" on page 1155


## Fields

The MQPMO structure contains the following fields; the fields are described in alphabetical order:

**PMCT (10 digit signed integer)**

Object handle of input queue.

If PMPASI or PMPASA is specified, this field must contain the input queue handle from which context information to be associated with the message being put is taken.

If PMPASI and PMPASA are not specified, this field is ignored.

This is an input field. The initial value of this field is `0`.

**PMIDC (10 digit signed integer)**

Number of messages that could not be sent.

This is the number of messages that could not be sent to queues in the distribution list. The count includes queues that failed to open, and queues that were opened successfully but for which the put operation failed. This field is also set when putting a message to a single queue which is not in a distribution list.

**Note:** This field is set only if the *CMPCOD* parameter on the MQPUT or MQPUT1 call is CCOK or CCWARN; it is not set if the *CMPCOD* parameter is CCFAIL.

This is an output field. The initial value of this field is 0. This field is not set if *PMVER* is less than PMVER2.

**PMKDC (10 digit signed integer)**

Number of messages sent successfully to local queues.

This is the number of messages that the current MQPUT or MQPUT1 call has sent successfully to queues in the distribution list that are local queues. The count does not include messages sent to queues that resolve to remote queues (even though a local transmission queue is used initially to store the message). This field is also set when putting a message to a single queue which is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is not set if *PMVER* is less than PMVER2.

**PMOPT (10 digit signed integer)**

Options that control the action of MQPUT and MQPUT1.

Any or none of the following can be specified. If more than one is required the values can be added (do not add the same constant more than once). Combinations that are not valid are noted; any other combinations are valid.

**Publishing options**: The following options control the way messages are published to a topic.

**PMSRTO**

Any information filled into the MDRQ and MDRM fields of the MQMD of this publication is not passed on to subscribers. If this option is used with a report option that requires a ReplyToQ, the call fails with RC2027 .

**PMRET**

The publication being sent is to be retained by the queue manager. This allows a subscriber to request a copy of this publication after the time it was published, by using the MQSUBRQ call. It also allows a publication to be sent to applications which make their subscription after the time this publication was made, unless they choose not to be sent it by using the option SONEWP. If an application is sent a publication which was retained, it is indicated by the mq.IsRetained message property of that publication.

Only one publication can be retained at each node of the topic tree. That means if there already is a retained publication for this topic, published by any other application, it is replaced with this publication. It is therefore better to avoid having more than one publisher retaining messages on the same topic.

When retained publications are requested by a subscriber, the subscription used may contain a wildcard in the topic, in which case a number of retained publications might match (at various nodes in the topic tree) and several publications may be sent to the requesting application. See the description of the “MQSUBRQ - Subscription request” on page 773 call for more details.

If this option is used and the publication cannot be retained, the message is not published and the call fails with RC2479 .

**Syncpoint options**: The following options relate to the participation of the MQPUT or MQPUT1 call within a unit of work:

**PMSYP**

Put message with syncpoint control.

The request is to operate within the normal unit-of-work protocols. The message is not visible outside the unit of work until the unit of work is committed. If the unit of work is backed out, the message is deleted.

If this option and PMNSYP are not specified, the put request is not within a unit of work.

PMSYP must not be specified with PMNSYP.

**PMNSYP**

Put message without syncpoint control.

The request is to operate outside the normal unit-of-work protocols. The message is available immediately, and it cannot be deleted by backing out a unit of work.

If this option and PMSYP are not specified, the put request is not within a unit of work.

PMNSYP must not be specified with PMSYP.

**Message-identifier and correlation-identifier options**: The following options request the queue manager to generate a new message identifier or correlation identifier:

**PMNMID**

Generate a new message identifier.

This option causes the queue manager to replace the contents of the *MDMID* field in MQMD with a new message identifier. This message identifier is sent with the message, and returned to the application on output from the MQPUT or MQPUT1 call.

This option can also be specified when the message is being put to a distribution list; see the description of the *PRMID* field in the MQPMR structure for details.

Using this option relieves the application of the need to reset the *MDMID* field to MINONE before each MQPUT or MQPUT1 call.

**PMNCID**
Generate a new correlation identifier.

This option causes the queue manager to replace the contents of the *MDCID* field in MQMD with a new correlation identifier. This correlation identifier is sent with the message, and returned to the application on output from the MQPUT or MQPUT1 call.

This option can also be specified when the message is being put to a distribution list; see the description of the *PRCID* field in the MQPMR structure for details.

PMNCID is useful in situations where the application requires a unique correlation identifier.

**Group and segment options**: The following option relates to the processing of messages in groups and segments of logical messages. These definitions might be of help in understanding the option:

**Physical message**
This is the smallest unit of information that can be placed on or removed from a queue; it often corresponds to the information specified or retrieved on a single MQPUT, MQPUT1, or MQGET call. Every physical message has its own message descriptor (MQMD). Generally, physical messages are distinguished by differing values for the message identifier (*MDMID* field in MQMD), although this is not enforced by the queue manager.

**Logical message**
This is a single unit of application information. In the absence of system constraints, a logical message would be the same as a physical message. But where logical messages are large, system constraints may make it advisable or necessary to split a logical message into two or more physical messages, called *segments*.

A logical message that has been segmented consists of two or more physical messages that have the same nonnull group identifier (*MDGID* field in MQMD), and the same message sequence number (*MDSEQ* field in MQMD). The segments are distinguished by differing values for the segment offset (*MDOFF* field in MQMD), which gives the offset of the data in the physical message from the start of the data in the logical message. Because each segment is a physical message, the segments in a logical message typically have differing message identifiers.

A logical message that has not been segmented, but for which segmentation has been permitted by the sending application, also has a nonnull group identifier, although in this case there is only one physical message with that group identifier if the logical message does not belong to a message group. Logical messages for which segmentation has been inhibited by the sending application have a null group identifier (GINONE), unless the logical message belongs to a message group.

**Message group**
This is a set of one or more logical messages that have the same nonnull group identifier. The logical messages in the group are distinguished by differing values for the message sequence number, which is an integer in the range 1 through n, where n is the number of logical messages in the group. If one or more of the logical messages is segmented, there are more than n physical messages in the group.

**PMLOGO**
Messages in groups and segments of logical messages are put in logical order.

This option tells the queue manager how the application puts messages in groups and segments of logical messages. It can be specified only on the MQPUT call; it is not valid on the MQPUT1 call.

If PMLOGO is specified, it indicates that the application uses successive MQPUT calls to:

- Put the segments in each logical message in the order of increasing segment offset, starting from 0, with no gaps.
- Put all of the segments in one logical message before putting the segments in the next logical message.
- Put the logical messages in each message group in the order of increasing message sequence number, starting from 1, with no gaps.

- Put all of the logical messages in one message group before putting logical messages in the next message group.

This order is called "logical order".

Because the application has told the queue manager how it puts messages in groups and segments of logical messages, the application does not have to maintain and update the group and segment information about each MQPUT call, as the queue manager does this. Specifically, it means that the application does not need to set the *MDGID*, *MDSEQ*, and *MDOFF* fields in MQMD, as the queue manager sets these to the appropriate values. The application need set only the *MDMFL* field in MQMD, to indicate when messages belong to groups or are segments of logical messages, and to indicate the last message in a group or last segment of a logical message.

Once a message group or logical message has been started, subsequent MQPUT calls must specify the appropriate MF* flags in *MDMFL* in MQMD. If the application tries to put a message not in a group when there is an unterminated message group, or put a message which is not a segment when there is an unterminated logical message, the call fails with reason code RC2241 or RC2242 , as appropriate. However, the queue manager retains the information about the current message group or current logical message, and the application can terminate them by sending a message (possibly with no application message data) specifying MFLMIG or MFLSEG as appropriate, before reissuing the MQPUT call to put the message that is not in the group or not a segment.

Table 605 on page 1145 shows the combinations of options and flags that are valid, and the values of the *MDGID*, *MDSEQ*, and *MDOFF* fields that the queue manager uses in each case. Combinations of options and flags that are not shown in the table are not valid. The columns in the table have the following meanings:

**LOG ORD**
Indicates whether the PMLOGO option is specified on the call.

**MIG**
Indicates whether the MFMIG or MFLMIG option is specified on the call.

**SEG**
Indicates whether the MFSEG or MFLSEG option is specified on the call.

**SEG OK**
Indicates whether the MFSEGA option is specified on the call.

**Cur grp**
Indicates whether a current message group exists before the call.

**Cur log msg**
Indicates whether a current logical message exists before the call.

**Other columns**
Show the values that the queue manager uses. "Previous" denotes the value used for the field in the previous message for the queue handle.

**PMRLOC**
Specifies that the PMRQN in the MQPMO structure must be completed with the name of the local queue which the message actually gets put to. The ResolvedQMgrName is similarly completed with the name of the local queue manager hosting the local queue. See OORLOQ for what this means. If a user is authorized for a put to a queue then they have the required authority to specify this flag on the MQPUT call. No special authority is needed.

*Table 605. MQPUT options relating to messages in groups and segments of logical messages*

| Options you specify | | | | Group and log-msg status before call | | Values the queue manager uses | | |
|---|---|---|---|---|---|---|---|---|
| **LOG ORD** | **MIG** | **SEG** | **SEG OK** | **Cur grp** | **Cur log msg** | *MDGID* | *MDSEQ* | *MDOFF* |
| Yes | No | No | No | No | No | GINONE | 1 | 0 |
| Yes | No | No | Yes | No | No | New group id | 1 | 0 |
| Yes | No | Yes | Yes or No | No | No | New group id | 1 | 0 |
| Yes | No | Yes | Yes or No | No | Yes | Previous group id | 1 | Previous offset + previous segment length |
| Yes | Yes | Yes or No | Yes or No | No | No | New group id | 1 | 0 |
| Yes | Yes | Yes or No | Yes or No | Yes | No | Previous group id | Previous sequence number + 1 | 0 |
| Yes | Yes | Yes | Yes or No | Yes | Yes | Previous group id | Previous sequence number | Previous offset + previous segment length |
| No | No | No | No | Yes or No | Yes or No | GINONE | 1 | 0 |
| No | No | No | Yes | Yes or No | Yes or No | New group id if GINONE, else value in field | 1 | 0 |
| No | No | Yes | Yes or No | Yes or No | Yes or No | New group id if GINONE, else value in field | 1 | Value in field |
| No | Yes | No | Yes or No | Yes or No | Yes or No | New group id if GINONE, else value in field | Value in field | 0 |
| No | Yes | Yes | Yes or No | Yes or No | Yes or No | New group id if GINONE, else value in field | Value in field | Value in field |

**Note:**

- PMLOGO is not valid on the MQPUT1 call.
- For the *MDMID* field, the queue manager generates a new message identifier if PMNMID or MINONE is specified, and uses the value in the field otherwise.
- For the *MDCID* field, the queue manager generates a new correlation identifier if PMNCID is specified, and uses the value in the field otherwise.

When PMLOGO is specified, the queue manager requires that all messages in a group and segments in a logical message be put with the same value in the *MDPER* field in MQMD, that is, all must be persistent, or all must be nonpersistent. If this condition is not satisfied, the MQPUT call fails with reason code RC2185 .

The PMLOGO option affects units of work as follows:

- If the first physical message in a group or logical message is put within a unit of work, all of the other physical messages in the group or logical message must be put within a unit of work, if the same queue handle is used. However, they need not be put within the same unit of work. This allows a message group or logical message consisting of many physical messages to be split across two or more consecutive units of work for the queue handle.
- If the first physical message in a group or logical message is not put within a unit of work, none of the other physical messages in the group or logical message can be put within a unit of work, if the same queue handle is used.

If these conditions are not satisfied, the MQPUT call fails with reason code RC2245 .

When PMLOGO is specified, the MQMD supplied on the MQPUT call must not be less than MDVER2. If this condition is not satisfied, the call fails with reason code RC2257 .

If PMLOGO is not specified, messages in groups and segments of logical messages can be put in any order, and it is not necessary to put complete message groups or complete logical messages. It is the responsibility of the application to ensure that the *MDGID*, *MDSEQ*, *MDOFF*, and *MDMFL* fields have appropriate values.

This is the technique that can be used to restart a message group or logical message in the middle, after a system failure has occurred. When the system restarts, the application can set the *MDGID*, *MDSEQ*, *MDOFF*, *MDMFL*, and *MDPER* fields to the appropriate values, and then issue the MQPUT call with PMSYP or PMNSYP set as *necessary*, but without specifying PMLOGO. If this call is successful, the queue manager retains the group and segment information, and subsequent MQPUT calls using that queue handle can specify PMLOGO as normal.

The group and segment information that the queue manager retains for the MQPUT call is separate from the group and segment information that it retains for the MQGET call.

For any given queue handle, the application is free to mix MQPUT calls that specify PMLOGO with MQPUT calls that do not, but the following points should be noted:

- If PMLOGO is not specified, each successful MQPUT call causes the queue manager to set the group and segment information for the queue handle to the values specified by the application; this replaces the existing group and segment information retained by the queue manager for the queue handle.
- If PMLOGO is not specified, the call does not fail if there is a current message group or logical message; the call might however succeed with a CCWARN completion code. Table 606 on page 1146 shows the various cases that can arise. In these cases, if the completion code is not CCOK, the reason code is one of the following (as appropriate):
  - RC2241
  - RC2242
  - RC2185
  - RC2245

  **Note:** The queue manager does not check the group and segment information for the MQPUT1 call.

*Table 606. Outcome when MQPUT or MQCLOSE call is not consistent with group and segment information*

| Current call is | Previous call was MQPUT with PMLOGO | Previous call was MQPUT without PMLOGO |
|---|---|---|
| MQPUT with PMLOGO | CCFAIL | CCFAIL |
| MQPUT without PMLOGO | CCWARN | CCOK |

*Table 606. Outcome when MQPUT or MQCLOSE call is not consistent with group and segment information (continued)*

| Current call is | Previous call was MQPUT with PMLOGO | Previous call was MQPUT without PMLOGO |
|---|---|---|
| MQCLOSE with an unterminated group or logical message | CCWARN | CCOK |

Applications that simply want to put messages and segments in logical order are recommended to specify PMLOGO, as this is the simplest option to use. This option relieves the application of the need to manage the group and segment information, because the queue manager manages that information. However, specialized applications may need more control than provided by the PMLOGO option, and this can be achieved by not specifying that option. If this is done, the application must ensure that the *MDGID*, *MDSEQ*, *MDOFF*, and *MDMFL* fields in MQMD are set correctly, before each MQPUT or MQPUT1 call.

For example, an application that wants to forward physical messages that it receives, without regard for whether those messages are in groups or segments of logical messages, must not specify PMLOGO. There are two reasons for this:

- If the messages are retrieved and put in order, specifying PMLOGO causes a new group identifier to be assigned to the messages, and this might make it difficult or impossible for the originator of the messages to correlate any reply or report messages that result from the message group.
- In a complex network with multiple paths between sending and receiving queue managers, the physical messages might arrive out of order. By not specifying PMLOGO and the corresponding GMLOGO on the MQGET call, the forwarding application can retrieve and forward each physical message as soon as it arrives, without needing to wait for the next one in logical order to arrive.

Applications that generate report messages for messages in groups or segments of logical messages must also not specify PMLOGO when putting the report message.

PMLOGO can be specified with any of the other PM* options.

**Context options**: The following options control the processing of message context:

**PMNOC**
No context is to be associated with the message.

Both identity and origin context are set to indicate no context. This means that the context fields in MQMD are set to:

- Blanks for character fields
- Nulls for byte fields
- Zeros for numeric fields

**PMDEFC**
Use default context.

The message is to have default context information associated with it, for both identity and origin. The queue manager sets the context fields in the message descriptor as follows:

| Field in MQMD | Value used |
|---|---|
| *MDUID* | Determined from the environment if possible; set to blanks otherwise. |
| *MDACC* | Determined from the environment if possible; set to ACNONE otherwise. |
| *MDAID* | Set to blanks. |
| *MDPAT* | Determined from the environment. |

| Field in MQMD | Value used |
|---|---|
| *MDPAN* | Determined from the environment if possible; set to blanks otherwise. |
| *MDPD* | Set to date when message is put. |
| *MDPT* | Set to time when message is put. |
| *MDAOD* | Set to blanks. |

For more information about message context, see Message context and Controlling context information.

This is the default action if no context options are specified.

**PMPASI**
Pass identity context from an input queue handle.

The message is to have context information associated with it. Identity context is taken from the queue handle specified in the *PMCT* field. Origin context information is generated by the queue manager in the same way that it is for PMDEFC (see the previous table for values). For more information about message context, see Message context and Controlling context information.

For the MQPUT call, the queue must have been opened with the OOPASI option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the OOPASI option.

**PMPASA**
Pass all context from an input queue handle.

The message is to have context information associated with it. Both identity and origin context are taken from the queue handle specified in the *PMCT* field. For more information about message context, see Message context and Controlling context information.

For the MQPUT call, the queue must have been opened with the OOPASA option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the OOPASA option.

**PMSETI**
Set identity context from the application.

The message is to have context information associated with it. The application specifies the identity context in the MQMD structure. Origin context information is generated by the queue manager in the same way that it is for PMDEFC (see the previous table for values). For more information about message context, see Message context and Controlling context information.

For the MQPUT call, the queue must have been opened with the OOSETI option (or an option that implies it). For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the OOSETI option.

**PMSETA**
Set all context from the application.

The message is to have context information associated with it. The application specifies the identity and origin context in the MQMD structure. For more information about message context, see Message context and Controlling context information.

For the MQPUT call, the queue must have been opened with the OOSETA option. For the MQPUT1 call, the same authorization check is carried out as for the MQOPEN call with the OOSETA option.

Only one of the PM* context options can be specified. If none of these options is specified, PMDEFC is assumed.

**Put response types.** The following options control the response returned to an MQPUT or MQPUT1 call . You can only specify one of these options. If PMARES and PMSRES are not specified, PMRASQ or PMRAST is assumed.

**PMARES**

The PMARES option requests that an MQPUT or MQPUT1 operation is completed without the application waiting for the queue manager to complete the call. Using this option can improve messaging performance, particularly for applications using client bindings. An application can periodically check, using the MQSTAT verb, whether an error has occurred during any previous asynchronous calls.

With this option, only the following fields are guaranteed to be completed in the MQMD;

- MDAID
- MDPAT
- MDPAN
- MDAOD

Additionally, if either or both of PMNMID or PMNCID are specified as options, the MDMID and MDCID returned are also completed. (PMNMID can be implicitly specified by specifying a blank MDMID field).

Only the fields previously specified are completed. Other information that would normally be returned in the MQMD or MQPMO structure is undefined.

When requesting asynchronous put response for MQPUT or MQPUT1, a CMPCOD and REASON of CCOK and RCNONE does not necessarily mean that the message was successfully put to a queue. When developing an MQI application that uses asynchronous put response and require confirmation that messages have been put to a queue you should check both CMPCOD and REASON codes from the put operations and also use MQSTAT to query asynchronous error information.

Although the success or failure of each individual MQPUT/MQPUT1 call might not be returned immediately, the first error that occurred under an asynchronous call can be determined at a later juncture through a call to MQSTAT.

If a persistent message under syncpoint fails to be delivered using asynchronous put response, and you attempt to commit the transaction, the commit fails and the transaction is backed out with a completion code of CCFAIL and a reason of RC2003 . The application can make a call to MQSTAT to determine the cause of a previous MQPUT or MQPUT1 failure

**PMSRES**

Specifying this value for a put option in the MQPMO structure ensures that the MQPUT or MQPUT1 operation is always issued synchronously. If the operation is successful, all fields in the MQMD and MQPMO are completed. It is provided to ensure a synchronous response irrespective of the default put response value defined on the queue or topic object.

**PMRASQ**

If this value is specified for an MQPUT call, the put response type used is taken from the DEFPRESP value specified on the queue when it was opened by the application. If a client application is connected to a queue manager at a level earlier than Version 7.0, it behaves as if PMSRES was specified.

If this option is specified for an MQPUT1 call, the DEFPRESP value from the queue definition is not used. If the MQPUT1 call is using PMSYP it behaves as for PMARES, and if it is using PMNSYP it behaves as for PMSRES.

**PMRAST**

This is a synonym for PMRASQ for use with topic objects.

**Other options**: The following options control authorization checking, and what happens when the queue manager is quiescing:

**PMALTU**

Validate with specified user identifier.

This indicates that the *ODAU* field in the *OBJDSC* parameter of the MQPUT1 call contains a user identifier that is to be used to validate authority to put messages on the queue. The call can

succeed only if this *ODAU* is authorized to open the queue with the specified options, regardless of whether the user identifier under which the application is running is authorized to do so. (This does not apply to the context options specified, however, which are always checked against the user identifier under which the application is running.)

This option is valid only with the MQPUT1 call.

**PMFIQ**
Fail if queue manager is quiescing.

This option forces the MQPUT or MQPUT1 call to fail if the queue manager is in the quiescing state.

The call returns completion code CCFAIL with reason code RC2161 .

**Default option**: If none of the options described previously are required, the following option can be used:

**PMNONE**
No options specified.

This value can be used to indicate that no other options have been specified; all options assume their default values. PMNONE is defined to aid program documentation; it is not intended that this option is used with any other, but as its value is zero, such use cannot be detected.

This is an input field. The initial value of the *PMOPT* field is PMNONE.

**PMPRF (10 digit signed integer)**

Flags indicating which MQPMR fields are present.

This field contains flags that must be set to indicate which MQPMR fields are present in the put message records provided by the application. *PMPRF* is used only when the message is being put to a distribution list. The field is ignored if *PMREC* is zero, or both *PMPRO* and *PMPRP* are zero.

For fields that are present, the queue manager uses for each destination the values from the fields in the corresponding put message record. For fields that are absent, the queue manager uses the values from the MQMD structure.

One or more of the following flags can be specified to indicate which fields are present in the put message records:

**PFMID**
Message-identifier field is present.

**PFCID**
Correlation-identifier field is present.

**PFGID**
Group-identifier field is present.

**PFFB**
Feedback field is present.

**PFACC**
Accounting-token field is present.

If this flag is specified, either PMSETI or PMSETA must be specified in the *PMOPT* field; if this condition is not satisfied, the call fails with reason code RC2158 .

If no MQPMR fields are present, the following can be specified:

**PFNONE**
No put-message record fields are present.

If this value is specified, either *PMREC* must be zero, or both *PMPRO* and *PMPRP* must be zero.

PFNONE is defined to aid program documentation. It is not intended that this constant is used with any other, but as its value is zero, such use cannot be detected.

If *PMPRF* contains flags which are not valid, or put message records are provided but *PMPRF* has the value PFNONE, the call fails with reason code RC2158 .

This is an input field. The initial value of this field is PFNONE. This field is ignored if *PMVER* is less than PMVER2.

**PMPRO (10 digit signed integer)**

Offset of first put message record from start of MQPMO.

This is the offset in bytes of the first MQPMR put message record from the start of the MQPMO structure. The offset can be positive or negative. *PMPRO* is used only when the message is being put to a distribution list. The field is ignored if *PMREC* is zero.

When the message is being put to a distribution list, an array of one or more MQPMR put message records can be provided in order to specify certain properties of the message for each destination individually; these properties are:

- message identifier
- correlation identifier
- group identifier
- feedback value
- accounting token

It is not necessary to specify all of these properties, but whatever subset is chosen, the fields must be specified in the correct order. See the description of the MQPMR structure for further details.

Usually, there should be as many put message records as there are object records specified by MQOD when the distribution list is opened; each put message record supplies the message properties for the queue identified by the corresponding object record. Queues in the distribution list which fail to open must still have put message records allocated for them at the appropriate positions in the array, although the message properties are ignored in this case.

It is possible for the number of put message records to differ from the number of object records. If there are fewer put message records than object records, the message properties for the destinations which do not have put message records are taken from the corresponding fields in the message descriptor MQMD. If there are more put message records than object records, the excess are not used (although it must still be possible to access them). Put message records are optional, but if they are supplied there must be *PMREC* of them.

The put message records can be provided in a similar way to the object records in MQOD, either by specifying an offset in *PMPRO*, or by specifying an address in *PMPRP* ; for details of how to do this, see the *ODORO* field described in “MQOD - Object descriptor” on page 1126.

No more than one of *PMPRO* and *PMPRP* can be used; the call fails with reason code RC2159 if both are nonzero.

This is an input field. The initial value of this field is 0. This field is ignored if *PMVER* is less than PMVER2.

**PMPRP (pointer)**

Address of first put message record.

This is the address of the first MQPMR put message record. *PMPRP* is used only when the message is being put to a distribution list. The field is ignored if *PMREC* is zero.

Either *PMPRP* or *PMPRO* can be used to specify the put message records, but not both; see the description of the PMRRO field for details. If *PMPRP* is not used, it must be set to the null pointer or null bytes.

This is an input field. The initial value of this field is the null pointer. This field is ignored if *PMVER* is less than PMVER2.

**PMREC (10 digit signed integer)**

Number of put message records or response records present.

This is the number of MQPMR put message records or MQRR response records that have been provided by the application. This number can be greater than zero only if the message is being put to a distribution list. Put message records and response records are optional - the application need not provide any records, or it can choose to provide records of only one type. However, if the application provides records of both types, it must provide *PMREC* records of each type.

The value of *PMREC* need not be the same as the number of destinations in the distribution list. If too many records are provided, the excess are not used; if too few records are provided, default values are used for the message properties for those destinations that do not have put message records (see *PMPRO* later in this topic).

If *PMREC* is less than zero, or is greater than zero but the message is not being put to a distribution list, the call fails with reason code RC2154 .

This is an input field. The initial value of this field is 0. This field is ignored if *PMVER* is less than PMVER2.

**PMRMN (48 byte character string)**

Resolved name of destination queue manager.

This is the name of the destination queue manager after name resolution has been performed by the local queue manager. The name returned is the name of the queue manager that owns the queue identified by *PMRQN*, and can be the name of the local queue manager.

If *PMRQN* is a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *PMRMN* is the name of the queue-sharing group. If the queue is owned by some other queue-sharing group, *PMRQN* can be the name of the queue-sharing group or the name of a queue manager that is a member of the queue-sharing group (the nature of the value returned is determined by the queue definitions that exist at the local queue manager).

A nonblank value is returned only if the object is a single queue; if the object is a distribution list or topic, the value returned is undefined.

This is an output field. The length of this field is given by LNQMN. The initial value of this field is 48 blank characters.

**PMRQN (48 byte character string)**

Resolved name of destination queue.

This is the name of the destination queue after name resolution has been performed by the local queue manager. The name returned is the name of a queue that exists on the queue manager identified by *PMRMN*.

A nonblank value is returned only if the object is a single queue; if the object is a distribution list or topic, the value returned is undefined.

This is an output field. The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**PMRRO (10 digit signed integer)**

Offset of first response record from start of MQPMO.

This is the offset in bytes of the first MQRR response record from the start of the MQPMO structure. The offset can be positive or negative. *PMRRO* is used only when the message is being put to a distribution list. The field is ignored if *PMREC* is zero.

When the message is being put to a distribution list, an array of one or more MQRR response records can be provided in order to identify the queues to which the message was not sent successfully (*RRCC* field in MQRR), and the reason for each failure (*RRREA* field in MQRR). The message might not have been sent either because the queue failed to open, or because the put operation failed. The queue manager sets the response records only when the outcome of the call is mixed (that is, some

messages were sent successfully while others failed, or all failed but for differing reasons); reason code RC2136 from the call indicates this case. If the same reason code applies to all queues, that reason is returned in the *REASON* parameter of the MQPUT or MQPUT1 call, and the response records are not set.

Usually, there should be as many response records as there are object records specified by MQOD when the distribution list is opened; when necessary, each response record is set to the completion code and reason code for the put to the queue identified by the corresponding object record. Queues in the distribution list which fail to open must still have response records allocated for them at the appropriate positions in the array, although they are set to the completion code and reason code resulting from the open operation, rather than the put operation.

It is possible for the number of response records to differ from the number of object records. If there are fewer response records than object records, it may not be possible for the application to identify all of the destinations for which the put operation failed, or the reasons for the failures. If there are more response records than object records, the excess are not used (although it must still be possible to access them). Response records are optional, but if they are supplied there must be *PMREC* of them.

The response records can be provided in a similar way to the object records in MQOD, either by specifying an offset in *PMRRO*, or by specifying an address in *PMRRP* ; for details of how to do this, see the *ODORO* field described in "MQOD - Object descriptor" on page 1126. However, no more than one of *PMRRO* and *PMRRP* can be used; the call fails with reason code RC2156 if both are nonzero.

For the MQPUT1 call, this field must be zero. This is because the response information (if requested) is returned in the response records specified by the object descriptor MQOD.

This is an input field. The initial value of this field is 0. This field is ignored if *PMVER* is less than PMVER2.

**PMRRP (pointer)**

Address of first response record.

This is the address of the first MQRR response record. *PMRRP* is used only when the message is being put to a distribution list. The field is ignored if *PMREC* is zero.

Either *PMRRP* or *PMRRO* can be used to specify the response records, but not both; see the description of the PMRRO field for details. If *PMRRP* is not used, it must be set to the null pointer or null bytes.

For the MQPUT1 call, this field must be the null pointer or null bytes. This is because the response information (if requested) is returned in the response records specified by the object descriptor MQOD.

This is an input field. The initial value of this field is the null pointer. This field is ignored if *PMVER* is less than PMVER2.

**PMSID (4 byte character string)**

Structure identifier.

The value must be:

**PMSIDV**
Identifier for put-message options structure.

This is always an input field. The initial value of this field is PMSIDV.

**PMSL (MQLONG)**

The level of subscription targeted by this publication.

Only those subscriptions with the highest *PMSL* less than or equal to this value receives this publication. This value must be in the range zero to 9; zero is the lowest level.

The initial value of this field is 9.

**PMTO (10 digit signed integer)**

Reserved.

This is a reserved field; its value is not significant. The initial value of this field is -1.

**PMUDC (10 digit signed integer)**

Number of messages sent successfully to remote queues.

This is the number of messages that the current MQPUT or MQPUT1 call has sent successfully to queues in the distribution list that resolve to remote queues. Messages that the queue manager retains temporarily in distribution-list form count as the number of individual destinations that those distribution lists contain. This field is also set when putting a message to a single queue which is not in a distribution list.

This is an output field. The initial value of this field is 0. This field is not set if *PMVER* is less than PMVER2.

**PMVER (10 digit signed integer)**

Structure version number.

The value must be one of the following:

**PMVER1**
Version-1 put-message options structure.

**PMVER2**
Version-2 put-message options structure.

Fields that exist only in the more-recent version of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**PMVERC**
Current version of put-message options structure.

This is always an input field. The initial value of this field is PMVER1.

## Initial values

*Table 607. Initial values of fields in MQPMO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *PMSID* | PMSIDV | 'PMO¬' |
| *PMVER* | PMVER1 | 1 |
| *PMOPT* | PMNONE | 0 |
| *PMTO* | None | -1 |
| *PMCT* | None | 0 |
| *PMKDC* | None | 0 |
| *PMUDC* | None | 0 |
| *PMIDC* | None | 0 |
| *PMRQN* | None | Blanks |
| *PMRMN* | None | Blanks |
| *PMREC* | None | 0 |
| *PMPRF* | PFNONE | 0 |
| *PMPRO* | None | 0 |

| *Table 607. Initial values of fields in MQPMO (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *PMRRO* | None | 0 |
| *PMPRP* | None | Null pointer or null bytes |
| *PMRRP* | None | Null pointer or null bytes |
| **Note:**<br>1. The symbol ¬ represents a single blank character. | | |

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQPMO Structure
D*
D* Structure identifier
D  PMSID                  1      4    INZ('PMO ')
D* Structure version number
D  PMVER                  5      8I 0 INZ(1)
D* Options that control the action of MQPUT and MQPUT1
D  PMOPT                  9     12I 0 INZ(0)
D* Reserved
D  PMTO                  13     16I 0 INZ(-1)
D* Object handle of input queue
D  PMCT                  17     20I 0 INZ(0)
D* Number of messages sent successfully to local queues
D  PMKDC                 21     24I 0 INZ(0)
D* Number of messages sent successfully to remote queues
D  PMUDC                 25     28I 0 INZ(0)
D* Number of messages that could notbe sent
D  PMIDC                 29     32I 0 INZ(0)
D* Resolved name of destination queue
D  PMRQN                 33     80    INZ
D* Resolved name of destination queuemanager
D  PMRMN                 81    128    INZ
D* Number of put message records or response records present
D  PMREC                129    132I 0 INZ(0)
D* Flags indicating which MQPMR fields are present
D  PMPRF                133    136I 0 INZ(0)
D* Offset of first put message record from start of MQPMO
D  PMPRO                137    140I 0 INZ(0)
D* Offset of first response record from start of MQPMO
D  PMRRO                141    144I 0 INZ(0)
D* Address of first put message record
D  PMPRP                145    160*   INZ(*NULL)
D* Address of first response record
D  PMRRP                161    176*   INZ(*NULL)
D* Original message handle
D  PMOMH                177    184I 0
D* New message handle
D  PMNMH                185    190I 0
D* The action being performed
D  PMACT                191    194I 0
D* Reserved
D  PMRE1                195    198I 0
```

## MQPMR - Put-message record

The MQPMR structure is used to specify various message properties for a single destination when a message is being put to a distribution list.

### Overview

**Purpose**: MQPMR is an input/output structure for the MQPUT and MQPUT1 calls.

**Character set and encoding**: Data in MQPMR must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the

application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQPUT or MQPUT1 call, it is possible to specify different values for each destination queue in a distribution list. Some of the fields are input only, others are input/output.

**Note:** This structure is unusual in that it does not have a fixed layout. The fields in this structure are optional, and the presence or absence of each field is indicated by the flags in the *PMPRF* field in MQPMO. Fields that are present ***must occur in the following order*** :

- *PRMID*
- *PRCID*
- *PRGID*
- *PRFB*
- *PRACC*

Fields that are absent occupy no space in the record.

Because MQPMR does not have a fixed layout, no definition of it is provided in the COPY file. The application programmer should create a declaration containing the fields that are required by the application, and set the flags in *PMPRF* to indicate the fields that are present.


- "Fields" on page 1156
- "Initial values" on page 1157
- "RPG declaration" on page 1157


## Fields

The MQPMR structure contains the following fields; the fields are described in **alphabetical order**:

**PRACC (32-byte bit string)**

Accounting token.

This is the accounting token to be used for the message sent to the queue with a name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MDACC* field in MQMD for a put to a single queue. See the description of *MDACC* in "MQMD - Message descriptor" on page 1077 for information about the content of this field.

If this field is not present, the value in MQMD is used.

This is an input field.

**PRCID (24-byte bit string)**

Correlation identifier.

This is the correlation identifier to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MDCID* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *PRCID* field.

If PMNCID is specified, a *single* new correlation identifier is generated and used for all of the destinations in the distribution list, regardless of whether they have MQPMR records. This is different from the way that PMNMID is processed (see *PRMID* field).

This is an input/output field.

**PRFB (10-digit signed integer)**

Feedback or reason code.

This is the feedback code to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MDFB* field in MQMD for a put to a single queue.

If this field is not present, the value in MQMD is used.

This is an input field.

**PRGID (24-byte bit string)**

Group identifier.

This is the group identifier to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MDGID* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *PRGID* field. The value is processed as documented in Table 605 on page 1145, but with the following differences:

- In those cases where a new group identifier would be used, the queue manager generates a different group identifier for each destination (that is, no two destinations have the same group identifier).
- In those cases where the value in the field would be used, the call fails with reason code RC2258.

This is an input/output field.

**PRMID (24-byte bit string)**

Message identifier.

This is the message identifier to be used for the message sent to the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call. It is processed in the same way as the *MDMID* field in MQMD for a put to a single queue.

If this field is not present in the MQPMR record, or there are fewer MQPMR records than destinations, the value in MQMD is used for those destinations that do not have an MQPMR record containing a *PRMID* field. If that value is MINONE, a new message identifier is generated for *each* of those destinations (that is, no two of those destinations have the same message identifier).

If PMNMID is specified, new message identifiers are generated for all of the destinations in the distribution list, regardless of whether they have MQPMR records. This is different from the way that PMNCID is processed (see *PRCID* field).

This is an input/output field.

## Initial values

There are no initial values defined for this structure, as no structure declaration is provided. The following sample declaration shows how the structure should be declared by the application programmer if all of the fields are required.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQPMR Structure
D*
D* Message identifier
D  PRMID                  1     24
D* Correlation identifier
D  PRCID                 25     48
D* Group identifier
```

```
     D  PRGID                 49     72
     D* Feedback or reason code
     D  PRFB                  73     76I 0
     D* Accounting token
     D  PRACC                 77    108
```

## MQRFH - Rules and formatting header

The MQRFH structure defines the layout of the rules and formatting header.

### Overview

**Purpose**: This header can be used to send string data in the form of name/value pairs.

**Format name**: FMRFH.

**Character set and encoding**: The fields in the MQRFH structure (including *RFNVS*) are in the character set and encoding given by the *MDCSI* and *MDENC* fields in the header structure that precedes the MQRFH, or by those fields in the MQMD structure if the MQRFH is at the start of the application message data.

The character set must be one that has single-byte characters for the characters that are valid in queue names.


- "Fields" on page 1158
- "Initial values" on page 1160
- "RPG declaration" on page 1160


### Fields

The MQRFH structure contains the following fields; the fields are described in **alphabetical order**:

**RFCSI (10-digit signed integer)**

Character set identifier of data that follows *RFNVS*.

This specifies the character set identifier of the data that follows *RFNVS* ; it does not apply to character data in the MQRFH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

Numeric encoding of data that follows *RFNVS*.

This specifies the numeric encoding of the data that follows *RFNVS* ; it does not apply to numeric data in the MQRFH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is ENNAT.

**RFFLG (10-digit signed integer)**

Flags.

The following can be specified:

**RFNONE**
No flags.

The initial value of this field is RFNONE.

**RFFMT (8-byte character string)**

Format name of data that follows *RFNVS*.

This specifies the format name of the data that follows *RFNVS*.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The initial value of this field is FMNONE.

**RFLEN (10-digit signed integer)**

Total length of MQRFH including *RFNVS*.

This is the length in bytes of the MQRFH structure, including the *RFNVS* field at the end of the structure. The length does *not* include any user data that follows the *RFNVS* field.

To avoid problems with data conversion of the user data in some environments, consider using *RFLEN* as a multiple of four.

The following constant gives the length of the *fixed* part of the structure, that is, the length excluding the *RFNVS* field:

**RFLENV**
Length of fixed part of MQRFH structure.

The initial value of this field is RFLENV.

**RFNVS (n-byte character string)**

String containing name/value pairs.

This is a variable-length character string containing name/value pairs in the form:

```
name1 value1 name2 value2 name3 value3 ...
```

Each name or value must be separated from the adjacent name or value by one or more blank characters; these blanks are not significant. A name or value can contain significant blanks by prefixing and suffixing the name or value with the quotation mark character; all characters between the opening quotation mark and the matching closing quotation mark are treated as significant. In the following example, the name is FAMOUS_WORDS, and the value is `Hello World`:

```
FAMOUS_WORDS "Hello World"
```

A name or value can contain any characters other than the null character (which acts as a delimiter for *RFNVS*). However, to assist interoperability an application might prefer to restrict names to the following characters:

- First character: uppercase or lowercase alphabetic (A through Z, or a through z), or underscore.
- Subsequent characters: upper or lowercase alphabetic, decimal digit (0 through 9), underscore, hyphen, or dot.

If a name or value contains one or more quotation marks, the name or value must be enclosed in quotation marks, and each quotation mark within the string must be doubled:

```
Famous_Words "The program displayed ""Hello World"""
```

Names and values are case sensitive, that is, lowercase letters are not considered to be the same as uppercase letters. For example, FAMOUS_WORDS and `Famous_Words` are two different names.

The length in bytes of *RFNVS* is equal to *RFLEN* minus RFLENV. To avoid problems with data conversion of the user data in some environments, it is recommended that this length should be a multiple of four. *RFNVS* must be padded with blanks to this length, or terminated earlier by placing a null character following the last significant character in the string. The null character and the bytes following it, up to the specified length of *RFNVS*, are ignored.

**Note:** Because the length of this field is not fixed, the field is omitted from the declarations of the structure that are provided for the supported programming languages.

**RFSID (4-byte character string)**

Structure identifier.

The value must be:

**RFSIDV**
Identifier for rules and formatting header structure.

The initial value of this field is RFSIDV.

**RFVER (10-digit signed integer)**

Structure version number.

The value must be:

**RFVER1**
Version-1 rules and formatting header structure.

The initial value of this field is RFVER1.

## Initial values

*Table 608. Initial values of fields in MQRFH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *RFSID* | RFSIDV | 'RFH¬' |
| *RFVER* | RFVER1 | 1 |
| *RFLEN* | RFLENV | 32 |
| *RFENC* | ENNAT | Depends on environment |
| *RFCSI* | CSUNDF | 0 |
| *RFFMT* | FMNONE | Blanks |
| *RFFLG* | RFNONE | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQRFH Structure
D*
D* Structure identifier
D  RFSID                  1      4    INZ('RFH ')
D* Structure version number
D  RFVER                  5      8I 0 INZ(1)
D* Total length of MQRFH includingNameValueString
D  RFLEN                  9     12I 0 INZ(32)
D* Numeric encoding of data that followsNameValueString
D  RFENC                 13     16I 0 INZ(273)
```

```
     D* Character set identifier of data thatfollows NameValueString
     D  RFCSI                 17     20I 0 INZ(0)
     D* Format name of data that followsNameValueString
     D  RFFMT                 21     28    INZ('        ')
     D* Flags
     D  RFFLG                 29     32I 0 INZ(0)
```

## MQRFH2 - Rules and formatting header 2

The MQRFH2 structure defines the format of the version-2 rules and formatting header.

### Overview

**Purpose**: This header can be used to send data that has been encoded using an XML-like syntax. A message can contain two or more MQRFH2 structures in series, with user data optionally following the last MQRFH2 structure in the series.

**Format name**: FMRFH2.

**Character set and encoding**: Special rules apply to the character set and encoding used for the MQRFH2 structure:

- Fields other than *RF2NVD* are in the character set and encoding given by the *MDCSI* and *MDENC* fields in the header structure that precedes MQRFH2, or by those fields in the MQMD structure if the MQRFH2 is at the start of the application message data.

  The character set must be one that has single-byte characters for the characters that are valid in queue names.

  When GMCONV is specified on the MQGET call, the queue manager converts these fields to the requested character set and encoding.
- *RF2NVD* is in the character set given by the *RF2NVC* field. Only certain Unicode character sets are valid for *RF2NVC* (see the description of *RF2NVC* for details).

  Some character sets have a representation that is dependent on the encoding. If *RF2NVC* is one of these character sets, *RF2NVD* must be in the same encoding as the other fields in the MQRFH2.

  When GMCONV is specified on the MQGET call, the queue manager converts *RF2NVD* to the requested encoding, but does not change its character set.


- "Fields" on page 1161
- "Initial values" on page 1166
- "RPG declaration" on page 1166


### Fields

The MQRFH2 structure contains the following fields; the fields are described in **alphabetical order**:

**RF2CSI (10-digit signed integer)**

Character set identifier of data that follows last *RF2NVD* field.

This specifies the character set identifier of the data that follows the last *RF2NVD* field; it does not apply to character data in the MQRFH2 structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSINHT.

**RF2ENC (10-digit signed integer)**

Numeric encoding of data that follows last *RF2NVD* field.

This specifies the numeric encoding of the data that follows the last *RF2NVD* field; it does not apply to numeric data in the MQRFH2 structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is ENNAT.

**RF2FLG (10-digit signed integer)**

Flags.

The following value must be specified:

**RFNONE**
No flags.

The initial value of this field is RFNONE.

**RF2FMT (8-byte character string)**

Format name of data that follows last *RF2NVD* field.

This specifies the format name of the data that follows the last *RF2NVD* field.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The initial value of this field is FMNONE.

**RF2LEN (10-digit signed integer)**

Total length of MQRFH2 including all *RF2NVL* and *RF2NVD* fields.

This is the length in bytes of the MQRFH2 structure, including the *RF2NVL* and *RF2NVD* fields at the end of the structure. It is valid for there to be multiple pairs of *RF2NVL* and *RF2NVD* fields at the end of the structure, in the sequence:

```
length1, data1, length2, data2, ...
```

*RF2LEN* does *not* include any user data that may follow the last *RF2NVD* field at the end of the structure.

To avoid problems with data conversion of the user data in some environments, consider using *RF2LEN* as a multiple of four.

The following constant gives the length of the *fixed* part of the structure, that is, the length excluding the *RF2NVL* and *RF2NVD* fields:

**RFLEN2**
Length of fixed part of MQRFH2 structure.

The initial value of this field is RFLEN2.

**RF2NVC (10-digit signed integer)**

Character set identifier of *RF2NVD*.

This specifies the coded character set identifier of the data in the *RF2NVD* field. This is different from the character set of the other strings in the MQRFH2 structure, and can be different from the character set of the data (if any) that follows the last *RF2NVD* field at the end of the structure.

*RF2NVC* must have one of the following CCSID values:

**1200**
UCS-2 open-ended

**13488**
UCS-2 2.0 subset

**17584**
UCS-2 2.1 subset (includes the Euro symbol)

**1208**
UTF-8

For the UCS-2 character sets, the encoding (byte order) of the *RF2NVD* must be the same as the encoding of the other fields in the MQRFH2 structure. Surrogate characters (X'D800' through X'DFFF') are not supported.

**Note:** If *RF2NVC* does not have one of the values listed previously, and the MQRFH2 structure requires conversion on the MQGET call, the call completes with reason code RC2111 and the message is returned unconverted.

The initial value of this field is 1208.

**RF2NVD (n-byte character string)**

Name/value data.

This is a variable-length character string containing data encoded using an XML-like syntax. The length in bytes of this string is provided by the *RF2NVL* field that precedes the *RF2NVD* field; this length should be a multiple of four.

The *RF2NVL* and *RF2NVD* fields are optional, but if present they must occur as a pair and be adjacent. The pair of fields can be repeated as many times as required, for example:

```
length1 data1 length2 data2 length3 data3
```

Because these fields are optional, they are omitted from the declarations of the structure that are provided for the various programming languages supported.

*RF2NVD* is unusual because it is *not* converted to the character set specified on the MQGET call when the message is retrieved with the GMCONV option in effect; *RF2NVD* remains in its original character set. However, *RF2NVD is* converted to the encoding specified on the MQGET call.

**Syntax of name/value data**: The string consists of a single "folder" that contains zero or more properties. The folder is delimited by XML start and end tags with the same name as the the folder:

```
<folder> property1 property2 ... </folder>
```

Characters following the folder end tag, up to the length defined by *RF2NVL*, must be blank. Within the folder, each property is composed of a name and a value, and optionally a data type:

```
<name dt="datatype">value</name>
```

In these examples:

- The delimiter characters (<, =, ", /, and >) must be specified exactly as shown.
- `name` is the user-specified name of the property; see the following example for more information about names.
- `datatype` is an optional user-specified data type of the property; see the following example for valid data types.
- `value` is the user-specified value of the property; see the following paragraphs for more information about values.

- Blanks are significant between the > character which precedes a value, and the < character which follows the value, and at least one blank must precede `dt=`. Elsewhere blanks can be coded freely between tags, or preceding or following tags (for example, in order to improve readability); these blanks are not significant.

If properties are related to each other, they can be grouped together by enclosing them within XML start and end tags with the same name as the group:

```
<folder> <group> property1 property2 ... </group> </folder>
```

Groups can be nested within other groups, without limit, and a group can occur more than once within a folder. It is also valid for a folder to contain some properties in groups and other properties not in groups.

**Names of properties, groups, and folders**: Names of properties, groups, and folders must be valid XML tag names, with the exception of the colon character, which is not permitted in a property, group, or folder name. In particular:

- Names must start with a letter or an underscore. Valid letters are defined in the W3C XML specification, and consist essentially of Unicode categories Ll, Lu, Lo, Lt, and Nl.
- The remaining characters in a name can be letters, decimal digits, underscores, hyphens, or dots. These correspond to Unicode categories Ll, Lu, Lo, Lt, Nl, Mc, Mn, Lm, and Nd.
- The Unicode compatibility characters (X'F900' and above) are not permitted in any part of a name.
- Names must not start with the string XML in any mixture of upper or lowercase.

In addition:

- Names are case-sensitive. For example, ABC, abc, and Abc are three different names.
- Each folder has a separate namespace. As a result, a group or property in one folder does not conflict with a group or property of the same name in another folder.
- Groups and properties occupy the same namespace within a folder. As a result, a property cannot have the same name as a group within the folder containing that property.

Generally, programs that analyze the *RF2NVD* field should ignore properties or groups that have names that the program does not recognize, provided that those properties or groups are correctly formed.

**Data types of properties**: Each property can have an optional data type. If specified, the data type must be one of the following values, in upper, lower, or mixed case:

| Data type | Used for |
|---|---|
| `string` | Any sequence of characters. Certain characters must be specified using escape sequences. |
| `boolean` | The character 0 or 1 (1 denotes TRUE). |
| `bin.hex` | Hexadecimal digits representing octets. |
| `i1` | Integer number in the range -128 through +127, expressed using only decimal digits and optional sign. |
| `i2` | Integer number in the range -32 768 through +32 767, expressed using only decimal digits and optional sign. |
| `i4` | Integer number in the range -2 147 483 648 through +2 147 483 647, expressed using only decimal digits and optional sign. |
| `i8` | Integer number in the range -9 223 372 036 854 775 808 through +9 223 372 036 854 775 807, expressed using only decimal digits and optional sign. |

| Data type | Used for |
|---|---|
| int | Integer number in the range -9 223 372 036 854 775 808 through +9 223 372 036 854 775 807, expressed using only decimal digits and optional sign. This can be used in place of i1, i2, i4, or i8 if the sender does not want to imply a particular precision. |
| r4 | Floating-point number with magnitude in the range 1.175E-37 through 3.402 823 47E+38, expressed using decimal digits, optional sign, optional fractional digits, and optional exponent. |
| r8 | Floating-point number with magnitude in the range 2.225E-307 through 1.797 693 134 862 3E+308 expressed using decimal digits, optional sign, optional fractional digits, and optional exponent. |

**Values of properties**: The value of a property can consist of any characters, except as detailed in the following figure. Each occurrence in the value of a character marked as "mandatory" must be replaced by the corresponding escape sequence. Each occurrence in the value of a character marked as "optional" can be replaced by the corresponding escape sequence, but this is not required.

| Character | Escape sequence | Usage |
|---|---|---|
| & | & | Mandatory |
| < | < | Mandatory |
| > | > | Optional |
| " | " | Optional |
| ' | ' | Optional |

**Note:** The & character at the start of an escape sequence must *not* be replaced by &.

In the following example, the blanks in the value are significant; however, no escape sequences are needed:

```
<Famous_Words>The program displayed "Hello World"</Famous_Words>
```

**RF2NVL (10-digit signed integer)**

Length of *RF2NVD*.

This specifies the length in bytes of the data in the *RF2NVD* field. To avoid problems with data conversion of the data (if any) that *follows* the *RF2NVD* field, *RF2NVL* should be a multiple of four.

**Note:** The *RF2NVL* and *RF2NVD* fields are optional, but if present they must occur as a pair and be adjacent. The pair of fields can be repeated as many times as required, for example:

```
length1 data1 length2 data2 length3 data3
```

Because these fields are optional, they are omitted from the declarations of the structure that are provided for the various programming languages supported.

**RF2SID (4-byte character string)**

Structure identifier.

The value must be:

**RFSIDV**
Identifier for rules and formatting header structure.

The initial value of this field is RFSIDV.

**RF2VER (10-digit signed integer)**

Structure version number.

The value must be:

**RFVER2**
Version-2 rules and formatting header structure.

The initial value of this field is RFVER2.

## Initial values

*Table 609. Initial values of fields in MQRFH2*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *RF2SID* | RFSIDV | 'RFH¬' |
| *RF2VER* | RFVER2 | 2 |
| *RF2LEN* | RFLEN2 | 36 |
| *RF2ENC* | ENNAT | Depends on environment |
| *RF2CSI* | CSINHT | -2 |
| *RF2FMT* | FMNONE | Blanks |
| *RF2FLG* | RFNONE | 0 |
| *RF2NVC* | None | 1208 |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQRFH2 Structure
D*
D* Structure identifier
D  RF2SID                 1      4    INZ('RFH ')
D* Structure version number
D  RF2VER                 5      8I 0 INZ(2)
D* Total length of MQRFH2 including allNameValueLength and
D* NameValueDatafields
D  RF2LEN                 9     12I 0 INZ(36)
D* Numeric encoding of data that followslast NameValueData field
D  RF2ENC                13     16I 0 INZ(273)
D* Character set identifier of data thatfollows last NameValueData field
D  RF2CSI                17     20I 0 INZ(-2)
D* Format name of data that follows lastNameValueData field
D  RF2FMT                21     28    INZ('        ')
D* Flags
D  RF2FLG                29     32I 0 INZ(0)
D* Character set identifier ofNameValueData
D  RF2NVC                33     36I 0 INZ(1208)
```

# MQRMH - Reference message header

The MQRMH structure defines the format of a reference message header.

## Overview

**Purpose**: This header is used with user-written message channel exits to send large amounts of data (called "bulk data" ) from one queue manager to another. The difference compared to normal messaging is that the bulk data is not stored on a queue; instead, only a *reference* to the bulk data is stored on the queue. This reduces the possibility of IBM MQ resources being exhausted by a few large messages.

**Format name**: FMRMH.

**Character set and encoding**: Character data in MQRMH, and the strings addressed by the offset fields, must be in the character set of the local queue manager; this is given by the *CodedCharSetId* queue manager attribute. Numeric data in MQRMH must be in the native machine encoding; this is given by the value of ENNAT for the C programming language.

The character set and encoding of the MQRMH must be set into the *MDCSI* and *MDENC* fields in:

- The MQMD (if the MQRMH structure is at the start of the message data), or
- The header structure that precedes the MQRMH structure (all other cases).

**Usage**: An application puts a message consisting of an MQRMH, but omitting the bulk data. When the message is read from the transmission queue by a message channel agent (MCA), a user-supplied message exit is invoked to process the reference message header. The exit can append to the reference message the bulk data identified by the MQRMH structure, before the MCA sends the message through the channel to the next queue manager.

At the receiving end, a message exit that waits for reference messages should exist. When a reference message is received, the exit should create the object from the bulk data that follows the MQRMH in the message, and then pass on the reference message without the bulk data. The reference message can later be retrieved by an application reading the reference message (without the bulk data) from a queue.

Normally, the MQRMH structure is all that is in the message. However, if the message is on a transmission queue, one or more additional headers will precede the MQRMH structure.

A reference message can also be sent to a distribution list. In this case, the MQDH structure and its related records precede the MQRMH structure when the message is on a transmission queue.

**Note:** A reference message should not be sent as a segmented message, because the message exit cannot process it correctly.


- “Data conversion” on page 1167
- “Fields” on page 1168
- “Initial values” on page 1171
- “RPG declaration” on page 1173


## Data conversion

For data conversion purposes, conversion of the MQRMH structure includes conversion of the source environment data, source object name, destination environment data, and destination object name. Any other bytes within *RMLEN* bytes of the start of the structure are either discarded or have undefined values after data conversion. The bulk data will be converted provided that all of the following are true:

- The bulk data is present in the message when the data conversion is performed.
- The *RMFMT* field in MQRMH has a value other than FMNONE.
- A user-written data-conversion exit exists with the format name specified.

Be aware, however, that typically the bulk data is *not* present in the message when the message is on a queue, and that as a result the bulk data will not be converted by the GMCONV option.

## Fields

The MQRMH structure contains the following fields; the fields are described in **alphabetical order**:

**RMCSI (10-digit signed integer)**

Character set identifier of bulk data.

This specifies the character set identifier of the bulk data; it does not apply to character data in the MQRMH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

**RMDEL (10-digit signed integer)**

Length of destination environment data.

If this field is zero, there is no destination environment data, and *RMDEO* is ignored.

**RMDEO (10-digit signed integer)**

Offset of destination environment data.

This field specifies the offset of the destination environment data from the start of the MQRMH structure. Destination environment data can be specified by the creator of the reference message, if that data is known to the creator. For example, the destination environment data might be the directory path of the object where the bulk data is to be stored. However, if the creator does not know the destination environment data, it is the responsibility of the user-supplied message exit to determine any environment information needed.

The length of the destination environment data is given by *RMDEL* ; if this length is zero, there is no destination environment data, and *RMDEO* is ignored. If present, the destination environment data must reside completely within *RMLEN* bytes from the start of the structure.

Applications should not assume that the destination environment data is contiguous with any of the data addressed by the *RMSEO*, *RMSNO*, and *RMDNO* fields.

The initial value of this field is 0.

**RMDL (10-digit signed integer)**

Length of bulk data.

The *RMDL* field specifies the length of the bulk data referenced by the MQRMH structure.

If the bulk data is present in the message, the data begins at an offset of *RMLEN* bytes from the start of the MQRMH structure. The length of the entire message minus *RMLEN* gives the length of the bulk data present.

If data is present in the message, *RMDL* specifies the amount of that data that is relevant. The normal case is for *RMDL* to have the same value as the length of data present in the message.

If the MQRMH structure represents the remaining data in the object (starting from the specified logical offset), the value zero can be used for *RMDL*, if the bulk data is not present in the message.

If no data is present, the end of MQRMH coincides with the end of the message.

The initial value of this field is 0.

**RMDNL (10-digit signed integer)**

Length of destination object name.

If this field is zero, there is no destination object name, and *RMDNO* is ignored.

**RMDNO (10-digit signed integer)**

Offset of destination object name.

This field specifies the offset of the destination object name from the start of the MQRMH structure. The destination object name can be specified by the creator of the reference message, if that data is known to the creator. However, if the creator does not know the destination object name, it is the responsibility of the user-supplied message exit to identify the object to be created or modified.

The length of the destination object name is given by *RMDNL* ; if this length is zero, there is no destination object name, and *RMDNO* is ignored. If present, the destination object name must reside completely within *RMLEN* bytes from the start of the structure.

Applications should not assume that the destination object name is contiguous with any of the data addressed by the *RMSEO*, *RMSNO*, and *RMDEO* fields.

The initial value of this field is 0.

**RMDO (10-digit signed integer)**

Low offset of bulk data.

This field specifies the low offset of the bulk data from the start of the object of which the bulk data forms part. The offset of the bulk data from the start of the object is called the *logical offset*. This is *not* the physical offset of the bulk data from the start of the MQRMH structure - that offset is given by *RMLEN*.

To allow large objects to be sent using reference messages, the logical offset is divided into two fields, and the actual logical offset is given by the sum of these two fields:

- *RMDO* represents the remainder obtained when the logical offset is divided by 1 000 000 000. It is thus a value in the range 0 through 999 999 999.
- *RMDO2* represents the result obtained when the logical offset is divided by 1 000 000 000. It is thus the number of complete multiples of 1 000 000 000 that exist in the logical offset. The number of multiples is in the range 0 through 999 999 999.

The initial value of this field is 0.

**RMDO2 (10-digit signed integer)**

High offset of bulk data.

This field specifies the high offset of the bulk data from the start of the object of which the bulk data forms part. It is a value in the range 0 through 999 999 999. See *RMDO* for details.

The initial value of this field is 0.

**RMENC (10-digit signed integer)**

Numeric encoding of bulk data.

This specifies the numeric encoding of the bulk data; it does not apply to numeric data in the MQRMH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is ENNAT.

**RMFLG (10-digit signed integer)**

Reference message flags.

The following flags are defined:

**RMLAST**
Reference message contains or represents last part of object.

This flag indicates that the reference message represents or contains the last part of the referenced object.

**RMNLST**
Reference message does not contain or represent last part of object.

RMNLST is defined to aid program documentation. It is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

The initial value of this field is RMNLST.

**RMFMT (8-byte character string)**

Format name of bulk data.

This specifies the format name of the bulk data.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The initial value of this field is FMNONE.

**RMLEN (10-digit signed integer)**

Total length of MQRMH, including strings at end of fixed fields, but not the bulk data.

The initial value of this field is zero.

**RMOII (24-byte bit string)**

Object instance identifier.

This field can be used to identify a specific instance of an object. If it is not needed, it should be set to the following value:

**OIINON**
No object instance identifier specified.

The value is binary zero for the length of the field.

The length of this field is given by LNOIID. The initial value of this field is OIINON.

**RMOT (8-byte character string)**

Object type.

This is a name that can be used by the message exit to recognize types of reference message that it supports. Consider making the name conform to the same rules as the *RMFMT* field.

The initial value of this field is 8 blanks.

**RMSEL (10-digit signed integer)**

Length of source environment data.

If this field is zero, there is no source environment data, and *RMSEO* is ignored.

The initial value of this field is 0.

**RMSEO (10-digit signed integer)**

Offset of source environment data.

This field specifies the offset of the source environment data from the start of the MQRMH structure. Source environment data can be specified by the creator of the reference message, if that data is known to the creator. For example, the source environment data might be the directory path of the object containing the bulk data. However, if the creator does not know the source environment data, it is the responsibility of the user-supplied message exit to determine any environment information needed.

The length of the source environment data is given by *RMSEL* ; if this length is zero, there is no source environment data, and *RMSEO* is ignored. If present, the source environment data must reside completely within *RMLEN* bytes from the start of the structure.

Applications should not assume that the environment data starts immediately after the last fixed field in the structure or that it is contiguous with any of the data addressed by the *RMSNO*, *RMDEO*, and *RMDNO* fields.

The initial value of this field is 0.

**RMSID (4-byte character string)**

Structure identifier.

The value must be:

**RMSIDV**
Identifier for reference message header structure.

The initial value of this field is RMSIDV.

**RMSNL (10-digit signed integer)**

Length of source object name.

If this field is zero, there is no source object name, and *RMSNO* is ignored.

The initial value of this field is 0.

**RMSNO (10-digit signed integer)**

Offset of source object name.

This field specifies the offset of the source object name from the start of the MQRMH structure. The source object name can be specified by the creator of the reference message, if that data is known to the creator. However, if the creator does not know the source object name, it is the responsibility of the user-supplied message exit to identify the object to be accessed.

The length of the source object name is given by *RMSNL* ; if this length is zero, there is no source object name, and *RMSNO* is ignored. If present, the source object name must reside completely within *RMLEN* bytes from the start of the structure.

Applications should not assume that the source object name is contiguous with any of the data addressed by the *RMSEO*, *RMDEO*, and *RMDNO* fields.

The initial value of this field is 0.

**RMVER (10-digit signed integer)**

Structure version number.

The value must be:

**RMVER1**
Version-1 reference message header structure.

The following constant specifies the version number of the current version:

**RMVERC**
Current version of reference message header structure.

The initial value of this field is RMVER1.

## Initial values

*Table 610. Initial values of fields in MQRMH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *RMSID* | RMSIDV | 'RMH¬' |

| *Table 610. Initial values of fields in MQRMH (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *RMVER* | RMVER1 | 1 |
| *RMLEN* | None | 0 |
| *RMENC* | ENNAT | Depends on environment |
| *RMCSI* | CSUNDF | 0 |
| *RMFMT* | FMNONE | Blanks |
| *RMFLG* | RMNLST | 0 |
| *RMOT* | None | Blanks |
| *RMOII* | OIINON | Nulls |
| *RMSEL* | None | 0 |
| *RMSEO* | None | 0 |
| *RMSNL* | None | 0 |
| *RMSNO* | None | 0 |
| *RMDEL* | None | 0 |
| *RMDEO* | None | 0 |
| *RMDNL* | None | 0 |
| *RMDNO* | None | 0 |
| *RMDL* | None | 0 |
| *RMDO* | None | 0 |
| *RMDO2* | None | 0 |
| **Notes:**<br>1. The symbol ¬ represents a single blank character. | | |

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQRMH Structure
D*
D* Structure identifier
D  RMSID                  1      4    INZ('RMH ')
D* Structure version number
D  RMVER                  5      8I 0 INZ(1)
D* Total length of MQRMH, includingstrings at end of fixed fields,but not
D* the bulk data
D  RMLEN                  9     12I 0 INZ(0)
D* Numeric encoding of bulk data
D  RMENC                 13     16I 0 INZ(273)
D* Character set identifier of bulkdata
D  RMCSI                 17     20I 0 INZ(0)
D* Format name of bulk data
D  RMFMT                 21     28    INZ('        ')
D* Reference message flags
D  RMFLG                 29     32I 0 INZ(0)
D* Object type
D  RMOT                  33     40    INZ
D* Object instance identifier
D  RMOII                 41     64    INZ(X'00000000000000-
D                                     0000000000000000000000-
D                                     000000000000')
```

```
     D* Length of source environmentdata
     D  RMSEL                 65     68I 0 INZ(0)
     D* Offset of source environmentdata
     D  RMSEO                 69     72I 0 INZ(0)
     D* Length of source object name
     D  RMSNL                 73     76I 0 INZ(0)
     D* Offset of source object name
     D  RMSNO                 77     80I 0 INZ(0)
     D* Length of destination environmentdata
     D  RMDEL                 81     84I 0 INZ(0)
     D* Offset of destination environmentdata
     D  RMDEO                 85     88I 0 INZ(0)
     D* Length of destination objectname
     D  RMDNL                 89     92I 0 INZ(0)
     D* Offset of destination objectname
     D  RMDNO                 93     96I 0 INZ(0)
     D* Length of bulk data
     D  RMDL                  97    100I 0 INZ(0)
     D* Low offset of bulk data
     D  RMDO                 101    104I 0 INZ(0)
     D* High offset of bulk data
     D  RMDO2                105    108I 0 INZ(0)
```

### RPG declaration

## MQRR - Response record

The MQRR structure is used to receive the completion code and reason code resulting from the open or put operation for a single destination queue, when the destination is a distribution list.

### Overview

**Purpose**: MQRR is an output structure for the MQOPEN, MQPUT, and MQPUT1 calls.

**Character set and encoding**: Data in MQRR must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.

**Usage**: By providing an array of these structures on the MQOPEN and MQPUT calls, or on the MQPUT1 call, it is possible to determine the completion codes and reason codes for all of the queues in a distribution list when the outcome of the call is mixed, that is, when the call succeeds for some queues in the list but fails for others. Reason code RC2136 from the call indicates that the response records (if provided by the application) have been set by the queue manager.


- "Fields" on page 1173
- "Initial values" on page 1174
- "RPG declaration" on page 1174


### Fields

The MQRR structure contains the following fields; the fields are described in **alphabetical order**:

**RRCC (10-digit signed integer)**

Completion code for queue.

This is the completion code resulting from the open or put operation for the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call.

This is always an output field. The initial value of this field is CCOK.

**RRREA (10-digit signed integer)**

Reason code for queue.

This is the reason code resulting from the open or put operation for the queue with the name that was specified by the corresponding element in the array of MQOR structures provided on the MQOPEN or MQPUT1 call.

This is always an output field. The initial value of this field is RCNONE.

### Initial values

| *Table 611. Initial values of fields in MQRR* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *RRCC* | CCOK | 0 |
| *RRREA* | RCNONE | 0 |

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQRR Structure
D*
D* Completion code for queue
D  RRCC                   1      4I 0 INZ(0)
D* Reason code for queue
D  RRREA                  5      8I 0 INZ(0)
```

## MQSCO - SSL configuration options

The MQSCO structure (with the SSL fields in the MQCD structure) allows an application running as an IBM MQ MQI client to specify configuration options that control the use of SSL for the client connection when the channel protocol is TCP/IP.

### Overview

**Purpose**: The structure is an input parameter on the MQCONNX call.

If the channel protocol for the client channel is not TCP/IP, the MQSCO structure is ignored.

**Character set and encoding**: Data in MQSCO must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT.


- "Fields" on page 1174
- "Initial values" on page 1178
- "RPG declaration" on page 1178


### Fields

The MQSCO structure contains the following fields; the fields are described in **alphabetical order**:

**SCAIC (10-digit signed integer)**

This is the number of authentication information (MQAIR) records addressed by the *SCAIP* or *SCAIO* fields. For more information, see"MQAIR - Authentication information record" on page 985. The value must be zero or greater. If the value is not valid, the call fails with reason code RC2383.

This is an input field. The initial value of this field is 0.

**SCAIO (10-digit signed integer)**

This is the offset in bytes of the first authentication information record from the start of the MQSCO structure. The offset can be positive or negative. The field is ignored if *SCAIC* is zero.

You can use either *SCAIO* or *SCAIP* to specify the MQAIR records, but not both; see the description of the *SCAIP* field for details.

This is an input field. The initial value of this field is 0.

**SCAIP (10-digit signed integer)**

This is the address of the first authentication information record. The field is ignored if *SCAIC* is zero.

You can provide the array of MQAIR records in one of two ways:

- By using the pointer field *SCAIP*

  In this case, the application can declare an array of MQAIR records that is separate from the MQSCO structure, and set *SCAIP* to the address of the array.

  Consider using *SCAIP* for programming languages that support the pointer data type in a fashion that is portable to different environments (for example, the C programming language).

- By using the offset field *SCAIO*

  In this case, the application must declare a compound structure containing an MQSCO followed by the array of MQAIR records, and set *SCAIO* to the offset of the first record in the array from the start of the MQSCO structure. Ensure that this value is correct, and has a value that can be accommodated within an MQLONG (the most restrictive programming language is COBOL, for which the valid range is -999 999 999 through +999 999 999).

  Consider using *SCAIO* for programming languages that do not support the pointer data type, or that implement the pointer data type in a fashion that is not portable to different environments (for example, the COBOL programming language).

Whatever technique you choose, only one of *SCAIP* and *SCAIO* can be used; the call fails with reason code RC2384 if both are nonzero.

This is an input field. The initial value of this field is the null pointer in those programming languages that support pointers, and an all-null byte string otherwise.

**Note:** On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

**SCCERLBL (10-digit signed integer)**

This field gives details of the certificate label being used.

IBM MQ initializes the value for the SCCERLBL field as blanks. Either enter the required value, or accept the default value.

`ibmwebspheremq<user_id>` is a valid value for this field for all versions of the product, and for MQSCO versions less than 5.0 it is the only valid value. Therefore the value of this field is interpreted at run time, and changed if necessary. If you specify an MQSCO version less than 5.0, or accept the default value of blanks for the SCCERLBL field, the system uses the value `ibmwebspheremq<user_id>`.

This is an input field.

**SCCERTVPOL (10-digit signed integer)**

This field specifies what type of certificate validation policy is used. The field can be set to one of the following values:

**MQ_CERT_VAL_POLICY_ANY**
Apply each of the certificate validation policies supported by the secure sockets library. Accept the certificate chain if any of the policies considers the certificate chain valid.

**MQ_CERT_VAL_POLICY_RFC5280**
Apply only the RFC5280 compliant certificate validation policy. This setting provides stricter validation than the ANY setting, but rejects some older digital certificates.

The initial value of this field is MQ_CERT_VAL_POLICY_ANY

**SCCH (10-digit signed integer)**

This field gives configuration details for cryptographic hardware connected to the client system.

Set the field to a string in the following format, or leave it blank or null:

```
GSK_PKCS11=<the PKCS #11 driver path and file name>;<the PKCS #11
token label>;<the PKCS #11 token password>;<symmetric cipher setting>;
```

To use cryptographic hardware which conforms to the PKCS11 interface, for example, the IBM 4960 or IBM 4963, specify the PKCS11 driver path, PKCS11 token label, and PKCS11 token password strings, each terminated by a semi-colon.

The PKCS #11 driver path is an absolute path to the shared library providing support for the PKCS #11 card. The PKCS #11 driver file name is the name of the shared library. An example of the value required for the PKCS #11 path and file name is:

```
/usr/lib/pkcs11/PKCS11_API.so
```

The PKCS #11 token label must be entirely in lowercase. If you have configured your hardware with a mixed case or uppercase token label, reconfigure it with this lowercase label.

If no cryptographic hardware configuration is required, set the field to blank or null.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. If the value is not valid, or leads to a failure when used to configure the cryptographic hardware, the call fails with reason code RC2382.

This is an input field. The length of this field is given by LNSSCH. The initial value of this field is blank characters.

**SCEPSUITEB (10-digit signed integer)**

This field Specifies whether Suite B compliant cryptography is used and what level of strength is employed. The value can be one or more of:

- SCEPSUITEB0

  Suite B compliant cryptography is not used.
- SCEPSUITEB1

  Suite B 128-bit strength security is used.
- SCEPSUITEB2

  Suite B 192-bit strength security is used.

**Note:** Using SCEPSUITEB0 with any other value in this field is invalid.

**SCFR (10-digit signed integer)**

IBM MQ can be configured with cryptographic hardware so that the cryptography modules used are those provided by the hardware product; these can be FIPS-certified to a particular level depending on the cryptographic hardware product in use.

Use this field to specify that only FIPS-certified algorithms are used if the cryptography is provided in IBM MQ-provided software.

When IBM MQ is installed an implementation of SSL cryptography is also installed which provides some FIPS-certified modules.

The values can be:

**MQSSL_FIPS_NO**

This is the default value. When set to this value:

- Any CipherSpec supported on a particular platform can be used.

- If run without use of cryptographic hardware, the following CipherSpecs run using FIPS 140-2 certified cryptography on the IBM MQ platforms:
  - TLS_RSA_WITH_3DES_EDE_CBC_SHA
  - TLS_RSA_WITH_AES_128_CBC_SHA
  - TLS_RSA_WITH_AES_256_CBC_SHA

**MQSSL_FIPS_YES**
When set to this value, unless you are using cryptographic hardware to perform the cryptography, you can be sure that

- Only FIPS-certified cryptographic algorithms can be used in the CipherSpec applying to this client connection.
- Inbound and outbound SSL channel connections only succeed if one of the following Cipher Specs are used:
  - TLS_RSA_WITH_3DES_EDE_CBC_SHA
  - TLS_RSA_WITH_AES_128_CBC_SHA
  - TLS_RSA_WITH_AES_256_CBC_SHA

**Notes:**

1. CipherSpec TLS_RSA_WITH_3DES_EDE_CBC_SHA is deprecated.
2. Where possible, if FIPS-only CipherSpecs is configured then the MQI client rejects connections which specify a non-FIPS CipherSpec withRC2393. IBM MQ does not guarantee to reject all such connections and it is your responsibility to determine whether your IBM MQ configuration is FIPS-compliant.

**SCKR (10-digit signed integer)**

This field is relevant only for IBM MQ MQI clients running on UNIX systems and Windows systems. It specifies the location of the key database file in which keys and certificates are stored. The key database file must have a file name of the form `zzz.kdb`, where `zzz` is user-selectable. The *SCKR* field contains the path to this file, along with the file name stem (all characters in the file name up to but not including the final `.kdb`). The `.kdb` file suffix is added automatically.

Each key database file has an associated *password stash file*. This holds encrypted passwords that are used to allow programmatic access to the key database. The password stash file must reside in the same directory and have the same file stem as the key database, and must end with the suffix `.sth`.

For example, if the *SCKR* field has the value `/xxx/yyy/key`, the key database file must be `/xxx/yyy/key.kdb`, and the password stash file must be `/xxx/yyy/key.sth`, where `xxx` and `yyy` represent directory names.

If the value is shorter than the length of the field, terminate the value with a null character, or pad it with blanks to the length of the field. The value is not checked; if there is an error in accessing the key repository, the call fails with reason code RC2381.

To run an SSL connection from an IBM MQ MQI client, set *SCKR* to a valid key database file name.

This is an input field. The length of this field is given by LNSSKR. The initial value of this field is a blank character.

**SCSID (10-digit signed integer)**

This is the structure identifier; the value must be:

**SCSIDV**
Identifier for SSL configuration options structure.

This is always an input field. The initial value of this field is SCSIDV.

**SCVER (10-digit signed integer)**

This is the structure version number; the value must be:

**SCVER1**
Version-1 SSL configuration options structure.

**SCVER2**
Version-2 SSL configuration options structure.

The following constant specifies the version number of the current version:

**SCVERC**
Current version of SSL configuration options structure.

This is always an input field. The initial value of this field is SCVER2

## Initial values

*Table 612. Initial values of fields in MQSCO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *SCSID* | SCSIDV | 'SCO¬' |
| *SCVER* | SCVER5 | 1 |
| *SCKR* | None | Null string or blanks |
| *SCCH* | None | Null string or blanks |
| *SCAIC* | None | 0 |
| *SCAIO* | None | 0 |
| *SCAIP* | None | Null pointer or null bytes |
| *SCKRC* | None | Null pointer or null bytes |
| *SCFR* | None | Null pointer or null bytes |
| *SCEPSUITEB* | None | Null pointer or null bytes |
| *SCCERTVPOL* | None | Null pointer or null bytes |
| *SCCERLBL* | None | Null pointer or null bytes |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. See“RPG declaration” on page 1178for the SCEPSUITEB options.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQSCO Structure
D*
D* Structure identifier
D  SCSID                  1      4    INZ('SCO ')
D* Structure version number
D  SCVER                  5      8I 0 INZ(1)
D* Location of SSL key repository
D  SCKR                   9    264    INZ
D* Cryptographic hardware configuration string
D  SCCH                 265    520    INZ
D* Number of MQAIR records present
D  SCAIC                521    524I 0 INZ(0)
D* Offset of first MQAIR record from start of MQSCO structure
D  SCAIO                525    528I 0 INZ(0)
D* Address of first MQAIR record
D SCAIP                 529    544*   INZ(*NULL)
D* Ver:1 **
D* Number of unencrypted bytes sent/received before secret key is
D* reset
```

```
     D SCKRC                 545    548I 0 INZ(0)
     D* Using FIPS-certified algorithms
     D SCFR                  549    552I 0 INZ(0)
     D* Ver:2 **
     * Use only Suite B cryptographic algorithms
     D SCEPSUITEB0
     D SCEPSUITEB1           553    556I 0 INZ(1)
     D SCEPSUITEB2           557    560I 0 INZ(0)
     D SCEPSUITEB3           561    564I 0 INZ(0)
     D SCEPSUITEB4           565    568I 0 INZ(0)
     D SCEPSUITEB                    10I 0 DIM(4) OVERLAY(SCEPSUITEB0)
     D* Ver:3 **
     D* Certificate validation policy
     D SCCERTVPOL            569    572I 0 INZ(0)
     D* Ver:4 **
```

# MQSD - Subscription descriptor

The MQSD structure is used to specify details about the subscription being made.

## Overview

**Purpose**

The structure is an input/output parameter on the MQSUB call.

**Managed subscriptions**

If an application has no specific need to use a particular queue as the destination for those publications that match its subscription, it can use the managed subscription feature. If an application elects to use a managed subscription, the queue manager informs the subscriber about the destination where published messages are sent, by providing an object handle as an output from the MQSUB call. For more information, see HOBJ (10-digit signed integer) - input/output.

When the subscription is removed, the queue manager also undertakes to clean up messages that have not been retrieved from the managed destination, in the following situations:

- When the subscription is removed - by use of MQCLOSE with CORMSB - and the managed Hobj is closed.
- By implicit means when the connection is lost to an application using a non-durable subscription (SONDUR)
- By expiration when a subscription is removed because it has expired and the managed Hobj is closed.

You must use managed subscriptions with non-durable subscriptions, so that the clean up can occur, and so that messages for closed non-durable subscriptions do not take up space in your queue manager. Durable subscriptions can also use managed destinations.

**Character set and encoding**

Data in MQSD must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT. However, if the application is running as an IBM MQ client, the structure must be in the character set and encoding of the client.


- "Fields" on page 1179
- "Initial values" on page 1191
- "RPG declaration" on page 1192


## Fields

The MQSD structure contains the following fields; the fields are described in alphabetical order:

**SDAID (32 byte character string)**

This value is in the *MDAID* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. *SDAID* is part of the identity context of the message. For more information about message context, see Message context.

For more information about *MDAID* see MDAID.

If the SOSETI option is not specified, the *MDAID* which is set in each message published for this subscription is blanks, as default context information.

If the SOSETI option is specified, the *SDAID* is being generated by the user and this field is an input field which contains the *MDAID* to be set in each publication for this subscription.

The length of this field is given by LNAIDD. The initial value of this field is 32 blank characters.

If altering an existing subscription using the SOALT option, the *SDAID* of any future publication messages can be changed.

On return from an MQSUB call using SORES, this field is set to the current *MDAID* being used for the subscription.

**SDACC (32 byte character string)**

This value is in the *MDACC* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. *MDACC* is part of the identity context of the message. For more information about message context, see Message context.

For more information about *MDACC* see MDACC.

You can use the following special value for the *SDACC* field:

**ACNONE**
No accounting token is specified.

The value is binary zero for the length of the field.

If the SOSETI option is not specified, the accounting token is generated by the queue manager as default context information and this field is an output field which contains the *MDACC* which is set in each message published for this subscription.

If the SOSETI option is specified, the accounting token is being generated by the user and this field is an input field which contains the *MDACC* to be set in each publication for this subscription.

The length of this field is given by LNACCT. The initial value of this field is ACNONE.

If altering an existing subscription using the SOALT option, the value of *MDACC* in any future publication messages can be changed.

On return from an MQSUB call using SORES, this field is set to the current *MDACC* being used for the subscription.

**SDASI (40 byte bit string)**

This is a security identifier that is passed with the *SDAU* to the authorization service to allow appropriate authorization checks to be performed.

*SDASI* is used only if SOALTU is specified, and the *SDAU* field is not entirely blank up to the first null character or the end of the field.

On return from an MQSUB call using SORES, this field is unchanged.

See the description of ODASI in the MQOD data type for more information.

**SDAU (12 byte character string)**

If you specify SOALTU, this field contains an alternate user identifier that is used to check the authorization for the subscription and for output to the destination queue (specified in the *Hobj* parameter of the MQSUB call), in place of the user identifier that the application is currently running under.

If successful, the user identifier specified in this field is recorded as the subscription owning user identifier in place of the user identifier that the application is currently running under.

If SOALTU is specified and this field is entirely blank up to the first null character or the end of the field, the subscription can succeed only if no user authorization is needed to subscribe to this topic with the options specified or the destination queue for output.

If SOALTU is not specified, this field is ignored.

On return from an MQSUB call using SORES, this field is unchanged.

This is an input field. The length of this field is given by LNUID. The initial value of this field is 12 blank characters.

**SDCID (24 byte bit string)**

All publications sent to match this subscription contain this correlation identifier in the message descriptor. If multiple subscriptions use the same queue to get their publications from, using MQGET by correlation ID allows only publications for a specific subscription to be obtained. This correlation identifier can either be generated by the queue manager or by the user.

If the SOSCID option is not specified, the correlation identifier is generated by the queue manager and this field is an output field which contains the correlation identifier which is set in each message published for this subscription.

If the SOSCID option is specified, the correlation identifier is being generated by the user and this field is an input field which contains the correlation identifier to be set in each publication for this subscription. In this case, if the field contains CINONE, the correlation identifier which is set in each message published for this subscription is the correlation identifier that was created by the original put of the message.

If the SOGRP option is specified and the correlation identifier specified is the same as an existing grouped subscription using the same queue and an overlapping topic string, only the most significant subscription in the group is provided with a copy of the publication.

The length of this field is given by LNCID. The initial value of this field is CINONE.

If altering an existing subscription using the SOALT option, and this field is an input field, then the subscription correlation ID can be changed, unless the subscription has been created using the SOGRP option.

On return from an MQSUB call using SORES, this field is set to the current correlation ID for the subscription.

**SDEXP (10 digit signed integer)**

This is the time expressed in tenths of a second after which the subscription expires. No more publications will match this subscription after this interval has passed. This is also used as the value in the *MDEXP* field in the MQMD of the publications sent to this subscriber.

The following special value is recognized:

**EIULIM**
The subscription has an unlimited expiration time.

If altering an existing subscription using the SOALT option, the expiry of the subscription can be changed.

On return from an MQSUB call using the SORES option this field is set to the original expiry of the subscription and not the remaining expiry time.

**SDON (48 byte character string)**

This is the name of the topic object as defined on the local queue manager.

The name can contain the following characters:

- Uppercase alphabetic characters (A through Z)
- Lowercase alphabetic characters (a through z)
- Numeric digits (0 through 9)

- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but can contain trailing blanks. Use a null character to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply:

- On systems that use EBCDIC Katakana, lowercase characters cannot be used.
- Names containing lowercase characters, forward slash, or percent, must be enclosed in quotation marks when specified on commands. These quotation marks must not be specified for names that occur as fields in structures or as parameters on calls.

The *SDON* is used to form the Full topic name.

The full topic name can be built from two different fields: *SDON* and *SDOS*. For details of how these two fields are used, see "Using topic strings" on page 560.

On return from an MQSUB call using the S0RES option this field is unchanged.

The length of this field is given by LNTOPN. The initial value of this field is 48 blank characters.

If altering an existing subscription using the SDALT option, the name of the topic object subscribed to cannot be changed. This field and *SDOS* can be omitted. If they are provided they must resolve to the same full topic name or the call fails with RC2510 .

**SDOPT (10 digit signed integer)**

You must specify at least one of the following options:

- S0ALT
- S0RES
- S0CRT

The values can be added. Do not add the same constant more than once. The table shows how you can combine these options: Combinations that are not valid are noted; any other combinations are valid.

**Access or creation options**

Access and creation options control whether a subscription is created, or whether an existing subscription is returned or altered. You must specify at least one of these options. The table displays valid combinations of access or creation options.

| Combination of options | Notes |
|---|---|
| SOCRT | Creates a subscription if one does not exist; fails if the subscription exists. |
| SORES | Resumes an existing subscription, fails if no subscription exists. |
| SOCRT + SORES | Creates a subscription if one does not exist and resumes a matching one, if it does exist. Useful combination if used in an application that might be run a number of times. |
| SORES + SOALT (see note) | Resumes an existing subscription, altering any fields to match those specified in the MQSD, fails if no subscription exists. |
| SOCRT + SOALT (see note) | Creates a subscription if one does not exist and resumes a matching one, if it does exist, altering any fields to match those specified in the MQSD. Useful combination if used in an application that wants to ensure that its subscription is in a certain state before proceeding. |

**Note:**

Options specifying SOALT can also specify SORES, but this combination has no additional effect to specifying SOALT alone. SOALT implies SORES, because calling MQSUB to alter a subscription implies that the subscriptions are also resumed. The opposite is not true, however: resuming a subscription does not imply it is to be altered.

**SOCRT**

Create a subscription for the topic specified. If a subscription using the same *SDSN* exists, the call fails with RC2432 . This failure can be avoided by combining the SOCRT option with SORES. The *SDSN* is not always necessary. For more details, see the description of that field.

Combining SOCRT with SORES first checks whether there is an existing subscription for the specified *SDSN*, and if there is returns a handle to that preexisting subscription; but if there is no existing subscription, a new one is created using all the fields provided in the MQSD.

SOCRT can also be combined with SOALT to similar effect (see details about SOALT later in this topic).

**SORES**

Return a handle to a preexisting subscription which matches those specified by *SDSN*. No changes are made to the matching subscription attributes, and they are returned on output in the MQSD structure. Most of the contents of the MQSD are not used: The fields used are *SDSID*, *SDVER*, *SDOPT*, *SDAID* and *SDASI*, and *SDSN*.

The call fails with reason code RC2428 if a subscription does not exist matching the full subscription name. This failure can be avoided by combining the SOCRT option with SORES. For details about SOCRT, see SOCRT.

The user ID of the subscription is the user ID that created the subscription, or if it has been later altered by a different user ID, it is the user ID of the most recent, successful alteration. If an *SDAID* is used, and use of alternate user IDs is allowed for that user, *SDAID* is recorded as the user ID that created the subscription instead of the user ID under which the subscription was made.

The user ID that created the subscription is recorded as *SDAU* if that field is used, and the use of alternate user IDs is allowed for that user.

If a matching subscription exists which was created without the SOAUID option and the user ID of the subscription is different from that of the application requesting a handle to the subscription, the call fails with reason code RC2434 .

If a matching subscription exists and is currently in use by another application, the call fails with reason code RC2429 . If it is currently in use by the same connection, the call does not fail and a handle to the subscription is returned.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call fails with RC2523 .

SORES is implied by SOALT and so is not required to be combined with that option, however, it is not an error if those two options are combined.

**SOALT**

Return a handle to a preexisting subscription with the full subscription name matching those specified in *SDSN*. Any attributes of the subscription that are different from those specified in the MQSD is altered in the subscription unless alteration is disallowed for that attribute. Details are noted in the description of each attribute and are summarized in the following table. If you try to alter an attribute that cannot be changed, the call fails with the reason code shown in the following table.

The call fails with reason code RC2428 if a subscription does not exist matching the full subscription name. This failure can be avoided by combining the SOCRT option with SOALT.

Combining SOCRT with SOALT first checks whether there is an existing subscription for the specified full subscription name, and if there is returns a handle to that preexisting subscription with alterations made as previously detailed; but if there is no existing subscription, a new one is created using all the fields provided in the MQSD.

The user ID of the subscription is the user ID that created the subscription, or if it has been later altered by a different user ID, it is the user ID of the most recent successful alteration. If *SDAU* is used (and use of alternate user IDs is allowed for that user), then the alternate user ID is recorded as the user ID that created the subscription instead of the user ID under which the subscription was made.

If a matching subscription exists that was created without the option SOAUID and the user ID of the subscription is different from that of the application requesting a handle to the subscription, the call fails with reason code RC2434 .

If a matching subscription exists and is currently in use by another application, the call fails with RC2429 . If it is currently in use by the same connection the call does not fail and a handle to the subscription is returned.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call fails with RC2523 .

The following tables show the subscription attributes that can be altered by SOALT.

| Data type descriptor or function call | Field name | Can this attribute be altered using SOALT? | Reason Code |
|---|---|---|---|
| MQSD | Durability options | No | RC2509 |
| MQSD | Destination Options | Yes | None |
| MQSD | Registration options | Yes (see note 1 ) | RC2515 if you try to alter SOGRP |
| MQSD | Publication options | Yes (see note 2 ) | None |
| MQSD | Wildcard options | No | RC2510 |
| MQSD | Other options | No (see note 3 ) | None |
| MQSD | ObjectName | No | RC2510 |
| MQSD | SDAU | No (see note 4 ) | None |
| MQSD | SDASI | No (see note 4 ) | None |
| MQSD | SDEXP | Yes | None |
| MQSD | SDOS | No | RC2510 |
| MQSD | SDSN | No (see note 5 ) | None |
| MQSD | SDSUD | Yes | None |
| MQSD | SDCID | Yes (see note 6 ) | RC2515 when in a grouped subscription |
| MQSD | SDPRI | Yes | None |
| MQSD | SDACC | Yes | None |
| MQSD | SDAID | Yes | None |
| MQSD | SDSL | No | RC2512 |
| MQSUB | Hobj | Yes (see note 6 ) | RC2515 when in a grouped subscription |

**Notes:**

1. SOGRP cannot be altered.
2. SONEWP cannot be altered because it is not part of the subscription
3. These options are not part of the subscription
4. This attribute is not part of the subscription
5. This attribute is the identity of the subscription being altered
6. Alterable except when part of a grouped sub ( SOGRP )

**Durability options**: The following options control how durable the subscription is. You can specify only one of these options. If you are altering an existing subscription using the SOALT option, you cannot change the durability of the subscription. On return from an MQSUB call using SORES, the appropriate durability option is set.

**SODUR**

Request that the subscription to this topic remains until it is explicitly removed using MQCLOSE with the CORMSB option. If this subscription is not explicitly removed it will remain even after this application connects to the queue manager is closed.

If a durable subscription is requested to a topic that is defined as not allowing durable subscriptions, the call fails with RC2436 .

**SONDUR**

Request that the subscription to this topic is removed when the application connection to the queue manager is closed, if it has not already been explicitly removed. SONDUR is the opposite of the SODUR option, and is defined to aid program documentation. It is the default if neither is specified.

**Destination options**: The following options control the destination that publications for a topic that has been subscribed to are sent to. If altering an existing subscription using the SOALT option, the destination used for publications for the subscription can be changed. On return from an MQSUB call using SORES, this option is set if appropriate.

**SOMAN**

Request that the destination that the publications are sent to is managed by the queue manager.

The object handle returned in *HOBJ* represents a queue manager managed queue, and is for use with subsequent MQGET, MQCB, MQINQ, or MQCLOSE calls.

An object handle returned from a previous MQSUB call cannot be provided in the *Hobj* parameter when SOMAN is not specified.

**Registration options**: The following options control the details of the registration that is made to the queue manager for this subscription. If altering an existing subscription using the SOALT option, these registration options can be changed. On return from an MQSUB call using SORES the appropriate registration options is set.

**SOGRP**

This subscription is grouped with other subscriptions of the same *SDSL* using the same queue and specifying the same correlation ID so that any publications to topics that would cause more than one publication message to be provided to the group of subscriptions, due to an overlapping set of topic strings being used, only causes one message to be delivered to the queue. If this option is not used, then each unique subscription (identified by *SDSN*) that matches is provided with a copy of the publication which might mean that more than one copy of the publication might be placed on the queue shared by a number of subscriptions.

Only the most significant subscription in the group is provided with a copy of the publication. The most significant subscription is based on the Full topic name up to the point where a wildcard is found. If a mixture of wildcard schemes is used within the group, only the position of the wildcard is important. You are advised not to combine different wildcard schemes within a group of subscriptions that share the same queue.

When creating a new grouped subscription it must still have a unique *SDSN*, but if it matches the full topic name of an existing subscription in the group, the call fails with RC2514 .

If the most significant subscription in group also specifies SONOLC and this is a publication from the same application, then no publication is delivered to the queue.

When altering a subscription made with this option, the fields which imply the grouping, *Hobj* on the MQSUB call (representing the queue and queue manager name), and the *SDCID* cannot be changed. Attempting to alter them causes the call to fail with RC2515 .

This option must be combined with SOSCID with a *SDCID* that is not set to CINONE, and cannot be combined with SOMAN.

**SOAUID**

When SOAUID is specified, the identity of the subscriber is not restricted to a single user ID. This allows any user to alter or resume the subscription when they have suitable authority. Only a single user can have the subscription at any one time. An attempt to resume use of a subscription currently in use by another application causes the call to fail with RC2429 .

To add this option to an existing subscription, the MQSUB call, using SOALT, must come from the same user ID as the original subscription itself.

If an MQSUB call references an existing subscription with SOAUID set, and the user ID differs from the original subscription, the call succeeds only if the new user ID has authority to subscribe to the topic. On successful completion, future publications to this subscriber are put to the subscriber's queue with the new user ID set in the publication message.

Do not specify both SOAUID and SOFUID. If neither is specified, the default is SOFUID.

**SOFUID**

When SOFUID is specified, the subscription can be altered or resumed by only the last user ID to alter the subscription. If the subscription has not been altered, it is the user ID that created the subscription.

If an MQSUB verb references an existing subscription with SOAUID set and alters the subscription using SOALT to use the SOFUID, the user ID of the subscription is now fixed at this new user ID. The call succeeds only if the new user ID has authority to subscribe to the topic.

If a user ID other than the one recorded as owning a subscription tries to resume or alter an SOFUID subscription, the call fails with RC2434 . The owning user ID of a subscription can be viewed using the **DISPLAY SBSTATUS** command.

Do not specify both SOAUID and SOFUID. If neither is specified, the default is SOFUID.

**Publication options**: The following options control the way publications are sent to this subscriber. If altering an existing subscription using the SOALT option, these publication options can be changed.

**SONOLC**
Tells the broker that the application does not want to see any of its own publications. Publications are considered to have originated from the same application if the connection handles are the same. On return from an MQSUB call using SORES this option is set if appropriate.

**SONEWP**
No currently retained publications are to be sent, when this subscription is created, only new publications. This option only applies when SOCRE is specified. Any subsequent changes to a subscription do not alter the flow of publications and so any publications that have been retained on a topic, has already been sent to the subscriber as new publications.

If this option is specified without SOCRE it causes the call to fail with RC2046 . On return from an MQSUB call using SORES this option is not set even if the subscription was created using this option.

If this option is not used, previously retained messages are sent to the destination queue provided. If this action fails due to an error, either RC2525 or RC2526 , the creation of the subscription fails.

This option is not valid in combination with SOPUBR.

**SOPUBR**

Setting this option indicates that the subscriber requests information specifically when required. The queue manager does not send unsolicited messages to the subscriber. The retained publication (or possibly multiple publications if a wildcard is specified in the topic) is sent to the subscriber each time an MQSUBRQ call is made using the Hsub handle from a previous MQSUB call. No publications are sent as a result of the MQSUB call using this option. On return from an MQSUB call using SORES this option is set if appropriate.

This option is not valid in combination with SONEWP.

**Wildcard options**: The following options control how wildcards are interpreted in the string provided in the *SDOS* field of the MQSD. You can specify only one of these options. If altering an existing subscription using the SOALT option, these wildcard options cannot be changed. On return from an MQSUB call using SORES the appropriate wildcard option is set.

**SOWCHR**

Wildcards only operate on characters within the topic string. The SOWCHR field treats forward slash (/) as just another character with no special significance.

The behavior defined by SOWCHR is shown in the following table:

| Special Character | Behavior |
|---|---|
| * | Wildcard, zero or more characters |
| ? | Wildcard, one character |
| % | Escape character to allow the characters '*', '?', or '%' to be used in a string and not be interpreted as a special character, for example, '%*', '%?' or '%%'. |

For example, publishing on the following topic:

```
/level0/level1/level2/level3/level4
```

matches subscribers using the following topics:

```
*
/*
/ level0/level1/level2/level3/*
/ level0/level1/*/level3/level4
/ level0/level1/le?el2/level3/level4
```

**Note:** This use of wildcards supplies exactly the meaning provided in IBM MQ V6 and WebSphere MB V6 when using MQRFH1 formatted messages for Publish/Subscribe. It is recommended that this is not used for newly written applications and is only used for applications that were previously running against that version and have not been changed to use the default wildcard behavior as described in SOWTOP.

**SOWTOP**

Wildcards only operate on topic elements within the topic string. This is the default behavior if none is chosen.

The behavior required by SOWTOP is shown in the following table:

| Special Character | Behavior |
|---|---|
| / | Topic level separator |
| # | Wildcard: multiple topic level |

| Special Character | Behavior |
|---|---|
| + | Wildcard: single topic level |

**Note:**

The '+' and '#' are not treated as wildcards if they are mixed in with other characters (including themselves) within a topic level. In the following string, the '#' and '+' characters are treated as ordinary characters.

```
level0/level1/#+/level3/level#
```

For example, publishing on the following topic:

```
/level0/level1/level2/level3/level4
```

matches subscribers using the following topics:

```
#
/#
/ level0/level1/level2/level3/#
/ level0/level1/+/level3/level4
```

**Note:** This use of wildcards supplies the meaning provided in WebSphere Message Broker Version 6 when using MQRFH2 formatted messages for Publish/Subscribe.

**Other options**: The following options control the way the API call is issued rather than the subscription. On return from an MQSUB call using S0RES these options are unchanged.

**SOALTU**
The SDAU field contains a user identifier to use to validate this MQSUB call. The call can succeed only if this SDAU is authorized to open the object with the specified access options, regardless of whether the user identifier under which the application is running is authorized to do so.

**SOSCID**
The subscription is to use the correlation identifier supplied in the *SDCID* field. If this option is not specified, a correlation identifier is automatically created by the queue manager at subscription time and is returned to the application in the *SDCID* field. See SDCID (24-byte bit string)SDCID for more information.

**SOSETI**

The subscription is to use the accounting token and application identity data supplied in the *SDACC* and *SDAID* fields.

If this option is specified, the same authorization check is carried out as if the destination queue was accessed using an MQOPEN call with 00SETI, except in the case where the S0MAN option is also used in which case there is no authorization check on the destination queue.

If this option is not specified, the publications sent to this subscriber has default context information associated with them as follows:

| Field in MQMD | Value used |
|---|---|
| *MDUID* | The user ID associated with the subscription at the time the subscription was made. |
| *MDACC* | Determined from the environment if possible; Set to ACNONE if not. |
| *MDAID* | Set to blanks |

This option is only valid with SOCRE and SOALT. If used with SORES, the *SDACC* and *SDAID* fields are ignored, so this option has no effect.

If a subscription is altered without using this option where previously the subscription had supplied identity context information, default context information is generated for the altered subscription.

If a subscription allowing different user IDs to use it with option SOAUID, is resumed by a different user ID, default identity context is generated for the new user ID now owning the subscription and any subsequent publications are delivered containing the new identity context.

**SOFIQ**
The MQSUB call fails if the queue manager is in quiescing state. On z/OS, for a CICS or IMS application, this option also forces the MQSUB call to fail if the connection is in quiescing state.

**SDAU (12 byte character string)**

If you specify SOALTU, this field contains an alternate user identifier that is used to check the authorization for the subscription and for output to the destination queue (specified in the *Hobj* parameter of the MQSUB call), in place of the user identifier that the application is currently running under.

If successful, the user identifier specified in this field is recorded as the subscription owning user identifier in place of the user identifier that the application is currently running under.

If SOALTU is specified and this field is entirely blank up to the first null character or the end of the field, the subscription can succeed only if no user authorization is must subscribe to this topic with the options specified or the destination queue for output.

If SOALTU is not specified, this field is ignored.

On return from an MQSUB call using SORES, this field is unchanged.

This is an input field. The length of this field is given by LNUID. The initial value of this field is 12 blank characters.

**SDPRI (10 digit signed integer)**

This is the value that is in the *MQPRI* field of the Message Descriptor (MQMD) of all publication messages matching this subscription. For more information about the *MQPRI* field in the MQMD, see MDPRI.

The value must be greater than or equal to zero; zero is the lowest priority. The following special values can also be used:

**PRQDEF**

When a subscription queue is provided in the Hobj field in the MQSUB call, and is not a managed handle, then the priority for the message is taken from the *DefPriority* attribute of this queue. If the queue so identified is a cluster queue or there is more than one definition in the queue-name resolution path then the priority is determined when the publication message is put to the queue as described for MDPRI.

If the MQSUB call uses a managed handle, the priority for the message is taken from the *DefPriority* attribute of the model queue associated with the topic subscribed to.

**PRPUB**
The priority for the message is the priority of the original publication. This is the initial value of the field.

If altering an existing subscription using the SOALT option, the *MQPRI* of any future publication messages can be changed.

On return from an MQSUB call using SORES, this field is set to the current priority being used for the subscription.

**SDRO (MQCHARV)**

SDRO is the long object name after the queue manager resolves the name provided in *SDON*.

If the long object name is provided in *SDOS* and nothing is provided in *SDON*, the value returned in this field is the same as provided in *SDOS*.

If this field is omitted (that is SDRO.VSBufSize is zero), the *SDRO* is not returned, but the length is returned in SDRO.VSLength. If the length is shorter than the full *SDRO*, it is truncated and returns as many of the rightmost characters as can fit in the provided length.

If *SDRO* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2520 .

**SDSID (4 byte character string)**

This is the structure identifier; the value must be:

**SDSIDV**
Identifier for Subscription Descriptor structure.

This is always an input field. The initial value of this field is SDSIDV

**SDSL (10 digit signed integer)**

This is the level associated with the subscription. Publications are only delivered to this subscription if it is in the set of subscriptions with the highest *SDSL* value less than or equal to the PubLevel used at publication time.

The value must be in the range zero to 9. Zero is the lowest level.

The initial value of this field is 1.

If altering an existing subscription using the SOALT option, then *SDSL* cannot be changed.

**SDSN (MQCHARV)**

SDSN specifies the subscription name.

This field is required only if *SDOPT* specifies the SODUR option, but if it is provided it is used by the queue manager for SONDUR as well. If specified, *SDSN* must be unique within the queue manager, because it is the field used to identify subscriptions.

The maximum length of *SDSN* is 10240.

This field serves two purposes. For a SODUR subscription, it is the means by which you identify a subscription to resume it after it has been created, if you have either closed the handle to the subscription (using the COKPSB option) or have been disconnected from the queue manager. Identifying a subscription to remove it after it has been created is done using the MQSUB call with the SORES option. The SDSN field is also displayed in the administration view of subscriptions in the *SDSN* field in DISPLAY SBSTATUS.

If *SDSN* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, or if it is omitted when it is required (that is *SDSN*. *VCHRL* is zero), or if it exceeds the maximum length, the call fails with reason code RC2440 .

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

If altering an existing subscription using the SOALT option, the subscription name cannot be changed, because it is the field used to identify the subscription. It is not changed on output from an MQSUB call with the SORES option.

**SDSS (MQCHARV)**

SDSS is the string that provides the selection criteria used when subscribing for messages from a topic.

This variable length field is returned on output from an MQSUB call using the SORES option, if a buffer is provided, and if there is also a positive buffer length in VSBufSize. If no buffer is provided

on the call, only the length of the selection string is returned in the VSLength field of the MQCHARV. If the buffer provided is smaller than the space required to return the field, only VSBufSize bytes are returned in the provided buffer.

If *SDSS* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2519 .

**SDSUD (MQCHARV)**

The data provided on the subscription in this field is included as the mq.SubUserData message property of every publication sent to this subscription.

The maximum length of *SDSUD* is 10240.

If *SDSUD* is specified incorrectly, according to the description of how to use the MQCHARV structure, or if it exceeds the maximum length, the call fails with reason code RC2431.

This is an input field. The initial values of the fields in this structure are the same as those in the MQCHARV structure.

If altering an existing subscription using the S0ALT option, the subscription user data can be changed.

This variable length field is returned on output from an MQSUB call using the S0RES option, if a buffer is provided and there is a positive buffer length in *VSBufLen*. If no buffer is provided on the call, only the length of the subscription user data is returned in the *VCHRL* field of the MQCHARV. If the buffer provided is smaller than the space required to return the field, only *VSBufLen* bytes are returned in the provided buffer.

**SDVER (10 digit signed integer)**

This is the structure version number; the value must be:

**SDVER1**
Version-1 Subscription Descriptor structure.

The following constant specifies the version number of the current version:

**SDVERC**
Current version of Subscription Descriptor structure.

This is always an input field. The initial value of the field is SDVER1.

## Initial values

| Field name | Name of constant | Value of constant |
|---|---|---|
| *SDSID* | SDSIDV | 'SD¬¬' |
| *SDVER* | SDVER1 | 1 |
| *SDOPT* | SONDUR | 0 |
| *SDON* | None | Blanks |
| *SDAU* | None | Blanks |
| *SDASI* | SINONE | Nulls |
| *SDEXP* | EIULIM | -1 |
| *SDOS* | Names and values as defined for MQCHARV | |
| *SDSN* | Names and values as defined for MQCHARV | |
| *SDSUD* | Names and values as defined for MQCHARV | |

| Field name | Name of constant | Value of constant |
|---|---|---|
| *SDCID* | CINONE | Nulls |
| *SDPRI* | PRQDEF | -3 |
| *SDACC* | ACNONE | Nulls |
| *SDAID* | None | Blanks |
| *SDSL* | None | 1 |
| *SDRO* | Names and values as defined in MQCHARV | |

**Note:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQSD Structure
D*
D* Structure identifier
D  SDSID                  1      4
D* Structure version number
D  SDVER                  5      8I 0
D* Options associated with subscribing
D  SDOPT                  9     12I 0
D* Object name
D  SDON                  13     60
D* Alternate user identifier
D  SDAU                  61     72
D* Alternate security identifier
D  SDASI                 73    112
D* Expiry of Subscription
D  SDEXP                113    116I 0
D* Object Long name
D SDOSP                 117    132*
D SDOSO                 133    136I 0
D SDOSS                 137    140I 0
D SDOSL                 141    144I 0
D SDOSC                 145    148I 0
D* Subscription name
D SDSNP                 149    164*
D SDSNO                 165    168I 0
D SDSNS                 169    172I 0
D SDSNL                 173    176I 0
D SDSNC                 177    180I 0
D* Subscription User data
D SDSUDP                181    196*
D SDSUDO                197    200I 0
D SDSUDS                201    204I 0
D SDSUDL                205    208I 0
D SDSUDC                209    212I 0
D* Correlation Id related to this subscription
D SDCID                 213    236
D* Priority set in publications
D SDPRI                 237    240I 0
D* Accounting Token set in publications
D SDACC                 241    272
D* Appl Identity Data set in publications
D SDAID                 273    304
D* Message Selector
D SDSSP                 305    320*
D SDSSO                 321    324I 0
D SDSSS                 325    328I 0
D SDSSL                 329    332I 0
D SDSSC                 333    336
D* Subscription level
D SDSL                  337    340  0
D* Resolved Long object name
D SDROP                 341    356*
D SDROO                 357    360I 0
```

```
D SDROS                 361    364I 0
D SDROL                 365    368I 0
D SDROC                 369    372I 0
```

## MQSMPO - Set message property options

The **MQSMPO** structure allows applications to specify options that control how properties of messages are set.

### Overview

**Purpose**: The structure is an input parameter on the **MQSETMP** call.

**Character set and encoding**: Data in **MQSMPO** must be in the character set of the application and encoding of the application (ENNAT).


- "Fields" on page 1193
- "Initial values" on page 1194
- "RPG declaration" on page 1194


### Fields

The MQSMPO structure contains the following fields; the fields are described in **alphabetical order**:

**SPOPT (10-digit signed integer)**

**Location options:** The following options relate to the relative location of the property compared to the property cursor:

**SPSETF**
Sets the value of the first property that matches the specified name, or if it does not exist, adds a new property after all other properties with a matching hierarchy.

**SPSETC**
Sets the value of the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired using either the IPINQF or the IPINQN option.

The property cursor is reset when the message handle is reused, or when the message handle is specified in the *HMSG* field of the MQGMO structure on an MQGET call or the MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established or if the property pointed to by the property cursor has been deleted, the call fails with completion code CCFAIL and reason code RC2471.

**SPSETA**
Sets a new property after the property pointed to by the property cursor. The property pointed to by the property cursor is the one that was last inquired using either the IPINQF or the IPINQO option.

The property cursor is reset when the message handle is reused, or when the message handle is specified in the *HMSG* field of the MQGMO structure on an MQGET call or the MQPMO structure on an MQPUT call.

If this option is used when the property cursor has not yet been established or if the property pointed to by the property cursor has been deleted, the call fails with completion code CCFAIL and reason code RC2471.

If you need none of the options described, use the following option:

**SPNONE**
No options specified.

This is always an input field. The initial value of this field is SPSETF.

**SPSID (10-digit signed integer)**

This is the structure identifier; the value must be:

**SPSIDV**

Identifier for set message property options structure.

This is always an input field. The initial value of this field is **SPSIDV**.

**SPVAKCSI (10-digit signed integer)**

The character set of the property value to be set if the value is a character string.

This is always an input field. The initial value of this field is **CSAPL**.

**SPVALENC (10-digit signed integer)**

The encoding of the property value to be set if the value is numeric.

This is always an input field. The initial value of this field is **ENNAT**.

**SPVER (10-digit signed integer)**

This is the structure version number; the value must be:

**SPVER1**
Version-1 set message property options structure.

The following constant specifies the version number of the current version:

**SPVERC**
Current version of set message property options structure.

This is always an input field. The initial value of this field is **SPVER1**.

## Initial values

*Table 613. Initial values of fields in MQSMPO*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *SPSID* | SPSIDV | 'SMPO' |
| *SPVER* | SPVER1 | 1 |
| *SPOPT* | SPNONE | 0 |
| *SPVALENC* | ENNAT | Depends on environment |
| *SPVALCSI* | CSAPL | -3 |

## RPG declaration

```
D* MQSMPO Structure
D*
D*
D* Structure identifier
D  SPSID                  1      4    INZ('SMPO')
D*
D* Structure version number
D  SPVER                  5      8I 0 INZ(1)
D*
** Options that control the action of
D* MQSETMP
D  SPOPT                  9     12I 0 INZ(0)
D*
D* Encoding of Value
D  SPVALENC              13     16I 0 INZ(273)
D*
```

```
     D* Character set identifier of Value
     D  SPVALCSI             17     20I 0 INZ(-3)
```

## MQSRO - Subscription Request Options

The MQSRO structure allows the application to specify options that control how a subscription request is made.

### Overview

**Purpose**: The structure is an input/output parameter on the MQSUBRQ call.

**Version**: The current version of MQSRO is SRVER1.


- "Fields" on page 1195
- "Initial values" on page 1196
- "RPG declaration" on page 1196


### Fields

The MQSRO structure contains the following fields; the fields are described in **alphabetical order**:

**SRNMP (10-digit signed integer)**

This is an output field, returned to the application to indicate the number of publications sent to the subscription queue as a result of this call. Although this number of publications have been sent as a result of this call, there is no guarantee that this many messages will be available for the application to get, especially if they are non-persistent messages.

There may be more than one publication if the topic subscribed to, contained a wildcard. If no wildcards were present in the topic string when the subscription represented by *HSUB* was created, then at most one publication is sent as a result of this call.

**SROPT (10-digit signed integer)**

One of the following options must be specified. Only one option can be specified.

**Other options:** The following option controls what happens when the queue manager is quiescing:

**SRFIQ**

The MQSUBRQ call fails if the queue manager is in the quiescing state.

**Default option:** If the option described previously is not required, the following option must be used:

**SRNONE**

Use this value to indicate that no other options have been specified; all options assume their default values.

SRNONE helps program documentation. Although it is not intended that this option be used with any other, because its value is zero, this use cannot be detected.

**SRSID (4-byte character string)**

This is the structure identifier; the value must be:

**SRSIDV**
Identifier for Subscription Request SROPT structure.

This is always an input field. The initial value of this field is SRSIDV.

**SRVER (10-digit signed integer)**

This is the structure version number; the value must be:

**SRVER1**
Version-1 Subscription Request Options structure.

The following constant specifies the version number of the current version:

**SRVERC**
Current version of Subscription Request Options structure.

This is always an input field. The initial value of this field is SRVER1.

### Initial values

| Field name | Name of constant | Value of constant |
|---|---|---|
| *SRSID* | SRSIDV | 'SRO¬' |
| *SRVER* | SRVER1 | 1 |
| *SROPT* | SRNONE | 0 |
| *SRNMP* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQSRO Structure
D*
D* Structure identifier
D  SRSID                  1      4
D* Structure version number
D  SRVER                  5      8I 0
D* Options that control the action of MQSUBRQ
D  SROPT                  9     12I 0
D* Number of publications sent
D  SRNMP                 13     16I 0
```

## MQSTS - Status reporting structure

The MQSTS structure describes the data in the status structure returned by the MQSTAT command.

### Overview

**Character set and encoding**: Character data in MQSTS is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue-manager attribute. Numeric data in MQSTS is in the native machine encoding; this is given by *ENNAT*.

**Usage**: The MQSTAT command is used to retrieve status information. This information is returned in an MQSTS structure. For information about MQSTAT, see "MQSTAT - Retrieve status information" on page 1325.


- "Fields" on page 1196
- "Initial values" on page 1200
- "RPG declaration" on page 1200


### Fields

The MQSTS structure contains the following fields; the fields are described in **alphabetical order**:

**STSCC (10-digit signed integer)**

This is the completion code resulting from the first error reported in the MQSTS structure.

This is always an output field. The initial value of this field is CCOK.

**STSFC (10-digit signed integer)**

This is the number of asynchronous put calls that failed.

This is an output field. The initial value of this field is 0.

**STSOBJN (48-byte character string)**

This is the local name of the object involved in the first failure.

This is an output field. The initial value of this field is 48 blank characters.

**STSOQMGR (48-byte character string)**

This is the name of the queue manager on which the *STSOBJN* object is defined. A name that is entirely blank up to the first null character or the end of the field denotes the queue manager to which the application is connected (the local queue manager).

This is an output field. The initial value of this field is 48 blank characters.

**STSOO (10-digit signed integer)**

The STSOO used to open the object being reported upon. Present only in Version 2 of MQSTS or higher.

The value of STSOO depends on the value of the MQSTAT STYPE parameter.

**STATAPT**

Zero.

**STATREC**

Zero.

**STATRER**

The STSOO used when the failure occurred. The reason for the failure is reported in the *STSCC* and *STSRC* fields in the MQSTS structure.

STSOO is an output field. Its initial value is zero.

**STSOS (MQCHARV)**

Long object name of failing object being reported on. Present only in Version 2 of MQSTS or higher.

STSOS is a MQCHARV field with a maximum length of 10240. See MQCHARV for a description of how to use the MQCHARV structure.

The interpretation of STSOS depends on the value of the MQSTAT STYPE parameter.

**STATAPT**

This is the long object name of the queue or topic used in the MQPUT operation, which failed.

**STATREC**

Zero length string

**STATRER**

This is the long object name of the object that caused the reconnection to fail.

STSOS is an output field. Its initial value is a zero length string.

**STSOT (10-digit signed integer)**

The type of object being named in *ObjectName*. Possible values are:

**OTALSQ**
Alias queue.

**OTLOCQ**
Local queue.

**OTMODQ**
Model queue.

**OTQ**
Queue.

**OTREMQ**
Remote queue.

**OTTOP**
Topic.

This is always an output field. The initial value of this field is OTQ.

**STSRC (10-digit signed integer)**

This is the reason code resulting from the first error reported in the MQSTS structure

This is always an output field. The initial value of this field is RCNONE.

**STSROBJN (48-byte character string)**

This is the name of the destination queue named in *STSOBJN* after the local queue manager resolves the name. The name returned is the name of a queue that exists on the queue manager identified by *STSRQMGR*.

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *STSROBJN* is set to blanks:

- A topic
- A queue, but not opened for browse, input, or output

This is an output field. The initial value of this field is 48 blank characters.

**STSRQMGR (48-byte character string)**

This is the name of the destination queue manager after the local queue manager resolves the name. The name returned is the name of the queue manager that owns the queue identified by *STSROBJN*. *STSRQMGR* can be the name of the local queue manager.

If *STSROBJN* is a shared queue that is owned by the queue-sharing group to which the local queue manager belongs, *STSRQMGR* is the name of the queue-sharing group. If the queue is owned by some other queue-sharing group, *STSROBJN* can be the name of the queue-sharing group or the name of a queue manager that is a member of the queue-sharing group (the nature of the value returned is determined by the queue definitions that exist at the local queue manager).

A nonblank value is returned only if the object is a single queue opened for browse, input, or output (or any combination). If the object opened is any of the following, *STSRQMGR* is set to blanks:

- A topic
- A queue, but not opened for browse, input, or output
- A cluster queue with OOBNDN specified (or with OOBNDQ in effect when the *DefBind* queue attribute has the value OOBNDN)

This is an output field. The initial value of this field is 48 blank characters.

**STSSC (10-digit signed integer)**

This is the number of asynchronous put calls that succeeded.

This is an output field. The initial value of this field is 0.

**STSSID (4-byte character string)**

This is the structure identifier. The value must be:

**STSSID**
Identifier for status reporting structure.

The initial value of this field is STSSID.

**STSSO (10 digit signed integer)**

The STSSO used to open the failing subscription. Present only in Version 2 of MQSTS or higher.

The interpretation of STSSO depends on the value of the MQSTAT STYPE parameter.

**STATAPT**

Zero.

**STATREC**

Zero.

**STATRER**

The STSSO used when the failure occurred. The reason for the failure is reported in the *STSCC* and *STSRC* fields in the MQSTS structure. If the failure is not related to subscribing to a topic, the value returned is zero.

STSSO is an output field. Its initial value is zero.

**STSSUN (MQCHARV)**

The name of the failing subscription. Present only in Version 2 of MQSTS or higher.

STSSUN is a MQCHARV field with a maxiumum length of 10240. See MQCHARV for a description of how to use the MQCHARV structure.

The interpretation of STSSUN depends on the value of the MQSTAT STYPE parameter.

**STATAPT**

Zero length string.

**STATREC**

Zero length string.

**STATRER**

The name of the subscription that caused reconnection to fail. If no subscription name is available, or the failure is not related to a subscription, this is a zero-length string.

STSSUN is an output field. Its initial value is a zero length string.

**STSVER (10-digit signed integer)**

This is the structure version number. The value must be:

**STSVR1**
Version number for status reporting structure.

The following constant specifies the version number of the current version:

**STSVRC**
Current version of status reporting structure.

The initial value of this field is STSVR1.

**STSWC (10-digit signed integer)**

This is the number of asynchronous put calls that completed with a warning.

This is an output field. The initial value of this field is 0.

## Initial values

*Table 614. Initial values of fields in MQSTS*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *STSSID* | STSID | |
| *STSVER* | STSVRC | STSVR1 |
| *STSCC* | CCOK | 0 |
| *STSRC* | RCNONE | 0 |
| *STSSC* | None | 0 |
| *STSWC* | None | 0 |
| *STSFC* | None | 0 |
| *STSOT* | None | 0 |
| *STSOBJN* | None | Blanks |
| *STSOQMGR* | None | Blanks |
| *STSROBJN* | None | Blanks |
| *STSRQMGR* | None | Blanks |
| *STSOS* | Names and values as defined for MQCHARV | |
| *STSSUN* | Names and values as defined for MQCHARV | |
| *STSOO* | None | 0 |
| *STSSO* | None | 0 |

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQSTS Structure
D*
D* Structure identifier
D  STSSID                 1      4
D* Structure version number
D  STSVER                 5      8I 0
D* Completion code
D  STSCC                  9     12I 0
D* Reason code
D  STSRC                 13     16I 0
D* Success count
D  STSSC                 17     20I 0
D* Warning count
D  STSWC                 21     24I 0
D* Failure count
D  STSFC                 25     28I 0
D* Object type
D  STSOT                 29     32I 0
D* Object name
D  STSOBJN               33     80
D* Object queue manager
D  STSOQMGR              81     128
D* Resolved object name
D  STSROBJN             129     176
D* Resolved object queue manager name
D  STSRQMGR             177     224
D* Ver:1 **
D* Failing object long name
D* Address of variable length string
D  STSOSCHRP            225    240*
D* Offset of variable length string
D  STSOSCHRO            241    244I 0
```

```
D* Size of buffer
D  STSOSVSBS            245    248I 0
D* Length of variable length string
D  STSOSCHRL            249    252I 0
D* CCSID of variable length string
D  STSOSCHRC            253    256I 0
D* Failing subscription name
D* Address of variable length string
D  STSSUNCHRP           257    272*
D* Offset of variable length string
D  STSSUNCHRO           273    276I 0
D* Size of buffer
D  STSSUNVSBS           277    280I 0
D* Length of variable length string
D  STSSUNCHRL           281    284I 0
D* CCSID of variable length string
D  STSSUNCHRC           285    288I 0
D* Failing open options
D  STSOO                289    292I 0
D* Failing subscription options
D  STSSO                293    296I 0
D* Ver:2 **
```

## MQTM - Trigger message

The MQTM structure describes the data in the trigger message that is sent by the queue manager to a trigger-monitor application when a trigger event occurs for a queue.

### Overview

**Purpose**: This structure is part of the IBM MQ Trigger Monitor Interface (TMI), which is one of the IBM MQ framework interfaces.

**Format name**: FMTM.

**Character set and encoding**: Character data in MQTM is in the character set of the queue manager that generates the MQTM. Numeric data in MQTM is in the machine encoding of the queue manager that generates the MQTM.

The character set and encoding of the MQTM are given by the *MDCSI* and *MDENC* fields in:

- The MQMD (if the MQTM structure is at the start of the message data), or
- The header structure that precedes the MQTM structure (all other cases).

**Usage**: A trigger-monitor application may need to pass some or all of the information in the trigger message to the application which is started by the trigger-monitor application. Information which may be needed by the started application includes *TMQN*, *TMTD*, and *TMUD*. The trigger-monitor application can pass the MQTM structure directly to the started application, or pass an MQTMC2 structure instead, depending on what is permitted by the environment and convenient for the started application. For information about MQTMC2, see “MQTMC2 - Trigger message 2 (character format)” on page 1205.

- On IBM i, the trigger-monitor application provided with IBM MQ passes an MQTMC2 structure to the started application.

For information about triggers, see Prerequisites for triggering.


- “MQMD for a trigger message” on page 1201
- “Fields” on page 1202
- “Initial values” on page 1204
- “RPG declaration” on page 1205


### MQMD for a trigger message

**MQMD for a trigger message**: The fields in the MQMD of a trigger message generated by the queue manager are set as follows:

| Field in MQMD | Value used |
|---|---|
| *MDSID* | MDSIDV |
| *MDVER* | MDVER1 |
| *MDREP* | RONONE |
| *MDMT* | MTDGRM |
| *MDEXP* | EIULIM |
| *MDFB* | FBNONE |
| *MDENC* | ENNAT |
| *MDCSI* | Queue manager's *CodedCharSetId* attribute |
| *MDFMT* | FMTM |
| *MDPRI* | Initiation queue's *DefPriority* attribute |
| *MDPER* | PENPER |
| *MDMID* | A unique value |
| *MDCID* | CINONE |
| *MDBOC* | 0 |
| *MDRQ* | Blanks |
| *MDRM* | Name of queue manager |
| *MDUID* | Blanks |
| *MDACC* | ACNONE |
| *MDAID* | Blanks |
| *MDPAT* | ATQM, or as appropriate for the message channel agent |
| *MDPAN* | First 28 bytes of the queue manager name |
| *MDPD* | Date when trigger message is sent |
| *MDPT* | Time when trigger message is sent |
| *MDAOD* | Blanks |

An application that generates a trigger message is recommended to set similar values, except for the following:

- The *MDPRI* field can be set to PRQDEF (the queue manager will change this to the default priority for the initiation queue when the message is put).
- The *MDRM* field can be set to blanks (the queue manager will change this to the name of the local queue manager when the message it put).
- The context fields should be set as appropriate for the application.

## Fields

The MQTM structure contains the following fields; the fields are described in **alphabetical order**:

**TMAI (256-byte character string)**

Application identifier.

This is a character string that identifies the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ApplId* attribute of the process object identified by the *TMPN* field; see “Attributes

for process definitions" on page 1364 for details of this attribute. The content of this data is of no significance to the queue manager.

The meaning of *TMAI* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ requires *TMAI* to be the name of an executable program.

The length of this field is given by LNPROA. The initial value of this field is 256 blank characters.

**TMAT (10-digit signed integer)**

Application type.

This identifies the nature of the program to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ApplType* attribute of the process object identified by the *TMPN* field; see "Attributes for process definitions" on page 1364 for details of this attribute. The content of this data is of no significance to the queue manager.

*TMAT* can have one of the following standard values. User-defined types can also be used, but should be restricted to values in the range ATUFST through ATULST:

**ATCICS**
CICS transaction.

**ATVSE**
CICS/VSE transaction.

**AT400**
IBM i application.

**ATUFST**
Lowest value for user-defined application type.

**ATULST**
Highest value for user-defined application type.

The initial value of this field is 0.

**TMED (128-byte character string)**

Environment data.

This is a character string that contains environment-related information pertaining to the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *EnvData* attribute of the process object identified by the *TMPN* field; see "Attributes for process definitions" on page 1364 for details of this attribute. The content of this data is of no significance to the queue manager.

The length of this field is given by LNPROE. The initial value of this field is 128 blank characters.

**TMPN (48-byte character string)**

Name of process object.

This is the name of the queue manager process object specified for the triggered queue, and can be used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *ProcessName* attribute of the queue identified by the *TMQN* field; see "Attributes for queues" on page 1335 for details of this attribute.

Names that are shorter than the defined length of the field are always padded to the right with blanks; they are not ended prematurely by a null character.

The length of this field is given by LNPRON. The initial value of this field is 48 blank characters.

**TMQN (48-byte character string)**

Name of triggered queue.

This is the name of the queue for which a trigger event occurred, and is used by the application started by the trigger-monitor application. The queue manager initializes this field with the value of the *QName* attribute of the triggered queue; see "Attributes for queues" on page 1335 for details of this attribute.

Names that are shorter than the defined length of the field are padded to the right with blanks; they are not ended prematurely by a null character.

The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**TMSID (4-byte character string)**

Structure identifier.

The value must be:

**TMSIDV**
Identifier for trigger message structure.

The initial value of this field is TMSIDV.

**TMTD (64-byte character string)**

Trigger data.

This is free-format data for use by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *TriggerData* attribute of the queue identified by the *TMQN* field; see "Attributes for queues" on page 1335 for details of this attribute. The content of this data is of no significance to the queue manager.

The length of this field is given by LNTRGD. The initial value of this field is 64 blank characters.

**TMUD (128-byte character string)**

User data.

This is a character string that contains user information relevant to the application to be started, and is used by the trigger-monitor application that receives the trigger message. The queue manager initializes this field with the value of the *UserData* attribute of the process object identified by the *TMPN* field; see "Attributes for process definitions" on page 1364 for details of this attribute. The content of this data is of no significance to the queue manager.

The length of this field is given by LNPROU. The initial value of this field is 128 blank characters.

**TMVER (10-digit signed integer)**

Structure version number.

The value must be:

**TMVER1**
Version number for trigger message structure.

The following constant specifies the version number of the current version:

**TMVERC**
Current version of trigger message structure.

The initial value of this field is TMVER1.

## Initial values

*Table 615. Initial values of fields in MQTM*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *TMSID* | TMSIDV | 'TM¬¬' |
| *TMVER* | TMVER1 | 1 |

| Table 615. Initial values of fields in MQTM (continued) | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |
| *TMQN* | None | Blanks |
| *TMPN* | None | Blanks |
| *TMTD* | None | Blanks |
| *TMAT* | None | 0 |
| *TMAI* | None | Blanks |
| *TMED* | None | Blanks |
| *TMUD* | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

### RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQTM Structure
D*
D* Structure identifier
D  TMSID                  1      4    INZ('TM  ')
D* Structure version number
D  TMVER                  5      8I 0 INZ(1)
D* Name of triggered queue
D  TMQN                   9     56    INZ
D* Name of process object
D  TMPN                  57    104    INZ
D* Trigger data
D  TMTD                 105    168    INZ
D* Application type
D  TMAT                 169    172I 0 INZ(0)
D* Application identifier
D  TMAI                 173    428    INZ
D* Environment data
D  TMED                 429    556    INZ
D* User data
D  TMUD                 557    684    INZ
```

## MQTMC2 - Trigger message 2 (character format)

When a trigger-monitor application retrieves a trigger message (MQTM) from an initiation queue, the trigger monitor might need to pass some or all of the information in the trigger message to the application that is started by the trigger monitor.

### Overview

**Purpose**: Information that may be needed by the started application includes *TC2QN*, *TC2TD*, and *TC2UD*. The trigger monitor application can pass the MQTM structure directly to the started application, or pass an MQTMC2 structure instead, depending on what is permitted by the environment and convenient for the started application.

This structure is part of the IBM MQ Trigger Monitor Interface (TMI), which is one of the IBM MQ framework interfaces.

**Character set and encoding**: Character data in MQTMC2 is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue manager attribute.

**Usage**: The MQTMC2 structure is like the format of the MQTM structure. The difference is that the non-character fields in MQTM are changed in MQTMC2 to character fields of the same length, and the queue manager name is added at the end of the structure.

- On IBM i, the trigger monitor application provided with IBM MQ passes an MQTMC2 structure to the started application.
- "Fields" on page 1206
- "Initial values" on page 1207
- "RPG declaration" on page 1207

## Fields

The MQTMC2 structure contains the following fields; the fields are described in **alphabetical order**:

**TC2AI (256-byte character string)**

Application identifier.

See the *TMAI* field in the MQTM structure.

**TC2AT (4-byte character string)**

Application type.

This field always contains blanks, whatever the value in the *TMAT* field in the MQTM structure of the original trigger message.

**TC2ED (128-byte character string)**

Environment data.

See the *TMED* field in the MQTM structure.

**TC2PN (48-byte character string)**

Name of process object.

See the *TMPN* field in the MQTM structure.

**TC2QMN (48-byte character string)**

Queue manager name.

This is the name of the queue manager at which the trigger event occurred.

**TC2QN (48-byte character string)**

Name of triggered queue.

See the *TMQN* field in the MQTM structure.

**TC2SID (4-byte character string)**

Structure identifier.

The value must be:

**TCSIDV**
Identifier for trigger message (character format) structure.

**TC2TD (64-byte character string)**

Trigger data.

See the *TMTD* field in the MQTM structure.

**TC2UD (128-byte character string)**

User data.

See the *TMUD* field in the MQTM structure.

**TC2VER (4-byte character string)**

Structure version number.

The value must be:

**TCVER2**
Version 2 trigger message (character format) structure.

The following constant specifies the version number of the current version:

**TCVERC**
Current version of trigger message (character format) structure.

## Initial values

*Table 616. Initial values of fields in MQTMC2*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *TC2SID* | TCSIDV | 'TMC¬' |
| *TC2VER* | TCVER2 | '¬¬¬2' |
| *TC2QN* | None | Blanks |
| *TC2PN* | None | Blanks |
| *TC2TD* | None | Blanks |
| *TC2AT* | None | Blanks |
| *TC2AI* | None | Blanks |
| *TC2ED* | None | Blanks |
| *TC2UD* | None | Blanks |
| *TC2QMN* | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQTMC2 Structure
D*
D* Structure identifier
D  TC2SID                 1      4
D* Structure version number
D  TC2VER                 5      8
D* Name of triggered queue
D  TC2QN                  9     56
D* Name of process object
D  TC2PN                 57    104
D* Trigger data
D  TC2TD                105    168
D* Application type
D  TC2AT                169    172
D* Application identifier
D  TC2AI                173    428
D* Environment data
D  TC2ED                429    556
D* User data
D  TC2UD                557    684
D* Queue manager name
D  TC2QMN               685    732
```

## MQWIH - Work information header

The MQWIH structure describes the information that must be present at the start of a message that is to be handled by the z/OS workload manager.

### Overview

**Format name**: FMWIH.

**Character set and encoding**: The fields in the MQWIH structure are in the character set and encoding given by the *MDCSI* and *MDENC* fields in the header structure that precedes MQWIH, or by those fields in the MQMD structure if the MQWIH is at the start of the application message data.

The character set must be one that has single-byte characters for the characters that are valid in queue names.

**Usage**: If a message is to be processed by the z/OS workload manager, the message must begin with an MQWIH structure.


- "Fields" on page 1208
- "Initial values" on page 1210
- "RPG declaration" on page 1210


### Fields

The MQWIH structure contains the following fields; the fields are described in **alphabetical order**:

**WICSI (10-digit signed integer)**

Character-set identifier of data that follows MQWIH.

This specifies the character set identifier of the data that follows the MQWIH structure; it does not apply to character data in the MQWIH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The following special value can be used:

**CSINHT**
Inherit character-set identifier of this structure.

Character data in the data *following* this structure is in the same character set as this structure.

The queue manager changes this value in the structure sent in the message to the actual character-set identifier of the structure. Provided no error occurs, the value CSINHT is not returned by the MQGET call.

CSINHT cannot be used if the value of the *MDPAT* field in MQMD is ATBRKR.

The initial value of this field is CSUNDF.

**WIENC (10-digit signed integer)**

Numeric encoding of data that follows MQWIH.

This specifies the numeric encoding of the data that follows the MQWIH structure; it does not apply to numeric data in the MQWIH structure itself.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data.

The initial value of this field is 0.

**WIFLG (10-digit signed integer)**

Flags

The value must be:

**WINONE**
No flags.

The initial value of this field is WINONE.

**WIFMT (8-byte character string)**

Format name of data that follows MQWIH.

This specifies the format name of the data that follows the MQWIH structure.

On the MQPUT or MQPUT1 call, the application must set this field to the value appropriate to the data. The rules for coding this field are the same as those for the *MDFMT* field in MQMD.

The length of this field is given by LNFMT. The initial value of this field is FMNONE.

**WILEN (10-digit signed integer)**

Length of MQWIH structure.

The value must be:

**WILEN1**
Length of version-1 work information header structure.

The following constant specifies the length of the current version:

**WILENC**
Length of current version of work information header structure.

The initial value of this field is WILEN1.

**WIRSV (32-byte character string)**

Reserved.

This is a reserved field; it must be blank.

**WISID (4-byte character string)**

Structure identifier.

The value must be:

**WISIDV**
Identifier for work information header structure.

The initial value of this field is WISIDV.

**WISNM (32-byte character string)**

Service name.

This is the name of the service that is to process the message.

The length of this field is given by LNSVNM. The initial value of this field is 32 blank characters.

**WISST (8-byte character string)**

Service step name.

This is the name of the step of *WISNM* to which the message relates.

The length of this field is given by LNSVST. The initial value of this field is 8 blank characters.

**WITOK (16-byte bit string)**

Message token.

This is a message token that uniquely identifies the message.

For the MQPUT and MQPUT1 calls, this field is ignored. The length of this field is given by LNMTOK. The initial value of this field is MTKNON.

**WIVER (10-digit signed integer)**

Structure version number.

The value must be:

**WIVER1**
Version-1 work information header structure.

The following constant specifies the version number of the current version:

**WIVERC**
Current version of work information header structure.

The initial value of this field is WIVER1.

## Initial values

*Table 617. Initial values of fields in MQWIH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *WISID* | WISIDV | 'WIH¬' |
| *WIVER* | WIVER1 | 1 |
| *WILEN* | WILEN1 | 120 |
| *WIENC* | None | 0 |
| *WICSI* | CSUNDF | 0 |
| *WIFMT* | FMNONE | Blanks |
| *WIFLG* | WINONE | 0 |
| *WISNM* | None | Blanks |
| *WISST* | None | Blanks |
| *WITOK* | MTKNON | Nulls |
| *WIRSV* | None | Blanks |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQWIH Structure
D*
D* Structure identifier
D  WISID                  1      4    INZ('WIH ')
D* Structure version number
D  WIVER                  5      8I 0 INZ(1)
D* Length of MQWIH structure
D  WILEN                  9     12I 0 INZ(120)
D* Numeric encoding of data that followsMQWIH
D  WIENC                 13     16I 0 INZ(0)
D* Character-set identifier of data thatfollows MQWIH
D  WICSI                 17     20I 0 INZ(0)
D* Format name of data that followsMQWIH
D  WIFMT                 21     28    INZ('        ')
D* Flags
D  WIFLG                 29     32I 0 INZ(0)
D* Service name
D  WISNM                 33     64    INZ
D* Service step name
```

```
     D  WISST                 65     72    INZ
     D* Message token
     D  WITOK                 73     88    INZ(X'00000000000000-
     D                                     000000000000000000')
     D* Reserved
     D  WIRSV                 89    120    INZ
```

## MQXQH - Transmission-queue header

The MQXQH structure describes the information that is prefixed to the application message data of messages when they are on transmission queues.

### Overview

**Purpose**: A transmission queue is a special type of local queue that temporarily holds messages destined for remote queues (that is, destined for queues that do not belong to the local queue manager). A transmission queue is denoted by the *Usage* queue attribute having the value USTRAN.

**Format name**: FMXQH.

**Character set and encoding**: Data in MQXQH must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT for the C programming language.

The character set and encoding of the MQXQH must be set into the *MDCSI* and *MDENC* fields in:

- The separate MQMD (if the MQXQH structure is at the start of the message data), or
- The header structure that precedes the MQXQH structure (all other cases).

**Usage**: A message that is on a transmission queue has *two* message descriptors:

- One message descriptor is stored separately from the message data; this is called the *separate message descriptor*, and is generated by the queue manager when the message is placed on the transmission queue. Some of the fields in the separate message descriptor are copied from the message descriptor provided by the application on the MQPUT or MQPUT1 call.

  The separate message descriptor is the one that is returned to the application in the *MSGDSC* parameter of the MQGET call when the message is removed from the transmission queue.
- A second message descriptor is stored within the MQXQH structure as part of the message data; this is called the *embedded message descriptor*, and is a copy of the message descriptor that was provided by the application on the MQPUT or MQPUT1 call (with minor variations).

  The embedded message descriptor is always a version-1 MQMD. If the message put by the application has nondefault values for one or more of the version-2 fields in the MQMD, an MQMDE structure follows the MQXQH, and is in turn followed by the application message data (if any). The MQMDE is either:

  – Generated by the queue manager (if the application uses a version-2 MQMD to put the message), or
  – Already present at the start of the application message data (if the application uses a version-1 MQMD to put the message).

  The embedded message descriptor is the one that is returned to the application in the *MSGDSC* parameter of the MQGET call when the message is removed from the final destination queue.


- “Fields in the separate message descriptor” on page 1212
- “Fields in the embedded message descriptor” on page 1213
- “Putting messages on remote queues” on page 1213
- “Putting messages directly on transmission queues” on page 1213
- “Getting messages from transmission queues” on page 1214
- “Fields” on page 1214
- “Initial values” on page 1215
- “RPG declaration” on page 1215

## Fields in the separate message descriptor

The fields in the separate message descriptor are set by the queue manager as shown in the following list. If the queue manager does not support the version-2 MQMD, a version-1 MQMD is used without loss of function.

| Field in separate MQMD | Value used |
|---|---|
| *MDSID* | MDSIDV |
| *MDVER* | MDVER2 |
| *MDREP* | Copied from the embedded message descriptor, but with the bits identified by ROAUXM set to zero. (This prevents a COA or COD report message being generated when a message is placed on or removed from a transmission queue.) |
| *MDMT* | Copied from the embedded message descriptor. |
| *MDEXP* | Copied from the embedded message descriptor. |
| *MDFB* | Copied from the embedded message descriptor. |
| *MDENC* | ENNAT |
| *MDCSI* | Queue manager's *CodedCharSetId* attribute. |
| *MDFMT* | FMXQH |
| *MDPRI* | Copied from the embedded message descriptor. |
| *MDPER* | Copied from the embedded message descriptor. |
| *MDMID* | A new value is generated by the queue manager. This message identifier is different from the *MDMID* that the queue manager may have generated for the embedded message descriptor (see described previously). |
| *MDCID* | The *MDMID* from the embedded message descriptor. |
| *MDBOC* | 0 |
| *MDRQ* | Copied from the embedded message descriptor. |
| *MDRM* | Copied from the embedded message descriptor. |
| *MDUID* | Copied from the embedded message descriptor. |
| *MDACC* | Copied from the embedded message descriptor. |
| *MDAID* | Copied from the embedded message descriptor. |
| *MDPAT* | ATQM |
| *MDPAN* | First 28 bytes of the queue manager name. |
| *MDPD* | Date when message was put on transmission queue. |
| *MDPT* | Time when message was put on transmission queue. |
| *MDAOD* | Blanks |
| *MDGID* | GINONE |
| *MDSEQ* | 1 |
| *MDOFF* | 0 |
| *MDMFL* | MFNONE |
| *MDOLN* | OLUNDF |

## Fields in the embedded message descriptor

The fields in the embedded message descriptor have the same values as those in the *MSGDSC* parameter of the MQPUT or MQPUT1 call, except for the following:

- The *MDVER* field always has the value MDVER1.
- If the *MDPRI* field has the value PRQDEF, it is replaced by the value of the queue's *DefPriority* attribute.
- If the *MDPER* field has the value PEQDEF, it is replaced by the value of the queue's *DefPersistence* attribute.
- If the *MDMID* field has the value MINONE, or the PMNMID option was specified, or the message is a distribution-list message, *MDMID* is replaced by a new message identifier generated by the queue manager.

  When a distribution-list message is split into smaller distribution-list messages placed on different transmission queues, the *MDMID* field in each of the new embedded message descriptors is the same as that in the original distribution-list message.
- If the PMNCID option was specified, *MDCID* is replaced by a new correlation identifier generated by the queue manager.
- The context fields are set as indicated by the PM* options specified in the *PMO* parameter; the context fields are:
  - *MDACC*
  - *MDAID*
  - *MDAOD*
  - *MDPAN*
  - *MDPAT*
  - *MDPD*
  - *MDPT*
  - *MDUID*
- The version-2 fields (if they were present) are removed from the MQMD, and moved into an MQMDE structure, if one or more of the version-2 fields has a nondefault value.

## Putting messages on remote queues

: When an application puts a message on a remote queue (either by specifying the name of the remote queue directly, or by using a local definition of the remote queue), the local queue manager:

- Creates an MQXQH structure containing the embedded message descriptor
- Appends an MQMDE if one is needed and is not already present
- Appends the application message data
- Places the message on an appropriate transmission queue

## Putting messages directly on transmission queues

It is also possible for an application to put a message directly on a transmission queue. In this case the application must prefix the application message data with an MQXQH structure, and initialize the fields with appropriate values. In addition, the *MDFMT* field in the *MSGDSC* parameter of the MQPUT or MQPUT1 call must have the value FMXQH.

Character data in the MQXQH structure created by the application must be in the character set of the local queue manager (defined by the *CodedCharSetId* queue manager attribute), and integer data must be in the native machine encoding. In addition, character data in the MQXQH structure must be padded with blanks to the defined length of the field; the data must not be ended prematurely by using a null

character, because the queue manager does not convert the null and subsequent characters to blanks in the MQXQH structure.

Note however that the queue manager does not check that an MQXQH structure is present, or that valid values have been specified for the fields.

## Getting messages from transmission queues

Applications that get messages from a transmission queue must process the information in the MQXQH structure in an appropriate fashion. The presence of the MQXQH structure at the beginning of the application message data is indicated by the value FMXQH being returned in the *MDFMT* field in the *MSGDSC* parameter of the MQGET call. The values returned in the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter, indicates the character set and encoding of the character and integer data in the MQXQH structure. The character set and encoding of the application message data are defined by the *MDCSI* and *MDENC* fields in the embedded message descriptor.

## Fields

The MQXQH structure contains the following fields; the fields are described in **alphabetical order**:

**XQMD (MQMD1)**

Original message descriptor.

This is the embedded message descriptor, and is a close copy of the message descriptor MQMD that was specified as the *MSGDSC* parameter on the MQPUT or MQPUT1 call when the message was originally put to the remote queue.

**Note:** This is a version-1 MQMD.

The initial values of the fields in this structure are the same as those in the MQMD structure.

**XQRQ (48-byte character string)**

Name of destination queue.

This is the name of the message queue that is the apparent eventual destination for the message (this may prove not to be the actual eventual destination if, for example, this queue is defined at *XQRQM* to be a local definition of another remote queue).

If the message is a distribution-list message (that is, the *MDFMT* field in the embedded message descriptor is FMDH), *XQRQ* is blank.

The length of this field is given by LNQN. The initial value of this field is 48 blank characters.

**XQRQM (48-byte character string)**

Name of destination queue manager.

This is the name of the queue manager or queue-sharing group that owns the queue that is the apparent eventual destination for the message.

If the message is a distribution-list message, *XQRQM* is blank.

The length of this field is given by LNQMN. The initial value of this field is 48 blank characters.

**XQSID (4-byte character string)**

Structure identifier.

The value must be:

**XQSIDV**
Identifier for transmission-queue header structure.

The initial value of this field is XQSIDV.

**XQVER (10-digit signed integer)**

Structure version number.

The value must be:

**XQVER1**
Version number for transmission-queue header structure.

The following constant specifies the version number of the current version:

**XQVERC**
Current version of transmission-queue header structure.

The initial value of this field is XQVER1.

## Initial values

*Table 618. Initial values of fields in MQXQH*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *XQSID* | XQSIDV | 'XQH¬' |
| *XQVER* | XQVER1 | 1 |
| *XQRQ* | None | Blanks |
| *XQRQM* | None | Blanks |
| *XQMD* | Same names and values as MQMD; see Table 598 on page 1118 | - |

**Notes:**

1. The symbol ¬ represents a single blank character.

## RPG declaration

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D*
D* MQXQH Structure
D*
D* Structure identifier
D  XQSID                  1      4    INZ('XQH ')
D* Structure version number
D  XQVER                  5      8I 0 INZ(1)
D* Name of destination queue
D  XQRQ                   9     56    INZ
D* Name of destination queue manager
D  XQRQM                 57    104    INZ
D* Original message descriptor
D  XQ1SID               105    108    INZ('MD  ')
D  XQ1VER               109    112I 0 INZ(1)
D  XQ1REP               113    116I 0 INZ(0)
D  XQ1MT                117    120I 0 INZ(8)
D  XQ1EXP               121    124I 0 INZ(-1)
D  XQ1FB                125    128I 0 INZ(0)
D  XQ1ENC               129    132I 0 INZ(273)
D  XQ1CSI               133    136I 0 INZ(0)
D  XQ1FMT               137    144    INZ('        ')
D  XQ1PRI               145    148I 0 INZ(-1)
D  XQ1PER               149    152I 0 INZ(2)
D  XQ1MID               153    176    INZ(X'00000000000000-
D                                     00000000000000000000-
D                                     000000000000')
D  XQ1CID               177    200    INZ(X'00000000000000-
D                                     00000000000000000000-
D                                     000000000000')
D  XQ1BOC               201    204I 0 INZ(0)
D  XQ1RQ                205    252    INZ
D  XQ1RM                253    300    INZ
```

```
     D  XQ1UID               301    312    INZ
     D  XQ1ACC               313    344    INZ(X'00000000000000-
     D                                     00000000000000000000-
     D                                     00000000000000000000-
     D                                     000000')
     D  XQ1AID               345    376    INZ
     D  XQ1PAT               377    380I 0 INZ(0)
     D  XQ1PAN               381    408    INZ
     D  XQ1PD                409    416    INZ
     D  XQ1PT                417    424    INZ
     D  XQ1AOD               425    428    INZ
```

# Function calls

Use this information to learn about the function calls available in IBM i programming.

## Conventions used in the call descriptions on IBM i

For each call, this collection of topics gives a description of the parameters and usage of the call. This is followed by typical invocations of the call, and typical declarations of its parameters, in the RPG programming language.

**Important:** When coding IBM MQ API calls you must ensure that all relevant parameters (as described in the following sections) are provided. Failure to do so can produce unpredictable results.

The description of each call contains the following sections:

**Call name**
The call name, followed by a brief description of the purpose of the call.

**Parameters**
For each parameter, the name is followed by its data type in parentheses ( ) and its direction; for example:

*CMPCOD* (9-digit decimal integer) - output

There is more information about the structure data types in “Elementary data types” on page 968.

The direction of the parameter can be:

**Input**
You (the programmer) must provide this parameter.

**Output**
The call returns this parameter.

**Input/output**
You must provide this parameter, but it is modified by the call.

There is also a brief description of the purpose of the parameter, together with a list of any values that the parameter can take.

The last two parameters in each call are a completion code and a reason code. The completion code indicates whether the call completed successfully, partially, or not at all. Further information about the partial success or the failure of the call is given in the reason code.

**Usage notes**
Additional information about the call, describing how to use it and any restrictions on its use.

**RPG invocation**
Typical invocation of the call, and declaration of its parameters, in RPG.

Other notational conventions are:

**Constants**
Names of constants are shown in uppercase; for example, OOOUT.

**Arrays**

In some calls, parameters are arrays of character strings with a size that is not fixed. In the descriptions of these parameters, a lowercase *n* represents a numeric constant. When you code the declaration for that parameter, replace the *n* with the numeric value you require.

## MQBACK - Back out changes

The MQBACK call indicates to the queue manager that all of the message gets and puts that have occurred since the last syncpoint are to be backed out. Messages put as part of a unit of work are deleted; messages retrieved as part of a unit of work are reinstated on the queue.

- On IBM i, this call is not supported for applications running in compatibility mode.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i


- "Syntax" on page 1217
- "Usage notes" on page 1217
- "Parameters" on page 1218
- "RPG Declaration" on page 1219


### Syntax

MQBACK *(Hconn, CompCode, Reason)*

### Usage notes

Consider these usage notes when using MQBACK.

1. This call can be used only when the queue manager itself coordinates the unit of work. This is a local unit of work, where the changes affect only IBM MQ resources.
2. In environments where the queue manager does not coordinate the unit of work, the appropriate back-out call must be used instead of MQBACK. The environment may also support an implicit back out caused by the application terminating abnormally.
   - On IBM i, this call can be used for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must not have been issued for the job.
3. If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 1256 for further details.
4. When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
   - The values of the *MDGID*, *MDSEQ*, *MDOFF*, and *MDMFL* fields in MQMD.
   - Whether the message is part of a unit of work.
   - For the MQPUT call: whether the message is persistent or nonpersistent.

   The queue manager keeps *three* sets of group and segment information, one set for each of the following:
   - The last successful MQPUT call (this can be part of a unit of work).
   - The last successful MQGET call that removed a message from the queue (this can be part of a unit of work).

- The last successful MQGET call that browsed a message on the queue (this *cannot* be part of a unit of work).

If the application puts or gets the messages as part of a unit of work, and the application then decides to back out the unit of work, the group and segment information is restored to the value that it had previously:

- The information associated with the MQPUT call is restored to the value that it had before the first successful MQPUT call for that queue handle in the current unit of work.
- The information associated with the MQGET call is restored to the value that it had before the first successful MQGET call for that queue handle in the current unit of work.

Queues which were updated by the application after the unit of work had started, but outside the scope of the unit of work, do not have their group and segment information restored if the unit of work is backed out.

Restoring the group and segment information to its previous value when a unit of work is backed out allows the application to spread a large message group or large logical message consisting of many segments across several units of work, and to restart at the correct point in the message group or logical message if one of the units of work fails. Using several units of work might be advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to be able to restart putting or getting messages at the correct point if a system failure occurs. For details of how to restart at the correct point after a system failure, see the PMLOGO option described in "MQPMO - Put-message options" on page 1140, and the GMLOGO option described in "MQGMO - Get-message options" on page 1044.

The remaining usage notes apply only when the queue manager coordinates the units of work:

1. A unit of work has the same scope as a connection handle. This means that all IBM MQ calls which affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See the *HCONN* parameter described in "MQCONN - Connect queue manager" on page 1242 for information about the scope of connection handles.
2. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
3. A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but which never issues a commit or backout call, can cause queues to fill up with messages that are not available to other applications. To guard against this possibility, the administrator should set the *MaxUncommittedMsgs* queue manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.

## Parameters

The MQBACK call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *COMCOD*.

If *COMCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *COMCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2101**
(2101, X'835') Object damaged.

**RC2123**
(2123, X'84B') Result of commit or back-out operation is mixed.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQBACK(HCONN : COMCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQBACK           PR                  EXTPROC('MQBACK')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Completion code
D COMCOD                        10I 0
D* Reason code qualifying COMCOD
D REASON                        10I 0
```

IBM i

AIX, HP-UX, IBM i, Solaris, Windows S/390

# MQBEGIN - Begin unit of work

The MQBEGIN call begins a unit of work that is coordinated by the queue manager, and that may involve external resource managers.

- This call is supported in the following environments: AIX, HP-UX, IBM i, Solaris, Windows.
- “Syntax” on page 1220
- “Usage notes” on page 1220

- "Parameters" on page 1221
- "RPG Declaration" on page 1222

## Syntax

MQBEGIN *(HCONN, BEGOP, CMPCOD, REASON)*

## Usage notes

1. The MQBEGIN call can be used to start a unit of work that is coordinated by the queue manager and that might involve changes to resources owned by other resource managers. The queue manager supports three types of unit-of-work:

   **Queue-manager-coordinated local unit of work**
   This is a unit of work in which the queue manager is the only resource manager participating, and so the queue manager acts as the unit-of-work coordinator.

   - To start this type of unit of work, the PMSYP or GMSYP option should be specified on the first MQPUT, MQPUT1, or MQGET call in the unit of work.

     It is not necessary for the application to issue the MQBEGIN call to start the unit of work, but if MQBEGIN is used, the call completes with CCWARN and reason code RC2121.
   - To commit or back out this type of unit of work, the MQCMIT or MQBACK call must be used.

   **Queue-manager-coordinated global unit of work**
   This is a unit of work in which the queue manager acts as the unit-of-work coordinator, both for IBM MQ resources *and* for resources belonging to other resource managers. Those resource managers cooperate with the queue manager to ensure that all changes to resources in the unit of work are committed or backed out together.

   - To start this type of unit of work, the MQBEGIN call must be used.
   - To commit or back out this type of unit of work, the MQCMIT and MQBACK calls must be used.

   **Externally-coordinated global unit of work**
   This is a unit of work in which the queue manager is a participant, but the queue manager does not act as the unit-of-work coordinator. Instead, there is an external unit-of-work coordinator with whom the queue manager cooperates.

   - To start this type of unit of work, the relevant call provided by the external unit-of-work coordinator must be used.

     If the MQBEGIN call is used to try to start the unit of work, the call fails with reason code RC2012.
   - To commit or back out this type of unit of work, the commit and back-out calls provided by the external unit-of-work coordinator must be used.

     If the MQCMIT or MQBACK call is used to try to commit or back out the unit of work, the call fails with reason code RC2012.
2. If the application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 1256 for further details.
3. An application can participate in only one unit of work at a time. The MQBEGIN call fails with reason code RC2128 if there is already a unit of work in existence for the application, regardless of which type of unit of work it is.
4. The MQBEGIN call is not valid in an IBM MQ client environment. An attempt to use the call fails with reason code RC2012.
5. When the queue manager is acting as the unit-of-work coordinator for global units of work, the resource managers that can participate in the unit of work are defined in the queue manager's configuration file.

6. On IBM i, the three types of unit of work are supported as follows:
   - **Queue-manager-coordinated local units of work** can be used only when a commitment definition does not exist at the job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must not have been issued for the job.
   - **Queue-manager-coordinated global units of work** are not supported.
   - **Externally-coordinated global units of work** can be used only when a commitment definition exists at job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must have been issued for the job. If this has been done, the IBM i COMMIT and ROLLBACK operations apply to IBM MQ resources as well as to resources belonging to other participating resource managers.

## Parameters

The MQBEGIN call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

**BEGOP (MQBO) - input/output**

Options that control the action of MQBEGIN.

See "MQBO - Begin options" on page 989 for details.

If no options are required, programs written in C or S/390 assembler can specify a null parameter address, instead of specifying the address of an MQBO structure.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2121**
(2121, X'849') No participating resource managers registered.

**RC2122**
(2122, X'84A') Participating resource manager not available.

If *CMPCOD* is CCFAIL:

**RC2134**
(2134, X'856') Begin-options structure not valid.

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2012**
(2012, X'7DC') Call not valid in environment.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2128**
(2128, X'850') Unit of work already started.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQBEGIN(HCONN : BEGOP : CMPCOD :
C                                       REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQBEGIN          PR                  EXTPROC('MQBEGIN')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Options that control the action of MQBEGIN
D BEGOP                         12A
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CMPCOD
D REASON                        10I 0
```

## MQBUFMH - Convert buffer into message handle

The MQBUFMH function call converts a buffer into a message handle and is the inverse of the MQMHBUF call.

This call takes a message descriptor and MQRFH2 properties in the buffer and makes them available through a message handle. The MQRFH2 properties in the message data are, optionally, removed. The *Encoding*, *CodedCharSetId*, and *Format* fields of the message descriptor are updated, if necessary, to correctly describe the contents of the buffer after the properties have been removed.


- "Syntax" on page 1222
- "Usage notes" on page 1223
- "Parameters" on page 1223
- "RPG Declaration" on page 1224


### Syntax

MQBUFMH *(Hconn, Hmsg, BufMsgHOpts, MsgDesc, Buffer, BufferLength, DataLength, CompCode, Reason)*

## Usage notes

MQBUFMH calls cannot be intercepted by API exits - a buffer is converted into a message handle in the application space; the call does not reach the queue manager.

## Parameters

The MQBUFMH call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *HCONN* must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created by using HCUNAS, a valid connection must be established on the thread converting a buffer into a message handle. If a valid connection is not established, the call fails with RC2009.

**HMSG (20-digit signed integer) - input**

This handle is the message handle for which a buffer is required. The value was returned by a previous MQCRTMH call.

**BMHOPT (MQBMHO) - input**

The MQBMHO structure allows applications to specify options that control how message handles are produced from buffers.

See "MQBMHO - Buffer to message handle options" on page 988 for details.

**MSGDSC (MQMD) - input/output**

The *MSGDSC* structure contains the message descriptor properties and describes the contents of the buffer area.

On output from the call, the properties are optionally removed from the buffer area and, in this case, the message descriptor is updated to correctly describe the buffer area.

Data in this structure must be in the character set and encoding of the application.

**BUFLEN (10-digit signed integer) - input**

*BUFLEN* is the length of the Buffer area, in bytes.

A *BUFLEN* of zero bytes is valid, and indicates that the buffer area contains no data.

**BUFFER (1-byte bit string x BUFLEN) - input/output**

*BUFFER* defines the area containing the message buffer. For most data, you must align the buffer on a 4-byte boundary.

If *BUFFER* contains character or numeric data, set the *CodedCharSetId* and *Encoding* fields in the *MSGDSC* parameter to the values appropriate to the data; this enables the data to be converted, if necessary.

If properties are found in the message buffer they are optionally removed; they later become available from the message handle on return from the call.

In the C programming language, the parameter is declared as a pointer-to-void, which means the address of any type of data can be specified as the parameter.

If the *BUFLEN* parameter is zero, *BUFFER* is not referred to. In this case, the parameter address passed by programs written in C or System/390 assembler can be null.

**DATLEN (10-digit signed integer) - output**

*DATLEN* is the length, in bytes, of the buffer which might have the properties removed.

**CMPCOD (10-digit signed integer) - output**

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2489**
(2489, X'09B9') Buffer to message handle options structure not valid.

**RC2004**
(2004, X'07D4') Buffer parameter not valid.

**RC2005**
(2005, X'07D5') Buffer length parameter not valid.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2009**
(2009, X'07D9') Connection to queue manager lost.

**RC2460**
(2460, X'099C') Message handle not valid.

**RC2026**
(2026, X'07EA') Message descriptor not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2334**
(2334, X'091E') MQRFH2 structure not valid.

**RC2421**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

**RC2195**
(2195, X'893') Unexpected error occurred.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQBUFMH(HCONN : HMSG : BMHOPT :
                                        MSGDSC : BUFLEN : BUFFER :
                                        DATLEN : CMPCOD : REASON)
```

The prototype definition for the call is:

```
     DMQBUFMH          PR                  EXTPROC('MQBUFMH')
     D* Connection handle
     D HCONN                         10I 0
     D* Message handle
     D HMSG                          10I 0
     D* Options that control the action of MQBUFMH
     D BMHOPT                        12A   VALUE
     D* Message descriptor
     D MSGDSC                       364A
     D* Length in bytes of the Buffer area
     D BUFLEN                        10I 0
     D* Area to contain the message buffer
     D BUFFER                          *   VALUE
     D* Length of the output buffer
     D DATLEN                        10I 0
     D* Completion code
     D CMPCOD                        10I 0
     D* Reason code qualifying CompCode
     D REASON                        10I 0
```

## MQCB - Manage callback

The MQCB call reregisters a callback for the specified object handle and controls activation and changes to the callback.

A callback is a piece of code (specified as either the name of a function that can be dynamically linked or as a function pointer) that is called by IBM MQ when certain events occur.

To use MQCB and MQCTL on a V7 client you must be connected to a V7 server and the **SHARECNV** parameter of the channel must have a non-zero value.

For information about Global units of work see: Global units of work.

The types of callback that can be defined are:

**Message consumer**
A message consumer callback function is called when a message, meeting the selection criteria specified, is available on an object handle.

Only one callback function can be registered against each object handle. If a single queue is to be read with multiple selection criteria then the queue must be opened multiple times and a consumer function registered on each handle.

**Event handler**
The event handler is called for conditions that affect the whole callback environment.

The function is called when an event condition occurs, for example, a queue manager or connection stopping or quiescing.

The function is not called for conditions that are specific to a single message consumer, for example RC2016; it is called however if a callback function does not end normally.


- “Syntax” on page 1225
- “Usage notes for MQCB” on page 1226
- “Parameters for MQCB” on page 1227
- “RPG Declaration” on page 1233


### Syntax

MQCB *(HCONN, OPERATN, HOBJ, CBDSC, MSGDSC, GMO, CMPCOD, REASON)*

## Usage notes for MQCB

1. MQCB is used to define the action to be invoked for each message, matching the specified criteria, available on the queue. When the action is processed, either the message is removed from the queue and passed to the defined message consumer, or a message token is provided, which is used to retrieve the message.
2. MQCB can be used to define callback routines before starting consumption with MQCTL or it can be used from within a callback routine.
3. To use MQCB from outside of a callback routine, you must first suspend message consumption by using MQCTL and resume consumption afterward.

**Message consumer callback sequence**

You can configure a consumer to invoke callback at key points during the lifecycle of the consumer. For example:

- when the consumer is first registered,
- when the connection is started,
- when the connection is stopped and
- when the consumer is deregistered, either explicitly, or implicitly by an MQCLOSE.

*Table 619. MQCTL verb definitions*

| Verb | Meaning |
|---|---|
| MQCTL(START) | MQCTL call by using the CTLSR Operation |
| MQCTL(STOP) | MQCTL call by using the CTLSP Operation |
| MQCTL(WAIT) | MQCTL call by using the CTLSW Operation |

Allows the consumer to maintain state associated with the consumer. When a callback is requested by an application, the rules for consumer invocation are as follows:

**REGISTER**
Is always the first type of invocation of the callback.

Is always called on the same thread as the MQCB(CBREG) call.

**START**
Is always called synchronously with the MQCTL(START) verb.

- All START callbacks are completed before the MQCTL(START) verb returns.

Is on the same thread as the message delivery if CTLTHR is requested.

The call with start is not guaranteed if, for example, a previous callback issues MQCTL(STOP) during the MQCTL(START).

**STOP**
No further messages or events are delivered after this call until the connection is restarted.

A STOP is guaranteed if the application was previously called for START, or a message, or an event.

**DEREGISTER**
Is always the last type of invocation of the callback.

Ensure that your application performs thread-based initialization and cleanup in the START and STOP callbacks. You can do non thread-based initialization and cleanup with REGISTER and DEREGISTER callbacks.

Do not make any assumptions about the life and availability of the thread other than what is stated. For example, do not rely on a thread staying alive beyond the last call to DEREGISTER. Similarly, when you have chosen not to use CTLTHR, do not assume that the thread exists whenever the connection is started.

If your application has particular requirements for thread characteristics, it can always create a thread accordingly, then use MQCTL(WAIT). This step *donates* the thread to IBM MQ for asynchronous message delivery.

**Message consumer connection usage**

Normally, when an application issues another MQI call while one is outstanding, the call fails with reason code RC2219.

There are special cases, however, when the application must issue a further MQI call before the previous call has completed. For example, the consumer can be invoked during an MQCB call with CBRE.

In such an instance, when as a result of the application issuing either an MQCB or MQCTL verb, the application is called back, the application is allowed to issue a further MQI call. This instance means you can issue, for example, an MQOPEN call, in the consumer function when called with a CBCCALLT type of CBCTRC. Any MQI call, except for MQDISC, is allowed.

## Parameters for MQCB

The MQCB call has the following parameters:

**HCONN (10-digit signed integer) - input**

Manage callback function - HCONN parameter.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and you can specify the following special value for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**OPERATN (10-digit signed integer) - input**

Manage callback function - OPERATN parameter.

The operation being processed on the callback defined for the specified object handle. You must specify one of the following options; if more than one option is required, the values can be added (do not add the same constant more than once) or combined by using the bitwise OR operation (if the programming language supports bit operations).

Combinations that are not valid are noted; all other combinations are valid.

**CBREG**
Define the callback function for the specified object handle. This operation defines the function to be called and the selection criteria to be used.

If a callback function is already defined for the object handle the definition is replaced. If an error is detected while replacing the callback, the function is deregistered.

If a callback is registered in the same callback function in which it was previously deregistered, this is treated as a replace operation; any initial or final calls are not invoked.

You can use CBREG with CTLSU or CTLRE.

**CBUNR**
Stop the consuming of messages for the object handle and removes the handle from those eligible for a callback.

A callback is automatically deregistered if the associated handle is closed.

If CBUNR is called from within a consumer, and the callback has a stop call defined, it is invoked upon return from the consumer.

If this operation is issued against an *Hobj* with no registered consumer, the call returns with RC2448.

**CTLSU**
Suspends the consuming of messages for the object handle.

If this operation is applied to an event handler, the event handler does not get events while suspended, and any events missed while in the suspended state are not provided to the operation when it is resumed.

While suspended, the consumer function continues to get the control type callbacks.

**CTLRE**
Resume the consuming of messages for the object handle.

If this operation is applied to an event handler, the event handler does not get events while suspended, and any events missed while in the suspended state are not provided to the operation when it is resumed.

**CBDSC (MQCBD) - input**

Manage callback function - CBDSC parameter.

This is a structure that identifies the callback function that is being registered by the application and the options used when registering it.

See "MQCBD - Callback descriptor" on page 282 for details of the structure.

Callback descriptor is required only for the CBREG option; if the descriptor is not required, the parameter address passed can be null.

**HOBJ (10-digit signed integer) - input**

Manage callback function - HOBJ parameter.

This handle represents the access that has been established to the object from which a message is to be consumed. This is a handle that has been returned from a previous MQOPEN or MQSUB call (in the *HOBJ* parameter).

*HOBJ* is not required when defining an event handler routine (CBTEH) and must be specified as HONONE.

If this *Hobj* has been returned from an MQOPEN call, the queue must have been opened with one or more of the following options:

- OOINPS
- OOINPX
- OOINPQ
- OOBRW

**MSGDSC (MQMD) - input**

Manage callback function -MSGDSC parameter.

This structure describes the attributes of the message required, and the attributes of the message retrieved.

The *MsgDesc* parameter defines the attributes of the messages required by the consumer, and the version of the MQMD to be passed to the message consumer.

The *MsgId*, *CorrelId*, *GroupId*, *MsgSeqNumber*, and *Offset* in the MQMD are used for message selection, depending on the options specified in the *GetMsgOpts* parameter.

The *Encoding* and *CodedCharSetId* are used for message conversion if you specify the GMCONV option.

See MQMD for details.

*MsgDesc* is used only for CBREG and, if you require values other than the default for any fields. *MsgDesc* is not used for an event handler.

If the descriptor is not required the parameter address passed can be null.

Note, that if multiple consumers are registered against the same queue with overlapping selectors, the chosen consumer for each message is undefined.

**GMO (MQGMO) - input**

Manage callback function - GMO parameter.

Options that control how the message consumer gets messages.

All options have the meaning as described in "MQGMO - Get-message options" on page 1044, when used on an MQGET call, except:

**GMSSIG**
This option is not permitted.

**GMBRWF, GMBRWN, GMMBH, GMMBC**
The order of messages delivered to a browsing consumer is dictated by the combinations of these options. Significant combinations are:

**GMBRWF**
The first message on the queue is delivered repeatedly to the consumer. This is useful when the consumer destructively consumes the message in the callback. Use this option with care.

**GMBRWN**
The consumer is given each message on the queue, from the current cursor position until the end of the queue is reached.

**GMBRWF + GMBRWN**
The cursor is reset to the start of the queue. The consumer is then given each message until the cursor reaches the end of the queue.

**GMBRWF + GMMBH or GMMBC**
Starting at the beginning of the queue, the consumer is given the first nonmarked message on the queue, which is then marked for this consumer. This combination ensures that the consumer can receive new messages added behind the current cursor point.

**GMBRWN + GMMBH or GMMBC**
Starting at the cursor position the consumer is given the next nonmarked message on the queue, which is then marked for this consumer. Use this combination with care because messages can be added to the queue behind the current cursor position.

**GMBRWF + GMBRWN + GMMBH or GMMBC**
This combination is not permitted, if used the call returns RC2046.

**GMNWT, GMWT and GMWI**
These options control how the consumer is invoked.

**GMNWT**
The consumer is never called with RC2033. The consumer is only invoked for messages and events

**GMWT with a zero GMWI**
The RC2033 code is only passed to the consumer when there are no messages and

- the consumer has been started
- the consumer has been delivered at least one message since the last no messages reason code.

This prevents the consumer from polling in a busy loop when a zero wait interval is specified.

**GMWT and a positive GMWI**
The user is invoked after the specified wait interval with reason code RC2033. This call is made regardless of whether any messages have been delivered to the consumer. This allows the user to perform heartbeat or batch type processing.

**GMWT and GMWI of WIULIM**
This specifies an infinite wait before returning RC2033. The consumer is never called with RC2033.

*GMO* is used only for CBREG and, if you require values other than the default for any fields. *GMO* is not used for an event handler.

If the options are not required the parameter address passed can be null.

If a message properties handle is provided in the MQGMO structure, a copy is provided in the MQGMO structure that is passed into the consumer callback. On return from the MQCB call, the application can delete the message properties handle.

**CMPCOD (10-digit signed integer) - output**

Manage callback function - CMPCOD parameter.

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Manage callback function - REASON parameter.

The following reason codes are the codes that the queue manager can return for the *REASON* parameter.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CompCode* is CCFAIL:

**RC2204**
(2204, X'89C') Adapter not available.

**RC2133**
(2133, X'855') Unable to load data conversion services modules.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2374**
(2374, X'946') API exit failed.

**RC2183**
(2183, X'887') Unable to load API exit.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2005**
(2005, X'7D5') Buffer length parameter not valid.

**RC2219**
(2219, X'8AB') MQI call entered before previous call complete.

**RC2487**
(2487, X'9B7') Incorrect callback type field.

**RC2448**
(2448, X'990') Unable to deregister, suspend, or resume because there is no registered callback.

**RC2486**
(2486, X'9B6') Either *CallbackFunction* or *CallbackName* must be specified but not both.

**RC2483**
(2483, X'9B3') Incorrect callback type field.

**RC2484**
(2484, X'9B4') Incorrect MQCBD options field.

**RC2140**
(2140, X'85C') Wait request rejected by CICS.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2217**
(2217, X'8A9') Not authorized for connection.

**RC2202**
(2202, X'89A') Connection quiescing.

**RC2203**
(2203, X'89B') Connection shutting down.

**RC2207**
(2207, X'89F') Correlation-identifier error.

**RC2010**
(2010, X'7DA') Data length parameter not valid.

**RC2016**
(2016, X'7E0') Gets inhibited for the queue.

**RC2351**
(2351, X'92F') Global units of work conflict.

**RC2186**
(2186, X'88A') Get-message options structure not valid.

**RC2353**
(2353, X'931') Handle in use for global unit of work.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2259**
(2259, X'8D3') Inconsistent browse specification.

**RC2245**
(2245, X'8C5') Inconsistent unit-of-work specification.

**RC2246**
(2246, X'8C6') Message under cursor not valid for retrieval.

**RC2352**
(2352, X'930') Global unit of work conflicts with local unit of work.

**RC2247**
(2247, X'8C7') Match options not valid.

**RC2485**
(2485, X'9B4') Incorrect *MaxMsgLength* field.

**RC2026**
(2026, X'7EA') Message descriptor not valid.

**RC2497**
(2497, X'9C1') The specified function entry point could not be found in the module.

**RC2496**
(2496, X'9C0') Module found, however it is of the wrong type; not 32 bit, 64 bit, or a valid dynamic link library.

**RC2495**
(2495, X'9BF') Module not found in the search path or not authorized to load.

**RC2250**
(2250, X'8CA') Message sequence number not valid.

**RC2331**
(2331, X'91B') Use of message token not valid.

**RC2033**
(2033, X'7F1') No message available.

**RC2034**
(2034, X'7F2') Browse cursor not positioned on message.

**RC2036**
(2036, X'7F4') Queue not open for browse.

**RC2037**
(2037, X'7F5') Queue not open for input.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2101**
(2101, X'835') Object damaged.

**RC2206**
(2206, X'89E') Incorrect operation code on API Call.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2193**
(2193, X'891') Error accessing page-set data set.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2394**
(2394, X'95A') Queue has wrong index type.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2069**
(2069, X'815') Signal outstanding for this handle.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2109**
(2109, X'83D') Call suppressed by exit program.

**RC2024**
(2024, X'7E8') No more messages can be handled within current unit of work.

**RC2072**
(2072, X'818') Syncpoint support not available.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2354**
(2354, X'932') Enlistment in global unit of work failed.

**RC2355**
(2355, X'933') Mixture of unit-of-work calls not supported.

**RC2255**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**RC2090**
(2090, X'82A') Wait interval in MQGMO not valid.

**RC2256**
(2256, X'8D0') Wrong version of MQGMO supplied.

**RC2257**
(2257, X'8D1') Wrong version of MQMD supplied.

**RC2298**
(2298, X'8FA') The function requested is not available in the current environment.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQCB(HCONN : OPERATN : CBDSC :
                                HOBJ : MSGDSC : GMO :
                                DATLEN : CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQCB             PR                  EXTPROC('MQCB')
D* Connection handle
D HCONN                          10I 0 VALUE
D* Operation
D OPERATN                        10I 0 VALUE
D* Callback descriptor
D CBDSC                         180A
D* Object handle
D HOBJ                           10I 0 VALUE
D* Message Descriptor
D MSGDSC                        364A
D* Get options
D GMO                           112A
D* Completion code
D CMPCOD                         10I 0
* Reason code qualifying CompCode
D REASON                         10I 0
```

## MQCLOSE - Close object

The MQCLOSE call relinquishes access to an object, and is the inverse of the MQOPEN call.


- “Syntax” on page 1234
- “Usage notes” on page 1234
- “Parameters” on page 1235
- “RPG Declaration” on page 1239

## Syntax

MQCLOSE *(HCONN, HOBJ, OPTS, CMPCOD, REASON)*

## Usage notes

1. When an application issues the MQDISC call, or ends either normally or abnormally, any objects that were opened by the application and are still open are closed automatically with the CONONE option.
2. The following points apply if the object being closed is a *queue*:
   - If operations on the queue are performed as part of a unit of work, the queue can be closed before or after the syncpoint occurs without affecting the outcome of the syncpoint.
   - If the queue was opened with the OOBRW option, the browse cursor is destroyed. If the queue is later reopened with the OOBRW option, a new browse cursor is created (see the OOBRW option described in MQOPEN).
   - If a message is currently locked for this handle at the time of the MQCLOSE call, the lock is released (see the GMLK option described in "MQGMO - Get-message options" on page 1044 ).
3. The following points apply if the object being closed is a *dynamic queue* (either permanent or temporary):
   - For a dynamic queue, the options CODEL or COPURG can be specified regardless of the options specified on the corresponding MQOPEN call.
   - When a dynamic queue is deleted, all MQGET calls with the GMWT option that are outstanding against the queue are canceled and reason code RC2052 is returned. See the GMWT option described in "MQGMO - Get-message options" on page 1044.

     After a dynamic queue has been deleted, any call (other than MQCLOSE) that attempts to reference the queue using a previously acquired *HOBJ* handle fails with reason code RC2052.

     Be aware that although a deleted queue cannot be accessed by applications, the queue is not removed from the system, and associated resources are not freed, until all handles that reference the queue have been closed, and all units of work that affect the queue have been either committed or backed out.
   - When a permanent dynamic queue is deleted, if the *HOBJ* handle specified on the MQCLOSE call is *not* the one that was returned by the MQOPEN call that created the queue, a check is made that the user identifier which was used to validate the MQOPEN call is authorized to delete the queue. If the OOALTU option was specified on the MQOPEN call, the user identifier checked is the *ODAU*.

     This check is not performed if:

     – The handle specified is the one returned by the MQOPEN call that created the queue.

     – The queue being deleted is a temporary dynamic queue.
   - When a temporary dynamic queue is closed, if the *HOBJ* handle specified on the MQCLOSE call is the one that was returned by the MQOPEN call that created the queue, the queue is deleted. This occurs regardless of the close options specified on the MQCLOSE call. If there are messages on the queue, they are discarded; no report messages are generated.

     If there are uncommitted units of work that affect the queue, the queue and its messages are still deleted, but this does not cause the units of work to fail. However, as described previously, the resources associated with the units of work are not freed until each of the units of work has been either committed or backed out.
4. The following points apply if the object being closed is a *distribution list*:
   - The only valid close option for a distribution list is CONONE; the call fails with reason code RC2046 or RC2045 if any other options are specified.
   - When a distribution list is closed, individual completion codes and reason codes are not returned for the queues in the list - only the *CMPCOD* and *REASON* parameters of the call are available for diagnostic purposes.

If a failure occurs closing one of the queues, the queue manager continues processing and attempts to close the remaining queues in the distribution list. The *CMPCOD* and *REASON* parameters of the call are then set to return information describing the failure. Thus it is possible for the completion code to be CCFAIL, even though most of the queues were closed successfully. The queue that encountered the error is not identified.

If there is a failure on more than one queue, it is not defined which failure is reported in the *CMPCOD* and *REASON* parameters.

5. On IBM i, if the application was connected implicitly when the first MQOPEN call was issued, an implicit MQDISC occurs when the last MQCLOSE is issued.

   Only applications running in compatibility mode can be connected implicitly; other applications must issue the MQCONN or MQCONNX call to connect to the queue manager explicitly.

   **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

## Parameters

The MQCLOSE call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HOBJ (10-digit signed integer) - input/output**

Object handle.

This handle represents the object that is being closed. The object can be of any type. The value of *HOBJ* was returned by a previous MQOPEN call.

On successful completion of the call, the queue manager sets this parameter to a value that is not a valid handle for the environment. This value is:

**HOUNUH**
Unusable object handle.

**OPTS (10-digit signed integer) - input**

Options that control the action of MQCLOSE.

The *OPTS* parameter controls how the object is closed. Only permanent dynamic queues and subscriptions can be closed in more than one way. Permanent dynamic queues can either be retained or deleted; these are queues with a *DefinitionType* attribute that has the value QDPERM (see the *DefinitionType* attribute described in “Attributes for queues” on page 1335 ). The close options are summarized in a table later in this topic.

Durable subscriptions can either be kept or removed; these are created using the MQSUB call with the SODUR option.

When closing the handle to a managed destination (that is the *Hobj* parameter returned on an MQSUB call which used the SOMAN option) the queue manager will clean up any unretrieved publications

when the associated subscription has also been removed. That is done using the CORMSB option on the *Hsub* parameter returned on an MQSUB call. Note that CORMSB is the default behavior on MQCLOSE for a non-durable subscription.

When closing a handle to a non-managed destination you are responsible for cleaning up the queue where publications are sent. You are recommended to close the subscription using CORMSB first and then process messages off the queue until there are none remaining.

One (and only one) of the following must be specified:

**Dynamic queue closure options**

These options control how permanent dynamic queues are closed:

**CODEL**
Delete the queue.

The queue is deleted if either of the following is true:

- It is a permanent dynamic queue, created by a previous MQOPEN call, and there are no messages on the queue and no uncommitted get or put requests outstanding for the queue (either for the current task or any other task).
- It is the temporary dynamic queue that was created by the MQOPEN call that returned *HOBJ*. In this case, all the messages on the queue are purged.

In all other cases, including the case where the *Hobj* was returned on an MQSUB call, the call fails with reason code RC2045, and the object is not deleted.

**COPURG**
Delete the queue, purging any messages on it.

The queue is deleted if either of the following is true:

- It is a permanent dynamic queue, created by a previous MQOPEN call, and there are no uncommitted get or put requests outstanding for the queue (either for the current task or any other task).
- It is the temporary dynamic queue that was created by the MQOPEN call that returned *HOBJ*.

In all other cases, including the case where the *Hobj* was returned on an MQSUB call, the call fails with reason code RC2045, and the object is not deleted.

The next table shows which close options are valid, and whether the object is retained or deleted.

*Table 620. Valid close options for use with retained or deleted objects*

| Type of object or queue | CONONE | CODEL | COPURG |
|---|---|---|---|
| Object other than a queue | Retained | Not valid | Not valid |
| Predefined queue | Retained | Not valid | Not valid |
| Permanent dynamic queue | Retained | Deleted if empty and no pending updates | Messages deleted; queue deleted if no pending updates |
| Temporary dynamic queue (call issued by creator of queue) | Deleted | Deleted | Deleted |
| Temporary dynamic queue (call not issued by creator of queue) | Retained | Not valid | Not valid |
| Distribution list | Retained | Not valid | Not valid |
| Managed subscription destination | Retained | Not valid | Not valid |

| Table 620. Valid close options for use with retained or deleted objects (continued) | | | |
|---|---|---|---|
| **Type of object or queue** | **CONONE** | **CODEL** | **COPURG** |
| Distribution list (subscription has been removed) | Messages deleted; queue deleted | Not valid | Not valid |

**Subscription closure options**

These options control whether durable subscriptions are removed when the handle is closed, and whether publications still waiting to be read by the application are cleaned up. These options are only valid for use with an object handle returned in the *HSUB* parameter of an MQSUB call.

**COKPSB**
The handle to the subscription is closed but the subscription made is kept. Publications will continue to be sent to the destination specified in the subscription. This option is only valid if the subscription was made with the option SODUR. COKPSB is the default if the subscription is durable

**CORMSB**
The subscription is removed and the handle to the subscription is closed.

The *Hobj* parameter of the MQSUB call is not invalidated by closure of the *Hsub* parameter and may continue to be used for MQGET or MQCB to receive the remaining publications. When the *Hobj* parameter of the MQSUB call is also closed, if it was a managed destination any unretrieved publications will be removed.

CORMSB is the default if the subscription is non-durable.

These subscription closure options are summarized in the following tables:

To close a durable subscription handle but leave the subscription around, use the following subscription closure options:

| **Task** | **Subscription closure option** |
|---|---|
| Keep publications on an MQOPENed handle | COKPSB |
| Remove publications on an MQOPENed handle | Action not allowed |
| Keep publications on a handle with SOMAN | COKPSB |
| Remove publications on a handle with SOMAN | Action not allowed |

To unsubscribe, either by closing a durable subscription handle and unsubscribing it or closing a non-durable subscription handle, use the following subscription closure options:

| **Task** | **Subscription closure option** |
|---|---|
| Keep publications on an MQOPENed handle | CORMSB |
| Remove publications on an MQOPENed handle | Action not allowed |
| Keep publications on a handle with SOMAN | CORMSB |
| Remove publications on a handle with SOMAN | COPGSB |

**Read ahead options**

The following options control what happens to non-persistent messages which have been sent to the client before an application requested them and have not yet been consumed by the application. These messages are stored in the client read ahead buffer waiting to be requested by the application and can either be discarded or consumed from the queue before the MQCLOSE is completed.

**COIMM**
The object is closed immediately and any messages which have been sent to the client before an application requested them are discarded and are not available to be consumed by any application. This is the default value.

**COQSC**
A request to close the object is made, but if any messages which have been sent to the client before an application requested them, still reside in the client read ahead buffer, the MQCLOSE call will return with a warning code of RC2458, and the object handle will remain valid.

The application can then continue to use the object handle to retrieve messages until no more are available, and then close the object again. No more messages will be sent to the client ahead of an application requesting then, read ahead is now turned off.

Applications are advised to use COQSC rather than trying to reach a point where there are no more messages in the client read ahead buffer, since a message could arrive between the last MQGET call and the following MQCLOSE which would be discarded if COIMM was used.

If an MQCLOSE with COQSC is issued from within an asynchronous callback function, the same behavior of reading ahead messages applies. If the warning code RC2458 is returned, then the callback function will be called at least one more time. When the last remaining message that was read ahead has been passed to the callback function the CBCFLG field is set to CBCFBE.

**Default option**

If you require none of the options described previously, you can use the following option:

**CONONE**
No optional close processing required.

This *must* be specified for:

- Objects other than queues
- Predefined queues
- Temporary dynamic queues (but only in those cases where *HOBJ* is *not* the handle returned by the MQOPEN call that created the queue).
- Distribution lists

In all of the previous cases, the object is retained and not deleted.

If this option is specified for a temporary dynamic queue:

- The queue is deleted, if it was created by the MQOPEN call that returned *HOBJ* ; any messages that are on the queue are purged.
- In all other cases the queue (and any messages on it) are retained.

If this option is specified for a permanent dynamic queue, the queue is retained and not deleted.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2241**
(2241, X'8C1') Message group not complete.

**RC2242**
(2242, X'8C2') Logical message not complete.

If *CMPCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2035**
(2035, X'7F3') Not authorized for access.

**RC2101**
(2101, X'835') Object damaged.

**RC2045**
(2045, X'7FD') Option not valid for object type.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2055**
(2055, X'807') Queue contains one or more messages or uncommitted put or get requests.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2063**
(2063, X'80F') Security error occurred.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                   CALLP     MQCLOSE(HCONN : HOBJ : OPTS :
C                                     CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
```

```
     DMQCLOSE          PR                  EXTPROC('MQCLOSE')
     D* Connection handle
     D HCONN                         10I 0 VALUE
     D* Object handle
     D HOBJ                          10I 0
     D* Options that control the action of MQCLOSE
     D OPTS                          10I 0 VALUE
     D* Completion code
     D CMPCOD                        10I 0
     D* Reason code qualifying CMPCOD
     D REASON                        10I 0
```

## MQCMIT - Commit changes

The MQCMIT call indicates to the queue manager that the application has reached a syncpoint, and that all of the message gets and puts that have occurred since the last syncpoint are to be made permanent. Messages put as part of a unit of work are made available to other applications; messages retrieved as part of a unit of work are deleted.

- On IBM i, this call is not supported for applications running in compatibility mode.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

- “Syntax” on page 1240
- “Usage notes” on page 1240
- “Parameters” on page 1241
- “RPG Declaration” on page 1242

### Syntax

MQCMIT *(HCONN, COMCOD, REASON)*

### Usage notes

Consider these usage notes when using MQCMIT.

1. This call can be used only when the queue manager itself coordinates the unit of work. This is a local unit of work, where the changes affect only IBM MQ resources.
2. In environments where the queue manager does not coordinate the unit of work, the appropriate commit call must be used instead of MQCMIT. The environment may also support an implicit commit caused by the application terminating normally.
   - On IBM i, this call can be used for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the STRCMTCTL command with the CMTSCOPE(*JOB) parameter must not have been issued for the job.
3. If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in “MQDISC - Disconnect queue manager” on page 1256 for further details.
4. When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
   - The values of the *MDGID*, *MDSEQ*, *MDOFF*, and *MDMFL* fields in MQMD.
   - Whether the message is part of a unit of work.
   - For the MQPUT call: whether the message is persistent or nonpersistent.

When a unit of work is committed, the queue manager retains the group and segment information, and the application can continue putting or getting messages in the current message group or logical message.

Retaining the group and segment information when a unit of work is committed allows the application to spread a large message group or large logical message consisting of many segments across several units of work. Using several units of work might be advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to be able to restart putting or getting messages at the correct point if a system failure occurs. For details of how to restart at the correct point after a system failure, see the PMLOGO option described in "MQPMO - Put-message options" on page 1140, and the GMLOGO option described in "MQGMO - Get-message options" on page 1044.

The remaining usage notes apply only when the queue manager coordinates the units of work:

1. A unit of work has the same scope as a connection handle. This means that all IBM MQ calls which affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See the *HCONN* parameter described in MQCONN for information about the scope of connection handles.
2. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
3. A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but which never issues a commit or back-out call, can cause queues to fill up with messages that are not available to other applications. To guard against this possibility, the administrator should set the *MaxUncommittedMsgs* queue manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.

## Parameters

The MQCMIT call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

**COMCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *COMCOD*.

If *COMCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *COMCOD* is CCWARN:

**RC2003**
(2003, X'7D3') Unit of work backed out.

**RC2124**
(2124, X'84C') Result of commit operation is pending.

If *COMCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2101**
(2101, X'835') Object damaged.

**RC2123**
(2123, X'84B') Result of commit or back-out operation is mixed.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                   CALLP     MQCMIT(HCONN : COMCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQCMIT           PR                  EXTPROC('MQCMIT')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Completion code
D COMCOD                        10I 0
D* Reason code qualifying COMCOD
D REASON                        10I 0
```

## MQCONN - Connect queue manager

The MQCONN call connects an application program to a queue manager. It provides a queue manager connection handle, which is used by the application on subsequent message queuing calls.

- On IBM i, applications running in compatibility mode do not have to issue this call. These applications are connected automatically to the queue manager when they issue the first MQOPEN call. However, the MQCONN and MQDISC calls are still accepted from IBM i applications.

  Other applications (that is, applications not running in compatibility mode) must use the MQCONN or MQCONNX call to connect to the queue manager, and the MQDISC call to disconnect from the queue manager. Consider using this style of programming.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

On IBM MQ for Windows, UNIX, and IBM i, each thread in an application can connect to different queue managers. On other systems, all concurrent connections within a process must be to the same queue manager.


- "Syntax" on page 1243
- "Usage notes" on page 1243
- "Parameters" on page 1244
- "RPG Declaration" on page 1247


## Syntax

MQCONN *(QMNAME, HCONN, CMPCOD, REASON)*

## Usage notes

1. The queue manager to which connection is made using the MQCONN call is called the *local queue manager*.
2. Queues that are owned by the local queue manager appear to the application as local queues. It is possible to put messages on and get messages from these queues.

   Shared queues that are owned by the queue-sharing group to which the local queue manager belongs appear to the application as local queues. It is possible to put messages on and get messages from these queues.

   Queues that are owned by remote queue managers appear as remote queues. It is possible to put messages on these queues, but not possible to get messages from these queues.
3. If the queue manager fails while an application is running, the application must issue the MQCONN call again in order to obtain a new connection handle to use on subsequent IBM MQ calls. The application can issue the MQCONN call periodically until the call succeeds.

   If an application is not sure whether it is connected to the queue manager, the application can safely issue an MQCONN call in order to obtain a connection handle. If the application is already connected, the handle returned is the same as that returned by the previous MQCONN call, but with completion code CCWARN and reason code RC2002.
4. When the application has finished using IBM MQ calls, the application should use the MQDISC call to disconnect from the queue manager.
5. On IBM i, applications written for releases earlier than MQSeries V5.1 of the queue manager can run without the need for recompilation.
6. This is a *compatibility mode*. This mode of operation provides a compatible runtime environment for applications written using the dynamic linkage. It comprises the following:

   - The service program AMQZSTUB residing in the library QMQM.

     AMQZSTUB provides the same public interface as previous releases, and has the same signature. This service program can be used to access the MQI through bound procedure calls.
   - The program QMQM residing in the library QMQM.

     QMQM provides a means of accessing the MQI through dynamic program calls.
   - Programs MQCLOSE, MQCONN, MQDISC, MQGET, MQINQ, MQOPEN, MQPUT, MQPUT1, and MQSET residing in the library QMQM.

     These programs also provide a means of accessing the MQI through dynamic program calls, but with a parameter list that corresponds to the standard descriptions of the IBM MQ calls.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

These three interfaces do not include capabilities that were introduced in version 5.1. For example, the MQBACK, MQCMIT, and MQCONNX calls are not supported. The support provided by these interfaces is for single-threaded applications only.

Support for the static bound IBM MQ calls in single-threaded applications, and for all IBM MQ calls in multi-threaded applications, is provided through the service programs LIBMQM and LIBMQM_R.

7. On IBM i, programs that end abnormally are not automatically disconnected from the queue manager. Therefore applications should be written to allow for the possibility of the MQCONN or MQCONNX call returning completion code CCWARN and reason code RC2002. The connection handle returned in this situation can be used as normal.

## Parameters

The MQCONN call has the following parameters:

**QMNAME (48-byte character string) - input**

Name of queue manager.

This is the name of the queue manager to which the application wants to connect. The name can contain the following characters:

- Uppercase alphabetic characters (A through Z)
- Lowercase alphabetic characters (a through z)
- Numeric digits (0 through 9)
- Period (.), forward slash (/), underscore (_), percent (%)

The name must not contain leading or embedded blanks, but might contain trailing blanks. A null character can be used to indicate the end of significant data in the name; the null and any characters following it are treated as blanks. The following restrictions apply in the environments indicated:

- On IBM i, names containing lowercase characters, forward slash, or percent must be enclosed in quotation marks when specified on commands. These quotation marks must not be specified in the *QMNAME* parameter.

If the name consists entirely of blanks, the name of the *default* queue manager is used.

The name specified for *QMNAME* must be the name of a *connectable* queue manager.

**Queue-sharing groups**: On systems where several queue managers exist and are configured to form a queue-sharing group, the name of the queue-sharing group can be specified for *QMNAME* in place of the name of a queue manager. This allows the application to connect to *any* queue manager that is available in the queue-sharing group. The system can also be configured so that a blank *QMNAME* causes connection to the queue-sharing group instead of to the default queue manager.

If *QMNAME* specifies the name of the queue-sharing group, but there is also a queue manager with that name on the system, connection is made to the latter in preference to the former. Only if that connection fails is connection to one of the queue managers in the queue-sharing group attempted.

If the connection is successful, the handle returned by the MQCONN or MQCONNX call can be used to access *all* of the resources (both shared and nonshared) that belong to the particular queue manager to which connection has been made. Access to these resources is subject to the typical authorization controls.

If the application issues two MQCONN or MQCONNX calls in order to establish concurrent connections, and one or both calls specifies the name of the queue-sharing group, the second call may return completion code CCWARN and reason code RC2002. This occurs when the second call connects to the same queue manager as the first call.

Queue-sharing groups are supported only on z/OS. Connection to a queue-sharing group is supported only in the batch, RRS batch, and TSO environments.

**IBM MQ client applications**: For IBM MQ MQI client applications, a connection is attempted for each client-connection channel definition with the specified queue manager name, until one is successful. The queue manager, however, must have the same name as the specified name. If an all-blank name is specified, each client-connection channel with an all-blank queue manager name is tried until one is successful; in this case there is no check against the actual name of the queue manager.

**IBM MQ client queue manager groups**: If the specified name starts with an asterisk (*), the actual queue manager to which connection is made may have a name that is different from that specified by the application. The specified name (without the asterisk) defines a *group* of queue managers that are eligible for connection. The implementation selects one from the group by trying each one in turn, in alphabetic order, until one is found to which a connection can be made. If none of the queue managers in the group is available for connection, the call fails. Each queue manager is tried once only. If an asterisk alone is specified for the name, an implementation-defined default queue manager group is used.

Queue-manager groups are supported only for applications running in an MQ-client environment; the call fails if a non-client application specifies a queue manager name beginning with an asterisk. A group is defined by providing several client connection channel definitions with the same queue manager name (the specified name without the asterisk), to communicate with each of the queue managers in the group. The default group is defined by providing one or more client connection channel definitions, each with a blank queue manager name (specifying an all-blank name therefore has the same effect as specifying a single asterisk for the name for a client application).

After connecting to one queue manager of a group, an application can specify blanks in the typical way in the queue manager name fields in the message and object descriptors to mean the name of the queue manager to which the application has actually connected (the *local queue manager* ). If the application needs to know this name, the MQINQ call can be issued to inquire the *QMgrName* queue manager attribute.

Prefixing an asterisk to the connection name implies that the application is not dependent on connecting to a particular queue manager in the group. Suitable applications would be:

- Applications that put messages but do not get messages.
- Applications that put request messages and then get the reply messages from a *temporary dynamic* queue.

Unsuitable applications would be those that need to get messages from a particular queue at a particular queue manager; such applications should not prefix the name with an asterisk.

Note that if an asterisk is specified, the maximum length of the remainder of the name is 47 characters.

The length of this parameter is given by LNQMN.

**HCONN (10-digit signed integer) - output**

Connection handle.

This handle represents the connection to the queue manager. It must be specified on all subsequent message queuing calls issued by the application. It ceases to be valid when the MQDISC call is issued, or when the unit of processing that defines the scope of the handle terminates.

The scope of the handle is restricted to the smallest unit of parallel processing supported by the platform on which the application is running; the handle is not valid outside the unit of parallel processing from which the MQCONN call was issued.

- On IBM i, the scope of the handle is the job issuing the call.

On IBM i for applications running in compatibility mode, the value returned is:

**HCDEFH**
Default connection handle.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2002**
(2002, X'7D2') Application already connected.

If *CMPCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2267**
(2267, X'8DB') Unable to load cluster workload exit.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2035**
(2035, X'7F3') Not authorized for access.

**RC2137**
(2137, X'859') Object not opened successfully.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2063**
(2063, X'80F') Security error occurred.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQCONN(QMNAME : HCONN : CMPCOD :
C                                      REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQCONN           PR                  EXTPROC('MQCONN')
D* Name of queue manager
D QMNAME                         48A
D* Connection handle
D HCONN                          10I 0
D* Completion code
D CMPCOD                         10I 0
D* Reason code qualifying CMPCOD
D REASON                         10I 0
```

## MQCONNX - Connect queue manager (extended)

The MQCONNX call connects an application program to a queue manager. It provides a queue manager connection handle, which is used by the application on subsequent IBM MQ calls.

The MQCONNX call is like the MQCONN call, except that MQCONNX allows options to be specified to control the way that the call works.

- On IBM i, this call is not supported for applications running in compatibility mode.

  **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

On IBM MQ for Windows, UNIX, and IBM i, each thread in an application can connect to different queue managers. On other systems, all concurrent connections within a process must be to the same queue manager.


- “Syntax” on page 1247
- “Parameters” on page 1247
- “RPG Declaration” on page 1248


### Syntax

MQCONNX *(QMNAME, CNOPT, HCONN, CMPCOD, REASON)*

### Parameters

The MQCONNX call has the following parameters:

**QMNAME (48-byte character string) - input**

Name of queue manager.

See the *QMNAME* parameter described in “MQCONN - Connect queue manager” on page 1242 for details.

**CNOPT (MQCNO) - input/output**

Options that control the action of MQCONNX.

See “MQCNO - Connect options” on page 1018 for details.

**HCONN (10-digit signed integer) - output**

Connection handle.

See the *HCONN* parameter described in "MQCONN - Connect queue manager" on page 1242 for details.

**CMPCOD (10-digit signed integer) - output**

Completion code.

See the *CMPCOD* parameter described in "MQCONN - Connect queue manager" on page 1242 for details.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

See the *REASON* parameter described in "MQCONN - Connect queue manager" on page 1242 for details of possible reason codes.

The following additional reason codes can be returned by the MQCONNX call:

If *CMPCOD* is CCFAIL:

**RC2278**
(2278, X'8E6') Client connection fields not valid.

**RC2139**
(2139, X'85B') Connect-options structure not valid.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQCONN(QMNAME : HCONN : CMPCOD :
C                                      REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQCONN           PR                  EXTPROC('MQCONN')
D* Name of queue manager
D QMNAME                         48A
D* Options that control the action of MQCONNX
D HCONN                         224A
D* Connection handle
D HCONN                          10I 0
D* Completion code
D CMPCOD                         10I 0
D* Reason code qualifying CMPCOD
D REASON                         10I 0
```

# MQCRTMH - Create message handle

The MQCRTMH call returns a message handle.

An application can use it on subsequent message queuing calls:

- Use the MQSETMP call to set a property of the message handle.
- Use the MQINQMP call to inquire on the value of a property of the message handle.
- Use the MQDLTMP call to delete a property of the message handle.

The message handle can be used on the MQPUT and MQPUT1 calls to associate the properties of the message handle with the properties of the message being put. Similarly, by specifying a message handle on the MQGET call, the properties of the message being retrieved can be accessed by using the message handle when the MQGET call completes.

Use MQDLTMH to delete the message handle.

- "Syntax" on page 1249
- "Parameters" on page 1249
- "RPG Declaration" on page 1251


## Syntax

MQCRTMH *(Hconn, CrtMsgHOpts, Hmsg, CompCode, Reason)*

## Parameters

The MQCRTMH call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call. If the connection to the queue manager ceases to be valid and no IBM MQ call is operating on the message handle, MQDLTMH is implicitly called to delete the message.

Alternatively, you can specify the following value:

**HCUNAS**
The connection handle does not represent a connection to any particular queue manager.

When this value is used, the message handle must be deleted with an explicit call to MQDLTMH in order to release any storage allocated to it; IBM MQ never implicitly deletes the message handle.

There must be at least one valid connection to a queue manager established on the thread creating the message handle, otherwise the call fails with RC2018.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and you can specify the following value for *HCONN* :

**HCDEFH**
Default connection handle

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**CRTOPT (MQCMHO) - input**

The options that control the action of MQCRTMH. See MQCMHO for details.

**HMSG (20-digit signed integer) - output**

On output a message handle is returned that can be used to set, inquire, and delete properties of the message handle. Initially the message handle contains no properties.

A message handle also has an associated message descriptor. Initially this message descriptor contains the default values. The values of the associated message descriptor fields can be set and inquired by using the MQSETMP and MQINQMP calls. The MQDLTMP call resets a field of the message descriptor back to its default value.

If the *HCONN* parameter is specified as the value HCUNAS then the returned message handle can be used on MQGET, MQPUT, or MQPUT1 calls with any connection within the unit of processing, but can be in use by only one IBM MQ call at a time. If the handle is in use when a second IBM MQ call attempts to use the same message handle, the second IBM MQ call fails with reason code RC2499.

If the *HCONN* parameter is not HCUNAS then the returned message handle can be used only on the specified connection.

The same *HCONN* parameter value must be used on the subsequent MQI calls where this message handle is used:

- MQDLTMH

- MQSETMP
- MQINQMP
- MQDLTMP
- MQMHBUF
- MQBUFMH

The returned message handle ceases to be valid when the MQDLTMH call is issued for the message handle, or when the unit of processing that defines the scope of the handle terminates. MQDLTMH is called implicitly if a specific connection is supplied when the message handle is created and the connection to the queue manager ceases to be valid, for example, if MQDBC is called.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2461**
(2461, X'099D') Create message handle options structure not valid.

**RC2273**
(2273, X'7D9') Connection to queue manager lost.

**RC2017**
(2017, X'07E1') No more handles available.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2460**
(2460, X'099C') Message handle pointer not valid.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

See “Return codes for IBM i (ILE RPG)” on page 1392 for more details.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQCRTMH(HCONN : CRTOPT : HMSG :
                                        CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQCRTMH          PR                  EXTPROC('MQCRTMH')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Options that control the action of MQCRTMH
D CRTOPT                        12A
D* Message handle
D HMSG                          20I 0
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQCTL - Control callback

The MQCTL call performs controlling actions on the object handles opened for a connection.


- "Syntax" on page 1251
- "Usage notes" on page 1251
- "Parameters" on page 1251
- "RPG Declaration" on page 1256


### Syntax

MQCTL *(Hconn, Operation, ControlOpts, CompCode, Reason)*

### Usage notes

1. Callback routines must check the responses from all services they invoke, and if the routine detects a condition that cannot be resolved, it must issue an MQCB(CBREG) command to prevent repeated calls to the callback routine.

### Parameters

The MQCTL call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and you can specify the following special value for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**OPERATN (10-digit signed integer) - input**

The operation being processed on the callback defined for the specified object handle. You must specify one, and one only, of the following options:

**CTLSR**
Start the consuming of messages for all defined message consumer functions for the specified connection handle.

Callbacks run on a thread started by the system, which is different from any of the application threads.

This operation gives control of the provided connection handle to system. The only MQI calls which can be issued by a thread other than the consumer thread are:

- MQCTL with Operation CTLSP
- MQCTL with Operation CTLSU
- MQDISC - This performs MQCTL with Operation CTLSP before disconnection the HConn.

RC2500 is returned if an IBM MQ API call is issued while the connection handle is started, and the call does not originate from a message consumer function.

If a connection fails, this stops the conversation as soon as possible. It is possible, therefore, for an IBM MQ API call being issued on the main thread to receive the return code RC2500 for a while, followed by the return code RC2009 when the connection reverts to the stopped state.

This can be issued in a consumer function. For the same connection as the callback routine, its only purpose is to cancel a previously issued CTLSP operation.

This option is not supported if the application is bound with a nonthreaded IBM MQ library.

**CTLSW**
Start the consuming of messages for all defined message consumer functions for the specified connection handle.

Message consumers run on the same thread and control is not returned to the caller of MQCTL until:

- Released by the use of the MQCTL CTLSP or CTLSU operations, or
- All consumer routines have been deregistered or suspended.

If all consumers are deregistered or suspended, an implicit CTLSP operation is issued.

This option cannot be used from within a callback routine, either for the current connection handle or any other connection handle. If the call is attempted it returns with RC2012.

If, at any time during a CTLSW operation there are no registered, non-suspended consumers the call fails with a reason code of RC2446.

If, during a CTLSW operation, the connection is suspended, the MQCTL call returns a warning reason code of RC2521; the connection remains 'started'.

The application can choose to issue CTLSP or CTLRE. In this instance, the CTLRE operation blocks.

This option is not supported in a single threaded client.

**CTLSP**
Stop the consuming of messages, and wait for all consumers to complete their operations before this option completes. This operation releases the connection handle.

If issued from within a callback routine, this option does not take effect until the routine exits. No more message consumer routines are called after the consumer routines for messages already read have completed, and after stop calls (if requested) to callback routines have been made.

If issued outside a callback routine, control does not return to the caller until the consumer routines for messages already read have completed, and after stop calls (if requested) to callbacks have been made. The callbacks themselves, however, remain registered.

This function has no effect on read ahead messages. You must ensure that consumers run MQCLOSE(COQSC), from within the callback function, to determine whether there are any further messages available to be delivered.

**CTLSU**
Pause the consuming of messages. This operation releases the connection handle.

This does not affect the reading ahead of messages for the application. If you intend to stop consuming messages for a long period, consider closing the queue and reopening it when consumption must continue.

If issued from within a callback routine, it does not take effect until the routine exits. No more message consumer routines will be called after the current routine exits.

If issued outside a callback, control does not return to the caller until the current consumer routine has completed and no more are called.

**CTLRE**
Resume the consuming of messages.

This option is normally issued from the main application thread, but it can also be used from within a callback routine to cancel an earlier suspension request issued in the same routine.

If CTLRE is used to resume a CTLSW, then the operation blocks.

**PCTLOP (MQCTLO) - input**

Options that control the action of MQCTL

See MQCTLO for details of the structure.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The following reason codes are the ones that the queue manager can return for the *Reason* parameter.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2133**
(2133, X'855') Unable to load data conversion services modules.

**RC2204**
(2204, X'89C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2374**
(2374, X'946') API exit failed.

**RC2183**
(2183, X'887') Unable to load API exit.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2005**
(2005, X'7D5') Buffer length parameter not valid.

**RC2487**
(2487, X'9B7') Unable to call the callback routine

**RC2448**
(2448, X'990') Unable to Deregister, Suspend, or Resume because there is no registered callback

**RC2486**
(2486, X'9B6') Either, both CallbackFunction and CallbackName have been specified on a CBREG call, or either one of CallbackFunction or CallbackName has been specified but does not match the currently registered callback function.

**RC2483**
(2483, X'9B3') Incorrect CallBackType field.

**RC2219**
(2219, X'8AB') MQI call entered before previous call complete.

**RC2444**
(2444, X'98C') Option block is incorrect.

**RC2484**
(2484, X'9B4') Incorrect MQCBD options field.

**RC2140**
(2140, X'85C') Wait request rejected by CICS.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2217**
(2217, X'8A9') Not authorized for connection.

**RC2202**
(2202, X'89A') Connection quiescing.

**RC2203**
(2203, X'89B') Connection shutting down.

**RC2207**
(2207, X'89F') Correlation-identifier error.

**RC2016**
(2016, X'7E0') Gets inhibited for the queue.

**RC2351**
(2351, X'92F') Global units of work conflict.

**RC2186**
(2186, X'88A') Get-message options structure not valid.

**RC2353**
(2353, X'931') Handle in use for global unit of work.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2259**
(2259, X'8D3') Inconsistent browse specification.

**RC2245**
(2245, X'8C5') Inconsistent unit-of-work specification.

**RC2246**
(2246, X'8C6') Message under cursor not valid for retrieval.

**RC2352**
(2352, X'930') Global unit of work conflicts with local unit of work.

**RC2247**
(2247, X'8C7') Match options not valid.

**RC2485**
(2485, X'9B5') Incorrect MaxMsgLength field

**RC2026**
(2026, X'7EA') Message descriptor not valid.

**RC2497**
(2497, X'9C1')The specified function entry point was not be found in the module.

**RC2496**
(2496, X'9C0') Module is found but is of the wrong type (32-bit or 64-bit) or is not a valid dll.

**RC2495**
(2495, X'9BF') Module not found in the search path or not authorized to load.

**RC2206**
(2206, X'89E') Message-identifier error.

**RC2250**
(2250, X'8CA') Message sequence number not valid.

**RC2331**
(2331, X'91B') Use of message token not valid.

**RC2036**
(2036, X'7F4') Queue not open for browse.

**RC2037**
(2037, X'7F5') Queue not open for input.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2101**
(2101, X'835') Object damaged.

**RC2488**
(2488, X'9B8') Incorrect Operation code on API Call

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2193**
(2193, X'891') Error accessing page-set data set.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2394**
(2394, X'95A') Queue has wrong index type.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2069**
(2069, X'815') Signal outstanding for this handle.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2109**
(2109, X'83D') Call suppressed by exit program.

**RC2072**
(2072, X'818') Syncpoint support not available.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2354**
(2354, X'932') Enlistment in global unit of work failed.

**RC2355**
(2355, X'933') Mixture of unit-of-work calls not supported.

**RC2255**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**RC2090**
(2090, X'82A') Wait interval in MQGMO not valid.

**RC2256**
(2256, X'8D0') Wrong version of MQGMO supplied.

**RC2257**
(2257, X'8D1') Wrong version of MQMD supplied.

**RC2298**
(2298, X'8FA') The function requested is not available in the current environment.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQCTL(HCONN : OPERATN : PCTLOP :
                                      CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQCTL            PR                  EXTPROC('MQCTL')
D* Connection handle
D HCONN                           10I 0 VALUE
D* Operation
D OPERATN                         10I 0 VALUE
D* Control options
D PCTLOP                          32A
D* Completion code
D CMPCOD                          10I 0
D* Reason code qualifying CompCode
D REASON                          10I 0
```

## MQDISC - Disconnect queue manager

The MQDISC call breaks the connection between the queue manager and the application program, and is the inverse of the MQCONN or MQCONNX call.

- On IBM i, applications running in compatibility mode do not need to issue this call. See “MQCONN - Connect queue manager” on page 1242 for more information.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i


- “Syntax” on page 1257
- “Usage notes” on page 1257
- “Parameters” on page 1257
- “RPG Declaration” on page 1258

## Syntax

MQDISC *(HCONN, CMPCOD, REASON)*

## Usage notes

1. If an MQDISC call is issued when the application still has objects open, those objects are closed by the queue manager, with the close options set to CONONE.
2. If the application ends with uncommitted changes in a unit of work, the disposition of those changes depends on how the application ends:
   a. If the application issues the MQDISC call before ending:
      - For a queue manager coordinated unit of work, the queue manager issues the MQCMIT call on behalf of the application. The unit of work is committed if possible, and backed out if not.
      - For an externally coordinated unit of work, there is no change in the status of the unit of work; however, the queue manager will indicate that the unit of work should be committed, when asked by the unit-of-work coordinator.
   b. If the application ends normally but without issuing the MQDISC call, the unit of work is backed out.
   c. If the application ends *abnormally* without issuing the MQDISC call, the unit of work is backed out.
3. On IBM i, applications running in compatibility mode do not have to issue this call; see the MQCONN call for more details.

## Parameters

The MQDISC call has the following parameters:

**HCONN (10-digit signed integer) - input/output**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN*:

**HCDEFH**
Default connection handle.

On successful completion of the call, the queue manager sets *HCONN* to a value that is not a valid handle for the environment. This value is:

**HCUNUH**
Unusable connection handle.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQDISC(HCONN : CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQDISC           PR                  EXTPROC('MQDISC')
D* Connection handle
D HCONN                         10I 0
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CMPCOD
D REASON                        10I 0
```

## MQDLTMH - Delete message handle

The MQDLTMH call deletes a message handle and is the inverse of the MQCRTMH call.


- "Syntax" on page 1258
- "Usage notes" on page 1258
- "Parameters" on page 1260
- "RPG Declaration" on page 1261


### Syntax

MQDLTMH *((Hconn, Hmsg, DltMsgHOpts, CompCode, Reason)*

### Usage notes

1. You can use this call only when the queue manager itself coordinates the unit of work. This can be:

- A local unit of work, where the changes affect only IBM MQ resources.
- A global unit of work, where the changes can affect resources belonging to other resource managers, as well as affecting IBM MQ resources.

For further details about local and global units of work, see "MQBEGIN - Begin unit of work" on page 1219.

2. In environments where the queue manager does not coordinate the unit of work, use the appropriate back-out call instead of MQBACK. The environment might also support an implicit back out caused by the application terminating abnormally.
   - On z/OS, use the following calls:
     - Batch programs (including IMS batch DL/I programs) can use the MQBACK call if the unit of work affects only IBM MQ resources. However, if the unit of work affects both IBM MQ resources and resources belonging to other resource managers (for example, Db2 ), use the SRRBACK call provided by the z/OS Recoverable Resource Service (RRS). The SRRBACK call backs out changes to resources belonging to the resource managers that have been enabled for RRS coordination.
     - CICS applications must use the `EXEC CICS SYNCPOINT ROLLBACK` command to back out the unit of work. Do not use the MQBACK call for CICS applications.
     - IMS applications (other than batch DL/I programs) must use IMS calls such as `ROLB` to back out the unit of work. Do not use the MQBACK call for IMS applications (other than batch DL/I programs).
   - On IBM i, use this call for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the `STRCMTCTL` command with the `CMTSCOPE(*JOB)` parameter must not have been issued for the job.
3. If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 1256 for further details.
4. When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
   - The values of the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* fields in MQMD.
   - Whether the message is part of a unit of work.
   - For the MQPUT call: whether the message is persistent or nonpersistent.

   The queue manager keeps three sets of group and segment information, one set for each of the following:
   - The last successful MQPUT call (this can be part of a unit of work).
   - The last successful MQGET call that removed a message from the queue (this can be part of a unit of work).
   - The last successful MQGET call that browsed a message on the queue (this cannot be part of a unit of work).

   If the application puts or gets the messages as part of a unit of work, and the application then backs out the unit of work, the group and segment information is restored to the value that it had previously:
   - The information associated with the MQPUT call is restored to the value that it had before the first successful MQPUT call for that queue handle in the current unit of work.
   - The information associated with the MQGET call is restored to the value that it had before the first successful MQGET call for that queue handle in the current unit of work.

   Queues that were updated by the application after the unit of work started, but outside the scope of the unit of work, do not have their group and segment information restored if the unit of work is backed out.

Restoring the group and segment information to its previous value when a unit of work is backed out allows the application to spread a large message group or large logical message consisting of many segments across several units of work, and to restart at the correct point in the message group or logical message if one of the units of work fails. Using several units of work might be advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to be able to restart putting or getting messages at the correct point if that a system failure occurs.

For details of how to restart at the correct point after a system failure, see the PMLOGO option described in PMOPT (10 digit signed integer), and the GMLOGO option described in GMOPT (10 digit signed integer).

The remaining usage notes apply only when the queue manager coordinates the units of work:

5. A unit of work has the same scope as a connection handle. All IBM MQ calls that affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See HCONN (10 digit signed integer) - output for information about the scope of connection handles.
6. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
7. A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but that never issues a commit or backout call, can fill queues with messages that are not available to other applications. To guard against this possibility, the administrator must set the *MaxUncommittedMsgs* queue-manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.

## Parameters

The MQDLTMH call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager.

The value must match the connection handle that was used to create the message handle specified in the *HMSG* parameter.

If the message handle was created using HCUNAS then a valid connection must be established on the thread deleting the message handle, otherwise the call fails with RC2009 .

**HMSG (20-digit signed integer) - input/output**

This is the message handle to be deleted. The value was returned by a previous MQCRTMH call.

On successful completion of the call, the handle is set to an invalid value for the environment. This value is:

**HMUNUH**
Unusable message handle.

The message handle cannot be deleted if another IBM MQ call is in progress that was passed the same message handle.

**DLTOPT (MQDMHO) - input**

See MQDMHO for details.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2009**
(2009, X'07D9') Connection to queue manager lost.

**RC2462**
(2462, X'099E') Delete message handle options structure not valid.

**RC2460**
(2460, X'099C') Message handle pointer not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

See "Return codes for IBM i (ILE RPG)" on page 1392 for more details.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQDLTMH(HCONN : HMSG : DLTOPT :
                                   CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQDLTMH          PR                  EXTPROC('MQDLTMH')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Message handle
D HMSG                          20I 0
D* Options that control the action of MQDLTMH
D DLTOPT                        12A
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQDLTMP - Delete message property

The MQDLTMP call deletes a property from a message handle and is the inverse of the MQSETMP call.


- "Syntax" on page 1262
- "Parameters" on page 1262
- "RPG Declaration" on page 1263


### Syntax

MQDLTMP *(Hconn, Hmsg, DltPropOpts, Name, CompCode, Reason)*

### Parameters

The MQDLTMP call has the following parameters:

**HCONN (10-digit signed integer) - Input**

This handle represents the connection to the queue manager. The value must match the connection handle that was used to create the message handle specified in the *HMSG* parameter.

If the message handle was created using HCUNAS then a valid connection must be established on the thread deleting the message handle otherwise the call fails with RC2009.

**HMSG (20-digit signed integer) - input**

This is the message handle containing the property to be deleted. The value was returned by a previous MQCRTMH call.

**DLTOPT (MQDMPO) - Input**

See the MQDMPO data type for details.

**PRNAME (MQCHARV) - input**

The name of the property to delete. See Property names for further information about property names.

Wildcards are not allowed in the property name.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2471**
(2471, X'09A7') Property not available.

**RC2421**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'0852') Unable to load adapter service module.

**RC2157**
(2157, X'086D') Primary and home ASIDs differ.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2009**
(2009, X'07D9') Connection to queue manager lost.

**RC2481**
(2481, X'09B1') Delete message property options structure not valid.

**RC2460**
(2460, X'099C') Message handle not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2442**
(2442, X'098A') Invalid property name.

**RC2111**
(2111, X'083F') Property name coded character set identifier not valid.

**RC2195**
(2195, X'0893') Unexpected error occurred.

For more information about these codes, see API completion and reason codes.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQDLTMP(HCONN : HMSG : DLTOPT :
                                   PRNAME : CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQDLTMP          PR                  EXTPROC('MQDLTMP')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Message handle
D HMSG                          20I 0 VALUE
D* Options that control the action of MQDLTMP
D DLTOPT                        12A
D* Property name
D PRNAME                        32A
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQGET - Get message

The MQGET call retrieves a message from a local queue that has been opened by using the MQOPEN call.


- "Syntax" on page 1264

- "Usage notes" on page 1264
- "Parameters" on page 1267
- "RPG Declaration" on page 1271


## Syntax

MQGET *(HCONN, HOBJ, MSGDSC, GMO, BUFLEN, BUFFER, DATLEN, CMPCOD, REASON)*

## Usage notes

1. The message retrieved is normally deleted from the queue. This deletion can occur as part of the MQGET call itself, or as part of a syncpoint. Message deletion does not occur if a GMBRWF or GMBRWN option is specified on the *GMO* parameter (see the *GMOPT* field described in "MQGMO - Get-message options" on page 1044 ).
2. If the GMLK option is specified with one of the browse options, the browsed message is locked so that it is visible only to this handle.

   If the GMUNLK option is specified, a previously locked message is unlocked. No message is retrieved in this case, and the *MSGDSC*, *BUFLEN*, *BUFFER* and *DATLEN* parameters are not checked or altered.
3. If the application issuing the MQGET call is running as an IBM MQ MQI client, it is possible for the message retrieved to be lost if during the processing of the MQGET call the IBM MQ MQI client terminates abnormally or the client connection is severed. This arises because the surrogate that is running on the platform of the queue manager and which issues the MQGET call on the behalf of the client cannot detect the loss of the client until the surrogate is about to return the message to the client; this is after the message has been removed from the queue. This can occur for both persistent messages and nonpersistent messages.

   The risk of losing messages in this way can be eliminated by always retrieving messages within units of work (that is, by specifying the GMSYP option on the MQGET call, and using the MQCMIT or MQBACK calls to commit or back out the unit of work when processing of the message is complete). If GMSYP is specified, and the client terminates abnormally or the connection is severed, the surrogate backs out the unit of work on the queue manager and the message is reinstated on the queue.

   In principle, the same situation can arise with applications that are running on the platform of the queue manager, but in this case the window during which a message can be lost is small. However, as with IBM MQ MQI clients the risk can be eliminated by retrieving the message within a unit of work.
4. If an application puts a sequence of messages on a particular queue within a single unit of work, and then commits that unit of work successfully, the messages become available for retrieval as follows:
   - If the queue is a *nonshared* queue (that is, a local queue), all messages within the unit of work become available at the same time.
   - If the queue is a *shared* queue, messages within the unit of work become available in the order in which they were put, but not all at the same time. When the system is heavily laden, it is possible for the first message in the unit of work to be retrieved successfully, but for the MQGET call for the second or subsequent message in the unit of work to fail with RC2033. If this occurs, the application must wait a short while and then try the operation again.
5. If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if certain conditions are satisfied. See the usage notes in the description of the MQPUT call for details. If the conditions are satisfied, the messages are presented to the receiving application in the order in which they were sent, if:
   - Only one receiver is getting messages from the queue.

     If there are two or more applications getting messages from the queue, they must agree with the sender the mechanism to be used to identify messages that belong to a sequence. For example, the sender might set all of the *MDCID* fields in the messages in a sequence to a value that was unique to that sequence of messages.

- The receiver does not deliberately change the order of retrieval, for example by specifying a particular *MDMID* or *MDCID*.

If the sending application put the messages as a message group, the messages are presented to the receiving application in the correct order if the receiving application specifies the GMLOGO option on the MQGET call. For more information about message groups, see:

- *MDMFL* field in MQMD
- PMLOGO option in MQPMO
- GMLOGO option in MQGMO

6. Applications test for the feedback code FBQUIT in the *MDFB* field of the *MSGDSC* parameter. If this value is found, the application ends. See the *MDFB* field described in "MQMD - Message descriptor" on page 1077 for more information.
7. If the queue identified by *HOBJ* was opened with the OOSAVA option, and the completion code from the MQGET call is CCOK or CCWARN, the context associated with the queue handle *HOBJ* is set to the context of the message that has been retrieved (unless the GMBRWF or GMBRWN option is set, in which case the context is marked as not available). This context can be used on a subsequent MQPUT or MQPUT1 call by specifying the PMPASI or PMPASA options. This enables the context of the message received to be transferred in whole or in part to another message (for example, when the message is forwarded to another queue). For more information about message context, see Message context and Controlling context information.
8. If the GMCONV option is included in the *GMO* parameter, the application message data is converted to the representation requested by the receiving application, before the data is placed in the *BUFFER* parameter:
   - The *MDFMT* field in the control information in the message identifies the structure of the application data, and the *MDCSI* and *MDENC* fields in the control information in the message specify its character-set identifier and encoding.
   - The application issuing the MQGET call specifies in the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter the character-set identifier and encoding to which the application message data must be converted.

   When conversion of the message data is necessary, the conversion is performed either by the queue manager itself or by a user-written exit, depending on the value of the *MDFMT* field in the control information in the message:

   - The following formats are converted automatically by the queue manager; these formats are called "built-in" formats:

     | | |
     |---|---|
     | FMADMN | FMMDE |
     | FMCICS | FMPCF |
     | FMCMD1 | FMRMH |
     | FMCMD2 | FMRFH |
     | FMDLH | FMRFH2 |
     | FMDH | FMSTR |
     | FMEVNT | FMTM |
     | FMIMS | FMXQH |
     | FMIMVS | |

   - The format name FMNONE is a special value that indicates that the nature of the data in the message is undefined. As a consequence, the queue manager does not attempt conversion when the message is retrieved from the queue.

     **Note:** If GMCONV is specified on the MQGET call for a message that has a format name of FMNONE, and the character set or encoding of the message differs from that specified in the *MSGDSC*

parameter, the message is still returned in the *BUFFER* parameter (assuming no other errors), but the call completes with completion code CCWARN and reason code RC2110.

FMNONE can be used either when the nature of the message data means that it does not require conversion, or when the sending and receiving applications have agreed between themselves the form in which the message data should be sent.

- All other format names cause the message to be passed to a user-written exit for conversion. The exit has the same name as the format, apart from environment-specific additions. User-specified format names must not begin with the letters "MQ", as such names might conflict with format names supported in the future.

User data in the message can be converted between any supported character sets and encodings. However, be aware that if the message contains one or more IBM MQ header structures, the message cannot be converted from or to a character set that has double-byte or multi-byte characters for any of the characters that are valid in queue names. Reason code RC2111 or RC2115 results if this is attempted, and the message is returned unconverted. Unicode character set UCS-2 is an example of such a character set.

On return from MQGET, the following reason code indicates that the message was converted successfully:

- RCNONE

The following reason code indicates that the message might have been converted successfully; the application must check the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter to find out:

- RC2079

All other reason codes indicate that the message was not converted.

**Note:** The interpretation of the reason code described in this example is true for conversions performed by user-written exits *only* if the exit conforms to the processing guidelines.

9. For the built-in formats listed previously, the queue manager might perform *default conversion* of character strings in the message when the GMCONV option is specified. Default conversion allows the queue manager to use an installation-specified default character set that approximates the actual character set, when converting string data. As a result, the MQGET call can succeed with completion code CCOK, instead of completing with CCWARN and reason code RC2111 or RC2115.

   **Note:** The result of using an approximate character set to convert string data is that some characters might be converted incorrectly. This can be avoided by using in the string only characters which are common to both the actual character set and the default character set.

   Default conversion applies both to the application message data and to character fields in the MQMD and MQMDE structures:

   - Default conversion of the application message data occurs only when *all* of the following are true:
     - The application specifies GMCONV.
     - The message contains data that must be converted either from or to a character set which is not supported.
     - Default conversion was enabled when the queue manager was installed or restarted.
   - Default conversion of the character fields in the MQMD and MQMDE structures occurs as necessary, if default conversion is enabled for the queue manager. The conversion is performed even if the GMCONV option is not specified by the application on the MQGET call.
10. The *BUFFER* parameter shown in the RPG programming example is declared as a string; this restricts the maximum length of the parameter to 256 bytes. If a larger buffer is required, the parameter must be declared instead as a structure, or as a field in a physical file.

    Declaring the parameter as a structure increases the maximum length possible to 9999 bytes, while declaring the parameter as a field in a physical file increases the maximum length possible to approximately 32 KB.

## Parameters

The MQGET call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HOBJ (10-digit signed integer) - input**

Object handle.

This handle represents the queue from which a message is to be retrieved. The value of *HOBJ* was returned by a previous MQOPEN call. The queue must have been opened with one or more of the following options (see "MQOPEN - Open object" on page 1288 for details):

- OOINPS
- OOINPX
- OOINPQ
- OOBRW

**MSGDSC (MQMD) - input/output**

Message descriptor.

This structure describes the attributes of the message required, and the attributes of the message retrieved. See "MQMD - Message descriptor" on page 1077 for details.

If *BUFLEN* is less than the message length, *MSGDSC* is still entered by the queue manager, whether GMATM is specified on the *GMO* parameter (see the *GMOPT* field described in "MQGMO - Get-message options" on page 1044 ).

If the application provides a version-1 MQMD, the message returned has an MQMDE prefixed to the application message data, but *only* if one or more of the fields in the MQMDE has a nondefault value. If all of the fields in the MQMDE have default values, the MQMDE is omitted. A format name of FMMDE in the *MDFMT* field in MQMD indicates that an MQMDE is present.

**GMO (MQGMO) - input/output**

Options that control the action of MQGET.

See "MQGMO - Get-message options" on page 1044 for details.

**BUFLEN (10-digit signed integer) - input**

Length in bytes of the *BUFFER* area.

Zero can be specified for messages that have no data, or if the message is to be removed from the queue and the data discarded (GMATM must be specified in this case).

**Note:** The length of the longest message that it is possible to read from the queue is given by the *MaxMsgLength* queue attribute; see "Attributes for queues" on page 1335.

**BUFFER (1-byte bit string x BUFLEN) - output**

Area to contain the message data.

The buffer must be aligned on a boundary appropriate to the nature of the data in the message. 4-byte alignment must be suitable for most messages (including messages containing IBM MQ header structures), but some messages might require more stringent alignment. For example, a message containing a 64-bit binary integer might require 8-byte alignment.

If *BUFLEN* is less than the message length, as much of the message as possible is moved into *BUFFER* ; this happens whether GMATM is specified on the *GMO* parameter (see the *GMOPT* field described in "MQGMO - Get-message options" on page 1044 for more information).

The character set and encoding of the data in *BUFFER* are given by the *MDCSI* and *MDENC* fields returned in the *MSGDSC* parameter. If these values are different from the values required by the receiver, the receiver must convert the application message data to the character set and encoding required. The GMCONV option can be used with a user-written exit to perform the conversion of the message data (see "MQGMO - Get-message options" on page 1044 for details of this option).

**Note:** All of the other parameters on the MQGET call are in the character set and encoding of the local queue manager (given by the *CodedCharSetId* queue manager attribute and ENNAT).

If the call fails, the contents of the buffer might still have changed.

**DATLEN (10-digit signed integer) - output**

Length of the message.

This is the length in bytes of the application data *in the message*. If this message length is greater than *BUFLEN*, only *BUFLEN* bytes are returned in the *BUFFER* parameter (that is, the message is truncated). If the value is zero, it means that the message contains no application data.

If *BUFLEN* is less than the message length, *DATLEN* is still entered by the queue manager, whether GMATM is specified on the *GMO* parameter (see the *GMOPT* field described in "MQGMO - Get-message options" on page 1044 for more information). This allows the application to determine the size of the buffer required to accommodate the message data, and then reissue the call with a buffer of the appropriate size.

However, if the GMCONV option is specified, and the converted message data is too long to fit in *BUFFER*, the value returned for *DATLEN* is:

- The length of the *unconverted* data, for queue manager defined formats.

  In this case, if the nature of the data causes it to expand during conversion, the application must allocate a buffer bigger than the value returned by the queue manager for *DATLEN*.
- The value returned by the data-conversion exit, for application-defined formats.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

The following reason codes are the ones that the queue manager can return for the *REASON* parameter. If the application specifies the GMCONV option, and a user-written exit is invoked to convert some or all of the message data, it is the exit that decides what value is returned for the

*REASON* parameter. As a result, values other than the values documented later in this section are possible.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2120**
(2120, X'848') Converted data too large for buffer.

**RC2190**
(2190, X'88E') Converted string too large for field.

**RC2150**
(2150, X'866') DBCS string not valid.

**RC2110**
(2110, X'83E') Message format not valid.

**RC2243**
(2243, X'8C3') Message segments have differing CCSIDs.

**RC2244**
(2244, X'8C4') Message segments have differing encodings.

**RC2209**
(2209, X'8A1') No message locked.

**RC2119**
(2119, X'847') Message data not converted.

**RC2272**
(2272, X'8E0') Message data partially converted.

**RC2145**
(2145, X'861') Source buffer parameter not valid.

**RC2111**
(2111, X'83F') Source coded character set identifier not valid.

**RC2113**
(2113, X'841') Packed-decimal encoding in message not recognized.

**RC2114**
(2114, X'842') Floating-point encoding in message not recognized.

**RC2112**
(2112, X'840') Source integer encoding not recognized.

**RC2143**
(2143, X'85F') Source length parameter not valid.

**RC2146**
(2146, X'862') Target buffer parameter not valid.

**RC2115**
(2115, X'843') Target coded character set identifier not valid.

**RC2117**
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.

**RC2118**
(2118, X'846') Floating-point encoding specified by receiver not recognized.

**RC2116**
(2116, X'844') Target integer encoding not recognized.

**RC2079**
(2079, X'81F') Truncated message returned (processing completed).

**RC2080**
(2080, X'820') Truncated message returned (processing not completed).

If *CMPCOD* is CCFAIL:

**RC2004**
(2004, X'7D4') Buffer parameter not valid.

**RC2005**
(2005, X'7D5') Buffer length parameter not valid.

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2010**
(2010, X'7DA') Data length parameter not valid.

**RC2016**
(2016, X'7E0') Gets inhibited for the queue.

**RC2186**
(2186, X'88A') Get-message options structure not valid.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2241**
(2241, X'8C1') Message group not complete.

**RC2242**
(2242, X'8C2') Logical message not complete.

**RC2259**
(2259, X'8D3') Inconsistent browse specification.

**RC2245**
(2245, X'8C5') Inconsistent unit-of-work specification.

**RC2246**
(2246, X'8C6') Message under cursor not valid for retrieval.

**RC2247**
(2247, X'8C7') Match options not valid.

**RC2026**
(2026, X'7EA') Message descriptor not valid.

**RC2250**
(2250, X'8CA') Message sequence number not valid.

**RC2033**
(2033, X'7F1') No message available.

**RC2034**
(2034, X'7F2') Browse cursor not positioned on message.

**RC2036**
(2036, X'7F4') Queue not open for browse.

**RC2037**
(2037, X'7F5') Queue not open for input.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2101**
(2101, X'835') Object damaged.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2024**
(2024, X'7E8') No more messages can be handled within current unit of work.

**RC2072**
(2072, X'818') Syncpoint support not available.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2255**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**RC2090**
(2090, X'82A') Wait interval in MQGMO not valid.

**RC2256**
(2256, X'8D0') Wrong version of MQGMO supplied.

**RC2257**
(2257, X'8D1') Wrong version of MQMD supplied.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQGET(HCONN : HOBJ : MSGDSC : GMO :
C                                     BUFLEN : BUFFER : DATLEN :
C                                     CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQGET            PR                  EXTPROC('MQGET')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Object handle
D HOBJ                          10I 0 VALUE
D* Message descriptor
D MSGDSC                       364A
D* Options that control the action of MQGET
D GMO                          112A
D* Length in bytes of the Buffer area
D BUFLEN                        10I 0 VALUE
D* Area to contain the message data
D BUFFER                          *   VALUE
D* Length of the message
D DATLEN                        10I 0
D* Completion code
D CMPCOD                        10I 0
```

```
     D* Reason code qualifying CMPCOD
     D REASON                        10I 0
```

## MQINQ - Inquire about object attributes

The MQINQ call returns an array of integers and a set of character strings containing the attributes of an object.

The following types of object are valid:

- Queue
- Namelist
- Process definition
- Queue manager


- "Syntax" on page 1272
- "Usage notes" on page 1272
- "Parameters" on page 1273
- "RPG Declaration" on page 1280


### Syntax

MQINQ *(HCONN, HOBJ, SELCNT, SELS, IACNT, INTATR, CALEN, CHRATR, CMPCOD, REASON)*

### Usage notes

1. The values returned are a snapshot of the selected attributes. There is no guarantee that the attributes are not changed before the application can act upon the returned values.
2. When you open a model queue, a dynamic local queue is created. This is true even if you open the model queue to inquire about its attributes.

   The attributes of the dynamic queue (with certain exceptions) are the same as those of the model queue at the time the dynamic queue is created. If you then use the MQINQ call on this queue, the queue manager returns the attributes of the dynamic queue, and not those of the model queue. See Table 1 for details of which attributes of the model queue are inherited by the dynamic queue.
3. If the object being inquired is an alias queue, the attribute values returned by the MQINQ call are those of the alias queue, and not those of the base queue to which the alias resolves.
4. If the object being inquired is a cluster queue, the attributes that can be inquired depend on how the queue is opened:
   - If the cluster queue is opened for inquire plus one or more of input, browse, or set, there must be a local instance of the cluster queue in order for the open to succeed. In this case the attributes that can be inquired are those valid for local queues.
   - If the cluster queue is opened for inquire alone, or inquire and output, only the following attributes can be inquired; the *QType* attribute has the value QTCLUS in this case:
     - CAQD
     - CAQN
     - IADBND
     - IADPER
     - IADPRI
     - IAIPUT
     - IAQTYP

     If the cluster queue is opened with no fixed binding (that is, OOBNDN specified on the MQOPEN call, or OOBNDQ specified when the *DefBind* attribute has the value BNDNOT), successive MQINQ

calls for the queue might inquire different instances of the cluster queue, although typically all of the instances have the same attribute values.

For more information about cluster queues, see Configuring a queue manager cluster.

5. If a number of attributes are to be inquired, and then some of them are to be set using the MQSET call, it might be convenient to position at the beginning of the selector arrays the attributes that are to be set, so that the same arrays (with reduced counts) can be used for MQSET.
6. If more than one of the warning situations arise (see the *CMPCOD* parameter), the reason code returned is the *first* one in the following list that applies:
   a. RC2068
   b. RC2022
   c. RC2008
7. For more information about object attributes, see:
   - "Attributes for queues" on page 1335
   - "Attributes for namelists" on page 1363
   - "Attributes for process definitions" on page 1364
   - "Attributes for the queue manager" on page 1366
8. A new local queue SYSTEM.ADMIN.COMMAND.EVENT is used for queuing messages that are generated whenever commands are issued. Messages are put onto this queue for most commands, depending on how the CMDEV queue manager attribute is set:
   - ENABLED - command event messages are generated and put onto the queue for all successful commands.
   - NODISPLAY - command event messages are generated and put onto the queue for all successful commands other than the DISPLAY (MQSC) command, and the Inquire (PCF) command.
   - DISABLED - command event messages are not generated (this is the queue manager's initial default value).

## Parameters

The MQINQ call has the following parameters:

**HCONN (10 digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HOBJ (10 digit signed integer) - input**

Object handle.

This handle represents the object (of any type) with attributes that are required. The handle must have been returned by a previous MQOPEN call that specified the OOINQ option.

**SELCNT (10 digit signed integer) - input**

Count of selectors.

This is the count of selectors that are supplied in the *SELS* array. It is the number of attributes that are to be returned. Zero is a valid value. The maximum number allowed is 256.

**SELS (10 digit signed integer x SELCNT) - input**

Array of attribute selectors.

This is an array of *SELCNT* attribute selectors; each selector identifies an attribute (integer or character) with a value that is required.

Each selector must be valid for the type of object that *HOBJ* represents, otherwise the call fails with completion code CCFAIL and reason code RC2067.

In the special case of queues:

- If the selector is not valid for queues of *any* type, the call fails with completion code CCFAIL and reason code RC2067.
- If the selector is applicable *only* to queues of type or types other than that of the object, the call succeeds with completion code CCWARN and reason code RC2068.
- If the queue being inquired is a cluster queue, the selectors that are valid depend on how the queue was resolved; see usage note 4 for further details.

Selectors can be specified in any order. Attribute values that correspond to integer attribute selectors (IA* selectors) are returned in *INTATR* in the same order in which these selectors occur in *SELS*. Attribute values that correspond to character attribute selectors (CA* selectors) are returned in *CHRATR* in the same order in which those selectors occur. IA* selectors can be interleaved with the CA* selectors; only the relative order within each type is important.

**Note:**

1. The integer and character attribute selectors are allocated within two different ranges; the IA* selectors reside within the range IAFRST through IALAST, and the CA* selectors within the range CAFRST through CALAST.

   For each range, the constants IALSTU and CALSTU define the highest value that the queue manager accepts.
2. If all the IA* selectors occur first, the same element numbers can be used to address corresponding elements in the *SELS* and *INTATR* arrays.

The attributes that can be inquired are listed in the following tables. For the CA* selectors, the constant that defines the length in bytes of the resulting string in *CHRATR* is given in parentheses.

*Table 621. MQINQ attribute selectors for queues.*

See the bottom of the table for an explanation of the notes.

| Selector | Description | Note |
|---|---|---|
| CAALTD | Date of most recent alteration (LNDATE). | 1 |
| CAALTT | Time of most recent alteration (LNTIME). | 1 |
| CABRQN | Excessive backout-requeue name (LNQN). | 5 |
| CABASQ | Name of queue that alias resolves to (LNQN). | |
| CACFSN | Coupling-facility structure name (LNCFSN). | 3 |
| CACLN | Cluster name (LNCLUN). | 1 |
| CACLNL | Cluster namelist (LNNLN). | 1 |
| CACRTD | Queue creation date (LNCRTD). | |
| CACRTT | Queue creation time (LNCRTT). | |
| CAINIQ | Initiation queue name (LNQN). | |

*Table 621. MQINQ attribute selectors for queues.*

See the bottom of the table for an explanation of the notes.

*(continued)*

| Selector | Description | Note |
|---|---|---|
| CAPRON | Name of process definition (LNPRON). | |
| CAQD | Queue description (LNQD). | |
| CAQN | Queue name (LNQN). | |
| CARQMN | Name of remote queue manager (LNQMN). | |
| CARQN | Name of remote queue as known on remote queue manager (LNQN). | |
| CATRGD | Trigger data (LNTRGD). | 5 |
| CAXQN | Transmission queue name (LNQN). | |
| IABTHR | Backout threshold. | 5 |
| IACDEP | Number of messages on queue. | |
| IADBND | Default binding. | 1 |
| IADINP | Default open-for-input option. | 5 |
| IADPER | Default message persistence. | |
| IADPRI | Default message priority. | 5 |
| IADEFT | Queue definition type. | |
| IADIST | Distribution list support. | 2 |
| IAHGB | Whether to harden backout count. | 5 |
| IAIGET | Whether get operations are allowed. | |
| IAIPUT | Whether put operations are allowed. | |
| IAMLEN | Maximum message length. | |
| IAMDEP | Maximum number of messages allowed on queue. | |
| IAMDS | Whether message priority is relevant. | 5 |
| IAOIC | Number of MQOPEN calls that have the queue open for input. | |
| IAOOC | Number of MQOPEN calls that have the queue open for output. | |
| IAQDHE | Control attribute for queue depth high events. | 4, 5 |
| IAQDHL | High limit for queue depth. | 4, 5 |
| IAQDLE | Control attribute for queue depth low events. | 4, 5 |
| IAQDLL | Low limit for queue depth. | 4, 5 |
| IAQDME | Control attribute for queue depth max events. | 4, 5 |
| IAQSI | Limit for queue service interval. | 4, 5 |
| IAQSIE | Control attribute for queue service interval events. | 4, 5 |
| IAQTYP | Queue type. | |
| IAQSGD | Queue-sharing group disposition. | 3 |

*Table 621. MQINQ attribute selectors for queues.*

See the bottom of the table for an explanation of the notes.

*(continued)*

| Selector | Description | Note |
|---|---|---|
| IARINT | Queue retention interval. | 5 |
| IASCOP | Queue definition scope. | 4, 5 |
| IASHAR | Whether queue can be shared for input. | |
| IATRGC | Trigger control. | |
| IATRGD | Trigger depth. | 5 |
| IATRGP | Threshold message priority for triggers. | 5 |
| IATRGT | Trigger type. | |
| IAUSAG | Usage. | |
| CLWLUSEQ | Use remote queues. | |

**Note:**

1. Supported on AIX, HP-UX, z/OS, IBM i, Solaris, Windows, plus IBM MQ MQI clients connected to these systems.
2. Supported on AIX, HP-UX, IBM i, Solaris, Windows, plus IBM MQ clients connected to these systems.
3. Supported on z/OS.
4. Not supported on z/OS.
5. Not supported on VSE/ESA.

*Table 622. MQINQ attribute selectors for namelists.*

See notes for an explanation of the notes.

| Selector | Description | Note |
|---|---|---|
| CAALTD | Date of most recent alteration (LNDATE) | 1 |
| CAALTT | Time of most recent alteration (LNTIME) | 1 |
| CALSTD | Namelist description (LNNLD) | 1 |
| CALSTN | Name of namelist object (LNNLN) | 1 |
| CANAMS | Names in the namelist (LNQN x Number of names in the list) | 1 |
| IANAMC | Number of names in the namelist | 1 |
| IAQSGD | Queue-sharing group disposition | 3 |

*Table 623. MQINQ attribute selectors for process definitions.*

See notes for an explanation of the notes.

| Selector | Description | Note |
|---|---|---|
| CAALTD | Date of most recent alteration (LNDATE) | 1 |
| CAALTT | Time of most recent alteration (LNTIME) | 1 |

*Table 623. MQINQ attribute selectors for process definitions.*

See notes for an explanation of the notes.

*(continued)*

| Selector | Description | Note |
|---|---|---|
| CAAPPI | Application identifier (LNPROA) | 5 |
| CAENVD | Environment data (LNPROE) | 5 |
| CAPROD | Description of process definition (LNPROD) | 5 |
| CAPRON | Name of process definition (LNPRON) | 5 |
| CAUSRD | User data (LNPROU) | 5 |
| IAAPPT | Application type | 5 |
| IAQSGD | Queue-sharing group disposition | 3 |

*Table 624. MQINQ attribute selectors for the queue manager.*

See notes for an explanation of the notes.

| Selector | Description | Note |
|---|---|---|
| CAALTD | Date of most recent alteration (LNDATE) | 1 |
| CAALTT | Time of most recent alteration (LNTIME) | 1 |
| CACADX | Automatic channel definition exit name (LNEXN) | 1 |
| CACLWD | Data passed to cluster workload exit (LNEXDA) | 1 |
| CACLWX | Name of cluster workload exit (LNEXN) | 1 |
| CACMDQ | System command input queue name (LNQN) | 5 |
| CADLQ | Name of dead-letter queue (LNQN) | 5 |
| CADXQN | Default transmission queue name (LNQN) | 5 |
| CAQMD | Queue manager description (LNQMD) | 5 |
| CAQMID | Queue-manager identifier (LNQMID) | 1 |
| CAQMN | Name of local queue manager (LNQMN) | 5 |
| CAQSGN | Queue-sharing group name (LNQSGN) | 3 |
| CARPN | Name of cluster for which queue manager provides repository services (LNQMN) | 1 |
| CARPNL | Name of namelist object containing names of clusters for which queue manager provides repository services (LNNLN) | 1 |
| CMDEV | Control attribute that determines whether messages generated when commands are issued, are put onto a queue | 8 |
| IAAUTE | Control attribute for authority events | 4, 5 |
| IACAD | Control attribute for automatic channel definition | 2 |
| IACADE | Control attribute for automatic channel definition events | 2 |
| IACLXQ | Default cluster transmission queue type | 4 |
| IACLWL | Cluster workload length | 1 |

*Table 624. MQINQ attribute selectors for the queue manager.*

See notes for an explanation of the notes.

*(continued)*

| Selector | Description | Note |
|---|---|---|
| IACCSI | Coded character set identifier | 5 |
| IACMDL | Command level supported by queue manager | 5 |
| IACFGE | Control attribute for configuration events | 3 |
| IADIST | Distribution list support | 2 |
| IAINHE | Control attribute for inhibit events | 4, 5 |
| IALCLE | Control attribute for local events | 4, 5 |
| IAMHND | Maximum number of handles | 5 |
| IAMLEN | Maximum message length | 5 |
| IAMPRI | Maximum priority | 5 |
| IAMUNC | Maximum number of uncommitted messages within a unit of work | 5 |
| IAPFME | Control attribute for performance events | 4, 5 |
| IAPLAT | Platform on which the queue manager resides | 5 |
| IARMTE | Control attribute for remote events | 4, 5 |
| IASSE | Control attribute for start stop events | 4, 5 |
| IASYNC | Sync point availability | 5 |
| IATRLFT | Lifetime of unused non-administrative topics | |
| IATRGI | Trigger interval | 5 |

**IACNT (10 digit signed integer) - input**

Count of integer attributes.

This is the number of elements in the *INTATR* array. Zero is a valid value.

If this is at least the number of IA* selectors in the *SELS* parameter, all integer attributes requested are returned.

**INTATR (10 digit signed integer x IACNT) - output**

Array of integer attributes.

This is an array of *IACNT* integer attribute values.

Integer attribute values are returned in the same order as the IA* selectors in the *SELS* parameter. If the array contains more elements than the number of IA* selectors, the excess elements are unchanged.

If *HOBJ* represents a queue, but an attribute selector is not applicable to that type of queue, the specific value IAVNA is returned for the corresponding element in the *INTATR* array.

**CALEN (10 digit signed integer) - input**

Length of character attributes buffer.

This is the length in bytes of the *CHRATR* parameter.

This must be at least the sum of the lengths of the requested character attributes (see *SELS*). Zero is a valid value.

**CHRATR (1 byte character string x CALEN) - output**

Character attributes.

This is the buffer in which the character attributes are returned, concatenated together. The length of the buffer is given by the *CALEN* parameter.

Character attributes are returned in the same order as the CA* selectors in the *SELS* parameter. The length of each attribute string is fixed for each attribute (see *SELS*), and the value in it is padded to the right with blanks if necessary. If the buffer is larger than that needed to contain all of the requested character attributes (including padding), the bytes beyond the last attribute value returned are unchanged.

If *HOBJ* represents a queue, but an attribute selector is not applicable to that type of queue, a character string consisting entirely of asterisks (*) is returned as the value of that attribute in *CHRATR*.

**CMPCOD (10 digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10 digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2008**
(2008, X'7D8') Not enough space allowed for character attributes.

**RC2022**
(2022, X'7E6') Not enough space allowed for integer attributes.

**RC2068**
(2068, X'814') Selector not applicable to queue type.

If *CMPCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2006**
(2006, X'7D6') Length of character attributes not valid.

**RC2007**
(2007, X'7D7') Character attributes string not valid.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2021**
(2021, X'7E5') Count of integer attributes not valid.

**RC2023**
(2023, X'7E7') Integer attributes array not valid.

**RC2038**
(2038, X'7F6') Queue not open for inquire.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2101**
(2101, X'835') Object damaged.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2065**
(2065, X'811') Count of selectors not valid.

**RC2067**
(2067, X'813') Attribute selector not valid.

**RC2066**
(2066, X'812') Count of selectors too large.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQINQ(HCONN : HOBJ : SELCNT :
C                                     SELS(1) : IACNT : INTATR(1) :
C                                     CALEN : CHRATR : CMPCOD :
C                                     REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQINQ            PR                  EXTPROC('MQINQ')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Object handle
D HOBJ                          10I 0 VALUE
D* Count of selectors
D SELCNT                        10I 0 VALUE
D* Array of attribute selectors
D SELS                          10I 0
D* Count of integer attributes
D IACNT                         10I 0 VALUE
D* Array of integer attributes
D INTATR                        10I 0
D* Length of character attributes buffer
D CALEN                         10I 0 VALUE
D* Character attributes
D CHRATR                          *   VALUE
D* Completion code
D CMPCOD                        10I 0
```

```
     D* Reason code qualifying CMPCOD
     D REASON                        10I 0
```

## MQINQMP - Inquire message property

The MQINQMP call returns the value of a property of a message.


- "Syntax" on page 1281
- "Parameters" on page 1281
- "RPG Declaration" on page 1285


### Syntax

MQINQMP *(Hconn, Hmsg, InqPropOpts, Name, PropDesc, Type, ValueLength, Value, DataLength, CompCode, Reason)*

### Parameters

The MQINQMP call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *Hconn* must match the connection handle that was used to create the message handle specified in the *Hmsg* parameter.

If the message handle was created using HCUNAS then a valid connection must be established on the thread inquiring a property of the message handle, otherwise the call fails with RC2009.

**HMSG (20-digit signed integer) - input**

This is the message handle to be inquired. The value was returned by a previous **MQCRTMH** call.

**INQOPT (MQIMPO) - input**

See the MQIMPO data type for details.

**PRNAME (MQCHARV) - input**

This describes the name of the property to inquire.

If no property with this name can be found, the call fails with reason RC2471.

You can use the percent sign (%) character at the end of the property name. The wildcard matches zero or more characters, including the period (.) character. This allows an application to inquire the value of many properties. Call MQINQMP with option IPINQF to get the first matching property and again with the option IPINQN to get the next matching property. When no more matching properties are available, the call fails with RC2471. If the *ReturnedName* field of the InqPropOpts structure is initialized with an address or offset for the returned name of the property, this is completed on return from MQINQMP with the name of the property that has been matched. If the *VSBufSize* field of the *ReturnedName* in the InqPropOpts structure is less than the length of the returned property name the completion code is set CCFAIL with reason RC2465.

Properties that have known synonyms are returned as follows:

1. Properties with the prefix "mqps." are returned with the IBM MQ property name. For example, "MQTopicString" is the returned name rather than "mqps.Top".
2. Properties with the prefix "jms." or "mcd." are returned as the JMS header field name. For example, "JMSExpiration" is the returned name rather than "jms.Exp".
3. Properties with the prefix "usr." are returned without that prefix. For example, "Color" is returned rather than "usr.Color".

Properties with synonyms are only returned once.

In the RPG programming language, the following macro variables are defined for inquiring on all properties and all properties that begin "usr.":

**INQALL**
Inquire on all properties of the message.

**INQUSR**
Inquire on all properties of the message that start "usr.". The returned name is returned without the "usr." prefix.

If IPINQN is specified but Name has changed since the previous call or this is the first call, then IPINQF is implied.

See Property names and Property name restrictions for further information about the use of property names.

**PRPDSC (MQPD) - output**

This structure is used to define the attributes of a property, including what happens if the property is not supported, what message context the property belongs to, and what messages the property should be copied into. See MQPD for details of this structure.

**TYPE (10-digit signed integer) - input/output**

On return from the MQINQMP call this parameter is set to the data type of *Value*. The data type can be any of the following:

**TYPBOL**
A boolean.

**TYPBST**
a byte string.

**TYPI8**
An 8-bit signed integer.

**TYPI16**
A 16-bit signed integer.

**TYPI32**
A 32-bit signed integer.

**TYPI64**
A 64-bit signed integer.

**TYPF32**
A 32-bit floating-point number.

**TYPF64**
A 64-bit floating-point number.

**TYPSTR**
A character string.

**TYPNUL**
The property exists but has a null value.

If the data type of the property value is not recognized then TYPSTR is returned and a string representation of the value is placed into the *Value* area. A string representation of the data type can be found in the *IPTYP* field of the *IPOPT* parameter. A warning completion code is returned with reason RC2467.

Additionally, if the option IPCTYP is specified, conversion of the property value is requested. Use *Type* as an input to specify the data type that you want the property to be returned as. See the description of the IPCTYP option of the “MQIMPO - Inquire message property options” on page 1070 for details of data type conversion.

If you do not request type conversion, you can use the following value on input:

**TYPAST**
The value of the property is returned without converting its data type.

**VALLEN (10-digit signed integer) - input**

The length in bytes of the Value area.

Specify zero for properties that you do not require the value returned for. These could be properties which are designed by an application to have a null value or an empty string. Also specify zero if the IPQLEN option has been specified; in this case no value is returned.

**VALUE (1-byte bit string x VALLEN) - output**

This is the area to contain the inquired property value. The buffer should be aligned on a boundary appropriate for the value being returned. Failure to do so might result in an error when the value is later accessed.

If *VALLEN* is less than the length of the property value, as much of the property value as possible is moved into *VALUE* and the call fails with completion code CCFAIL and reason RC2469.

The character set of the data in *VALUE* is given by the IPRETCSI field in the INQOPT parameter. The encoding of the data in *VALUE* is given by the IPRETENC field in the INQOPT parameter.

If the *VALLEN* parameter is zero, VALUE is not referred to.

**DATLEN (10-digit signed integer) - output**

This is the length in bytes of the actual property value as returned in the *Value* area.

If *DataLength* is less than the property value length, *DataLength* is still entered on return from the MQINQMP call. This allows the application to determine the size of the buffer required to accommodate the property value, and then reissue the call with a buffer of the appropriate size.

The following values may also be returned.

If the *Type* parameter is set to TYPSTR or TYPBST:

**VLEMP**
The property exists but contains no characters or bytes.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CompCode*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CompCode* is CCWARN:

**RC2492**
(2492, X'09BC') Returned property name not converted.

**RC2466**
(2466, X'09A2') Property value not converted.

**RC2467**
(2467, X'09A3') Property data type is not supported.

**RC2421**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'0852') Unable to load adapter service module.

**RC2157**
(2157, X'086D') Primary and home ASIDs differ.

**RC2004**
(2004, X'07D4') Value parameter not valid.

**RC2005**
(2005, X'07D5') Value length parameter not valid.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2009**
(2009, X'07D9') Connection to queue manager lost.

**RC2010**
(2010, X'07DA') Data length parameter not valid.

**RC2464**
(2464, X'09A0') Inquire message property options structure not valid.

**RC2460**
(2460, X'099C') Message handle not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2064**
(2046, X'07F8') Options not valid or not consistent.

**RC2482**
(2482, X'09B2') Property descriptor structure not valid.

**RC2470**
(2470, X'09A6') Conversion from the actual to requested data type not supported.

**RC2442**
(2442, X'098A') Invalid property name.

**RC2465**
(2465, X'09A1') Property name too large for returned name buffer.

**RC2471**
(2471, X'09A7) Property not available.

**RC2469**
(2469, X'09A5') Property value too large for the Value area.

**RC2472**
(2472, X'09A8') Number format error encountered in value data.

**RC2473**
(2473, X'09A9') Invalid requested property type.

**RC2111**
(2111, X'083F') Property name coded character set identifier not valid.

**RC2071**
(2071, X'0871') Insufficient storage available.

**RC2195**
(2195, X'0893') Unexpected error occurred.

For detailed information about these codes, see:

- IBM MQ for z/OS messages, completion, and reason codes for IBM MQ for z/OS

- Messages and reason codes for all other IBM MQ platforms

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQINQMP(HCONN : HMSG : INQOPT :
                                        PRNAME : PRPDSC : TYPE :
                                        VALLEN : VALUE : DATLEN :
                                        CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQINQMP          PR                  EXTPROC('MQINQMP')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Message handle
D HMSG                          20I 0 VALUE
D* Options that control the action of MQINQMP
D INQOPT                        72A
D* Property name
D PRNAME                        32A
D* Property descriptor
D PRPDSC                        24A
D* Property data type
D TYPE                          10I 0
D* Length in bytes of the Value area
D VALLEN                        10I 0 VALUE
D* Property value
D VALUE                           *   VALUE
D* Length of the property value
D DATLEN                        10I 0
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQMHBUF - Convert message handle into buffer

The MQMHBUF converts a message handle into a buffer and is the inverse of the MQBUFMH call.


- “Syntax” on page 1285
- “Usage notes” on page 1285
- “Parameters” on page 1285
- “RPG Declaration” on page 1288


### Syntax

MQMHBUF *(Hconn, Hmsg, MsgHBufOpts, Name, MsgDesc, BufferLength, Buffer, DataLength, CompCode, Reason)*

### Usage notes

MQMHBUF converts a message handle into a buffer.

You can use it with an MQGET API exit to access certain properties, by using the message property APIs, and then pass these properties in a buffer back to an application designed to use MQRFH2 headers rather than message handles.

This call is the inverse of the MQBUFMH call, which you can use to parse message properties from a buffer into a message handle.

### Parameters

The MQMHBUF call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager.

The value of *HCONN* must match the connection handle that was used to create the message handle specified in the *HMSG* parameter.

If the message handle was created by using HCUNAS, a valid connection must be established on the thread deleting the message handle. If a valid connection is not established, the call fails with RC2009.

**HMSG (20-digit signed integer) - input**

This handle is the message handle for which a buffer is required.

The value was returned by a previous MQCRTMH call.

**MHBOPT (MQMHBO) - input**

The MQMHBO structure allows applications to specify options that control how buffers are produced from message handles.

See "MQBMHO - Buffer to message handle options" on page 988 for details.

**PRNAME (MQCHARV) - input**

The name of the property or properties to put into the buffer.

If no property matching the name can be found, the call fails with RC2471.

**Wildcards**

You can use a wildcard to put more than one property into the buffer. To do so, use the percent sign (%) at the end of the property name. This wildcard matches zero or more characters, including the period (.) character.

See Property names and Property name restrictions for further information about the use of property names.

**MSGDSC (MQMD) - input/output**

The *MSGDSC* structure describes the contents of the buffer area.

On output, the *Encoding*, *CodedCharSetId* and *Format* fields are set to correctly describe the encoding, character set identifier, and format of the data in the buffer area as written by the call.

Data in this structure is in the character set and encoding of the application.

**BUFLEN (10-digit signed integer) - input**

*BUFFLEN* is the length of the Buffer area, in bytes.

**BUFFER (1-byte bit string x BUFLEN) - input/output**

*BUFFER* defines the area containing the message buffer. For most data, you must align the buffer on a 4-byte boundary.

If *BUFFER* contains character or numeric data, set the *CodedCharSetId* and *Encoding* fields in the *MSGDSC* parameter to the values appropriate to the data; this enables the data to be converted, if necessary.

If properties are found in the message buffer they are optionally removed; they later become available from the message handle on return from the call.

In the C programming language, the parameter is declared as a pointer-to-void, which means the address of any type of data can be specified as the parameter.

If the *BUFLEN* parameter is zero, *BUFFER* is not referred to. In this case, the parameter address passed by programs written in C or System/390 assembler can be null.

**DATLEN (10-digit signed integer) - output**

*DATLEN* is the length, in bytes, of the returned properties in the buffer. If the value is zero, no properties matched the value given in *PRNAME* and the call fails with reason code RC2471.

If *BUFLEN* is less than the length required to store the properties in the buffer, the MQMHBUF call fails with RC2469, but a value is still entered into *DATLEN*. This allows the application to determine the size of the buffer required to accommodate the properties, and then reissue the call with the required *BUFLEN*.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2501**
(2501, X'095C') Message handle to buffer options structure not valid.

**RC2004**
(2004, X'07D4') Buffer parameter not valid.

**RC2005**
(2005, X'07D5') Buffer length parameter not valid.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2009**
(2009, X'07D9') Connection to queue manager lost.

**RC2010**
(2010, X'07DA') Data length parameter not valid.

**RC2460**
(2460, X'099C') Message handle not valid.

**RC2026**
(2026, X'07EA') Message descriptor not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2442**
(2442, X'098A') Property name is not valid.

**RC2471**
(2471, X'09A7') Property not available.

**RC2469**
(2469, X'09A5') BufferLength value is too small to contain specified properties.

**RC2195**
(2195, X'893') Unexpected error occurred.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQMHBUF(HCONN : HMSG : MHBOPT :
                                        PRNAME : MSGDSC : BUFLEN :
                                        BUFFER : DATLEN :
                                        CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQMHBUF          PR                  EXTPROC('MQMHBUF')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Message handle
D HMSG                          20I 0 VALUE
D* Options that control the action of MQMHBUF
D MHBOPT                        12A
D* Property name
D PRNAME                        32A
D* Message descriptor
D MSGDSC                       364A
D* Length in bytes of the Buffer area
D BUFLEN                        10I 0 VALUE
D* Area to contain the properties
D BUFFER                          *   VALUE
D* Length of the properties
D DATLEN                        10I 0
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQOPEN - Open object

The MQOPEN call establishes access to an object.

The following types of object are valid:

- Queue (including distribution lists)
- Namelist
- Process definition
- Queue manager
- Topic


- "Syntax" on page 1288
- "Usage notes" on page 1289
- "Parameters" on page 1293
- "RPG Declaration" on page 1299


### Syntax

MQOPEN *(HCONN, OBJDSC, OPTS, HOBJ, CMPCOD, REASON)*

## Usage notes

1. The object opened is one of the following:
   - A queue, in order to:
     - Get or browse messages (using the MQGET call)
     - Put messages (using the MQPUT call)
     - Inquire about the attributes of the queue (using the MQINQ call)
     - Set the attributes of the queue (using the MQSET call)

     If the queue named is a model queue, a dynamic local queue is created.

     A distribution list is a special type of queue object that contains a list of queues. It can be opened to put messages, but not to get or browse messages, or to inquire or set attributes. See usage note 8 for further details.

     A queue that has `QSGDISP(GROUP)` is a special type of queue definition that cannot be used with the MQOPEN or MQPUT1 calls.
   - A namelist, in order to:
     - Inquire about the names of the queues in the list (using the MQINQ call).
   - A process definition, in order to:
     - Inquire about the process attributes (using the MQINQ call).
   - The queue manager, in order to:
     - Inquire about the attributes of the local queue manager (using the MQINQ call).
2. It is valid for an application to open the same object more than once. A different object handle is returned for each open. Each handle that is returned can be used for the functions for which the corresponding open was performed.
3. If the object being opened is a queue but not a cluster queue, all name resolution within the local queue manager takes place at the time of the MQOPEN call. This might include one or more of the following for a particular MQOPEN call:
   - Alias resolution to the name of a base queue
   - Resolution of the name of a local definition of a remote queue to the name of the remote queue manager, and the name by which the queue is known at the remote queue manager
   - Resolution of the remote queue manager name to the name of a local transmission queue

   However, be aware that subsequent MQINQ or MQSET calls for the handle relate solely to the name that has been opened, and not to the object resulting after name resolution has occurred. For example, if the object opened is an alias, the attributes returned by the MQINQ call are the attributes of the alias, not the attributes of the base queue to which the alias resolves. Name resolution checking is still carried out, however, regardless of what is specified for the *OPTS* parameter on the corresponding MQOPEN.

   If the object being opened is a cluster queue, name resolution can occur at the time of the MQOPEN call, or be deferred until later. The point at which resolution occurs is controlled by the OOBND* options specified on the MQOPEN call:
   - OOBNDO
   - OOBNDN
   - OOBNDQ

   See Name resolution for more information about name resolution for cluster queues.
4. The attributes of an object can change while an application has the object open. In many cases, the application does not notice this, but for certain attributes the queue manager marks the handle as no longer valid. These are:

- Any attribute that affects the name resolution of the object. This applies regardless of the open options used, and includes the following:
  - A change to the *BaseQName* attribute of an alias queue that is open.
  - A change to the *RemoteQName* or *RemoteQMgrName* queue attributes, for any handle that is open for this queue, or for a queue which resolves through this definition as a queue manager alias.
  - Any change that causes a currently open handle for a remote queue to resolve to a different *transmission* queue, or to fail to resolve to one at all. For example, this can include:
    - A change to the *XmitQName* attribute of the local definition of a remote queue, whether the definition is being used for a queue, or for a queue manager alias.

    There is one exception to this, namely the creation of a new transmission queue. A handle that would have resolved to this queue had it been present when the handle was opened, but instead resolved to the default transmission queue, is not made invalid.
  - A change to the *DefXmitQName* queue manager attribute. In this case all open handles that resolved to the previously named queue (that resolved to it only because it was the default transmission queue) are marked as invalid. Handles that resolved to this queue for other reasons are not affected.
- The *Shareability* queue attribute, if there are two or more handles that are currently providing OOINPS access for this queue, or for a queue that resolves to this queue. If so, *all* handles that are open for this queue, or for a queue that resolves to this queue, are marked as invalid, regardless of the open options.
- The *Usage* queue attribute, for all handles that are open for this queue, or for a queue that resolves to this queue, regardless of the open options.

When a handle is marked as invalid, all subsequent calls (other than MQCLOSE) using this handle fail with reason code RC2041; the application should issue an MQCLOSE call (using the original handle) and then reopen the queue. Any uncommitted updates against the old handle from previous successful calls can still be committed or backed out, as required by the application logic.

If changing an attribute will cause this to happen, a special "force" version of the command must be used.

5. The queue manager performs security checks when an MQOPEN call is issued, to verify that the user identifier under which the application is running has the appropriate level of authority before access is permitted. The authority check is made on the name of the object being opened, and not on the name, or names, resulting after a name has been resolved.

   If the object being opened is a model queue, the queue manager performs a full security check against both the name of the model queue and the name of the dynamic queue that is created. If the resulting dynamic queue is then opened explicitly, a further resource security check is performed against the name of the dynamic queue.

6. A remote queue can be specified in one of two ways in the *OBJDSC* parameter of this call (see the *ODON* and *ODMN* fields described in “MQOD - Object descriptor” on page 1126 ):

   - By specifying for *ODON* the name of a local definition of the remote queue. In this case, *ODMN* refers to the local queue manager, and can be specified as blanks.

     The security validation performed by the local queue manager verifies that the user is authorized to open the local definition of the remote queue.
   - By specifying for *ODON* the name of the remote queue as known to the remote queue manager. In this case, *ODMN* is the name of the remote queue manager.

     The security validation performed by the local queue manager verifies that the user is authorized to send messages to the transmission queue resulting from the name resolution process.

   In either case:

- No messages are sent by the local queue manager to the remote queue manager in order to check that the user is authorized to put messages on the queue.
- When a message arrives at the remote queue manager, the remote queue manager might reject it because the user originating the message is not authorized.

7. An MQOPEN call with the OOBRW option establishes a browse cursor, for use with MQGET calls that specify the object handle and one of the browse options. This allows the queue to be scanned without altering its contents. A message that has been found by browsing can later be removed from the queue by using the GMMUC option.

   Multiple browse cursors can be active for a single application by issuing several MQOPEN requests for the same queue.

8. The following notes apply to the use of distribution lists.

   - Fields in the MQOD structure must be set as follows when opening a distribution list:
     - *ODVER* must be ODVER2 or greater.
     - *ODOT* must be OTQ.
     - *ODON* must be blank or the null string.
     - *ODMN* must be blank or the null string.
     - *ODREC* must be greater than zero.
     - One of *ODORO* and *ODORP* must be zero and the other nonzero.
     - No more than one of *ODRRO* and *ODRRP* can be nonzero.
     - There must be *ODREC* object records, addressed by either *ODORO* or *ODORP*. The object records must be set to the names of the destination queues to be opened.
     - If one of *ODRRO* and *ODRRP* is nonzero, there must be *ODREC* response records present. They are set by the queue manager if the call completes with reason code RC2136.

     A version-2 MQOD can also be used to open a single queue that is not in a distribution list, by ensuring that *ODREC* is zero.
   - Only the following open options are valid in the *OPTS* parameter:
     - OOOUT
     - OOPAS*
     - OOSET*
     - OOALTU
     - OOFIQ
   - The destination queues in the distribution list can be local, alias, or remote queues, but they cannot be model queues. If a model queue is specified, that queue fails to open, with reason code RC2057. However, this does not prevent other queues in the list being opened successfully.
   - The completion code and reason code parameters are set as follows:
     - If the open operations for the queues in the distribution list all succeed or fail in the same way, the completion code and reason code parameters are set to describe the common result. The MQRR response records (if provided by the application) are not set in this case.

       For example, if every open succeeds, the completion code is set to CCOK and the reason code is RCNONE; if every open fails because none of the queues exists, the parameters are set to CCFAIL and RC2085.
     - If the open operations for the queues in the distribution list do not all succeed or fail in the same way:
       - The completion code parameter is set to CCWARN if at least one open succeeded, and to CCFAIL if all failed.
       - The reason code parameter is set to RC2136.

- The response records (if provided by the application) are set to the individual completion codes and reason codes for the queues in the distribution list.

- When a distribution list has been opened successfully, the handle *HOBJ* returned by the call can be used on subsequent MQPUT calls to put messages to queues in the distribution list, and on an MQCLOSE call to relinquish access to the distribution list. The only valid close option for a distribution list is CONONE.

  The MQPUT1 call can also be used to put a message to a distribution list; the MQOD structure defining the queues in the list is specified as a parameter on that call.
- Each successfully opened destination in the distribution list counts as a *separate* handle when checking whether the application has exceeded the permitted maximum number of handles (see the *MaxHandles* queue manager attribute). This is true even when two or more of the destinations in the distribution list actually resolve to the same physical queue. If the MQOPEN or MQPUT1 call for a distribution list would cause the number of handles in use by the application to exceed *MaxHandles*, the call fails with reason code RC2017.
- Each destination that is opened successfully has the value of its *OpenOutputCount* attribute incremented by one. If two or more of the destinations in the distribution list actually resolve to the same physical queue, that queue has its *OpenOutputCount* attribute incremented by the number of destinations in the distribution list that resolve to that queue.
- Any change to the queue definitions that would have caused a handle to become invalid had the queues been opened individually (for example, a change in the resolution path), does not cause the distribution-list handle to become invalid. However, it does result in a failure for that particular queue when the distribution-list handle is used on a subsequent MQPUT call.
- It is valid for a distribution list to contain only one destination.

9. The following notes apply to the use of cluster queues.

   - When a cluster queue is opened for the first time, and the local queue manager is not a full repository queue manager, the local queue manager obtains information about the cluster queue from a full repository queue manager. When the network is busy, it may take several seconds for the local queue manager to receive the needed information from the repository queue manager. As a result, the application issuing the MQOPEN call might have to wait for up to 10 seconds before control returns from the MQOPEN call. If the local queue manager does not receive the needed information about the cluster queue within this time, the call fails with reason code RC2189.
   - When a cluster queue is opened and there are multiple instances of the queue in the cluster, the instance actually opened depends on the options specified on the MQOPEN call:

     – If the options specified include any of the following:

       - OOBRW
       - OOINPQ
       - OOINPX
       - OOINPS
       - OOSET

       the instance of the cluster queue opened is required to be the local instance. If there is no local instance of the queue, the MQOPEN call fails.

     – If the options specified include none of the above, but do include one or both of the following:

       - OOINQ
       - OOOUT

       the instance opened is the local instance if there is one, and a remote instance otherwise. The instance chosen by the queue manager can, however, be altered by a cluster workload exit (if there is one).

   For more information about cluster queues, see Cluster queues.

10. Applications started by a trigger monitor are passed the name of the queue that is associated with the application when the application is started. This queue name can be specified in the *OBJDSC* parameter to open the queue. See the description of the MQTMC structure for further details.
11. On IBM i, applications running in compatibility mode are connected automatically to the queue manager by the first MQOPEN call issued by the application (if the application has not already connected to the queue manager by using the MQCONN call).

    **Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

    Applications not running in compatibility mode must issue the MQCONN or MQCONNX call to connect to the queue manager explicitly, before using the MQOPEN call to open an object.
12. When using the OORLOQ option, the local queue is already returned when either a local, alias, or model queue is opened, but this is not the case when, for example, a remote queue or a non-local cluster queue is opened; the ResolvedQName and ResolvedQMgrName are entered with the RemoteQName and RemoteQMgrName found in the remote queue definition, or similarly with the chosen remote cluster queue. If OORLOQ is specified when opening, for example, a remote queue, ResolvedQName will now be the transmission queue which messages will be put to. The ResolvedQMgrName will be entered with the name of the local queue manager hosting the transmission queue. If a user is authorized for browse, input or output on a queue, they have the required authority to specify this flag on the MQOPEN call. No special authority is needed.

## Parameters

The MQOPEN call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**OBJDSC (MQOD) - input/output**

Object descriptor.

This is a structure that identifies the object to be opened; see “MQOD - Object descriptor” on page 1126 for details.

If the *ODON* field in the *OBJDSC* parameter is the name of a model queue, a dynamic local queue is created with the attributes of the model queue; this happens irrespective of the open options specified by the *OPTS* parameter. Subsequent operations using the *HOBJ* returned by the MQOPEN call are performed on the new dynamic queue, and not on the model queue. This is true even for the MQINQ and MQSET calls. The name of the model queue in the *OBJDSC* parameter is replaced with the name of the dynamic queue created. The type of the dynamic queue is determined by the value of the *DefinitionType* attribute of the model queue (see “Attributes for queues” on page 1335 ). For information about the close options applicable to dynamic queues, see the description of the MQCLOSE call.

**OPTS (10-digit signed integer) - input**

Options that control the action of MQOPEN.

At least one of the following options must be specified:

- OOBRW
- OOINP* (only one of these)
- OOINQ
- OOOUT
- OOSET
- OORLQ

Other options can be specified as required. If more than one option is required, the values can be added (do not add the same constant more than once). Combinations that are not valid are noted; all other combinations are valid. Only options that are applicable to the type of object specified by *OBJDSC* are allowed (see Valid MQOPEN options for each queue type ).

**Access options**: The following options control the type of operations that can be performed on the object:

**OOINPQ**
Open queue to get messages using queue-defined default.

The queue is opened for use with subsequent MQGET calls. The type of access is either shared or exclusive, depending on the value of the *DefInputOpenOption* queue attribute; see "Attributes for queues" on page 1335 for details.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**OOINPS**
Open queue to get messages with shared access.

The queue is opened for use with subsequent MQGET calls. The call can succeed if the queue is currently open by this or another application with OOINPS, but fails with reason code RC2042 if the queue is currently open with OOINPX.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

**OOINPX**
Open queue to get messages with exclusive access.

The queue is opened for use with subsequent MQGET calls. The call fails with reason code RC2042 if the queue is currently open by this or another application for input of any type (OOINPS or OOINPX).

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects that are not queues.

The following notes apply to these options:

- Only one of these options can be specified.
- An MQOPEN call with one of these options can succeed even if the *InhibitGet* queue attribute is set to QAGETI (although subsequent MQGET calls will fail while the attribute is set to this value).
- If the queue is defined as not being shareable (that is, the *Shareability* queue attribute has the value QANSHR), attempts to open the queue for shared access are treated as attempts to open the queue with exclusive access.
- If an alias queue is opened with one of these options, the test for exclusive use (or for whether another application has exclusive use) is against the base queue to which the alias resolves.

- These options are not valid if *ODMN* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue manager aliasing is the name of the local queue manager.

**OOBRW**
Open queue to browse messages.

The queue is opened for use with subsequent MQGET calls with one of the following options:

- GMBRWF
- GMBRWN
- GMBRWC

This is allowed even if the queue is currently open for OOINPX. An MQOPEN call with the OOBRW option establishes a browse cursor, and positions it logically before the first message on the queue; see the *GMOPT* field described in "MQGMO - Get-message options" on page 1044 for further information.

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects which are not queues. It is also not valid if *ODMN* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue manager aliasing is the name of the local queue manager.

**OOOUT**
Open queue to put messages, or a topic or topic string to publish messages.

The queue is opened for use with subsequent MQPUT calls.

An MQOPEN call with this option can succeed even if the *InhibitPut* queue attribute is set to QAPUTI (although subsequent MQPUT calls will fail while the attribute is set to this value).

This option is valid for all types of queue, including distribution lists and topics.

**OOINQ**
Open object to inquire attributes.

The queue, namelist, process definition, or queue manager is opened for use with subsequent MQINQ calls.

This option is valid for all types of object other than distribution lists. It is not valid if *ODMN* is the name of a queue manager alias; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue manager aliasing is the name of the local queue manager.

**OOSET**
Open queue to set attributes.

The queue is opened for use with subsequent MQSET calls.

This option is valid for all types of queue other than distribution lists. It is not valid if *ODMN* is the name of a local definition of a remote queue; this is true even if the value of the *RemoteQMgrName* attribute in the local definition of a remote queue used for queue manager aliasing is the name of the local queue manager.

**Binding options**: The following options apply when the object being opened is a cluster queue; these options control the binding of the queue handle to an instance of the cluster queue:

**OOBNDO**
Bind handle to destination when queue is opened.

This causes the local queue manager to bind the queue handle to an instance of the destination queue when the queue is opened. As a result, all messages put using this handle are sent to the same instance of the destination queue, and by the same route.

This option is valid only for queues, and affects only cluster queues. If specified for a queue that is not a cluster queue, the option is ignored.

**OOBNDN**
Do not bind to a specific destination.

This stops the local queue manager binding the queue handle to an instance of the destination queue. As a result, successive MQPUT calls using this handle may result in the messages being sent to *different* instances of the destination queue, or being sent to the same instance but by different routes. It also allows the instance selected to be changed later by the local queue manager, by a remote queue manager, or by a message channel agent (MCA), according to network conditions.

**Note:** Client and server applications which need to exchange a *series* of messages in order to complete a transaction should not use OOBNDN (or OOBNDQ when *DefBind* has the value BNDNOT), because successive messages in the series may be sent to different instances of the server application.

If OOBRW or one of the OOINP* options is specified for a cluster queue, the queue manager is forced to select the local instance of the cluster queue. As a result, the binding of the queue handle is fixed, even if OOBNDN is specified.

If OOINQ is specified with OOBNDN, successive MQINQ calls using that handle may inquire different instances of the cluster queue, although typically all of the instances have the same attribute values.

OOBNDN is valid only for queues, and affects only cluster queues. If specified for a queue that is not a cluster queue, the option is ignored.

**OOBNDQ**
Use default binding for queue.

This causes the local queue manager to bind the queue handle in the way defined by the *DefBind* queue attribute. The value of this attribute is either BNDOPN or BNDNOT.

OOBNDQ is the default if OOBNDO and OOBNDN are not specified.

OOBNDQ is defined to aid program documentation. It is not intended that this option is used with either of the other two bind options, but because its value is zero such use cannot be detected.

**Context options**: The following options control the processing of message context:

**OOSAVA**
Save context when message retrieved.

Context information is associated with this queue handle. This information is set from the context of any message retrieved using this handle. For more information about message context, see Message context and Controlling context information.

This context information can be passed to a message that is later put on a queue using the MQPUT or MQPUT1 calls. See the PMPASI and PMPASA options described in "MQPMO - Put-message options" on page 1140.

Until a message has been successfully retrieved, context cannot be passed to a message being put on a queue.

A message retrieved using one of the GMBRW* browse options does not have its context information saved (although the context fields in the *MSGDSC* parameter are set after a browse).

This option is valid only for local, alias, and model queues; it is not valid for remote queues, distribution lists, and objects which are not queues. One of the OOINP* options must be specified.

**OOPASI**
Allow identity context to be passed.

This allows the PMPASI option to be specified in the *PMO* parameter when a message is put on a queue; this gives the message the identity context information from an input queue that was

opened with the OOSAVA option. For more information about message context, see Message context and Controlling context information.

The OOOUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**OOPASA**
Allow all context to be passed.

This allows the PMPASA option to be specified in the *PMO* parameter when a message is put on a queue; this gives the message the identity and origin context information from an input queue that was opened with the OOSAVA option. For more information about message context, see Message context and Controlling context information.

This option implies OOPASI, which need not therefore be specified. The OOOUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**OOSETI**
Allow identity context to be set.

This allows the PMSETI option to be specified in the *PMO* parameter when a message is put on a queue; this gives the message the identity context information contained in the *MSGDSC* parameter specified on the MQPUT or MQPUT1 call. For more information about message context, see Message context and Controlling context information.

This option implies OOPASI, which need not therefore be specified. The OOOUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**OOSETA**
Allow all context to be set.

This allows the PMSETA option to be specified in the *PMO* parameter when a message is put on a queue; this gives the message the identity and origin context information contained in the *MSGDSC* parameter specified on the MQPUT or MQPUT1 call. For more information about message context, see Message context and Controlling context information.

This option implies the following options, which need not therefore be specified:

- OOPASI
- OOPASA
- OOSETI

The OOOUT option must be specified.

This option is valid for all types of queue, including distribution lists.

**Other options**: The following options control authorization checking, and what happens when the queue manager is quiescing:

**OOALTU**
Validate with specified user identifier.

This indicates that the *ODAU* field in the *OBJDSC* parameter contains a user identifier that is to be used to validate this MQOPEN call. The call can succeed only if this *ODAU* is authorized to open the object with the specified access options, regardless of whether the user identifier under which the application is running is authorized to do so. This does not apply to any context options specified, however, which are always checked against the user identifier under which the application is running.

This option is valid for all types of object.

**OOFIQ**
Fail if queue manager is quiescing.

This option forces the MQOPEN call to fail if the queue manager is in quiescing state.

This option is valid for all types of object.

**OORLQ**
Enter the name of local queue that was opened.

This option specifies that the ResolvedQName in the MQOD structure (if available) should be entered with the name of the local queue which was opened. The ResolvedQMgrName will similarly be entered with the name of the local queue manager hosting the local queue.

**Valid MQOPEN options for each queue type**

| Option | Alias ( "1" on page 1299 ) | Local and Model | Remote | Nonlocal Cluster | Distribution list | Topic |
|---|---|---|---|---|---|---|
| OOINPQ | ✓ | ✓ | - | - | - | - |
| OOINPS | ✓ | ✓ | - | - | - | - |
| OOINPX | ✓ | ✓ | - | - | - | - |
| OOBRW | ✓ | ✓ | - | - | - | - |
| OOOUT | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| OOINQ | ✓ | ✓ | "2" on page 1299 | ✓ | - | - |
| OOSET | ✓ | ✓ | "2" on page 1299 | - | - | - |
| OOBNDO ( "3" on page 1299 ) | ✓ | ✓ | ✓ | ✓ | ✓ | - |
| OOBNDN ( "3" on page 1299 ) | ✓ | ✓ | ✓ | ✓ | ✓ | - |
| OOBNDQ ( "3" on page 1299 ) | ✓ | ✓ | ✓ | ✓ | ✓ | - |
| OOSAVA | ✓ | ✓ | - | - | - | - |
| OOPASI | ✓ | ✓ | ✓ | ✓ | ✓ | "5" on page 1299 |
| OOPASA | ✓ | ✓ | ✓ | ✓ | ✓ | "5" on page 1299 |
| OOSETI | ✓ | ✓ | ✓ | ✓ | ✓ | "5" on page 1299 |
| OOSETA | ✓ | ✓ | ✓ | ✓ | ✓ | "5" on page 1299 |
| OOALTU | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| OOFIQ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| OORLQ | ✓ | ✓ | ✓ | ✓ | - | - |

**Notes:**

1. The validity of options for aliases depends on the validity of the option for the queue to which the alias resolves.
2. This option is valid only for the local definition of a remote queue.
3. This option can be specified for any queue type, but is ignored if the queue is not a cluster queue.
4. This attribute is ignored for a topic.
5. These attributes can be used with a topic, but only affect the context set for the retained message, not the context fields sent to any subscriber.

**HOBJ (10-digit signed integer) - output**

Object handle.

This handle represents the access that has been established to the object. It must be specified on subsequent message queuing calls that operate on the object. It ceases to be valid when the MQCLOSE call is issued, or when the unit of processing that defines the scope of the handle terminates.

The scope of the handle is restricted to the smallest unit of parallel processing supported by the platform on which the application is running; the handle is not valid outside the unit of parallel processing from which the MQOPEN call was issued:

- On IBM i, the scope of the handle is the job issuing the call.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

## RPG Declaration

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                     CALLP     MQOPEN(HCONN : OBJDSC : OPTS :
     C                                      HOBJ : CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQOPEN           PR                  EXTPROC('MQOPEN')
D* Connection handle
D HCONN                          10I 0 VALUE
D* Object descriptor
D OBJDSC                        468A
D* Options that control the action of MQOPEN
D OPTS                           10I 0 VALUE
D* Object handle
D HOBJ                           10I 0
D* Completion code
D CMPCOD                         10I 0
D* Reason code qualifying CMPCOD
D REASON                         10I 0
```

## MQPUT - Put message

The MQPUT call puts a message on a queue, distribution list or to a topic. The queue, distribution list, or topic must already be open.


- "Syntax" on page 1300
- "Usage notes" on page 1300
  - "Topics" on page 1300
  - "MQPUT and MQPUT1" on page 1301
  - "Destination queues" on page 1301
  - "Distribution lists" on page 1302
  - "Headers" on page 1303
  - "Buffer" on page 1304
- "Parameters" on page 1304
- "RPG Declaration" on page 1309


### Syntax

MQPUT *(HCONN, HOBJ, MSGDSC, PMO, BUFLEN, BUFFER, CMPCOD, REASON)*

### Usage notes

### Topics

The following notes apply to the use of topics:

1. When using MQPUT to publish messages on a topic, where one or more subscribers to that topic cannot be given the publication due to a problem with their subscriber queue (for example it is full), the Reason code returned to the MQPUT call and the delivery behavior is dependent on the setting of the PMSGDLV or NPMSGDLV attributes on the TOPIC. Note that delivery of a publication to the dead letter queue when RODLQ is specified, or discarding the message when RODISC is specified, is considered a successful delivery of the message. If none of the publications are delivered, the MQPUT will return with RC2502. This can happen in the following cases:

   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALL and any subscription (durable or not) has a queue which cannot receive the publication.
   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLDUR and a durable subscription has a queue which cannot receive the publication.

   The MQPUT can return with RCNONE even though publications could not be delivered to some subscribers in the following cases:

   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLAVAIL and any subscription, durable or not, has a queue which cannot receive the publication.
   - A message is published to a TOPIC with PMSGDLV or NPMSGDLV (depending on the persistence of the message) set to ALLDUR and a non-durable subscription has a queue which cannot receive the publication.
2. If there are no subscribers to the topic being used, the message published is not sent to any queue and is discarded. It does not make any difference whether this message is persistent or non-persistent, or whether it has unlimited expiry or some small expiry time, it is still discarded if there are no subscribers. The exception to this is if the message is to be retained, in which case, although

it is not sent to any subscribers' queues, it is stored against the topic to be delivered to any new subscriptions or to any subscribers that ask for retained publications using MQSUBRQ.

## MQPUT and MQPUT1

Both the MQPUT and MQPUT1 calls can be used to put messages on a queue; which call to use depends on the circumstances

- The MQPUT call should be used when multiple messages are to be placed on the *same* queue.

  An MQOPEN call specifying the OOOUT option is issued first, followed by one or more MQPUT requests to add messages to the queue; finally the queue is closed with an MQCLOSE call. This gives better performance than repeated use of the MQPUT1 call.
- The MQPUT1 call should be used when only *one* message is to be put on a queue.

  This call encapsulates the MQOPEN, MQPUT, and MQCLOSE calls into a single call, minimizing the number of calls that must be issued.

## Destination queues

If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if the following conditions are satisfied. Some conditions apply to both local and remote destination queues; other conditions apply only to remote destination queues.

**Conditions for local and remote destination queues**

- All of the MQPUT calls are within the same unit of work, or none of them is within a unit of work.

  When messages are put onto a particular queue within a single unit of work, messages from other applications might be interspersed with the sequence of messages on the queue.
- All of the MQPUT calls are made using the same object handle *HOBJ*.

  In some environments, message sequence is also preserved when different object handles are used, provided the calls are made from the same application. The meaning of "same application" is determined by the environment:

  – On IBM i, the application is the job.
- The messages all have the same priority.

**Additional conditions for remote destination queues**

- There is only one path from the sending queue manager to the destination queue manager.

  If there is a possibility that some messages in the sequence may go on a different path (for example, because of reconfiguration, traffic balancing, or path selection based on message size), the order of the messages at the destination queue manager cannot be guaranteed.
- Messages are not placed temporarily on dead-letter queues at the sending, intermediate, or destination queue managers.

  If one or more of the messages is put temporarily on a dead-letter queue (for example, because a transmission queue or the destination queue is temporarily full), the messages can arrive on the destination queue out of sequence.
- The messages are either all persistent or all nonpersistent.

  If a channel on the route between the sending and destination queue managers has its *CDNPM* attribute set to NPFAST, nonpersistent messages can jump ahead of persistent messages, resulting in the order of persistent messages relative to nonpersistent messages not being preserved. However, the order of persistent messages relative to each other, and of nonpersistent messages relative to each other, is preserved.

If these conditions are not satisfied, message groups can be used to preserve message order, but note that this requires both the sending and receiving applications to use the message-grouping support. For more information about message groups, see:

- *MDMFL* field in MQMD
- PMLOGO option in MQPMO
- GMLOGO option in MQGMO

## Distribution lists

The following notes apply to the use of distribution lists.

1. Messages can be put to a distribution list using either a version-1 or a version-2 MQPMO. If a version-1 MQPMO is used (or a version-2 MQPMO with *PMREC* equal to zero), no put message records or response records can be provided by the application. This means that it will not be possible to identify the queues which encounter errors, if the message is sent successfully to some queues in the distribution list and not others.

   If put message records or response records are provided by the application, the *PMVER* field must be set to PMVER2.

   A version-2 MQPMO can also be used to send messages to a single queue that is not in a distribution list, by ensuring that *PMREC* is zero.
2. The completion code and reason code parameters are set as follows:
   - If the puts to the queues in the distribution list all succeed or fail in the same way, the completion code and reason code parameters are set to describe the common result. The MQRR response records (if provided by the application) are not set in this case.

     For example, if every put succeeds, the completion code is set to CCOK and the reason code is RCNONE; if every put fails because all of the queues are inhibited for puts, the parameters are set to CCFAIL and RC2051.
   - If the puts to the queues in the distribution list do not all succeed or fail in the same way:
     - The completion code parameter is set to CCWARN if at least one put succeeded, and to CCFAIL if all failed.
     - The reason code parameter is set to RC2136.
     - The response records (if provided by the application) are set to the individual completion codes and reason codes for the queues in the distribution list.

     If the put to a destination fails because the open for that destination failed, the fields in the response record are set to CCFAIL and RC2137; that destination is included in *PMIDC*.
3. If a destination in the distribution list resolves to a local queue, the message is placed on that queue in normal form (that is, not as a distribution-list message). If more than one destination resolves to the same local queue, one message is placed on the queue for each such destination.

   If a destination in the distribution list resolves to a remote queue, a message is placed on the appropriate transmission queue. Where several destinations resolve to the same transmission queue, a single distribution-list message containing those destinations may be placed on the transmission queue, even if those destinations were not adjacent in the list of destinations provided by the application. However, this can be done only if the transmission queue supports distribution-list messages (see the *DistLists* queue attribute described in "Attributes for queues" on page 1335 ).

   If the transmission queue does not support distribution lists, one copy of the message in normal form is placed on the transmission queue for each destination that uses that transmission queue.

   If a distribution list with the application message data is too large for a transmission queue, the distribution list message is split up into smaller distribution-list messages, each containing fewer destinations. If the application message data only just fits on the queue, distribution-list messages cannot be used at all, and the queue manager generates one copy of the message in normal form for each destination that uses that transmission queue.

   If different destinations have different message priority or message persistence (this can occur when the application specifies PRQDEF or PEQDEF), the messages are not held in the same distribution-list

message. Instead, the queue manager generates as many distribution-list messages as are necessary to accommodate the differing priority and persistence values.

4. A put to a distribution list might result in:
   - A single distribution-list message, or
   - A number of smaller distribution-list messages, or
   - A mixture of distribution list messages and normal messages, or
   - Normal messages only.

   Which of the previous occurs depends on whether:
   - The destinations in the list are local, remote, or a mixture.
   - The destinations have the same message priority and message persistence.
   - The transmission queues can hold distribution-list messages.
   - The transmission queues' maximum message lengths are large enough to accommodate the message in distribution-list form.

   However, regardless of which of the above occurs, each *physical* message resulting (that is, each normal message or distribution-list message resulting from the put) counts as only *one* message when:
   - Checking whether the application has exceeded the permitted maximum number of messages in a unit of work (see the *MaxUncommittedMsgs* queue manager attribute).
   - Checking whether the triggering conditions are satisfied.
   - Incrementing queue depths and checking whether the queues' maximum queue depth would be exceeded.
5. Any change to the queue definitions that would have caused a handle to become invalid had the queues been opened individually (for example, a change in the resolution path), does not cause the distribution-list handle to become invalid. However, it does result in a failure for that particular queue when the distribution-list handle is used on a subsequent MQPUT call.

## Headers

If a message is put with one or more IBM MQ header structures at the beginning of the application message data, the queue manager performs certain checks on the header structures to verify that they are valid. If the queue manager detects an error, the call fails with an appropriate reason code. The checks performed vary according to the particular structures that are present. In addition, the checks are performed only if a version-2 or later MQMD is used on the MQPUT or MQPUT1 call; the checks are not performed if a version-1 MQMD is used, even if an MQMDE is present at the start of the application message data.

The following IBM MQ header structures are validated completely by the queue manager: MQDH, MQMDE.

For other IBM MQ header structures, the queue manager performs some validation, but does not check every field. Structures that are not supported by the local queue manager, and structures following the first MQDLH in the message, are not validated.

In addition to general checks on the fields in IBM MQ structures, the following conditions must be satisfied:

- An IBM MQ structure must not be split over two or more segments - the structure must be entirely contained within one segment.
- The sum of the lengths of the structures in a PCF message must equal the length specified by the *BUFLEN* parameter on the MQPUT or MQPUT1 call. A PCF message is a message that has one of the following format names:
  - FMADMN
  - FMEVNT
  - FMPCF

- IBM MQ structures must not be truncated, except in the following situations where truncated structures are permitted:
  - Messages which are report messages.
  - PCF messages.
  - Messages containing an MQDLH structure. (Structures *following* the first MQDLH can be truncated; structures preceding the MQDLH cannot.)

## Buffer

The *BUFFER* parameter shown in the RPG programming example is declared as a string; this restricts the maximum length of the parameter to 256 bytes. If a larger buffer is required, the parameter should be declared instead as a structure, or as a field in a physical file. This will increase the maximum length possible to approximately 32 KB.

## Parameters

The MQPUT call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HOBJ (10-digit signed integer) - input**

Object handle.

This handle represents the queue to which the message is added, or the topic to which the message is published. The value of *HOBJ* was returned by a previous MQOPEN call that specified the OOOUT option.

**MSGDSC (MQMD) - input/output**

Message descriptor.

This structure describes the attributes of the message being sent, and receives information about the message after the put request is complete. See “MQMD - Message descriptor” on page 1077 for details.

If the application provides a version-1 MQMD, the message data can be prefixed with an MQMDE structure in order to specify values for the fields that exist in the version-2 MQMD but not the version-1. The *MDFMT* field in the MQMD must be set to FMMDE to indicate that an MQMDE is present. See “MQMDE - Message descriptor extension” on page 1120 for more details.

**PMO (MQPMO) - input/output**

Options that control the action of MQPUT.

See “MQPMO - Put-message options” on page 1140 for details.

**BUFLEN (10-digit signed integer) - input**

Length of the message in *BUFFER*.

Zero is valid, and indicates that the message contains no application data. The upper limit for *BUFLEN* depends on various factors:

- If the destination queue is a shared queue, the upper limit is 63 KB (64 512 bytes).
- If the destination is a local queue or resolves to a local queue (but is not a shared queue), the upper limit depends on whether:
  - The local queue manager supports segmentation.
  - The sending application specifies the flag that allows the queue manager to segment the message. This flag is MFSEGA, and can be specified either in a version-2 MQMD, or in an MQMDE used with a version-1 MQMD.

  If both of these conditions are satisfied, *BUFLEN* cannot exceed 999 999 999 minus the value of the *MDOFF* field in MQMD. The longest logical message that can be put is therefore 999 999 999 bytes (when *MDOFF* is zero). However, resource constraints imposed by the operating system or environment in which the application is running may result in a lower limit.

  If one or both of the previously described conditions are not satisfied, *BUFLEN* cannot exceed the smaller of the queue's *MaxMsgLength* attribute and queue manager's *MaxMsgLength* attribute.
- If the destination is a remote queue or resolves to a remote queue, the conditions for local queues apply, *but at each queue manager through which the message must pass in order to reach the destination queue* ; in particular:
  1. The local transmission queue used to store the message temporarily at the local queue manager
  2. Intermediate transmission queues (if any) used to store the message at queue managers on the route between the local and destination queue managers
  3. The destination queue at the destination queue manager

  The longest message that can be put is therefore governed by the most restrictive of these queues and queue managers.

  When a message is on a transmission queue, additional information resides with the message data, and this reduces the amount of application data that can be carried. In this situation it is recommended that LNMHD bytes be subtracted from the *MaxMsgLength* values of the transmission queues when determining the limit for *BUFLEN*.

  **Note:** Only failure to comply with condition 1 can be diagnosed synchronously (with reason code RC2030 or RC2031) when the message is put. If conditions 2 or 3 are not satisfied, the message is redirected to a dead-letter (undelivered-message) queue, either at an intermediate queue manager or at the destination queue manager. If this happens, a report message is generated if one was requested by the sender.

**BUFFER (1-byte bit string x BUFLEN) - input**

Message data.

This is a buffer containing the application data to be sent. The buffer should be aligned on a boundary appropriate to the nature of the data in the message. 4-byte alignment should be suitable for most messages (including messages containing MQ header structures), but some messages may require more stringent alignment. For example, a message containing a 64-bit binary integer might require 8-byte alignment.

If *BUFFER* contains character data, numeric data, or both, the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter should be set to the values appropriate to the data; this will enable the receiver of the message to convert the data (if necessary) to the character set and encoding used by the receiver.

**Note:** All of the other parameters on the MQPUT call must be in the character set given by the *CodedCharSetId* queue manager attribute, and encoding of the local queue manager given by the ENNAT.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2104**
(2104, X'838') Report option in message descriptor not recognized.

**RC2136**
(2136, X'858') Multiple reason codes returned.

If *CMPCOD* is CCFAIL:

**RC2004**
(2004, X'7D4') Buffer parameter not valid.

**RC2005**
(2005, X'7D5') Buffer length parameter not valid.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2013**
(2013, X'7DD') Expiry time not valid.

**RC2014**
(2014, X'7DE') Feedback code not valid.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2024**
(2024, X'7E8') No more messages can be handled within current unit of work.

**RC2026**
(2026, X'7EA') Message descriptor not valid.

**RC2027**
(2027, X'7EB') Missing reply-to queue.

**RC2029**
(2029, X'7ED') Message type in message descriptor not valid.

**RC2030**
(2030, X'7EE') Message length greater than maximum for queue.

**RC2031**
(2031, X'7EF') Message length greater than maximum for queue manager.

**RC2039**
(2039, X'7F7') Queue not open for output.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2047**
(2047, X'7FF') Persistence not valid.

**RC2048**
(2048, X'800') Queue does not support persistent messages.

**RC2050**
(2050, X'802') Message priority not valid.

**RC2051**
(2051, X'803') Put calls inhibited for the queue.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2053**
(2053, X'805') Queue already contains maximum number of messages.

**RC2056**
(2056, X'808') No space available on disk for queue.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2061**
(2061, X'80D') Report options in message descriptor not valid.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2072**
(2072, X'818') Syncpoint support not available.

**RC2093**
(2093, X'82D') Queue not open for pass all context.

**RC2094**
(2094, X'82E') Queue not open for pass identity context.

**RC2095**
(2095, X'82F') Queue not open for set all context.

**RC2096**
(2096, X'830') Queue not open for set identity context.

**RC2097**
(2097, X'831') Queue handle referred to does not save context.

**RC2098**
(2098, X'832') Context not available for queue handle referred to.

**RC2101**
(2101, X'835') Object damaged.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2135**
(2135, X'857') Distribution header structure not valid.

**RC2136**
(2136, X'858') Multiple reason codes returned.

**RC2137**
(2137, X'859') Object not opened successfully.

**RC2149**
(2149, X'865') PCF structures not valid.

**RC2154**
(2154, X'86A') Number of records present not valid.

**RC2156**
(2156, X'86C') Response records not valid.

**RC2158**
(2158, X'86E') Put message record flags not valid.

**RC2159**
(2159, X'86F') Put message records not valid.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2173**
(2173, X'87D') Put-message options structure not valid.

**RC2185**
(2185, X'889') Inconsistent persistence specification.

**RC2188**
(2188, X'88C') Call rejected by cluster workload exit.

**RC2189**
(2189, X'88D') Cluster name resolution failed.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2241**
(2241, X'8C1') Message group not complete.

**RC2242**
(2242, X'8C2') Logical message not complete.

**RC2245**
(2245, X'8C5') Inconsistent unit-of-work specification.

**RC2248**
(2248, X'8C8') Message descriptor extension not valid.

**RC2249**
(2249, X'8C9') Message flags not valid.

**RC2250**
(2250, X'8CA') Message sequence number not valid.

**RC2251**
(2251, X'8CB') Message segment offset not valid.

**RC2252**
(2252, X'8CC') Original length not valid.

**RC2253**
(2253, X'8CD') Length of data in message segment is zero.

**RC2255**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**RC2257**
(2257, X'8D1') Wrong version of MQMD supplied.

**RC2258**
(2258, X'8D2') Group identifier not valid.

**RC2266**
(2266, X'8DA') Cluster workload exit failed.

**RC2269**
(2269, X'8DD') Cluster resource error.

**RC2270**
(2270, X'8DE') No destination queues available.

**RC2420**
(2420) An MQPUT call was issued, but the message data contains an MQEPH structure that is not valid.

**RC2479**
(2479, X'9AF') Publication could not be retained.

**RC2480**
(2480, X'9B0') Target type has changed: the alias queue referred to a queue but now refers to a topic.

**RC2502**
(2502, X'9C6') Publication failed, and publication has not been delivered to any subscribers

**RC2551**
(2551, X'9F7') Specified selection string is not available.

**RC2554**
(2554, X'9FA') Message content could not be parsed to determine whether the message should be delivered to a subscriber with an extended message selector.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQPUT(HCONN : HOBJ : MSGDSC : PMO :
C                                     BUFLEN : BUFFER : CMPCOD :
C                                     REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQPUT            PR                  EXTPROC('MQPUT')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Object handle
D HOBJ                          10I 0 VALUE
D* Message descriptor
D MSGDSC                       364A
D* Options that control the action of MQPUT
D PMO                          200A
D* Length of the message in Buffer
D BUFLEN                        10I 0 VALUE
D* Message data
D BUFFER                          *   VALUE
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CMPCOD
D REASON                        10I 0
```

## MQPUT1 - Put one message

The MQPUT1 call puts one message on a queue or distribution list, or to a topic. The queue, distribution list, or topic does not need to be open.


- "Syntax" on page 1310
- "Usage notes" on page 1310
- "Parameters" on page 1311
- "RPG Declaration" on page 1315

## Syntax

MQPUT1 *(HCONN, OBJDSC, MSGDSC, PMO, BUFLEN, BUFFER, CMPCOD, REASON)*

## Usage notes

1. Both the MQPUT and MQPUT1 calls can be used to put messages on a queue; which call to use depends on the circumstances:

   - The MQPUT call should be used when multiple messages are to be placed on the *same* queue.

     An MQOPEN call specifying the OOOUT option is issued first, followed by one or more MQPUT requests to add messages to the queue; finally the queue is closed with an MQCLOSE call. This gives better performance than repeated use of the MQPUT1 call.

   - The MQPUT1 call should be used when only *one* message is to be put on a queue.

     This call encapsulates the MQOPEN, MQPUT, and MQCLOSE calls into a single call, minimizing the number of calls that must be issued.

2. If an application puts a sequence of messages on the same queue without using message groups, the order of those messages is preserved if certain conditions are satisfied. However, in most environments the MQPUT1 call does not satisfy these conditions, and so does not preserve message order. The MQPUT call must be used instead in these environments. See the usage notes in the description of the MQPUT call for details.
3. The MQPUT1 call can be used to put messages to distribution lists. For general information about this, see the usage notes for the MQOPEN and MQPUT calls.

   The following differences apply when using the MQPUT1 call:

   a. If MQRR response records are provided by the application, they must be provided using the MQOD structure; they cannot be provided using the MQPMO structure.

   b. The reason code RC2137 is never returned by MQPUT1 in the response records; if a queue fails to open, the response record for that queue contains the actual reason code resulting from the open operation.

      If an open operation for a queue succeeds with a completion code of CCWARN, the completion code and reason code in the response record for that queue are replaced by the completion and reason codes resulting from the put operation.

      As with the MQOPEN and MQPUT calls, the queue manager sets the response records (if provided) only when the outcome of the call is not the same for all queues in the distribution list; this is indicated by the call completing with reason code RC2136.

4. If the MQPUT1 call is used to put a message on a cluster queue, the call behaves as though OOBNDN had been specified on the MQOPEN call.
5. If a message is put with one or more IBM MQ header structures at the beginning of the application message data, the queue manager performs certain checks on the header structures to verify that they are valid. For more information about this, see the usage notes for the MQPUT call.
6. If more than one of the warning situations arise (see the *CMPCOD* parameter), the reason code returned is the *first* one in the following list that applies:

   a. RC2136

   b. RC2242

   c. RC2241

   d. RC2049 or RC2104

7. The *BUFFER* parameter shown in the RPG programming example is declared as a string; this restricts the maximum length of the parameter to 256 bytes. If a larger buffer is required, the parameter should be declared instead as a structure, or as a field in a physical file. This will increase the maximum length possible to approximately 32 KB.

## Parameters

The MQPUT1 call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**OBJDSC (MQOD) - input/output**

Object descriptor.

This is a structure which identifies the queue to which the message is added. See "MQOD - Object descriptor" on page 1126 for details.

The user must be authorized to open the queue for output. The queue must **not** be a model queue.

**MSGDSC (MQMD) - input/output**

Message descriptor.

This structure describes the attributes of the message being sent, and receives feedback information after the put request is complete. See "MQMD - Message descriptor" on page 1077 for details.

If the application provides a version-1 MQMD, the message data can be prefixed with an MQMDE structure in order to specify values for the fields that exist in the version-2 MQMD but not the version-1. The *MDFMT* field in the MQMD must be set to FMMDE to indicate that an MQMDE is present. See "MQMDE - Message descriptor extension" on page 1120 for more details.

**PMO (MQPMO) - input/output**

Options that control the action of MQPUT1.

See "MQPMO - Put-message options" on page 1140 for details.

**BUFLEN (10-digit signed integer) - input**

Length of the message in *BUFFER*.

Zero is valid, and indicates that the message contains no application data. The upper limit depends on various factors; see the description of the *BUFLEN* parameter of the MQPUT call for further details.

**BUFFER (1-byte bit string x BUFLEN) - input**

Message data.

This is a buffer containing the application message data to be sent. The buffer should be aligned on a boundary appropriate to the nature of the data in the message. 4-byte alignment should be suitable for most messages (including messages containing IBM MQ header structures), but some messages may require more stringent alignment. For example, a message containing a 64-bit binary integer might require 8-byte alignment.

If *BUFFER* contains character data, numeric data, or both, the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter should be set to the values appropriate to the data; this will enable the receiver of the message to convert the data (if necessary) to the character set and encoding used by the receiver.

**Note:** All of the other parameters on the MQPUT1 call must be in the character set given by the *CodedCharSetId* queue manager attribute and encoding of the local queue manager given by ENNAT.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2104**
(2104, X'838') Report option in message descriptor not recognized.

**RC2136**
(2136, X'858') Multiple reason codes returned.

**RC2049**
(2049, X'801') Message Priority exceeds maximum value supported.

**RC2241**
(2241, X'8C1') Message group not complete.

**RC2242**
(2242, X'8C2') Logical message not complete.

If *CMPCOD* is CCFAIL:

**RC2001**
(2001, X'7D1') Alias base queue not a valid type.

**RC2004**
(2004, X'7D4') Buffer parameter not valid.

**RC2005**
(2005, X'7D5') Buffer length parameter not valid.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2013**
(2013, X'7DD') Expiry time not valid.

**RC2014**
(2014, X'7DE') Feedback code not valid.

**RC2017**
(2017, X'7E1') No more handles available.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2024**
(2024, X'7E8') No more messages can be handled within current unit of work.

**RC2026**
(2026, X'7EA') Message descriptor not valid.

**RC2027**
(2027, X'7EB') Missing reply-to queue.

**RC2029**
(2029, X'7ED') Message type in message descriptor not valid.

**RC2030**
(2030, X'7EE') Message length greater than maximum for queue.

**RC2031**
(2031, X'7EF') Message length greater than maximum for queue manager.

**RC2035**
(2035, X'7F3') Not authorized for access.

**RC2042**
(2042, X'7FA') Object already open with conflicting options.

**RC2043**
(2043, X'7FB') Object type not valid.

**RC2044**
(2044, X'7FC') Object descriptor structure not valid.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2047**
(2047, X'7FF') Persistence not valid.

**RC2048**
(2048, X'800') Queue does not support persistent messages.

**RC2050**
(2050, X'802') Message priority not valid.

**RC2051**
(2051, X'803') Put calls inhibited for the queue.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2053**
(2053, X'805') Queue already contains maximum number of messages.

**RC2056**
(2056, X'808') No space available on disk for queue.

**RC2057**
(2057, X'809') Queue type not valid.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2061**
(2061, X'80D') Report options in message descriptor not valid.

**RC2063**
(2063, X'80F') Security error occurred.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2072**
(2072, X'818') Syncpoint support not available.

**RC2082**
(2082, X'822') Unknown alias base queue.

**RC2085**
(2085, X'825') Unknown object name.

**RC2086**
(2086, X'826') Unknown object queue manager.

**RC2087**
(2087, X'827') Unknown remote queue manager.

**RC2091**
(2091, X'82B') Transmission queue not local.

**RC2092**
(2092, X'82C') Transmission queue with wrong usage.

**RC2097**
(2097, X'831') Queue handle referred to does not save context.

**RC2098**
(2098, X'832') Context not available for queue handle referred to.

**RC2101**
(2101, X'835') Object damaged.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2135**
(2135, X'857') Distribution header structure not valid.

**RC2136**
(2136, X'858') Multiple reason codes returned.

**RC2149**
(2149, X'865') PCF structures not valid.

**RC2154**
(2154, X'86A') Number of records present not valid.

**RC2155**
(2155, X'86B') Object records not valid.

**RC2156**
(2156, X'86C') Response records not valid.

**RC2158**
(2158, X'86E') Put message record flags not valid.

**RC2159**
(2159, X'86F') Put message records not valid.

**RC2161**
(2161, X'871') Queue manager quiescing.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2173**
(2173, X'87D') Put-message options structure not valid.

**RC2184**
(2184, X'888') Remote queue name not valid.

**RC2188**
(2188, X'88C') Call rejected by cluster workload exit.

**RC2189**
(2189, X'88D') Cluster name resolution failed.

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2196**
(2196, X'894') Unknown transmission queue.

**RC2197**
(2197, X'895') Unknown default transmission queue.

**RC2198**
(2198, X'896') Default transmission queue not local.

**RC2199**
(2199, X'897') Default transmission queue usage error.

**RC2258**
(2258, X'8D2') Group identifier not valid.

**RC2248**
(2248, X'8C8') Message descriptor extension not valid.

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2249**
(2249, X'8C9') Message flags not valid.

**RC2250**
(2250, X'8CA') Message sequence number not valid.

**RC2251**
(2251, X'8CB') Message segment offset not valid.

**RC2252**
(2252, X'8CC') Original length not valid.

**RC2253**
(2253, X'8CD') Length of data in message segment is zero.

**RC2255**
(2255, X'8CF') Unit of work not available for the queue manager to use.

**RC2257**
(2257, X'8D1') Wrong version of MQMD supplied.

**RC2266**
(2266, X'8DA') Cluster workload exit failed.

**RC2269**
(2269, X'8DD') Cluster resource error.

**RC2270**
(2270, X'8DE') No destination queues available.

**RC2420**
(2420) An MQPUT1 call was issued, but the message data contains an MQEPH structure that is not valid.

**RC2551**
(2551, X'9F7') Specified selection string is not available.

**RC2554**
(2554, X'9FA') Message content could not be parsed to determine whether the message should be delivered to a subscriber with an extended message selector.

## RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQPUT1(HCONN : OBJDSC : MSGDSC :
C                                      PMO : BUFLEN : BUFFER :
C                                      CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQPUT1           PR                  EXTPROC('MQPUT1')
```

```
     D* Connection handle
     D HCONN                         10I 0 VALUE
     D* Object descriptor
     D OBJDSC                       468A
     D* Message descriptor
     D MSGDSC                       364A
     D* Options that control the action of MQPUT1
     D PMO                          200A
     D* Length of the message in BUFFER
     D BUFLEN                        10I 0 VALUE
     D* Message data
     D BUFFER                          *   VALUE
     D* Completion code
     D CMPCOD                        10I 0
     D* Reason code qualifying CMPCOD
     D REASON                        10I 0
```

## MQSET - Set object attributes

The MQSET call is used to change the attributes of an object represented by a handle. The object must be a queue.


- "Syntax" on page 1316
- "Usage notes" on page 1316
- "Parameters" on page 1317
- "RPG Declaration" on page 1320


### Syntax

MQSET *(HCONN, HOBJ, SELCNT, SELS, IACNT, INTATR, CALEN, CHRATR, CMPCOD, REASON)*

### Usage notes

1. Using this call, the application can specify an array of integer attributes, or a collection of character attribute strings, or both. If no errors occur, the attributes specified are all set simultaneously. If an error occurs (for example, if a selector is not valid, or an attempt is made to set an attribute to a value that is not valid), the call fails and no attributes are set.
2. The values of attributes can be determined using the MQINQ call IBM i; see "MQINQ - Inquire about object attributes" on page 1272 for details.

   **Note:** Not all attributes with values that can be inquired upon using the MQINQ call can have their values changed using the MQSET call. For example, no process-object or queue manager attributes can be set with this call.
3. Attribute changes are preserved across restarts of the queue manager (other than alterations to temporary dynamic queues, which do not survive restarts of the queue manager).
4. You cannot change the attributes of a model queue using the MQSET call. However, if you open a model queue using the MQOPEN call with the MQOO_SET option, you can use the MQSET call to set the attributes of the dynamic local queue that is created by the MQOPEN call.
5. If the object being set is a cluster queue, there must be a local instance of the cluster queue for the open to succeed.

IBM i For more information about object attributes, see:

- "Attributes for queues" on page 1335
- "Attributes for namelists" on page 1363
- "Attributes for process definitions" on page 1364
- "Attributes for the queue manager" on page 1366

## Parameters

The MQSET call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HOBJ (10-digit signed integer) - input**

Object handle.

This handle represents the queue object with attributes that are to be set. The handle was returned by a previous MQOPEN call that specified the OOSET option.

**SELCNT (10-digit signed integer) - input**

Count of selectors.

This is the count of selectors that are supplied in the *SELS* array. It is the number of attributes that are to be set. Zero is a valid value. The maximum number allowed is 256.

**SELS (10-digit signed integer x SELCNT) - input**

Array of attribute selectors.

This is an array of *SELCNT* attribute selectors; each selector identifies an attribute (integer or character) with a value that is to be set.

Each selector must be valid for the type of queue that *HOBJ* represents. Only certain IA* and CA* values are allowed; these values are listed later in this section.

Selectors can be specified in any order. Attribute values that correspond to integer attribute selectors (IA* selectors) must be specified in *INTATR* in the same order in which these selectors occur in *SELS*. Attribute values that correspond to character attribute selectors (CA* selectors) must be specified in *CHRATR* in the same order in which those selectors occur. IA* selectors can be interleaved with the CA* selectors; only the relative order within each type is important.

It is not an error to specify the same selector more than once; if this is done, the last value specified for a particular selector is the one that takes effect.

**Note:**

1. The integer and character attribute selectors are allocated within two different ranges; the IA* selectors reside within the range IAFRST through IALAST, and the CA* selectors within the range CAFRST through CALAST.

   For each range, the constants IALSTU and CALSTU define the highest value that the queue manager will accept.
2. If all the IA* selectors occur first, the same element numbers can be used to address corresponding elements in the *SELS* and *INTATR* arrays.

The attributes that can be set are listed in the following table. No other attributes can be set using this call. For the CA* attribute selectors, the constant that defines the length in bytes of the string that is required in *CHRATR* is provided in parentheses.

| *Table 625. MQSET attribute selectors for queues* | | |
|---|---|---|
| **Selector** | **Description** | **Note** |
| CATRGD | Trigger data (LNTRGD). | “2” on page 1318 |
| IADIST | Distribution list support. | “1” on page 1318 |
| IAIGET | Whether get operations are allowed. | |
| IAIPUT | Whether put operations are allowed. | |
| IATRGC | Trigger control. | “2” on page 1318 |
| IATRGD | Trigger depth. | “2” on page 1318 |
| IATRGP | Threshold message priority for triggers. | “2” on page 1318 |
| IATRGT | Trigger type. | “2” on page 1318 |

**Notes:**

1. Supported only on AIX, HP-UX, IBM i, Solaris, Windows, plus IBM MQ clients connected to these systems.
2. Not supported on VSE/ESA.

**IACNT (10-digit signed integer) - input**

Count of integer attributes.

This is the number of elements in the *INTATR* array, and must be at least the number of IA* selectors in the *SELS* parameter. Zero is a valid value if there are none.

**INTATR (10-digit signed integer x IACNT) - input**

Array of integer attributes.

This is an array of *IACNT* integer attribute values. These attribute values must be in the same order as the IA* selectors in the *SELS* array.

**CALEN (10-digit signed integer) - input**

Length of character attributes buffer.

This is the length in bytes of the *CHRATR* parameter, and must be at least the sum of the lengths of the character attributes specified in the *SELS* array. Zero is a valid value if there are no CA* selectors in *SELS*.

**CHRATR (1-byte character string x CALEN) - input**

Character attributes.

This is the buffer containing the character attribute values, concatenated together. The length of the buffer is given by the *CALEN* parameter.

The characters attributes must be specified in the same order as the CA* selectors in the *SELS* array. The length of each character attribute is fixed (see *SELS*). If the value to be set for an attribute contains fewer nonblank characters than the defined length of the attribute, the value in *CHRATR*

must be padded to the right with blanks to make the attribute value match the defined length of the attribute.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2219**
(2219, X'8AB') MQI call reentered before previous call complete.

**RC2006**
(2006, X'7D6') Length of character attributes not valid.

**RC2007**
(2007, X'7D7') Character attributes string not valid.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2019**
(2019, X'7E3') Object handle not valid.

**RC2020**
(2020, X'7E4') Value for inhibit-get or inhibit-put queue attribute not valid.

**RC2021**
(2021, X'7E5') Count of integer attributes not valid.

**RC2023**
(2023, X'7E7') Integer attributes array not valid.

**RC2040**
(2040, X'7F8') Queue not open for set.

**RC2041**
(2041, X'7F9') Object definition changed since opened.

**RC2101**
(2101, X'835') Object damaged.

**RC2052**
(2052, X'804') Queue has been deleted.

**RC2058**
(2058, X'80A') Queue manager name not valid or not known.

**RC2059**
(2059, X'80B') Queue manager not available for connection.

**RC2162**
(2162, X'872') Queue manager shutting down.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2065**
(2065, X'811') Count of selectors not valid.

**RC2067**
(2067, X'813') Attribute selector not valid.

**RC2066**
(2066, X'812') Count of selectors too large.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2075**
(2075, X'81B') Value for trigger-control attribute not valid.

**RC2076**
(2076, X'81C') Value for trigger-depth attribute not valid.

**RC2077**
(2077, X'81D') Value for trigger-message-priority attribute not valid.

**RC2078**
(2078, X'81E') Value for trigger-type attribute not valid.

**RC2195**
(2195, X'893') Unexpected error occurred.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQSET(HCONN : HOBJ : SELCNT :
C                                     SELS(1) : IACNT : INTATR(1) :
C                                     CALEN : CHRATR : CMPCOD :
C                                     REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQSET            PR                  EXTPROC('MQSET')
D* Connection handle
D HCONN                           10I 0 VALUE
D* Object handle
D HOBJ                            10I 0 VALUE
D* Count of selectors
D SELCNT                          10I 0 VALUE
D* Array of attribute selectors
D SELS                            10I 0
D* Count of integer attributes
D IACNT                           10I 0 VALUE
D* Array of integer attributes
D INTATR                          10I 0
D* Length of character attributes buffer
D CALEN                           10I 0 VALUE
D* Character attributes
D CHRATR                            *   VALUE
D* Completion code
D CMPCOD                          10I 0
D* Reason code qualifying CMPCOD
D REASON                          10I 0
```

## MQSETMP - Set message handle property

The MQSETMP call sets or modifies a property of a message handle.


- "Syntax" on page 1321
- "Usage notes" on page 1321

- "Parameters" on page 1322
- "RPG Declaration" on page 1325

## Syntax

MQSETMP *(Hconn, Hmsg, SetPropOpts, Name, PropDesc, Type, ValueLength, Value, CompCode, Reason)*

## Usage notes

- You can use this call only when the queue manager itself coordinates the unit of work. This can be:
  - A local unit of work, where the changes affect only IBM MQ resources.
  - A global unit of work, where the changes can affect resources belonging to other resource managers, as well as affecting IBM MQ resources.

  For further details about local and global units of work, see "MQBEGIN - Begin unit of work" on page 1219.
- In environments where the queue manager does not coordinate the unit of work, use the appropriate back-out call instead of MQBACK. The environment might also support an implicit back out caused by the application terminating abnormally.
  - On z/OS, use the following calls:
    - Batch programs (including IMS batch DL/I programs) can use the MQBACK call if the unit of work affects only IBM MQ resources. However, if the unit of work affects both IBM MQ resources and resources belonging to other resource managers (for example, Db2 ), use the SRRBACK call provided by the z/OS Recoverable Resource Service (RRS). The SRRBACK call backs out changes to resources belonging to the resource managers that have been enabled for RRS coordination.
    - CICS applications must use the `EXEC CICS SYNCPOINT ROLLBACK` command to back out the unit of work. Do not use the MQBACK call for CICS applications.
    - IMS applications (other than batch DL/I programs) must use IMS calls such as `ROLB` to back out the unit of work. Do not use the MQBACK call for IMS applications (other than batch DL/I programs).
  - On IBM i, use this call for local units of work coordinated by the queue manager. This means that a commitment definition must not exist at job level, that is, the `STRCMTCTL` command with the `CMTSCOPE(*JOB)` parameter must not have been issued for the job.
- If an application ends with uncommitted changes in a unit of work, the disposition of those changes depends on whether the application ends normally or abnormally. See the usage notes in "MQDISC - Disconnect queue manager" on page 1256 for further details.
- When an application puts or gets messages in groups or segments of logical messages, the queue manager retains information relating to the message group and logical message for the last successful MQPUT and MQGET calls. This information is associated with the queue handle, and includes such things as:
  - The values of the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* fields in MQMD.
  - Whether the message is part of a unit of work.
  - For the MQPUT call: whether the message is persistent or nonpersistent.

  The queue manager keeps three sets of group and segment information, one set for each of the following:
  - The last successful MQPUT call (this can be part of a unit of work).
  - The last successful MQGET call that removed a message from the queue (this can be part of a unit of work).
  - The last successful MQGET call that browsed a message on the queue (this cannot be part of a unit of work).

If the application puts or gets the messages as part of a unit of work, and the application then decides to back out the unit of work, the group and segment information is restored to the value that it had previously:

- The information associated with the MQPUT call is restored to the value that it had before the first successful MQPUT call for that queue handle in the current unit of work.
- The information associated with the MQGET call is restored to the value that it had before the first successful MQGET call for that queue handle in the current unit of work.

Queues that were updated by the application after the unit of work started, but outside the scope of the unit of work, do not have their group and segment information restored if the unit of work is backed out.

Restoring the group and segment information to its previous value when a unit of work is backed out allows the application to spread a large message group or large logical message consisting of many segments across several units of work, and to restart at the correct point in the message group or logical message if one of the units of work fails.

Using several units of work might be advantageous if the local queue manager has only limited queue storage. However, the application must maintain sufficient information to be able to restart putting or getting messages at the correct point if a system failure occurs.

For details of how to restart at the correct point after a system failure, see the PMLOGO option described in PMOPT (10 digit signed integer), and the GMLOGO option described in GMOPT (10 digit signed integer).

The remaining usage notes apply only when the queue manager coordinates the units of work:

- A unit of work has the same scope as a connection handle. All IBM MQ calls that affect a particular unit of work must be performed using the same connection handle. Calls issued using a different connection handle (for example, calls issued by another application) affect a different unit of work. See HCONN (10-digit signed integer) - output for information about the scope of connection handles.
- Only messages that were put or retrieved as part of the current unit of work are affected by this call.
- A long-running application that issues MQGET, MQPUT, or MQPUT1 calls within a unit of work, but that never issues a commit or backout call, can fill queues with messages that are not available to other applications. To guard against this possibility, the administrator must set the *MaxUncommittedMsgs* queue-manager attribute to a value that is low enough to prevent runaway applications filling the queues, but high enough to allow the expected messaging applications to work correctly.

## Parameters

The MQSETMP call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager.

The value must match the connection handle that was used to create the message handle specified in the *HMSG* parameter.

If the message handle was created using HCUNAS, a valid connection must be established on the thread setting a property of the message handle, otherwise the call fails with reason code RC2009 .

**HMSG (20-digit signed integer) - input**

This is the message handle to be modified. The value was returned by a previous MQCRTMH call.

**SETOPT (MQSMPO) - input**

Control how message properties are set.

This structure allows applications to specify options that control how message properties are set. The structure is an input parameter on the MQSETMP call. See MQSMPO for further information.

**PRNAME (MQCHARV) - input**

This is the name of the property to set.

See Property names and Property name restrictions for further information about the use of property names.

**PRPDSC (MQPD) - input/output**

This structure is used to define the attributes of a property, including:

- what happens if the property is not supported
- what message context the property belongs to
- what messages the property is copied into as it flows

See MQPD for further information about this structure.

**TYPE (10 digit signed integer) - input**

The data type of the property being set. It can be one of the following:

**TYPBOL**
A boolean. *ValueLength* must be 4.

**TYPBST**
A byte string. *ValueLength* must be zero or greater.

**TYPI8**
An 8 bit signed integer. *ValueLength* must be 1.

**TYPI16**
A 16 bit signed integer. *ValueLength* must be 2.

**TYPI32**
A 32 bit signed integer. *ValueLength* must be 4.

**TYPI64**
A 64 bit signed integer. *ValueLength* must be 8.

**TYPF32**
A 32 bit floating-point number. *ValueLength* must be 4.

**TYPF64**
A 64 bit floating-point number. *ValueLength* must be 8.

**TYPSTR**
A character string. *ValueLength* must be zero or greater, or the special value VLNULL.

**TYPNUL**
The property exists but has a null value. *ValueLength* must be zero.

**VALLEN (10-digit signed integer) - input**

The length in bytes of the property value in the *Value* parameter.

Zero is valid only for null values or for strings or byte strings. Zero indicates that the property exists but that the value contains no characters or bytes.

The value must be greater than or equal to zero or the following special value if the *Type* parameter has TYPSTR set:

**VLNULL**
The value is delimited by the first null encountered in the string. The null is not included as part of the string. This value is invalid if TYPSTR is not also set.

Note: The null character used to terminate a string if VLNULL is set is a null from the character set of the Value.

**VALUE (1-byte bit string x VALLEN) - input**

The value of the property to be set. The buffer must be aligned on a boundary appropriate to the nature of the data in the value.

In the C programming language, the parameter is declared as a pointer-to-void; the address of any type of data can be specified as the parameter.

If *ValueLength* is zero, *Value* is not referred to. In this case, the parameter address passed by programs written in C or System/390 assembler can be null.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2421**
(2421, X'0975') An MQRFH2 folder containing properties could not be parsed.

If *CMPCOD* is CCFAIL:

**RC2204**
(2204, X'089C') Adapter not available.

**RC2130**
(2130, X'852') Unable to load adapter service module.

**RC2157**
(2157, X'86D') Primary and home ASIDs differ.

**RC2004**
(2004, X'07D4') Value parameter not valid.

**RC2005**
(2005, X'07D5') Value length parameter not valid.

**RC2219**
(2219, X'08AB') MQI call entered before previous call completed.

**RC2460**
(2460, X'099C') Message handle pointer not valid.

**RC2499**
(2499, X'09C3') Message handle already in use.

**RC2046**
(2046, X'07FE') Options not valid or not consistent.

**RC2482**
(2482, X'09B2') Property descriptor structure not valid.

**RC2442**
(2442, X'098A') Invalid property name.

**RC2473**
(2473, X'09A9') Invalid property data type.

**RC2472**
(2472, X'09A8') Number format error encountered in value data.

**RC2463**
(2463, X'099F') Set message property options structure not valid.

**RC2111**
(2111, X'083F') Property name coded character set identifier not valid.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2195**
(2195, X'893') Unexpected error occurred.

See “Return codes for IBM i (ILE RPG)” on page 1392 for more details.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQSETMP(HCONN : HMSG : SETOPT :
                                        PRNAME : PRPDSC :
                                        TYPE : VALLEN : VALUE :
                                        CMPCOD : REASON)
```

The prototype definition for the call is:

```
DMQSETMP          PR                  EXTPROC('MQSETMP')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Message handle
D HMSG                          10I 0 VALUE
D* Options that control the action of MQSETMP
D SETOPT                        20A
D* Property name
D PRNAME                        32A
D* Property descriptor
D PRPDSC                        24A
D* Property data type
D TYPE                          10I 0 VALUE
D* Length of the Value area
D VALLEN                        10I 0 VALUE
D* Property value
D VALUE                           *   VALUE
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQSTAT - Retrieve status information

Use the MQSTAT call to retrieve status information. The type of status information returned is determined by the STYPE value specified on the call.


- “Syntax” on page 1325
- “Usage notes” on page 1325
- “Parameters” on page 1326
- “RPG Declaration” on page 1327


### Syntax

MQSTAT *(HCONN, STYPE, STAT, CMPCOD, REASON)*

### Usage notes

1. A call to MQSTAT specifying a type of STATAPT returns information about previous asynchronous MQPUT and MQPUT1 operations. The MQSTAT structure passed on the call is completed with the first recorded asynchronous warning or error information for that connection. If further errors or warnings follow the first, they do not normally alter these values. However, if an error occurs with a completion code of CCWARN, a subsequent failure with a completion code of CCFAIL is returned instead.
2. If no errors have occurred since the connection was established or since the last call to MQSTAT then a CMPCOD of CCOK and REASON of RCNONE are returned.

3. Counts of the number of asynchronous calls that have been processed under the connection handle are returned by using three counters; STSPSC, STSPWC, and STSPFC. These counters are incremented by the queue manager each time an asynchronous operation is processed successfully, has a warning, or fails (note that for accounting purposes a put to a distribution list counts once per destination queue rather than once per distribution list).
4. A successful call to MQSTAT results in any previous error information or counts being reset.

## Parameters

The MQSTAT call has the following parameters:

**Hconn (MQHCONN) - input**

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN or MQCONNX call.

**STYPE (10-digit signed integer) - input**

Type of status information being requested. The only valid value is:

**STATAPT**
Return information about previous asynchronous put operations.

**STS (MQSTS) - input/output**

Status information structure. See "MQSTS - Status reporting structure" on page 1196 for details.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion.

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2374**
(2374, X'946') API exit failed

**RC2183**
(2183, X'887') Unable to load API exit.

**RC2219**
(2219, X'8AB') MQI call entered before previous call complete.

**RC2009**
(2009, X'7D9') Connection to queue manager lost.

**RC2203**
(2203, X'89B') Connection shutting down.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2162**
(2162, X'872') Queue manager stopping

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2430**
(2430, X'97E') Error with MQSTAT type.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2424**
(2424, X'978') Error with MQSTS structure

**RC2195**
(2195, X'893') Unexpected error occurred.

**RC2298**
(2298, X'8FA') The function requested is not available in the current environment.

For detailed information about these codes, see:

- Messages and reason codes

### RPG Declaration

```
C*.. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
C                     CALLP     MQSTAT(HCONN : ETYPE : ERR :
C                                      CMPCOD : REASON)
```

The prototype definition for the call is:

```
D.. 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7
DMQSTAT           PR                  EXTPROC('MQSTAT')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Status information type
D STYPE                         10I 0 VALUE
D* Status information
D STATUS                       296A
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## MQSUB - Register Subscription

The MQSUB call registers the applications subscription to a particular topic.

- “Syntax” on page 1327
- “Usage notes” on page 1327
- “Parameters” on page 1329
- “RPG Declaration” on page 1333

### Syntax

MQSUB *(HCONN, SUBDSC, HOBJ, HSUB, CMPCOD, REASON)*

### Usage notes

- The subscription is made to a topic, named either using the short name of a pre-defined topic object, the full name of the topic string, or it is formed by the concatenation of two parts, as described in “Using topic strings” on page 560.
- The queue manager performs security checks when an MQSUB call is issued, to verify that the user identifier under which the application is running has the appropriate level of authority before access is permitted. The appropriate topic object is located either by a short name being provided in the call, or the nearest short name object in the topic hierarchy being found if a long name is provided. An authority check is made on this topic object to ensure authority to subscribe is set and on the destination queue

to ensure that authority for output is set. If the SDMAN option is used, this means that an authority check is made on the managed queue name associated with this topic object, and if a non-managed queue is provided, this means that an authority check is made on the queue represented by the *HOBJ* parameter.

- The *HOBJ* returned on the MQSUB call when the SOMAN option is used, can be inquired in order to find out attributes such as the Backout threshold and the Excessive backout requeue name. You can also inquire the name of the managed queue, but you should not attempt to directly open this queue.
- Subscriptions can be grouped allowing only a single publication to be delivered to the group of subscriptions even where more than one of the group matched the publication. Subscriptions are grouped using the SOGRP option and in order to group subscriptions they must:
  - be using the same named queue (that is not using the SOMAN option) on the same queue manager - represented by the *HOBJ* parameter on the MQSUB call
  - share the same *SDCID*
  - be of the same *SDSL*

  These attributes define the set of subscriptions considered to be in the group, and are also the attributes that cannot be altered if a subscription is grouped. Alteration of *SDSL* results in RC2512, and alteration of any of the others (which can be changed if a subscription is not grouped) results in RC2515.
- Fields in the MQSD are completed on return from an MQSUB call which uses the SORES option. The MQSD returned can be passed directly into an MQSUB call which uses the SOALT option with any changes you need to make to the subscription applied to the MQSD. Some fields have special considerations as noted in the table.

| MQSD output from MQSUB | |
|---|---|
| **Field name in MQSD** | **Special considerations** |
| Access or creation options | None of these options are set on return from the MQSUB call. If you later reuse the MQSD in an MQSUB call the option you require must be explicitly set. |
| Durability options, Destination options, Registration Options & Wildcard options | These options will be set as appropriate |
| Publication options | These options will be set as appropriate, except for SONEWP which is only applicable to SOCRE. |
| Other options | These options are unchanged on return from an MQSUB call. They control how the API call is issued and are not stored with the subscription. They must be set as required on any subsequent MQSUB call reusing the MQSD. |
| ObjectName | This input only field is unchanged on return from an MQSUB call. |
| ObjectString | This input only field is unchanged on return from an MQSUB call. The Full topic name used is returned in the *SDRO* field, if a buffer is provided. |
| AlternateUserId and AlternateSecurityId | These input only fields are unchanged on return from an MQSUB call. They control how the API call is issued and are not stored with the subscription. They must set as required on any subsequent MQSUB call reusing the MQSD. |

| MQSD output from MQSUB *(continued)* | |
|---|---|
| **Field name in MQSD** | **Special considerations** |
| SubExpiry | On return from an MQSUB call using the SORES option this field will be set to the original expiry of the subscription and not the remaining expiry time. If you then reuse the MQSD in an MQSUB call using the SOALT option you will reset the expiry of the subscription to start counting down again. |
| SubName | This field is an input field on an MQSUB call and is not changed on output. |
| SubUserData and SelectionString | These variable length fields will be returned on output from an MQSUB call using the SORES option, if a buffer is provided, and also a positive buffer length in *VCHRP*. If no buffer is provided only the length will be returned in the *VCHRL* field of the MQCHARV.If the buffer provided is smaller than the space required to return the field, only *VCHRP* bytes are returned in the provided buffer.<br>If you later reuse the MQSD in an MQSUB call using the SOALT option and a buffer is not provided but a non-zero *VCHRL* is provided, if that length matches the existing length of the field, no alteration will made to the field. |
| SubCorrelId and PubAccountingToken | If you do not use SOSCID, then the *SDCID* will be generated by the queue manager. If you do not use SOSETI, then the *SDACC* will be generated by the queue manager.<br>These fields will be returned in the MQSD from an MQSUB call using the SORES option. If they are generated by the queue manager, the generated value will be returned on an MQSUB call using the SOCRE or SOALT option. |
| PubPriority, SubLevel & PubApplIdentityData | These fields will be returned in the MQSD. |
| ResObjectString | This output only field will be returned in the MQSD if a buffer is provided. |

## Parameters

The MQSUB call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**SUBDSC (MQSD) - input/output**

This is a structure that identifies the object with use that is being registered by the application. See "MQSD - Subscription descriptor" on page 1179 for more information.

**HOBJ (10-digit signed integer) - input/output**

This handle represents the access that has been established to obtain the messages sent to this subscription. These messages can either be stored on a specific queue or the queue manager can be asked to manage their storage without the need for a specific queue.

Object handle.

If a specific queue is to be used it must be associated with the subscription at creation time. This can be done in two ways:

- By providing this handle when calling MQSUB with the SDCRT option. If this handle is provided as an input parameter on the call, it must be a valid object handle returned from a previous MQOPEN call of a queue using at least one of OOINP*, OOOUT (if a remote queue for example), or OOBRW option. If this is not the case, the call fails with RC2019. It cannot be an object handle to an alias queue which resolves to a topic object. If so, the call fails with RC2019
- By using the DEFINE SUB MQSC command and provided that command with the name of a queue object.

If the queue manager is to manage the storage of messages sent to this subscription, you should indicate this when the subscription is created, by using the SOMAN option and setting the parameter value to HONONE. The queue manager returns the handle as an output parameter on the call, and the handle that is returned is known as a managed handle. If HONONE is specified and SOMAN is not also specified, the call fails with RC2019.

A managed handle that is returned by the queue manager can be used on an MQGET or MQCB call, with or without browse options, on an MQINQ call, or on MQCLOSE. It cannot be used on MQPUT, MQSET, or on a subsequent MQSUB; attempting to do so fails with RC2039 for MQPUT, RC2040 for MQSET, or RC2038 for MQSUB.

If the SORES option in the *OPTS* field in the MQSD structure is used to resume this subscription, the handle can be returned to the application in this parameter if HONONE is specified. You can use this whether the subscription is using a managed handle or not. It can be useful for subscriptions created using DEFINE SUB if you want the handle to the subscription queue defined on the DEFINE SUB command. In the case where an administratively created subscription is being resumed, the queue is opened with OOINPQ and OOBRW. If other options are needed, the application must open the subscription queue explicitly and provide the object handle on the call. If there is a problem opening the queue the call will fail with RC2522. If the *HOBJ* is provided, it must be equivalent to the *HOBJ* in the original MQSUB call. This means if an object handle returned from an MQOPEN call is being provided, the handle must be to the same queue as previously used or the call fails with RC2019.

If this subscription is being altered, by using the SOALT option in the *OPTS* field in the MQSD structure, then a different *HOBJ* can be provided. Any publications that have been delivered to the queue previously identified through this parameter remain on that queue and it is the responsibility of the application to retrieve those messages if the *HOBJ* parameter now represents a different queue.

The use of this parameter with various subscription options is summarized in the following table:

| Options | Hobj | Description |
|---|---|---|
| SOCRT + SOMAN | Ignored on input | Creates a subscription with queue manager managed storage of messages. |

| Options | Hobj | Description |
|---|---|---|
| SOCRT | Valid object handle | Creates a subscription providing a specific queue as the destination for messages. |
| SORES | HONONE | Resumes a previously created subscription (managed or not) and have the queue manager return the object handle for use by the application. |
| SORES | Valid, matching, object handle | Resumes a previously created subscription which uses a specific queue as the destination for messages and use an object handle with specific open options. |
| SOALT + SOMAN | HONONE | Alters an existing subscription which was previously using a specific queue, to now be managed. |
| SOALT | Valid object handle | Alters an existing subscription to use a specific queue (either from managed, or from a different specific queue). |

Whether it was provided or returned, *H0BJ* must be specified on subsequent MQGET calls that you need to receive the publications.

The *H0BJ* handle ceases to be valid when the MQCLOSE call is issued on it, or when the unit of processing that defines the scope of the handle terminates. The scope of the object handle returned is the same as that of the connection handle specified on the call. See HCONN for information about handle scope. An MQCLOSE of the *H0BJ* handle has no effect on the *HSUB* handle.

**HSUB (10-digit signed integer) - output**

This handle represents the subscription that has been made. It can be used for two further operations:

- It can be used on a subsequent MQSUBRQ call to request that publications be sent when the SOPUBR option has been used when making the subscription.
- It can be used on a subsequent MQCLOSE call to remove the subscription that has been made. The *HSUB* handle ceases to be valid when the MQCLOSE call is issued, or when the unit of processing that defines the scope of the handle terminates. The scope of the object handle returned is the same as that of the connection handle specified on the call. An MQCLOSE of the *HSUB* handle has no effect on the *H0BJ* handle.

This handle cannot be passed to an MQGET or MQCB call. You must use the *H0BJ* parameter. Passing this handle to any other IBM MQ call results in RC2019.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion

**CCWARN**
Warning (partial completion)

**CCFAIL**
Call failed

**REASON (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCFAIL:

**RC2019**
(2019 X'07E3') Object handle not valid

**RC2046**
(2046 X'07FE') Options not valid or not consistent

**RC2085**
(2085 X'0825') Object identified cannot be found

**RC2161**
(2161 X'0871') Queue manager quiescing

**RC2298**
(2298 X'08FA') Function not supported.

**RC2424**
(2424 X'0978') Subscription descriptor (MQSD) not valid

**RC2425**
(2441 X'979') Topic string not valid

**RC2428**
(2428 X'097C') Subscription name specified does not match existing subscriptions

**RC2429**
(2429 X'097D') Subscription name exists and is in use by another application

**RC2431**
(2431 X'097F') SubUserData field not valid

**RC2432**
(2432 X'0980') Subscription exists

**RC2434**
(2434 X'0982') Subscription name matches existing subscription

**RC2440**
(2440 X'0988') SubName field not valid

**RC2441**
(2441 X'0989') Objectstring field not valid

**RC2435**
(2435 X'0983') Attribute cannot be changed using SDALT, or subscription was created with SDIMM.

**RC2436**
(2436 X'0984') SODUR option not valid

**RC2459**
(2459, X'99B') Selection string syntax error.

**RC2503**
(2503 X'09C7') MQSUB calls are currently inhibited for the topics subscribed to.

**RC2519**
(2519, X'9D7') The selection string is not as specified in the description of how to use an MQCHARV structure.

**RC2551**
(2551, X'9F7') Specified selection string is not available.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQSUB(HCONN : SUBDSC : HOBJ :
C                                     HSUB : CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQSUB            PR                  EXTPROC('MQSUB')
D* Connection handle
D HCONN                          10I 0 VALUE
D* Subscription descriptor
D SUBDSC                        400A
D* Object handle for queue
D HOBJ                           10I 0
D* Subscription object handle
D HSUB                           10I 0
D* Completion code
D CMPCOD                         10I 0
D* Reason code qualifying CompCode
D REASON                         10I 0
```

## MQSUBRQ - Subscription Request

The MQSUBRQ call makes a request on a subscription.


- "Syntax" on page 1333
- "Usage notes" on page 1333
- "Parameters" on page 1334
- "RPG Declaration" on page 1335


### Syntax

MQSUBRQ *(HCONN, HSUB, ACTION, SUBROPT, CMPCOD, REASON)*

### Usage notes

The following usage notes apply to the use of SRAPUB:

1. If this verb completes successfully, the retained publications matching the subscription specified have been sent to the subscription and can be received by using MQGET or MQCB using the HOBJ returned on the original MQSUB verb that created the subscription.
2. If the topic subscribed to by the original MQSUB verb that created the subscription contained a wildcard, more than one retained publication might be sent. The number of publications sent as a result of this call is recorded in the *SRNMP* field in the SBROPT structure.
3. If this verb completes with a reason code of RC2437 then there were no currently retained publications for the topic specified.
4. If this verb completes with a reason code of RC2525 or RC2526 then there are currently retained publications for the topic specified but an error has occurred that that meant they were unable to be delivered.
5. The application must have a current subscription to the topic before it can make this call. If the subscription was made in a previous instance of the application and a valid handle to the subscription is not available, the application must first call MQSUB with the SORES option to obtain a handle to it for use in this call.

6. The publications are sent to the destination that is registered for use with the current subscription of this application. If the publications should be sent somewhere else, the subscription must first be altered using the MQSUB call with the SOALT option.

## Parameters

The MQSUBRQ call has the following parameters:

**HCONN (10-digit signed integer) - input**

This handle represents the connection to the queue manager. The value of *HCONN* was returned by a previous MQCONN or MQCONNX call.

On z/OS for CICS applications, and on IBM i for applications running in compatibility mode, the MQCONN call can be omitted, and the following value specified for *HCONN* :

**HCDEFH**
Default connection handle.

**Important:** IBM i If you are still using compatibility mode, consider recompiling your application and using static bound calls instead. See Compatibility mode for RPG applications on IBM i

**HSUB (10-digit signed integer) - input**

This handle represents the subscription for which an update is to be requested. The value of *HSUB* was returned from a previous MQSUB call.

**ACTION (10-digit signed integer) - input**

This parameter controls the particular action that is being requested on the subscription. One (and only one) of the following must be specified:

**SRAPUB**

This action requests that an update publication be sent for the specified topic. This is normally used if the subscriber specified the option SOPUBR on the MQSUB call when it made the subscription. If the queue manager has a retained publication for the topic, this is sent to the subscriber. If not, the call fails. If an application is sent a publication which was retained, this is indicated by the MQIsRetained message property of that publication.

Since the topic in the existing subscription represented by the *HSUB* parameter can contain wildcards, the subscriber might receive multiple retained publications.

**SBROPT (MQSRO) - input/output**

These options control the action of MQSUBRQ, see “MQSRO - Subscription request options” on page 568 for details.

**CMPCOD (10-digit signed integer) - output**

The completion code; it is one of the following:

**CCOK**
Successful completion

**CCWARN**
Warning (partial completion)

**CCFAIL**
Call failed

**Reason (10-digit signed integer) - output**

The reason code qualifying *CMPCOD*.

If *CPMCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CPMCOD* is CCFAIL:

**RC2298**
2298 (X'08FA') The function requested is not available in the current environment.

**RC2437**
2437 (X'0985') There are no retained publications currently stored for this topic.

**RC2046**
2046 (X'07FE') Options parameter or field contains options that are not valid, or a combination of options that is not valid.

**RC2161**
2161 (X'0871') Queue manager quiescing

**RC2438**
2438 (X'0986') On the MQSUBRQ call, the Subscription Request Options MQSRO is not valid.

### RPG Declaration

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQSUBRQ(HCONN : HSUB : ACTION :
C                                       SBROPT : CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQSUBRQ          PR                  EXTPROC('MQSUBRQ')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Subscription handle
D HSUB                          10I 0 VALUE
D* Action requested on the subscription
D ACTION                        10I 0 VALUE
D* Subscription Request Options
D SBROPT                        16A
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CompCode
D REASON                        10I 0
```

## Attributes of objects

This collection of topics lists only those IBM MQ objects that can be the subject of an MQINQ function call, and gives details of the attributes that can be inquired on and the selectors to be used.

### Attributes for queues

Use this information to learn about the different types of queue definitions and the attributes supported by each.

**Types of queue**: The queue manager supports the following types of queue definition:

**Local queue**
This is a physical queue that stores messages. The queue exists on the local queue manager.

Applications connected to the local queue manager can place messages on and remove messages from queues of this type. The value of the *QType* queue attribute is QTLOC.

**Shared queue**
This is a physical queue that stores messages. The queue exists in a shared repository that is accessible to all of the queue managers that belong to the queue-sharing group that owns the shared repository.

Applications connected to any queue manager in the queue-sharing group can place messages on and remove messages from queues of this type. Such queues are effectively the same as local queues. The value of the *QType* queue attribute is QTLOC.

- Shared queues are supported only on z/OS.

**Cluster queue**
This is a physical queue that stores messages. The queue exists either on the local queue manager, or on one or more of the queue managers that belong to the same cluster as the local queue manager.

Applications connected to the local queue manager can place messages on queues of this type, regardless of the location of the queue. If an instance of the queue exists on the local queue manager, the queue behaves in the same way as a local queue, and applications connected to the local queue manager can remove messages from the queue. The value of the *QType* queue attribute is QTCLUS.

**Alias queue**
This is not a physical queue - it is an alternative name for a local queue. The name of the local queue to which the alias resolves is part of the definition of the alias queue.

Applications connected to the local queue manager can place messages on and remove messages from alias queues - the messages are placed on and removed from the local queue to which the alias resolves. The value of the *QType* queue attribute is QTALS.

**Remote queue**
This is not a physical queue - it is the local definition of a queue that exists on a remote queue manager. The local definition of the remote queue contains information that tells the local queue manager how to route messages to the remote queue manager.

Applications connected to the local queue manager can place messages on remote queues - the messages are placed on the local transmission queue used to route messages to the remote queue manager. Applications cannot remove messages from remote queues. The value of the *QType* queue attribute is QTREM.

A remote queue definition can also be used for:

- Reply-queue aliasing

  In this case the name of the definition is the name of a reply-to queue. For more information, see Reply-to queue alias definitions.

- Queue-manager aliasing

  In this case the name of the definition is an alias for a queue manager, and not the name of a queue. For more information, see Queue manager alias definitions.

**Model queue**
This is not a physical queue - it is a set of queue attributes from which a local queue can be created.

Messages cannot be stored on queues of this type.

Some queue attributes apply to all types of queue; other queue attributes apply only to certain types of queue. The types of queue to which an attribute applies are indicated by the ✓ symbol in Table 626 on page 1337 and subsequent tables.

Table 626 on page 1337 summarizes the attributes that are specific to queues. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown in this section are the names used with the MQINQ and MQSET calls. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see Script (MQSC) Commands for details.

*Table 626. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| AlterationDate | Date when definition was last changed | ✓ | | ✓ | ✓ | |
| AlterationTime | Time when definition was last changed | ✓ | | ✓ | ✓ | |
| BackoutRequeueQName | Excessive backout requeue queue name | ✓ | ✓ | | | |
| BackoutThreshold | Backout threshold | ✓ | ✓ | | | |
| BaseQName | Queue name to which alias resolves | | | ✓ | | |
| ClusterChannelName | Cluster-sender channel name | ✓ | ✓ | | | |
| ClusterName | Name of cluster to which queue belongs | ✓ | | ✓ | ✓ | |
| ClusterNamelist | Name of namelist object containing names of clusters to which queue belongs | ✓ | | ✓ | ✓ | |
| CreationDate | Date the queue was created | ✓ | | | | |
| CreationTime | Time the queue was created | ✓ | | | | |
| CurrentQDepth | Current queue depth | ✓ | | | | |
| DefBind | Default binding | ✓ | | ✓ | ✓ | ✓ |
| DefinitionType | Queue definition type | ✓ | ✓ | | | |
| DefInputOpenOption | Default input open option | ✓ | ✓ | | | |
| DefPersistence | Default message persistence | ✓ | ✓ | ✓ | ✓ | ✓ |
| DefPriority | Default message priority | ✓ | ✓ | ✓ | ✓ | ✓ |
| DistLists | Distribution list support | ✓ | ✓ | | | |

*Table 626. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

*(continued)*

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| HardenGetBackout | Whether to maintain an accurate backout count | ✓ | ✓ | | | |
| InhibitGet | Controls whether get operations for the queue are allowed | ✓ | ✓ | ✓ | | |
| InhibitPut | Controls whether put operations for the queue are allowed | ✓ | ✓ | ✓ | ✓ | ✓ |
| InitiationQName | Name of initiation queue | ✓ | ✓ | | | |
| MaxMsgLength | Maximum message length in bytes | ✓ | ✓ | | | |
| MaxQDepth | Maximum queue depth | ✓ | ✓ | | | |
| MediaLog | Identity of oldest log extent (or oldest journal receiver on IBM i ) needed for media recovery of a specified queue | ✓ | ✓ | | | |
| MsgDeliverySequence | Message delivery sequence | ✓ | ✓ | | | |
| OpenInputCount | Number of opens for input | ✓ | | | | |
| OpenOutputCount | Number of opens for output | ✓ | | | | |
| ProcessName | Process name | ✓ | ✓ | | | |
| QDepthHighEvent | Controls whether Queue Depth High events are generated | ✓ | ✓ | | | |
| QDepthHighLimit | High limit for queue depth | ✓ | ✓ | | | |
| QDepthLowEvent | Controls whether Queue Depth Low events are generated | ✓ | ✓ | | | |

*Table 626. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

*(continued)*

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| QDepthLowLimit | Low limit for queue depth | ✓ | ✓ | | | |
| QDepthMaxEvent | Controls whether Queue Full events are generated | ✓ | ✓ | | | |
| QDesc | Queue description | ✓ | ✓ | ✓ | ✓ | ✓ |
| QName | Queue name | ✓ | | ✓ | ✓ | ✓ |
| QServiceInterval | Target for queue service interval | ✓ | ✓ | | | |
| QServiceIntervalEvent | Controls whether Service Interval High or Service Interval OK events are generated | ✓ | ✓ | | | |
| QType | Queue type | ✓ | | ✓ | ✓ | ✓ |
| RemoteQMgrName | Name of remote queue manager | | | | ✓ | |
| RemoteQName | Name of remote queue | | | | ✓ | |
| RetentionInterval | Retention interval | ✓ | ✓ | | | |
| Scope | Controls whether an entry for the queue also exists in a cell directory | ✓ | | ✓ | ✓ | |
| Shareability | Queue shareability | ✓ | ✓ | | | |
| TriggerControl | Trigger control | ✓ | ✓ | | | |
| TriggerData | Trigger data | ✓ | ✓ | | | |
| TriggerDepth | Trigger depth | ✓ | ✓ | | | |
| TriggerMsgPriority | Threshold message priority for triggers | ✓ | ✓ | | | |
| TriggerType | Trigger type | ✓ | ✓ | | | |
| Usage | Queue usage | ✓ | ✓ | | | |

*Table 626. Attributes for queues.* The columns apply as follows:

- The column for local queues applies also to shared queues.
- The column for model queues indicates which attributes are inherited by the local queue created from the model queue.
- The column for cluster queues indicates the attributes that can be inquired when the cluster queue is opened for inquire alone, or for inquire and output. If the cluster queue is opened for inquire plus one or more of input, browse, or set, the column for local queues applies instead.

*(continued)*

| Attribute | Description | Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|---|---|
| XmitQName | Transmission queue name | | | | ✓ | |

### *AlterationDate (12-byte character string)*

Date when definition was last changed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

This is the date when the definition was last changed. The format of the date is `YYYY-MM-DD`, padded with two trailing blanks to make the length 12 bytes (for example, `1992-09-23¬¬`, where ¬¬ represents two blank characters).

The values of certain attributes (for example, *CurrentQDepth*) change as the queue manager operates. Changes to these attributes do not affect *AlterationDate*.

To determine the value of this attribute, use the CAALTD selector with the MQINQ call. The length of this attribute is given by LNDATE.

### *AlterationTime (8-byte character string)*

Time when definition was last changed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

This is the time when the definition was last changed. The format of the time is `HH.MM.SS` using the 24-hour clock, with a leading zero if the hour is less than 10 (for example `09.10.20`). The time is local time.

The values of certain attributes (for example, *CurrentQDepth*) change as the queue manager operates. Changes to these attributes do not affect *AlterationTime*.

To determine the value of this attribute, use the CAALTT selector with the MQINQ call. The length of this attribute is given by LNTIME.

### *BackoutRequeueQName (48-byte character string)*

Excessive backout requeue queue name.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

Applications running inside WebSphere Application Server and those that use the IBM MQ Application Server Facilities use this attribute to determine where messages that have been backed out should go. For all other applications, apart from allowing its value to be queried, the queue manager takes no action based on the value of the attribute.

To determine the value of this attribute, use the CABRQN selector with the MQINQ call. The length of this attribute is given by LNQN.

### *BackoutThreshold (10-digit signed integer)*

Backout threshold.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

Applications running inside WebSphere Application Server and those that use the IBM MQ Application Server Facilities use this attribute to determine if a message should be backed out. For all other applications, apart from allowing its value to be queried, the queue manager takes no action based on the value of the attribute.

To determine the value of this attribute, use the IABTHR selector with the MQINQ call.

### *BaseQName (48-byte character string)*

The queue name to which the alias resolves.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | ✓ | | |

This is the name of a queue that is defined to the local queue manager. (For more information about queue names, see the description of the *ODON* field in MQOD. The queue is one of the following types:

**QTLOC**
Local queue.

**QTREM**
Local definition of a remote queue.

**QTCLUS**
Cluster queue.

To determine the value of this attribute, use the CABASQ selector with the MQINQ call. The length of this attribute is given by LNQN.

### *BaseType (integer parameter structure)*

The type of object to which the alias resolves.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | ✓ | | |

This attribute can have one of the following values:

**OTQ**
Base object type is a queue

**OTTOP**
Base object type is a topic

### *CFStrucName (12-byte character string)*

Coupling-facility structure name.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the name of the coupling-facility structure where the messages on the queue are stored. The first character of the name is in the range A through Z, and the remaining characters are in the range A through Z, 0 through 9, or blank.

The full name of the structure in the coupling facility is obtained by suffixing the value of the *QSGName* queue manager attribute with the value of the *CFStrucName* queue attribute.

This attribute applies only to shared queues; it is ignored if *QSGDisp* does not have the value QSGDSH.

To determine the value of this attribute, use the CACFSN selector with the MQINQ call. The length of this attribute is given by LNCFSN.

This attribute is supported only on z/OS.

### *ClusterChannelName (20-byte character string)*

`ClusterChannelName` is the generic name of the cluster-sender channels that use this queue as a transmission queue. The attribute specifies which cluster-sender channels send messages to a cluster-receiver channel from this cluster transmission queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

The default queue manager configuration is for all cluster-sender channels to send messages from a single transmission queue, `SYSTEM.CLUSTER.TRANSMIT.QUEUE`. The default configuration can be changed by modified by changing the queue manager attribute, **DefClusterXmitQueueType**. The default value of the attribute is `SCTQ`. You can change the value to `CHANNEL`. If you set the **DefClusterXmitQueueType** attribute to `CHANNEL`, each cluster-sender channel defaults to using a specific cluster transmission queue, `SYSTEM.CLUSTER.TRANSMIT.`*`ChannelName`*.

You can also set the transmission queue attribute `ClusterChannelName` attribute to a cluster-sender channel manually. Messages that are destined for the queue manager connected by the cluster-sender channel are stored in the transmission queue that identifies the cluster-sender channel. They are not stored in the default cluster transmission queue. If you set the `ClusterChannelName` attribute to blanks, the channel switches to the default cluster transmission queue when the channel restarts. The default queue is either `SYSTEM.CLUSTER.TRANSMIT.`*`ChannelName`* or `SYSTEM.CLUSTER.TRANSMIT.QUEUE`, depending on the value of the queue manager `DefClusterXmitQueueType` attribute.

By specifying asterisks, "`*`", in **ClusterChannelName**, you can associate a transmission queue with a set of cluster-sender channels. The asterisks can be at the beginning, end, or any number of places in the middle of the channel name string. **ClusterChannelName** is limited to a length of 20 characters: `MQ_CHANNEL_NAME_LENGTH`.

### *ClusterName (48-byte character string)*
Name of cluster to which queue belongs.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

This is the name of the cluster to which the queue belongs. If the queue belongs to more than one cluster, *ClusterNamelist* specifies the name of a namelist object that identifies the clusters, and *ClusterName* is blank. At least one of *ClusterName* and *ClusterNamelist* must be blank.

To determine the value of this attribute, use the CACLN selector with the MQINQ call. The length of this attribute is given by LNCLUN.

### *ClusterNamelist (48-byte character string)*
Name of namelist object containing names of clusters to which queue belongs.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

This is the name of a namelist object that contains the names of clusters to which this queue belongs. If the queue belongs to only one cluster, the namelist object contains only one name. Alternatively, *ClusterName* can be used to specify the name of the cluster, in which case *ClusterNamelist* is blank. At least one of *ClusterName* and *ClusterNamelist* must be blank.

To determine the value of this attribute, use the CACLNL selector with the MQINQ call. The length of this attribute is given by LNNLN.

### *CreationDate (12-byte character string)*
Date when queue was created.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | | | |

This is the date when the queue was created. The format of the date is `YYYY-MM-DD`, padded with two trailing blanks to make the length 12 bytes (for example, `1992-09-23¬¬`, where ¬¬ represents two blank characters).

- On IBM i, the creation date of a queue might differ from that of the underlying operating system entity (file or userspace) that represents the queue.

To determine the value of this attribute, use the CACRTD selector with the MQINQ call. The length of this attribute is given by LNCRTD.

### *CreationTime (8-byte character string)*
Time when queue was created.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | | | |

This is the time when the queue was created. The format of the time is HH.MM.SS using the 24-hour clock, with a leading zero if the hour is less than 10 (for example 09.10.20). The time is local time.

- On IBM i, the creation time of a queue might differ from that of the underlying operating system entity (file or user space) that represents the queue.

To determine the value of this attribute, use the CACRTT selector with the MQINQ call. The length of this attribute is given by LNCRTT.

### *CurrentQDepth (10-digit signed integer)*

Current queue depth.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | | | |

This is the number of messages currently on the queue. It is incremented during an MQPUT call, and during backout of an MQGET call. It is decremented during a nonbrowse MQGET call, and during backout of an MQPUT call. The effect of this is that the count includes messages that have been put on the queue within a unit of work, but which have not yet been committed, even though they are not eligible to be retrieved by the MQGET call. Similarly, it excludes messages that have been retrieved within a unit of work using the MQGET call, but which have yet to be committed.

The count also includes messages which have passed their expiry time but have not yet been discarded, although these messages are not eligible to be retrieved. See the *MDEXP* field described in "MQMD - Message descriptor" on page 1077.

Unit-of-work processing and the segmentation of messages can both cause *CurrentQDepth* to exceed *MaxQDepth*. However, this does not affect the retrievability of the messages - *all* messages on the queue can be retrieved using the MQGET call in the normal way.

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the IACDEP selector with the MQINQ call.

### *DefBind (10-digit signed integer)*

Default binding.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | ✓ |

This attribute is the default binding that is used when OOBNDQ is specified on the MQOPEN call and the queue is a cluster queue. DefBind can have one of the following values:

**BNDOPN**
Binding fixed by MQOPEN call.

**BNDNOT**
Binding not fixed.

**BNDGRP**
Binding is not fixed by the MQOPEN call, but is fixed on MQPUT for all messages in a logical group.

To determine the value of this attribute, use the IADBND selector with the MQINQ call.

### *DefinitionType (10-digit signed integer)*

Queue definition type.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This indicates how the queue was defined. The value is one of the following:

**QDPRE**
Predefined permanent queue.

The queue is a permanent queue created by the system administrator; only the system administrator can delete it.

Predefined queues are created using the DEFINE MQSC command, and can be deleted only by using the DELETE MQSC command. Predefined queues cannot be created from model queues.

Commands can be issued either by an operator, or by an authorized user sending a command message to the command input queue (see the *CommandInputQName* attribute described in “Attributes for the queue manager” on page 1366 ).

**QDPERM**
Dynamically defined permanent queue.

The queue is a permanent queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value QDPERM for the *DefinitionType* attribute.

This type of queue can be deleted using the MQCLOSE call. See “MQCLOSE - Close object” on page 1233 for more details.

The value of the *QSGDisp* attribute for a permanent dynamic queue is QSGDQM.

**QDTEMP**
Dynamically defined temporary queue.

The queue is a temporary queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value QDTEMP for the *DefinitionType* attribute.

This type of queue is deleted automatically by the MQCLOSE call when it is closed by the application that created it.

The value of the *QSGDisp* attribute for a temporary dynamic queue is QSGDQM.

**QDSHAR**
Dynamically defined shared queue.

The queue is a shared permanent queue that was created by an application issuing an MQOPEN call with the name of a model queue specified in the object descriptor MQOD. The model queue definition had the value QDSHAR for the *DefinitionType* attribute.

This type of queue can be deleted using the MQCLOSE call. See “MQCLOSE - Close object” on page 1233 for more details.

The value of the *QSGDisp* attribute for a shared dynamic queue is QSGDSH.

This attribute in a model queue definition does not indicate how the model queue was defined, because model queues are always predefined. Instead, the value of this attribute in the model queue is used to determine the *DefinitionType* of each of the dynamic queues created from the model queue definition using the MQOPEN call.

To determine the value of this attribute, use the IADEFT selector with the MQINQ call.

### *DefInputOpenOption (10-digit signed integer)*
Default input open option.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the default way in which the queue should be opened for input. It applies if the OOINPQ option is specified on the MQOPEN call when the queue is opened. This can have one of the following values:

**OOINPX**
Open queue to get messages with exclusive access.

The queue is opened for use with subsequent MQGET calls. The call fails with reason code RC2042 if the queue is currently open by this or another application for input of any type (OOINPS or OOINPX).

**OOINPS**
Open queue to get messages with shared access.

The queue is opened for use with subsequent MQGET calls. The call can succeed if the queue is currently open by this or another application with OOINPS, but fails with reason code RC2042 if the queue is currently open with OOINPX.

To determine the value of this attribute, use the IADINP selector with the MQINQ call.

### *DefPersistence (10-digit signed integer)*
Default message persistence.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | ✓ | ✓ |

This is the default persistence of messages on the queue. It applies if PEQDEF is specified in the message descriptor when the message is put.

If there is more than one definition in the queue-name resolution path, the default persistence is taken from the value of this attribute in the *first* definition in the path at the time of the MQPUT or MQPUT1 call. This could be:

- An alias queue
- A local queue
- A local definition of a remote queue
- A queue manager alias
- A transmission queue (for example, the *DefXmitQName* queue)

This can have one of the following values:

**PEPER**
Message is persistent.

This means that the message survives system failures and restarts of the queue manager. Persistent messages cannot be placed on:

- Temporary dynamic queues
- Shared queues

Persistent messages can be placed on permanent dynamic queues, and predefined queues.

**PENPER**
Message is not persistent.

This means that the message does not normally survive system failures or restarts of the queue manager. This applies even if an intact copy of the message is found on auxiliary storage during restart of the queue manager.

In the special case of shared queues, nonpersistent messages *do* survive restarts of queue managers in the queue-sharing group, but do not survive failures of the coupling facility used to store messages on the shared queues.

Both persistent and nonpersistent messages can exist on the same queue.

To determine the value of this attribute, use the IADPER selector with the MQINQ call.

### *DefPriority (10-digit signed integer)*

Default message priority.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | ✓ | ✓ |

This is the default priority for messages on the queue. This applies if PRQDEF is specified in the message descriptor when the message is put on the queue.

If there is more than one definition in the queue-name resolution path, the default priority for the message is taken from the value of this attribute in the *first* definition in the path at the time of the put operation. This could be:

- An alias queue
- A local queue
- A local definition of a remote queue
- A queue manager alias
- A transmission queue (for example, the *DefXmitQName* queue)

The way in which a message is placed on a queue depends on the value of the queue's *MsgDeliverySequence* attribute:

- If the *MsgDeliverySequence* attribute is MSPRIO, the logical position at which a message is placed on the queue is dependent on the value of the *MDPRI* field in the message descriptor.
- If the *MsgDeliverySequence* attribute is MSFIFO, messages are placed on the queue as though they had a priority equal to the *DefPriority* of the resolved queue, regardless of the value of the *MDPRI* field in the message descriptor. However, the *MDPRI* field retains the value specified by the application that put the message. See the *MsgDeliverySequence* attribute described in "Attributes for queues" on page 1335 for more information.

Priorities are in the range zero (lowest) through *MaxPriority* (highest); see the *MaxPriority* attribute described in "Attributes for the queue manager" on page 1366.

To determine the value of this attribute, use the IADPRI selector with the MQINQ call.

### *DefReadAhead (10-digit signed integer)*

Specifies the default read ahead behavior for non-persistent messages delivered to the client.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | | |

DefReadAhead can be set to one of the following values:

**RAHNO**
Non-persistent messages are not sent ahead to the client before an application requests them. A maximum of one non-persistent message can be lost if the client ends abnormally.

**RAHYES**
Non-persistent messages are sent ahead to the client before an application requests them. Non-persistent messages can be lost if the client ends abnormally or if the client does not consume all the messages it is sent.

**RAHDIS**
Read ahead of non-persistent messages in not enabled for this queue. Messages are not sent ahead to the client regardless of whether read ahead is requested by the client application.

To determine the value of this attribute, use the IADRAH selector with the MQINQ call.

### *DefPResp (10-digit signed integer)*

The default put response type (DEFPRESP) attribute defines the value used by applications when the PutResponseType within MQPMO has been set to PMRASQ. This attribute is valid for all queue types.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | ✓ | ✓ |

This can have one of the following values:

**SYNC**
The put operation is issued synchronously returning a response.

**ASYNC**
The put operation is issued asynchronously, returning a subset of MQMD fields.

To determine the value of this attribute, use the IADPRT selector with the MQINQ call.

### *DistLists (10-digit signed integer)*

Distribution list support.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This indicates whether distribution-list messages can be placed on the queue. The attribute is set by a message channel agent (MCA) to inform the local queue manager whether the queue manager at the other end of the channel supports distribution lists. This latter queue manager (called the "partnering queue manager") is the one which next receives the message, after it has been removed from the local transmission queue by a sending MCA.

The attribute is set by the sending MCA whenever it establishes a connection to the receiving MCA on the partnering queue manager. In this way, the sending MCA can cause the local queue manager to place on the transmission queue only messages which the partnering queue manager can process correctly.

This attribute is primarily for use with transmission queues, but the processing described is performed regardless of the usage defined for the queue (see the *Usage* attribute).

This can have one of the following values:

**DLSUPP**
Distribution lists supported.

This indicates that distribution-list messages can be stored on the queue, and transmitted to the partnering queue manager in that form. This reduces the amount of processing required to send the message to multiple destinations.

**DLNSUP**
Distribution lists not supported.

This indicates that distribution-list messages cannot be stored on the queue, because the partnering queue manager does not support distribution lists. If an application puts a distribution-list message, and that message is to be placed on this queue, the queue manager splits the distribution-list message and places the individual messages on the queue instead. This increases the amount of processing required to send the message to multiple destinations, but ensures that the messages will be processed correctly by the partnering queue manager.

To determine the value of this attribute, use the IADIST selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *HardenGetBackout (10-digit signed integer)*

Whether to maintain an accurate backout count.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

For each message, a count is kept of the number of times that the message is retrieved by an MQGET call within a unit of work, and that unit of work later backed out. This count is available in the *MDBOC* field in the message descriptor after the MQGET call has completed.

The message backout count survives when the queue manager restarts. However, to ensure that the count is accurate, information has to be "hardened" (recorded on disk or other permanent storage device) each time a message is retrieved by an MQGET call within a unit of work for this queue. If this is not done, and a failure of the queue manager occurs together with backout of the MQGET call, the count might not be incremented.

Hardening information for each MQGET call within a unit of work, however, imposes a performance cost, and the *HardenGetBackout* attribute should be set to QABH only if the count has to be accurate.

- On IBM i, the message backout count is always hardened, regardless of the setting of this attribute.

The following values are possible:

**QABH**
Backout count remembered.

Hardening is used to ensure that the backout count for messages on this queue is accurate.

**QABNH**
Backout count might not be remembered.

Hardening is not used to ensure that the backout count for messages on this queue is accurate. The count might therefore be lower than it should be.

To determine the value of this attribute, use the IAHGB selector with the MQINQ call.

### *InhibitGet (10-digit signed integer)*

Controls whether get operations for this queue are allowed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | | |

If the queue is an alias queue, get operations must be allowed for both the alias and the base queue at the time of the get operation, in order for the MQGET call to succeed. The value is one of the following:

**QAGETI**
Get operations are inhibited.

MQGET calls fail with reason code RC2016. This includes MQGET calls that specify GMBRWF or GMBRWN.

**Note:** If an MQGET call operating within a unit of work completes successfully, changing the value of the *InhibitGet* attribute after to QAGETI does not prevent the unit of work being committed.

**QAGETA**
Get operations are allowed.

To determine the value of this attribute, use the IAIGET selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *InhibitPut (10-digit signed integer)*
Controls whether put operations for this queue are allowed.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | ✓ | ✓ |

If there is more than one definition in the queue-name resolution path, put operations must be allowed for *every* definition in the path (including any queue manager alias definitions) at the time of the put operation, in order for the MQPUT or MQPUT1 call to succeed. This can have one of the following values:

**QAPUTI**
Put operations are inhibited.

MQPUT and MQPUT1 calls fail with reason code RC2051.

**Note:** If an MQPUT call operating within a unit of work completes successfully, changing the value of the *InhibitPut* attribute later to QAPUTI does not prevent the unit of work being committed.

**QAPUTA**
Put operations are allowed.

To determine the value of this attribute, use the IAIPUT selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *InitiationQName (48-byte character string)*
Name of initiation queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the name of a queue defined on the local queue manager; the queue must be of type QTLOC. The queue manager sends a trigger message to the initiation queue when application startup is required as a result of a message arriving on the queue to which this attribute belongs. The initiation queue must be monitored by a trigger monitor application which will start the appropriate application after receipt of the trigger message.

To determine the value of this attribute, use the CAINIQ selector with the MQINQ call. The length of this attribute is given by LNQN.

### *MaxMsgLength (10-digit signed integer)*
Maximum message length in bytes.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is an upper limit for the length of the longest *physical* message that can be placed on the queue. However, because the *MaxMsgLength* queue attribute can be set independently of the *MaxMsgLength* queue manager attribute, the actual upper limit for the length of the longest physical message that can be placed on the queue is the lesser of those two values.

If the queue manager supports segmentation, it is possible for an application to put a *logical* message that is longer than the lesser of the two *MaxMsgLength* attributes, but only if the application specifies the MFSEGA flag in MQMD. If that flag is specified, the upper limit for the length of a logical message is 999 999 999 bytes, but typically, resource constraints imposed by the operating system or by the environment in which the application is running, results in a lower limit.

An attempt to place on the queue a message that is too long fails with reason code:

- RC2030 if the message to too large for the queue
- RC2031 if the message to too large for the queue manager, but not too large for the queue

The lower limit for the *MaxMsgLength* attribute is zero. The upper limit is determined by the environment:

- On IBM i, the maximum message length is 100 MB (104 857 600 bytes).

For more information, see the *BUFLEN* parameter described in "MQPUT - Put message" on page 1300.

To determine the value of this attribute, use the IAMLEN selector with the MQINQ call.

### *MaxQDepth (10-digit signed integer)*

Maximum queue depth.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the defined upper limit for the number of physical messages that can exist on the queue at any one time. An attempt to put a message on a queue that already contains *MaxQDepth* messages, fails with reason code RC2053.

Unit-of-work processing and the segmentation of messages can both cause the actual number of physical messages on the queue to exceed *MaxQDepth*. However, this does not affect the retrievability of the messages - *all* messages on the queue can be retrieved using the MQGET call in the normal way.

The value of this attribute is zero or greater. The upper limit is determined by the environment.

**Note:** It is possible for the storage space available to the queue to be exhausted even if there are fewer than *MaxQDepth* messages on the queue.

To determine the value of this attribute, use the IAMDEP selector with the MQINQ call.

### *MediaLog (10-digit signed integer)*

Identity of the log extent (or journal receiver on IBM i ) needed for media recovery of a particular queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

On queue managers where circular logging is in use, the value is returned as a null string.

### *MsgDeliverySequence (10-digit signed integer)*

Message delivery sequence.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This determines the order in which messages are returned to the application by the MQGET call:

**MSFIFO**
Messages are returned in FIFO order (first in, first out).

This means that an MQGET call will return the *first* message that satisfies the selection criteria specified on the call, regardless of the priority of the message.

**MSPRIO**
Messages are returned in priority order.

This means that an MQGET call will return the *highest-priority* message that satisfies the selection criteria specified on the call. Within each priority level, messages are returned in FIFO order (first in, first out).

If the relevant attributes are changed while there are messages on the queue, the delivery sequence is as follows:

- The order in which messages are returned by the MQGET call is determined by the values of the *MsgDeliverySequence* and *DefPriority* attributes in force for the queue at the time the message arrives on the queue:
  - If *MsgDeliverySequence* is MSFIFO when the message arrives, the message is placed on the queue as though its priority were *DefPriority*. This does not affect the value of the *MDPRI* field in the message descriptor of the message; that field retains the value it had when the message was first put.
  - If *MsgDeliverySequence* is MSPRIO when the message arrives, the message is placed on the queue at the place appropriate to the priority given by the *MDPRI* field in the message descriptor.

  If the value of the *MsgDeliverySequence* attribute is changed while there are messages on the queue, the order of the messages on the queue is not changed.

  If the value of the *DefPriority* attribute is changed while there are messages on the queue, the messages will not necessarily be delivered in FIFO order, even though the *MsgDeliverySequence* attribute is set to MSFIFO; those that were placed on the queue at the higher priority are delivered first.

To determine the value of this attribute, use the IAMDS selector with the MQINQ call.

### *OpenInputCount (10-digit signed integer)*

Number of opens for input.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | | | |

This is the number of handles that are currently valid for removing messages from the queue with the MQGET call. It is the total number of such handles known to the *local* queue manager. If the queue is a shared queue, the count does not include opens for input that were performed for the queue at other queue managers in the queue-sharing group to which the local queue manager belongs.

The count includes handles where an alias queue which resolves to this queue was opened for input. The count does not include handles where the queue was opened for actions which did not include input (for example, a queue opened only for browse).

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the IAOIC selector with the MQINQ call.

### *OpenOutputCount (10-digit signed integer)*

Number of opens for output.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | | | |

This is the number of handles that are currently valid for adding messages to the queue with the MQPUT call. It is the total number of such handles known to the *local* queue manager; it does not include opens for output that were performed for this queue at remote queue managers. If the queue is a shared queue, the count does not include opens for output that were performed for the queue at other queue managers in the queue-sharing group to which the local queue manager belongs.

The count includes handles where an alias queue which resolves to this queue was opened for output. The count does not include handles where the queue was opened for actions which did not include output (for example, a queue opened only for inquire).

The value of this attribute fluctuates as the queue manager operates.

To determine the value of this attribute, use the IAOOC selector with the MQINQ call.

### *ProcessName (48-byte character string)*

Process name.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the name of a process object that is defined on the local queue manager. The process object identifies a program that can service the queue.

To determine the value of this attribute, use the CAPRON selector with the MQINQ call. The length of this attribute is given by LNPRON.

### *QDepthHighEvent (10-digit signed integer)*

Controls whether Queue Depth High events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

A Queue Depth High event indicates that an application has put a message on a queue, which has caused the number of messages on the queue to become greater than or equal to the queue depth high threshold (see the *QDepthHighLimit* attribute).

**Note:** The value of this attribute can change dynamically.

QDepthHighEvent can have one of two values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAQDHE selector with the MQINQ call.

### *QDepthHighLimit (10-digit signed integer)*
High limit for queue depth.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the threshold against which the queue depth is compared to generate a Queue Depth High event. This event indicates that an application has put a message on a queue, and this has caused the number of messages on the queue to become greater than or equal to the queue depth high threshold. See the *QDepthHighEvent* attribute.

The value is expressed as a percentage of the maximum queue depth (*MaxQDepth* attribute), and is in the range zero through 100. The default value is 80.

To determine the value of this attribute, use the IAQDHL selector with the MQINQ call.

### *QDepthLowEvent (10-digit signed integer)*
Controls whether Queue Depth Low events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

A Queue Depth Low event indicates that an application has retrieved a message from a queue, which has caused the number of messages on the queue to become less than or equal to the queue depth low threshold (see the *QDepthLowLimit* attribute).

**Note:** The value of this attribute can change dynamically.

QDepthLowEvent can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAQDLE selector with the MQINQ call.

### *QDepthLowLimit (10-digit signed integer)*
Low limit for queue depth.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the threshold against which the queue depth is compared to generate a Queue Depth Low event. This event indicates that an application has retrieved a message from a queue, and this has caused the number of messages on the queue to become less than or equal to the queue depth low threshold. See the *QDepthLowEvent* attribute.

The value is expressed as a percentage of the maximum queue depth (*MaxQDepth* attribute), and is in the range zero through 100. The default value is 20.

To determine the value of this attribute, use the IAQDLL selector with the MQINQ call.

### *QDepthMaxEvent (10-digit signed integer)*

Controls whether Queue Full events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

A Queue Full event indicates that a put to a queue has been rejected because the queue is full, that is, the queue depth has already reached its maximum value.

**Note:** The value of this attribute can change dynamically.

This can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAQDME selector with the MQINQ call.

### *QDesc (64-byte character string)*

Queue description.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | ✓ | ✓ | ✓ |

This is a field that can be used for descriptive commentary. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contains only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the CAQD selector with the MQINQ call. The length of this attribute is given by LNQD.

### *QName (48-byte character string)*

Queue name.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | ✓ |

This is the name of a queue defined on the local queue manager. For more information about queue names, see Rules for naming IBM MQ objects. All queues defined on a queue manager share the same queue namespace. Therefore, a QTLOC queue and a QTALS queue cannot have the same name.

To determine the value of this attribute, use the CAQN selector with the MQINQ call. The length of this attribute is given by LNQN.

### *QServiceInterval (10-digit signed integer)*

Target for queue service interval.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the service interval used for comparison to generate Service Interval High and Service Interval OK events. See the *QServiceIntervalEvent* attribute.

The value is in units of milliseconds, and is in the range zero through 999 999 999.

To determine the value of this attribute, use the IAQSI selector with the MQINQ call.

### *QServiceIntervalEvent (10-digit signed integer)*

Controls whether Service Interval High or Service Interval OK events are generated.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

- A Service Interval High event is generated when a check indicates that no messages have been retrieved from the queue for at least the time indicated by the *QServiceInterval* attribute.
- A Service Interval OK event is generated when a check indicates that messages have been retrieved from the queue within the time indicated by the *QServiceInterval* attribute.

**Note:** The value of this attribute can change dynamically.

This attribute can have one of the following values:

**QSIEHI**
Queue Service Interval High events enabled.

- Queue Service Interval High events are **enabled** and
- Queue Service Interval OK events are **disabled**.

**QSIEOK**
Queue Service Interval OK events enabled.

- Queue Service Interval High events are **disabled** and
- Queue Service Interval OK events are **enabled**.

**QSIENO**
No queue service interval events enabled.

- Queue Service Interval High events are **disabled** and
- Queue Service Interval OK events are also **disabled**.

For shared queues, the value of this attribute is ignored; the value QSIENO is assumed.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAQSIE selector with the MQINQ call.

### *QSGDisp (10-digit signed integer)*

Queue-sharing group disposition.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

This specifies the disposition of the queue. The value is one of the following:

**QSGDQM**
Queue manager disposition.

The object has queue manager disposition. This means that the object definition is known only to the local queue manager; the definition is not known to other queue managers in the queue-sharing group.

It is possible for each queue manager in the queue-sharing group to have an object with the same name and type as the current object, but these are separate objects and there is no correlation between them. Their attributes are not constrained to be the same as each other.

**QSGDCP**
Copied-object disposition.

The object is a local copy of a master object definition that exists in the shared repository. Each queue manager in the queue-sharing group can have its own copy of the object. Initially, all copies have the same attributes, but by using MQSC commands each copy can be altered so that its attributes differ from those of the other copies. The attributes of the copies are resynchronized when the master definition in the shared repository is altered.

**QSGDSH**
Shared disposition.

The object has shared disposition. This means that there exists in the shared repository a single instance of the object that is known to all queue managers in the queue-sharing group. When a queue manager in the group accesses the object, it accesses the single shared instance of the object.

To determine the value of this attribute, use the IAQSGD selector with the MQINQ call.

This attribute is supported only on z/OS.

### *QType (10-digit signed integer)*

Queue type.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | ✓ |

This attribute has one of the following values:

**QTALS**
Alias queue definition.

**QTCLUS**
Cluster queue.

**QTLOC**
Local queue.

**QTREM**
Local definition of a remote queue.

To determine the value of this attribute, use the IAQTYP selector with the MQINQ call.

### *RemoteQMgrName (48-byte character string)*

Name of remote queue manager.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | ✓ | |

This is the name of the remote queue manager on which the queue *RemoteQName* is defined. If the *RemoteQName* queue has a *QSGDisp* value of QSGDCP or QSGDSH, *RemoteQMgrName* can be the name of the queue-sharing group that owns *RemoteQName*.

If an application opens the local definition of a remote queue, *RemoteQMgrName* must not be blank and must not be the name of the local queue manager. If *XmitQName* is blank, the local queue with same name as *RemoteQMgrName* is used as the transmission queue. If there is no queue with the name *RemoteQMgrName*, the queue identified by the *DefXmitQName* queue manager attribute is used.

If this definition is used for a queue manager alias, *RemoteQMgrName* is the name of the queue manager that is being aliased. It can be the name of the local queue manager. Otherwise, if *XmitQName* is blank when the open occurs, there must be a local queue with the same name as *RemoteQMgrName* ; this queue is used as the transmission queue.

If this definition is used for a reply-to alias, this name is the name of the queue manager which is to be the *MDRM*.

**Note:** No validation is performed on the value specified for this attribute when the queue definition is created or modified.

To determine the value of this attribute, use the CARQMN selector with the MQINQ call. The length of this attribute is given by LNQMN.

### *RemoteQName (48-byte character string)*

Name of remote queue.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | ✓ | |

This is the name of the queue as it is known on the remote queue manager *RemoteQMgrName*.

If an application opens the local definition of a remote queue, when the open occurs *RemoteQName* must not be blank.

If this definition is used for a queue manager alias definition, when the open occurs *RemoteQName* must be blank.

If the definition is used for a reply-to alias, this name is the name of the queue that is to be the *MDRQ*.

**Note:** No validation is performed on the value specified for this attribute when the queue definition is created or modified.

To determine the value of this attribute, use the CARQN selector with the MQINQ call. The length of this attribute is given by LNQN.

### *RetentionInterval (10-digit signed integer)*

Retention interval.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the time which the queue should be retained. After this time has elapsed, the queue is eligible for deletion.

The time is measured in hours, counting from the date and time when the queue was created. The creation date of the queue is recorded in the *CreationDate* and the create time of the queue is recorded in the *CreationTime* attribute.

This information is provided to enable a housekeeping application or the operator to identify and delete queues that are no longer required.

**Note:** The queue manager never tries to delete queues based on this attribute, or to prevent the deletion of queues with a retention interval that has not expired; it is the user's responsibility to cause any required action to be taken.

A realistic retention interval should be used to prevent the accumulation of permanent dynamic queues (see *DefinitionType*). However, this attribute can also be used with predefined queues.

To determine the value of this attribute, use the IARINT selector with the MQINQ call.

### *Scope (10-digit signed integer)*

Controls whether an entry for this queue also exists in a cell directory.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | | ✓ | ✓ | |

A cell directory is provided by an installable Name service. This can have one of the following values:

**SCOQM**
Queue-manager scope.

The queue definition has queue manager scope. This means that the definition of the queue does not extend beyond the queue manager which owns it. To open the queue for output from some other queue manager, either the name of the owning queue manager must be specified, or the other queue manager must have a local definition of the queue.

**SCOCEL**
Cell scope.

The queue definition has cell scope. This means that the queue definition is also placed in a cell directory available to all of the queue managers in the cell. The queue can be opened for output from any of the queue managers in the cell merely by specifying the name of the queue; the name of the queue manager which owns the queue need not be specified. However, the queue definition is not available to any queue manager in the cell which also has a local definition of a queue with that name, as the local definition takes precedence.

A cell directory is provided by an installable name service such as LDAP (Lightweight Directory Access Protocol. Note that IBM MQ no longer supports the DCE (Distributed Computing Environment) name service that was formerly used for inserting queue definitions into a DCE directory (also no longer supported).

Model and dynamic queues cannot have cell scope.

This value is only valid if a name service supporting a cell directory has been configured.

To determine the value of this attribute, use the IASCOP selector with the MQINQ call.

Support for this attribute is subject to the following restrictions:

- On IBM i, the attribute is supported, but only SCOQM is valid.

### *Shareability (10-digit signed integer)*
Whether queue can be shared for input.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This indicates whether the queue can be opened for input multiple times concurrently. This can have one of the following values:

**QASHR**
Queue is shareable.

Multiple opens with the OOINPS option are allowed.

**QANSHR**
Queue is not shareable.

An MQOPEN call with the OOINPS option is treated as OOINPX.

To determine the value of this attribute, use the IASHAR selector with the MQINQ call.

### *TriggerControl (10-digit signed integer)*
Trigger control.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This controls whether trigger messages are written to an initiation queue, in order to cause an application to be started to service the queue. This is one of the following:

**TCOFF**
Trigger messages not required.

No trigger messages are to be written for this queue. The value of *TriggerType* is irrelevant in this case.

**TCON**
Trigger messages required.

Trigger messages are to be written for this queue, when the appropriate trigger events occur.

To determine the value of this attribute, use the IATRGC selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerData (64-byte character string)*
Trigger data.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is free-format data that the queue manager inserts into the trigger message when a message arriving on this queue causes a trigger message to be written to the initiation queue.

The content of this data is of no significance to the queue manager. It is meaningful either to the trigger-monitor application which processes the initiation queue, or to the application which is started by the trigger monitor.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the CATRGD selector with the MQINQ call. To change the value of this attribute, use the MQSET call. The length of this attribute is given by LNTRGD.

### *TriggerDepth (10-digit signed integer)*

Trigger depth.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the number of messages of priority *TriggerMsgPriority* or greater that must be on the queue before a trigger message is written. This applies when *TriggerType* is set to TTDPTH. The value of *TriggerDepth* is one or greater. This attribute is not used otherwise.

To determine the value of this attribute, use the IATRGD selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerMsgPriority (10-digit signed integer)*

Threshold message priority for triggers.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This is the message priority below which messages do not contribute to the generation of trigger messages (that is, the queue manager ignores these messages when determining whether a trigger message should be generated). *TriggerMsgPriority* can be in the range zero (lowest) through *MaxPriority* (highest; see "Attributes for the queue manager" on page 1366 ); a value of zero causes all messages to contribute to the generation of trigger messages.

To determine the value of this attribute, use the IATRGP selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *TriggerType (10-digit signed integer)*

Trigger type.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This controls the conditions under which trigger messages are written as a result of messages arriving on this queue. The value is one of the following:

**TTNONE**
No trigger messages.

No trigger messages are written as a result of messages on this queue. This has the same effect as setting *TriggerControl* to TCOFF.

**TTFRST**
Trigger message when queue depth goes from 0 to 1.

A trigger message is written whenever the number of messages of priority *TriggerMsgPriority* or greater on the queue changes from 0 to 1.

**TTEVRY**
Trigger message for every message.

A trigger message is written whenever a message of priority *TriggerMsgPriority* or greater arrives on the queue.

**TTDPTH**
Trigger message when depth threshold exceeded.

A trigger message is written whenever the number of messages of priority *TriggerMsgPriority* or greater on the queue equals or exceeds *TriggerDepth*. After the trigger message has been written, *TriggerControl* is set to TCOFF to prevent further triggering until it is explicitly turned on again.

To determine the value of this attribute, use the IATRGT selector with the MQINQ call. To change the value of this attribute, use the MQSET call.

### *Usage (10-digit signed integer)*
Queue usage.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| ✓ | ✓ | | | |

This indicates what the queue is used for. The value is one of the following:

**USNORM**
Normal usage.

This is a queue that normal applications use when putting and getting messages; the queue is not a transmission queue.

**USTRAN**
Transmission queue.

This is a queue used to hold messages destined for remote queue managers. When a normal application sends a message to a remote queue, the local queue manager stores the message temporarily on the appropriate transmission queue in a special format. A message channel agent then reads the message from the transmission queue, and transports the message to the remote queue manager. For more information about transmission queues, see Transmission queues.

Only privileged applications can open a transmission queue for OOOUT to put messages on it directly. Only utility applications would normally be expected to do this. Care must be taken that the message data format is correct (see “MQXQH - Transmission-queue header” on page 1211 ), otherwise errors might occur during the transmission process. Context is not passed or set unless one of the PM* context options is specified.

To determine the value of this attribute, use the IAUSAG selector with the MQINQ call.

### *XmitQName (48-byte character string)*
Transmission queue name.

| Local | Model | Alias | Remote | Cluster |
|---|---|---|---|---|
| | | | ✓ | |

If this attribute is nonblank when an open occurs, either for a remote queue or for a queue manager alias definition, it specifies the name of the local transmission queue to be used for forwarding the message.

If *XmitQName* is blank, the local queue with the same name as *RemoteQMgrName* is used as the transmission queue. If there is no queue with the name *RemoteQMgrName*, the queue identified by the *DefXmitQName* queue manager attribute is used.

This attribute is ignored if the definition is being used as a queue manager alias and *RemoteQMgrName* is the name of the local queue manager. It is also ignored if the definition is used as a reply-to queue alias definition.

To determine the value of this attribute, use the CAXQN selector with the MQINQ call. The length of this attribute is given by LNQN.

## Attributes for namelists

This topic summarizes the attributes that are specific to namelists. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown are the names used with the MQINQ and MQSET calls.

### Attribute descriptions

A namelist object has the following attributes:

**AlterationDate (12-byte character string)**

Date when definition was last changed.

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the CAALTD selector with the MQINQ call. The length of this attribute is given by LNDATE.

**AlterationTime (8-byte character string)**

Time when definition was last changed.

This is the time when the definition was last changed. The format of the time is HH.MM.SS.

To determine the value of this attribute, use the CAALTT selector with the MQINQ call. The length of this attribute is given by LNTIME.

**NameCount (10-digit signed integer)**

Number of names in namelist.

This is greater than or equal to zero. The following value is defined:

**NCMXNL**
Maximum number of names in a namelist.

To determine the value of this attribute, use the IANAMC selector with the MQINQ call.

**NamelistDesc (64-byte character string)**

Namelist description.

This is a field that might be used for descriptive commentary; its value is established by the definition process. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contains only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, this field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the CALSTD selector with the MQINQ call.

The length of this attribute is given by LNNLD.

**NamelistName (48-byte character string)**

Namelist name.

This is the name of a namelist that is defined on the local queue manager.

Each namelist has a name that is different from the names of other namelists belonging to the queue manager, but might duplicate the names of other queue manager objects of different types (for example, queues).

To determine the value of this attribute, use the CALSTN selector with the MQINQ call.

The length of this attribute is given by LNNLN.

**Names (48-byte character string x NameCount)**

A list of *NameCount* names.

Each name is the name of an object that is defined to the local queue manager. For more information about object names, see Naming IBM MQ objects.

To determine the value of this attribute, use the CANAMS selector with the MQINQ call.

The length of each name in the list is given by LNOBJN.

## Attributes for process definitions

This topic summarizes the attributes that are specific to process definitions. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown are the names used with the MQINQ and MQSET calls. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see MQSC commands for details.

### Attribute descriptions

A process-definition object has the following attributes:

**AlterationDate (12-byte character string)**

Date when definition was last changed.

This is the date when the definition was last changed. The format of the date is YYYY-MM-DD, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the CAALTD selector with the MQINQ call. The length of this attribute is given by LNDATE.

**AlterationTime (8-byte character string)**

Time when definition was last changed.

This is the time when the definition was last changed. The format of the time is HH.MM.SS.

To determine the value of this attribute, use the CAALTT selector with the MQINQ call. The length of this attribute is given by LNTIME.

**ApplId (256-byte character string)**

Application identifier.

This is a character string that identifies the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

The meaning of *ApplId* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ requires *ApplId* to be the name of an executable program.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the CAAPPI selector with the MQINQ call. The length of this attribute is given by LNPROA.

**ApplType (10-digit signed integer)**

Application type.

This identifies the nature of the program to be started in response to the receipt of a trigger message. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

*ApplType* can have any value. You can use the following values for standard types; user-defined application types are restricted to values in the range ATUFST through ATULST:

**ATCICS**
CICS transaction.

**AT400**
IBM i application.

**ATUFST**
Lowest value for user-defined application type.

**ATULST**
Highest value for user-defined application type.

To determine the value of this attribute, use the IAAPPT selector with the MQINQ call.

**EnvData (128-byte character string)**

Environment data.

This is a character string that contains environment-related information pertaining to the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue; the information is sent to the initiation queue as part of the trigger message.

The meaning of *EnvData* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ appends *EnvData* to the parameter list passed to the started application. The parameter list consists of the MQTMC2 structure, followed by one blank, followed by *EnvData* with trailing blanks removed.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the CAENVD selector with the MQINQ call. The length of this attribute is given by LNPROE.

**ProcessDesc (64-byte character string)**

Process description.

This is a field that can be used for descriptive commentary. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

To determine the value of this attribute, use the CAPROD selector with the MQINQ call.

The length of this attribute is given by LNPROD.

**ProcessName (48-byte character string)**

Process name.

This is the name of a process definition that is defined on the local queue manager.

Each process definition has a name that is different from the names of other process definitions belonging to the queue manager. But the name of the process definition can be the same as the names of other queue manager objects of different types (for example, queues).

To determine the value of this attribute, use the CAPRON selector with the MQINQ call.

The length of this attribute is given by LNPRON.

**UserData (128-byte character string)**

User data.

This is a character string that contains user information pertaining to the application to be started. This information is for use by a trigger-monitor application that processes messages on the initiation queue, or the application which is started by the trigger monitor. The information is sent to the initiation queue as part of the trigger message.

The meaning of *UserData* is determined by the trigger-monitor application. The trigger monitor provided by IBM MQ passes *UserData* to the started application as part of the parameter list. The parameter list consists of the MQTMC2 structure (containing *UserData*), followed by one blank, followed by *EnvData* with trailing blanks removed.

The character string cannot contain any nulls. It is padded to the right with blanks if necessary.

To determine the value of this attribute, use the CAUSRD selector with the MQINQ call. The length of this attribute is given by LNPROU.

## Attributes for the queue manager

A summary of queue manager attributes.

Some queue manager attributes are fixed for particular implementations, while others can be changed by using the MQSC command `ALTER QMGR`. The attributes can also be displayed by using the command `DISPLAY QMGR`. Most queue manager attributes can be inquired by opening a special OTQM object, and using the MQINQ call with the handle returned.

The following table summarizes the attributes that are specific to the queue manager. The attributes are described in alphabetical order.

**Note:** The names of the attributes shown in this section are the names used with the MQINQ and MQSET calls. When MQSC commands are used to define, alter, or display attributes, alternative short names are used; see Script (MQSC) Commands for more information.

*Table 627. Attributes for the queue manager*

| Attribute | Description |
|---|---|
| AlterationDate | Date when definition was last changed |
| AlterationTime | Time when definition was last changed |
| AuthorityEvent | Controls whether authorization (Not Authorized) events are generated |
| BridgeEvent | Controls whether IMS bridge events are generated |
| ChannelAutoDef | Controls whether automatic channel definition is permitted |
| ChannelAutoDefEvent | Controls whether channel automatic-definition events are generated |
| ChannelAutoDefExit | Name of user exit for automatic channel definition |
| ChannelEvent | Controls whether channel events are generated |
| ClusterCacheType | Controls whether the cluster cache is fixed in size or dynamically sized |
| ClusterWorkloadData | User data for cluster workload exit |

| *Table 627. Attributes for the queue manager (continued)* | |
|---|---|
| **Attribute** | **Description** |
| ClusterWorkloadExit | Name of user exit for cluster workload management |
| ClusterWorkloadLength | Maximum length of message data passed to cluster workload exit |
| CodedCharSetId | Coded character set identifier |
| CommandEvent | Controls whether command event messages are queued |
| CommandInputQName | Command input queue name |
| CommandLevel | Command level |
| ConfigurationEvent | Configuration event |
| DeadLetterQName | Name of dead-letter queue |
| DefClusterXmitQueueType | Default cluster transmission queue type |
| DefXmitQName | Default transmission queue name |
| DistLists | Distribution list support |
| InhibitEvent | Controls whether inhibit (Inhibit Get and Inhibit Put) events are generated |
| LocalEvent | Controls whether local error events are generated |
| LoggerEvent | Controls whether recovery log events are generated |
| MaxHandles | Maximum number of handles |
| MaxMsgLength | Maximum message length in bytes |
| MaxPriority | Maximum priority |
| MaxUncommittedMsgs | Maximum number of uncommitted messages within a unit of work |
| PerformanceEvent | Controls whether performance-related events are generated |
| Platform | Platform on which the queue manager is running |
| PubSubMode | Whether the publish/subscribe engine and queued publish/subscribe interface are running |
| QMgrDesc | Queue manager description |
| QMgrIdentifier | Unique internally-generated identifier of queue manager |
| QMgrName | Queue manager name |
| RemoteEvent | Controls whether remote error events are generated |
| RepositoryName | Name of cluster for which this queue manager provides repository services |
| RepositoryNamelist | Name of namelist object containing names of clusters for which this queue manager provides repository services |
| SSLCRLNamelist | Name of namelist object containing names of authentication information objects (See Note 1) |
| SSLEvent | Controls whether SSL events are generated |
| SSLKeyRepository | Location of SSL key repository (See Note 1) |

| Table 627. Attributes for the queue manager (continued) | |
|---|---|
| **Attribute** | **Description** |
| SSLKeyResetCount | Determines the number of non-encrypted bytes sent and received within an SSL conversation before the encryption key is renegotiated |
| StartStopEvent | Controls whether start and stop events are generated |
| SyncPoint | Syncpoint availability |
| TraceRouteRecording | Controls the recording of trace route information for messages |
| TreeLifeTime | The lifetime, in seconds, of non-administrative topics |
| TriggerInterval | Trigger-message interval |

**Notes:**

1. This attribute cannot be inquired using the MQINQ call, and is not described in this section. For more information about this attribute, see Change Queue Manager.

### *AlterationDate (12-byte character string)*

Date when definition was last changed.

This is the date when the definition was last changed. The format of the date is `YYYY-MM-DD`, padded with two trailing blanks to make the length 12 bytes.

To determine the value of this attribute, use the CAALTD selector with the MQINQ call. The length of this attribute is given by LNDATE.

### *AlterationTime (8-byte character string)*

Time when definition was last changed.

This is the time when the definition was last changed. The format of the time is `HH.MM.`SS.

To determine the value of this attribute, use the CAALTT selector with the MQINQ call. The length of this attribute is given by LNTIME.

### *AuthorityEvent (10-digit signed integer)*

Controls whether authorization (Not Authorized) events are generated.

The AuthorityEvent attribute must be set to one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAAUTE selector with the MQINQ call.

### *BridgeEvent (character string)*

This attribute determines whether IMS bridge event messages are put onto the SYSTEM.ADMIN.CHANNEL.EVENT queue. It is only supported on z/OS.

### *ChannelAutoDef (10-digit signed integer)*

Controls whether automatic channel definition is permitted.

This attribute controls the automatic definition of channels of type CTRCVR and CTSVCN. Note that the automatic definition of CTCLSD channels is always enabled. This can have one of the following values:

**CHADDI**
Channel auto-definition disabled.

**CHADEN**
Channel auto-definition enabled.

To determine the value of this attribute, use the IACAD selector with the MQINQ call.

### *ChannelAutoDefEvent (10-digit signed integer)*
Controls whether channel automatic-definition events are generated.

This applies to channels of type CTRCVR, CTSVCN, and CTCLSD. This can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Monitoring and performance.

To determine the value of this attribute, use the IACADE selector with the MQINQ call.

### *ChannelAutoDefExit (20-byte character string)*
Name of user exit for automatic channel definition.

If this name is nonblank, and *ChannelAutoDef* has the value CHADEN, the exit is called each time that the queue manager is about to create a channel definition. This applies to channels of type CTRCVR, CTSVCN, and CTCLSD. The exit can then do one of the following:

- Allow the creation of the channel definition to proceed without change.
- Modify the attributes of the channel definition that is created.
- Suppress creation of the channel entirely.

To determine the value of this attribute, use the CACADX selector with the MQINQ call. The length of this attribute is given by LNEXN.

### *ChannelEvent (character string)*
Determines whether channel event messages are generated.

This attribute determines whether channel event messages are put onto the SYSTEM.ADMIN.CHANNEL.EVENT queue, and if so, what type of messages are queued (for example 'channel started', 'channel stopped', 'channel not activated'). Before the implementation of this attribute, the only way of preventing channel event messages from being queued was to delete the target queue.

This attribute also allows you to collect IMS bridge events only (because you can now switch off channel events, they do not get put onto the same queue). The same applies to SSL events which can also be collected without having to collect channel events as well.

This attribute also allows you to collect significant events only (for example when channels have errors, not when they start and stop normally).

The value for the ChannelEvent attribute can be one of the following:

- EVREXP (only the following channel events are generated: RC2279, RC2283, RC2284, RC2295, RC2296).
- EVRENA (all channel events are generated; that is, in addition to the events generated by EVREXP, the RC2282, and RC2283 events are also generated).
- EVRDIS (no channel events are generated; this is the queue manager initial default value).

To determine the value of this attribute, use the IACHNE selector with the MQINQ call.

### *ClusterCacheType (32-byte character string)*
Controls whether cluster cache is fixed size, or is dynamically sized.

This is a user-defined 32-byte character string that is passed to the cluster workload exit when it is called. If there is no data to pass to the exit, the string is blank.

To determine the value of this attribute, use the CACLWD selector with the MQINQ call.

### *ClusterWorkloadData (32-byte character string)*

User data for cluster workload exit.

This is a user-defined 32-byte character string that is passed to the cluster workload exit when it is called. If there is no data to pass to the exit, the string is blank.

To determine the value of this attribute, use the CACLWD selector with the MQINQ call.

### *ClusterWorkloadExit (20-byte character string)*

Name of user exit for cluster workload management.

If this name is not blank, the exit is called each time that a message is put to a cluster queue or moved from one cluster-sender queue to another. The exit can then either accept the queue instance selected by the queue manager as the destination for the message, or select another queue instance.

To determine the value of this attribute, use the CACLWX selector with the MQINQ call. The length of this attribute is given by LNEXN.

### *ClusterWorkloadLength (10-digit signed integer)*

Maximum length of message data passed to cluster workload exit.

This is the maximum length of message data that is passed to the cluster workload exit. The actual length of data passed to the exit is the minimum of the following:

- The length of the message.
- The queue manager's *MaxMsgLength* attribute.
- The *ClusterWorkloadLength* attribute.

To determine the value of this attribute, use the IACLWL selector with the MQINQ call.

### *CodedCharSetId (10-digit signed integer)*

Coded character set identifier.

This defines the character set used by the queue manager for all character string fields defined in the MQI such as the names of objects, and queue creation date and time. The character set must be one that has single-byte characters for the characters that are valid in object names. It does not apply to application data carried in the message. The value depends on the environment:

- On IBM i, the value is that which is set in the environment when the queue manager is first created.

To determine the value of this attribute, use the IACCSI selector with the MQINQ call.

### *CommandEvent (integer)*

Controls whether messages are put onto a local queue when commands are issued.

This controls whether messages are written to a new event queue, SYSTEM.ADMIN.COMMAND.EVENT, whenever commands are issued. This feature is useful for command tracking notification, and for problem diagnosis. To inquire about the CommandEvent queue manager attribute, use the new attribute selector iacev with one of the following values:

- EVRENA - command event messages are generated and put onto the queue for all successful commands.
- EVND - command event messages are generated and put onto the queue for all successful commands other than the DISPLAY (MQSC) command, and the Inquire (PCF) command.
- EVRDIS - command event messages are not generated or put onto the queue (this is the queue manager's initial default value).

To determine the value of this attribute, use the CMDEV selector with the MQINQ call.

### *CommandInputQName (48-byte character string)*

Command input queue name.

CommandInputQName is the name of the command input queue defined on the local queue manager. It is a queue to which users can send commands, if authorized to do so. The name of the queue depends on the environment:

- On IBM i, the name of the queue is SYSTEM.ADMIN.COMMAND.QUEUE, and only PCF commands can be sent to it. However, an MQSC command can be sent to this queue if the MQSC command is enclosed within a PCF command of type CMESC. For more information about the Escape command, see Escape.

To determine the value of this attribute, use the CACMDQ selector with the MQINQ call. The length of this attribute is given by LNQN.

### *CommandLevel (10-digit signed integer)*

Command Level. This indicates the level of system control commands supported by the queue manager.

The level is one of the following values:

**CML700**
Level 700 of system control commands.

This value is returned by the following applications:

- IBM MQ for IBM i Version 7 Release 0

**CML701**
Level 701 of system control commands.

This value is returned by the following applications:

- IBM MQ for IBM i Version 7 Release 0 Modification 1

**CML71**
Level 71 of system control commands.

This value is returned by the following applications:

- IBM MQ for IBM i Version 7 Release 1

**CML800**
Level 800 of system control commands.

This value is returned by the following applications:

- IBM MQ for IBM i
  - Version 8.0

The set of system control commands that corresponds to a particular value of the *CommandLevel* attribute varies according to the value of the *Platform* attribute; both must be used to decide which system control commands are supported.

To determine the value of this attribute, use the IACMDL selector with the MQINQ call.

### *ConfigurationEvent*

Controls whether configuration events are generated and sent to the SYSTEM.ADMIN.CONFIG.EVENT queue default object.

The ConfigurationEvent attribute can be one of the following values:

- EVRENA
- EVRDIS

If the ConfigurationEvent attribute is set to EVRENA, and certain commands are successfully issued by runmqsc or PCF, configuration events are generated and sent to the SYSTEM.ADMIN.CONFIG.EVENT queue. Events for the following commands are issued, even if an alter command does not change the object involved. The commands for which configuration events are generated and sent are:

- DEFINE/ALTER AUTHINFO
- DEFINE/ALTER CHANNEL
- DEFINE/ALTER NAMELIST
- DEFINE/ALTER PROCESS
- DEFINE/ALTER QLOCAL (unless it is a temporary dynamic queue)
- DEFINE/ALTER QMODEL/QALIAS/QREMOTE
- DELETE AUTHINFO
- DELETE CHANNEL
- DELETE NAMELIST
- DELETE PROCESS
- DELETE QLOCAL (unless it is a temporary dynamic queue)
- DELETE QMODEL/QALIAS/QREMOTE
- ALTER QMGR (unless the CONFIGEV attribute is disabled and is not changed to enabled)
- REFRESH QMGR
- An MQSET call, other than for a temporary dynamic queue.

Events are not generated (if enabled) in the following circumstances:

- The command or MQSET call fails.
- The queue manager cannot put the event message on the event queue. The command should still complete successfully.
- Temporary dynamic queues.
- Internal attribute changes done directly or implicitly (not by MQSET or command); this affects TRIGGER, CURDEPTH, IPPROCS, OPPROCS, QDPHIEV, QDPLOEV, QDPMAXEV, QSVCIEV.
- When the configuration event queue is changed, although it an event message will be generated for that change when a Refresh is requested.
- Clustering changes by the commands REFRESH/RESET CLUSTER and RESUME/SUSPEND QMGR.
- Creating or deleting a queue manager.

### *DeadLetterQName (48-byte character string)*

Name of dead-letter (undelivered-message) queue.

This is the name of a queue defined on the local queue manager. Messages are sent to this queue if they cannot be routed to their correct destination.

For example, messages are put on this queue when:

- A message arrives at a queue manager, destined for a queue that is not yet defined on that queue manager
- A message arrives at a queue manager, but the queue for which it is destined cannot receive it because, possibly:
  - The queue is full
  - Put requests are inhibited
  - The sending node does not have authority to put messages on the queue

Applications can also put messages on the dead-letter queue.

Report messages are treated in the same way as ordinary messages; if the report message cannot be delivered to its destination queue (typically the queue specified by the *MDRQ* field in the message descriptor of the original message), the report message is placed on the dead-letter (undelivered-message) queue.

**Note:** Messages that have passed their expiry time (see the *MDEXP* field described in "MQMD - Message descriptor" on page 1077 ) are **not** transferred to this queue when they are discarded. However, an expiration report message (ROEXP) is still generated and sent to the *MDRQ* queue, if requested by the sending application.

Messages are not put on the dead-letter (undelivered-message) queue when the application that issued the put request has been notified synchronously of the problem with the reason code returned by the MQPUT or MQPUT1 call (for example, a message put on a local queue for which put requests are inhibited).

Messages on the dead-letter (undelivered-message) queue sometimes have their application message data prefixed with an MQDLH structure. This structure contains extra information that indicates why the message was placed on the dead-letter (undelivered-message) queue. See "MQDLH - Dead-letter header" on page 1032 for more details of this structure.

This queue must be a local queue, with a *Usage* attribute of USNORM.

If a dead-letter (undelivered-message) queue is not supported by a queue manager, or one has not been defined, the name is all blanks. All IBM MQ queue managers support a dead-letter (undelivered-message) queue, but by default it is not defined.

If the dead-letter (undelivered-message) queue is not defined, or it is full, or unusable for some other reason, a message which would have been transferred to it by a message channel agent is retained instead on the transmission queue.

To determine the value of this attribute, use the CADLQ selector with the MQINQ call. The length of this attribute is given by LNQN.

### *DefClusterXmitQueueType (10-digit signed integer)*

The `DefClusterXmitQueueType` attribute controls which transmission queue is selected by default by cluster-sender channels to get messages from, to send the messages to cluster-receiver channels.

The values of **DefClusterXmitQueueType** are `MQCLXQ_SCTQ` or `MQCLXQ_CHANNEL`.

**MQCLXQ_SCTQ**

All cluster-sender channels send messages from `SYSTEM.CLUSTER.TRANSMIT.QUEUE`. The `correlID` of messages placed on the transmission queue identifies which cluster-sender channel the message is destined for.

`SCTQ` is set when a queue manager is defined. This behavior is implicit in versions of IBM WebSphere MQ, earlier than Version 7.5. In earlier versions, the queue manager attribute `DefClusterXmitQueueType` was not present.

**MQCLXQ_CHANNEL**

Each cluster-sender channel sends messages from a different transmission queue. Each transmission queue is created as a permanent dynamic queue from the model queue `SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE`.

If the queue manager attribute, `DefClusterXmitQueueType`, is set to `CHANNEL`, the default configuration is changed to cluster-sender channels being associated with individual cluster transmission queues. The transmission queues are permanent-dynamic queues created from the model queue `SYSTEM.CLUSTER.TRANSMIT.MODEL.QUEUE`. Each transmission queue is associated with one cluster-sender channel. As one cluster-sender channel services a cluster transmission queue, the transmission queue contains messages for only one queue manager in one cluster. You can configure clusters so that each queue manager in a cluster contains only one cluster queue. In this case, the message traffic from a queue manager to each cluster queue is transferred separately from messages to other queues.

To query the value, call `MQINQ`, or send an Inquire Queue Manager ( `MQCMD_INQUIRE_Q_MGR`) PCF command, setting the `MQIA_DEF_CLUSTER_XMIT_Q_TYPE` selector. To change the value, send a Change Queue Manager ( `MQCMD_CHANGE_Q_MGR`) PCF command, setting the `MQIA_DEF_CLUSTER_XMIT_Q_TYPE` selector.

**Related reference**

Change Queue Manager

Inquire Queue Manager

"MQINQ - Inquire about object attributes" on page 1272

The MQINQ call returns an array of integers and a set of character strings containing the attributes of an object.

### *DefXmitQName (48-byte character string)*

Default transmission queue name.

This is the name of the transmission queue that is used for the transmission of messages to remote queue managers, if there is no other indication of which transmission queue to use.

If there is no default transmission queue, the name is entirely blank. The initial value of this attribute is blank.

To determine the value of this attribute, use the CADXQN selector with the MQINQ call. The length of this attribute is given by LNQN.

### *DistLists (10-digit signed integer)*

Distribution list support.

This indicates whether the local queue manager supports distribution lists on the MQPUT and MQPUT1 calls. This can have one of the following values:

**DLSUPP**
Distribution lists supported.

**DLNSUP**
Distribution lists not supported.

To determine the value of this attribute, use the IADIST selector with the MQINQ call.

### *InhibitEvent (10-digit signed integer)*

Controls whether inhibit (Inhibit Get and Inhibit Put) events are generated.

This can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Monitoring and performance.

To determine the value of this attribute, use the IAINHE selector with the MQINQ call.

### *LocalEvent (10-digit signed integer)*

Controls whether local error events are generated.

The value is one of the following:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring

To determine the value of this attribute, use the IALCLE selector with the MQINQ call.

### *LoggerEvent (10-digit signed integer)*

Controls whether recovery logger events are generated.

This can have one of the following values:

**ENABLED**
Logger events are generated.

**DISABLED**
Logger events are not generated. This is the queue managers initial default value.

For more information about events, see Monitoring and performance.

### *MaxHandles (10-digit signed integer)*
Maximum number of handles.

This is the maximum number of open handles that any one task can use concurrently. Each successful MQOPEN call for a single queue (or for an object that is not a queue) uses one handle. That handle becomes available for reuse when the object is closed. However, when a distribution list is opened, each queue in the distribution list is allocated a separate handle, and so that MQOPEN call uses as many handles as there are queues in the distribution list. This must be taken into account when deciding on a suitable value for *MaxHandles*.

The MQPUT1 call performs an MQOPEN call as part of its processing; as a result, MQPUT1 uses as many handles as MQOPEN would, but the handles are used only for the duration of the MQPUT1 call itself.

The value is in the range 1 through 999 999 999. On IBM i, the default value is 256.

To determine the value of this attribute, use the IAMHND selector with the MQINQ call.

### *MaxMsgLength (10-digit signed integer)*
Maximum message length in bytes.

This is the length of the longest *physical* message that can be handled by the queue manager. However, because the *MaxMsgLength* queue manager attribute can be set independently of the *MaxMsgLength* queue attribute, the longest physical message that can be placed on a queue is the lesser of those two values.

If the queue manager supports segmentation, it is possible for an application to put a *logical* message that is longer than the lesser of the two *MaxMsgLength* attributes, but only if the application specifies the MFSEGA flag in MQMD. If that flag is specified, the upper limit for the length of a logical message is 999 999 999 bytes, but typically, resource constraints imposed by the operating system or by the environment in which the application is running, will result in a lower limit.

The lower limit for the *MaxMsgLength* attribute is 32 KB (32 768 bytes). On IBM i, the maximum message length is 100 MB (104 857 600 bytes).

To determine the value of this attribute, use the IAMLEN selector with the MQINQ call.

### *MaxPriority (10-digit signed integer)*
Maximum priority.

This is the maximum message priority supported by the queue manager. Priorities range from zero (lowest) to *MaxPriority* (highest).

To determine the value of this attribute, use the IAMPRI selector with the MQINQ call.

### *MaxUncommittedMsgs (10-digit signed integer)*
Maximum number of uncommitted messages within a unit of work.

This is the maximum number of uncommitted messages that can exist within a unit of work. The number of uncommitted messages is the sum of the following since the start of the current unit of work:

- Messages put by the application with the PMSYP option
- Messages retrieved by the application with the GMSYP option
- Trigger messages and COA report messages generated by the queue manager for messages put with the PMSYP option
- COD report messages generated by the queue manager for messages retrieved with the GMSYP option

The following are *not* counted as uncommitted messages:

- Messages put or retrieved by the application outside a unit of work
- Trigger messages or COA/COD report messages generated by the queue manager as a result of messages put or retrieved outside a unit of work
- Expiration report messages generated by the queue manager (even if the call causing the expiration report message specified GMSYP)
- Event messages generated by the queue manager (even if the call causing the event message specified PMSYP or GMSYP)

**Note:**

1. Exception report messages are generated by the Message Channel Agent (MCA), or by the application, and so are treated in the same way as ordinary messages put or retrieved by the application.
2. When a message or segment is put with the PMSYP option, the number of uncommitted messages is incremented by one regardless of how many physical messages actually result from the put. (More than one physical message might result if the queue manager needs to subdivide the message or segment.)
3. When a distribution list is put with the PMSYP option, the number of uncommitted messages is incremented by one *for each physical message that is generated*. This can be as small as one, or as great as the number of destinations in the distribution list.

The lower limit for this attribute is 1; the upper limit is 999 999 999.

To determine the value of this attribute, use the IAMUNC selector with the MQINQ call.

### *PerformanceEvent (10-digit signed integer)*

Controls whether performance-related events are generated.

PerformanceEvent can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IAPFME selector with the MQINQ call.

### *Platform (10-digit signed integer)*

Platform on which the queue manager is running.

This indicates the operating system on which the queue manager is running. The value is:

**PL400**
IBM i.

### *PubSubMode (10-digit signed integer)*

Whether the publish/subscribe engine and the queued publish/subscribe interface are running, therefore allowing applications to publish/subscribe by using the application programming interface and the queues that are being monitored by the queued publish/subscribe interface.

This can have one of the following values:

**PSMCP**
The publish/subscribe engine is running. It is therefore possible to publish/subscribe by using the application programming interface. The queued publish/subscribe interface is not running, therefore any message that is put to the queues that are monitored by the queued publish/subscribe interface is not acted on. This setting is used for compatibility with WebSphere Message Broker V6 or earlier versions using this queue manager, because it must read the same queues from which the queued publish/subscribe interface normally reads.

**PSMDS**
The publish/subscribe engine and the queued publish/subscribe interface are not running. It is therefore not possible to publish/subscribe by using the application programming interface. Any publish/subscribe messages that are put to the queues that are monitored by the queued publish/subscribe interface are not acted on.

**PSMEN**
The publish/subscribe engine and the queued publish/subscribe interface are running. It is therefore possible to publish/subscribe by using the application programming interface and the queues that are being monitored by the queued publish/subscribe interface. This is the queue manager's initial default value.

To determine the value of this attribute, use the PSMODE selector with the MQINQ call.

### *QMgrDesc (64-byte character string)*
Queue manager description.

This is a field that can be used for descriptive commentary. The content of the field is of no significance to the queue manager, but the queue manager might require that the field contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, this field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the queue manager's character set (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

On IBM i, the default value is blanks.

To determine the value of this attribute, use the CAQMD selector with the MQINQ call. The length of this attribute is given by LNQMD.

### *QMgrIdentifier (48-byte character string)*
Unique internally-generated identifier of queue manager.

This is an internally-generated unique name for the queue manager.

To determine the value of this attribute, use the CAQMID selector with the MQINQ call. The length of this attribute is given by LNQMID.

### *QMgrName (48-byte character string)*
Queue manager name.

This is the name of the local queue manager, that is, the name of the queue manager to which the application is connected.

The first 12 characters of the name are used to construct a unique message identifier (see the *MDMID* field described in “MQMD - Message descriptor” on page 1077 ). Queue managers that can intercommunicate must therefore have names that differ in the first 12 characters, in order for message identifiers to be unique in the queue manager network.

To determine the value of this attribute, use the CAQMN selector with the MQINQ call. The length of this attribute is given by LNQMN.

### *RemoteEvent (10-digit signed integer)*
Controls whether remote error events are generated.

The value is one of the following:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IARMTE selector with the MQINQ call.

### *RepositoryName (48-byte character string)*

Name of cluster for which this queue manager provides repository services.

This is the name of a cluster for which this queue manager provides a repository-manager service. If the queue manager provides this service for more than one cluster, *RepositoryNamelist* specifies the name of a namelist object that identifies the clusters, and *RepositoryName* is blank. At least one of *RepositoryName* and *RepositoryNamelist* must be blank.

To determine the value of this attribute, use the CARPN selector with the MQINQ call. The length of this attribute is given by LNQMN.

### *RepositoryNamelist (48-byte character string)*

Name of namelist object containing names of clusters for which this queue manager provides repository services.

This is the name of a namelist object that contains the names of clusters for which this queue manager provides a repository-manager service. If the queue manager provides this service for only one cluster, the namelist object contains only one name. Alternatively, *RepositoryName* can be used to specify the name of the cluster, in which case *RepositoryNamelist* is blank. At least one of *RepositoryName* and *RepositoryNamelist* must be blank.

To determine the value of this attribute, use the CARPNL selector with the MQINQ call. The length of this attribute is given by LNNLN.

### *SSLEvent (character string)*

Determines whether SSL events are generated.

The value is one of the following:

- EVRENA (MQINQ/PCF/config event) ENABLED (MQSC): SSL events are generated (that is, the RC2371 event is generated).
- EVRDIS (MQINQ/PCF/config event) DISABLED (MQSC): SSL events are not generated. This is the queue manager's initial default value.

To determine the value of this attribute, use the IASSLE selector with the MQINQ call.

### *SSLKeyResetCount (integer)*

Determines the total number of non-encrypted bytes that are sent and received within an SSL conversation, before the secret key is renegotiated. The number of bytes includes control information sent by the message channel agent (MCA).

This value is only used by SSL channel MCAs which initiate communication from this queue manager (that is, the sender channel MCA in a sender and receiver channel pairing).

If the value of this attribute is greater than 0, and channel heartbeats are enabled for a channel, the secret key is also renegotiated before data is sent or received following a channel heartbeat. The count of bytes until the next secret key renegotiation is reset after each successful renegotiation occurs.

The value can be in the range 0 through 999 999 999. A value of 0 for this attribute indicates that the secret key is never renegotiated. If you specify an SSL/TLS secret key reset count in the range 1 byte through 32 KB, SSL/TLS channels will use a secret key reset count of 32 KB. This is to avoid the processing cost of excessive key resets which would occur for small SSL/TLS secret key reset values.

When the SSL server is an IBM MQ queue manager, and both secret key reset and channel heartbeats are enabled, renegotiation occurs immediately after each channel heartbeat.

To determine the value of this attribute, use the IASSRC selector with the MQINQ call.

### *StartStopEvent (10-digit signed integer)*

Controls whether start and stop events are generated.

This attribute can have one of the following values:

**EVRDIS**
Event reporting disabled.

**EVRENA**
Event reporting enabled.

For more information about events, see Event monitoring.

To determine the value of this attribute, use the IASSE selector with the MQINQ call.

### *SyncPoint (10-digit signed integer)*
Syncpoint availability.

This indicates whether the local queue manager supports units of work and syncpointing with the MQGET, MQPUT, and MQPUT1 calls.

**SPAVL**
Units of work and syncpointing available.

**SPNAVL**
Units of work and syncpointing not available.

To determine the value of this attribute, use the IASYNC selector with the MQINQ call.

### *TraceRouteRecording (10-digit signed integer)*
This controls whether information about messages is recorded as they flow through a queue manager.

The value is one of the following:

- RECDD: no appending to trace route messages is allowed
- RECDQ: messages are put onto a fixed named queue
- RECDM: determine using message (this is the initial default setting)

To prevent the trace route message from remaining in the system, set an expiry value on it that is greater than zero, and specify the RODISC report option. To prevent report or reply messages remaining in the system, set the report option ROPDAE. For more information, see “Report options and message flags” on page 1399.

To determine the value of this attribute, use the IATRGI selector with the MQINQ call.

### *TreeLifeTime (10-digit signed integer)*
The lifetime, in seconds, of non-administrative topics.

Non-administrative topics are those created when an application publishes to, or subscribes as, a topic string that does not exist as an administrative node. When this non-administrative node no longer has any active subscriptions, this parameter determines how long the queue manager will wait before removing that node. Only non-administrative topics that are in use by a durable subscription remain after the queue manager is recycled.

Specify a value in the range 0 through 604 000. A value of 0 means that non-administrative topics are not removed by the queue manager. The queue manager's initial default value is 1800.

To determine the value of this attribute, use the IATRLFT selector with the MQINQ call.

### *TriggerInterval (10-digit signed integer)*
Trigger-message interval.

This is a time interval (in milliseconds) used to restrict the number of trigger messages. This is relevant only when the *TriggerType* is TTFRST. In this case, trigger messages are normally generated only when a suitable message arrives on the queue, and the queue was previously empty. Under certain circumstances, however, an additional trigger message can be generated with TTFRST triggering even if the queue was not empty. These additional trigger messages are not generated more often than every *TriggerInterval* milliseconds.

For more information about triggering, see Triggering channels.

The value is in the range zero through 999 999 999. The default value is 999 999 999.

To determine the value of this attribute, use the IATRGI selector with the MQINQ call.

# Applications

This information describes the sample programs delivered with IBM MQ for IBM i for RPG. Also, learn how to build executable applications from the programs you write.

## Building your application

The IBM i publications describe how to build executable applications from the programs you write. This topic describes the additional tasks, and the changes to the standard tasks, you must perform when building IBM MQ for IBM i applications to run under IBM i.

In addition to coding the MQI calls in your source code, you must add the appropriate language statements to include the IBM MQ for IBM i copy files for the RPG language. You should make yourself familiar with the contents of these files; their names, and a brief description of their contents are given in the following text.

### *IBM MQ copy files*

IBM MQ for IBM i provides copy files to assist you with writing your applications in the RPG programming language. They are suitable for use with the WebSphere Development toolset (5722 WDS) ILE RPG 4 Compiler.

The copy files that IBM MQ for IBM i provides to assist with the writing of channel exits are described in Channel-exit programs for messaging channels.

The names of the IBM MQ for IBM i copy files for RPG have the prefix CMQ. They have a suffix of G or H. There are separate copy files containing the named constants, and one file for each of the structures. The copy files are listed in “Language considerations” on page 980.

**Note:** For ILE RPG/400, they are supplied as members of file QRPGLESRC in library QMQM.

The structure declarations do not contain DS statements. This allows the application to declare a data structure (or a multiple-occurrence data structure) by coding the DS statement and using the /COPY statement to copy in the remainder of the declaration:

For ILE RPG/400 the statement is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7
D* Declare an MQMD data structure
D MQMD       DS
D/COPY CMQMDG
```

### *Preparing your programs to run*

To create an executable IBM MQ for IBM i application, you have to compile the source code you have written.

To do this for ILE RPG/400, you can use the typical IBM i commands, CRTRPGMOD and CRTPGM.

After creating your *MODULE, you need to specify BNDSRVPGM(QMQM/LIBMQM) in the CRTPGM command. This includes the various IBM MQ procedures in your program.

Make sure that the library containing the copy files (QMQM) is in the library list when you perform the compilation.

For further information concerning programming considerations, including client modes, see “Language considerations” on page 980.

### *Interfaces to the IBM i external syncpoint manager*

IBM MQ for IBM i uses native IBM i commitment control as an external syncpoint coordinator.

See the *IBM i Programming: Backup and Recovery Guide* for more information about the commitment control capabilities of IBM i.

To start the IBM i commitment control facilities, use the STRCMTCTL system command. To end commitment control, use the ENDCMTCTL system command.

**Note:** The default value of *Commitment definition scope* is *ACTGRP. This must be defined as *JOB for IBM MQ for IBM i. For example:

```
STRCMTCTL LCKLVL(*ALL) CMTSCOPE(*JOB)
```

If you call MQPUT, MQPUT1, or MQGET, specifying PMSYP or GMSYP, after starting commitment control, IBM MQ for IBM i adds itself as an API commitment resource to the commitment definition. This is typically the first such call in a job. While there are any API commitment resources registered under a particular commitment definition, you cannot end commitment control for that definition.

IBM MQ for IBM i removes its registration as an API commitment resource when you disconnect from the queue manager, provided there are no pending MQI operations in the current unit of work.

If you disconnect from the queue manager while there are pending MQPUT, MQPUT1, or MQGET operations in the current unit of work, IBM MQ for IBM i remains registered as an API commitment resource so that it is notified of the next commit or rollback. When the next syncpoint is reached, IBM MQ commits or rolls back the changes as required. It is possible for an application to disconnect and reconnect to a queue manager during an active unit of work and perform further MQGET and MQPUT operations inside the same unit of work (this is a pending disconnect).

If you attempt to issue an ENDCMTCTL system command for that commitment definition, message CPF8355 is issued, indicating that pending changes were active. This message also appears in the job log when the job ends. To avoid this, ensure that you commit or roll back all pending IBM MQ operations, and that you disconnect from the queue manager. Thus, using COMMIT or ROLLBACK commands before ENDCMTCTL should enable end-commitment control to complete successfully.

When IBM i commitment control is used as an external syncpoint coordinator, MQCMIT, MQBACK, and MQBEGIN calls might not be issued. Calls to these functions fail with the reason code RC2012.

To commit or roll back (that is, to back out) your unit of work, use one of the programming languages that supports the commitment control. For example:

- CL commands: COMMIT and ROLLBACK
- ILE C Programming Functions: _Rcommit and _Rrollback
- RPG/400: COMMIT and ROLBK
- COBOL/400®: COMMIT and ROLLBACK

### *Syncpoints in CICS for IBM i applications*

IBM MQ for IBM i participates in units of work with CICS. You can use the MQI within a CICS application to put and get messages inside the current unit of work.

You can use the EXEC CICS SYNCPOINT command to establish a syncpoint that includes the IBM MQ for IBM i operations. To back out all changes up to the previous syncpoint, you can use the EXEC CICS SYNCPOINT ROLLBACK command.

If you use MQPUT, MQPUT1, or MQGET with the PMSYP, or GMSYP , option set in a CICS application, you cannot log off CICS until IBM MQ for IBM i has removed its registration as an API commitment resource. Therefore, you should commit or back out any pending put or get operations before you disconnect from the queue manager. This will allow you to log off CICS.

## Sample programs on IBM i

This topic describes the sample programs delivered with IBM MQ for IBM i for RPG. The samples demonstrate typical uses of the Message Queue Interface (MQI).

The samples are not intended to demonstrate general programming techniques, so some error checking that you may want to include in a production program has been omitted. However, these samples are suitable for use as a base for your own message queuing programs.

The source code for all the samples is provided with the product; this source includes comments that explain the message queuing techniques demonstrated in the programs.

There is one set of ILE sample programs:

1. **Programs using prototyped calls to the MQI (static bound calls)**

   The source exists in QMQMSAMP/QRPGLESRC. The members are named AMQ3xxx4, where xxx indicates the sample function. Copy members exist in QMQM/QRPGLESRC. Each member name has a suffix of G or H.

Table 628 on page 1382 gives a complete list of the sample programs delivered with IBM MQ for IBM i, and shows the names of the programs in each of the supported programming languages. Notice that their names all start with the prefix AMQ, the fourth character in the name indicates the programming language.

*Table 628. Names of the sample programs*

| | **RPG (ILE)** |
|---|---|
| Put samples | AMQ3PUT4 |
| Browse samples | AMQ3GBR4 |
| Get samples | AMQ3GET4 |
| Request samples | AMQ3REQ4 |
| Echo samples | AMQ3ECH4 |
| Inquire samples | AMQ3INQ4 |
| Set samples | AMQ3SET4 |
| Trigger Monitor sample | AMQ3TRG4 |
| Trigger Server sample | AMQ3SRV4 |

In addition to these, the IBM MQ for IBM i sample option includes a sample data file, AMQSDATA, which can be used as input to certain sample programs and sample CL programs that demonstrate administration tasks. The CL samples are described in Administering IBM i . You could use the sample CL program to create queues to use with the sample programs described in this topic.

For information about how to run the sample programs, see “Preparing and running the sample programs on IBM i” on page 1383.

### *Features demonstrated in the sample programs on IBM i*

A table that shows the techniques demonstrated by the IBM MQ for IBM i sample programs.

Some techniques occur in more than one sample program, but only one program is listed in the table. All the samples open and close queues using the MQOPEN and MQCLOSE calls, so these techniques are not listed separately in the table.

| *Table 629. Sample programs demonstrating use of the MQI* | |
|---|---|
| **Technique** | **RPG (ILE)** |
| Using the MQCONN and MQDISC calls | AMQ3ECH4 or AMQ3INQ4 |
| Implicitly connecting and disconnecting | AMQ3PUT4 |
| Putting messages using the MQPUT call | AMQ3PUT4 |
| Putting a single message using the MQPUT1 call | AMQ3ECH4 or AMQ3INQ4 |
| Replying to a request message | AMQ3INQ4 |
| Getting messages (no wait) | AMQ3GBR4 |
| Getting messages (wait with a time limit) | AMQ3GET4 |
| Getting messages (with data conversion) | AMQ3ECH4 |
| Browsing a queue | AMQ3GBR4 |
| Using a shared input queue | AMQ3INQ4 |
| Using an exclusive input queue | AMQ3REQ4 |
| Using the MQINQ call | AMQ3INQ4 |
| Using the MQSET call | AMQ3SET4 |
| Using a reply-to queue | AMQ3REQ4 |
| Requesting exception messages | AMQ3REQ4 |
| Accepting a truncated message | AMQ3GBR4 |
| Using a resolved queue name | AMQ3GBR4 |
| Trigger processing | AMQ3SRV4 or AMQ3TRG4 |

**Note:** All the sample programs produce a spool file that contains the results of the processing.

### *Preparing and running the sample programs on IBM i*

Before you can run the IBM MQ for IBM i sample programs, you must compile them as you would any other IBM MQ for IBM i applications. To do so, you can use the IBM i commands CRTRPGMOD and CRTPGM.

When you create the AMQ3xxx4 programs, you must specify BNDSRVPGM(QMQM/LIBMQM) in the CRTPGM command. Doing so includes the various IBM MQ procedures in your program.

The sample programs are provided in library QMQMSAMP as members of QRPGLESRC. They use the copy files provided in library QMQM, so make sure that this library is in the library list when you compile them. The RPG compiler gives information messages because the samples do not use many of the variables that are declared in the copy files.

## Running the sample programs

You can use your own queues when you run the samples, or you can compile and run AMQSAMP4 to create some sample queues. The source for this program is shipped in file QCLSRC in library QMQMSAMP. It can be compiled using the CRTCLPGM command.

To call one of the sample programs, use a command like:

```
CALL PGM(QMQMSAMP/AMQ3PUT4) PARM('Queue_Name','Queue_Manager_Name')
```

Where Queue_Name and Queue_Manager_Name must be 48 characters in length, which you achieve by padding the Queue_Name and Queue_Manager_Name with the required number of blanks.

For the Inquire and Set sample programs, the sample definitions created by AMQSAMP4 cause the C versions of these samples to be triggered. If you want to trigger the RPG versions, you must change the process definitions SYSTEM.SAMPLE.ECHOPROCESS and SYSTEM.SAMPLE.INQPROCESS and SYSTEM.SAMPLE.SETPROCESS. You can use the CHGMQMPRC command (described in Change MQ Process (CHGMQMPRC) ) to do so, or edit and run AMQSAMP4 with the alternative definition.

### *The Put sample program on IBM i*

The Put sample program, AMQ3PUT4, puts messages on a queue using the MQPUT call.

To start the program, call the program and give the name of your target queue as a program parameter. The program puts a set of fixed messages on the queue; these messages are taken from the data block at the end of the program source code. A sample put program is AMQ3PUT4 in library QMQMSAMP.

Using this example program, the command is:

```
CALL PGM(QMQMSAMP/AMQ3PUT4) PARM('Queue_Name','Queue_Manager_Name')
```

Where Queue_Name and Queue_Manager_Name *must* be 48 characters in length, which you achieve by padding the Queue_Name and Queue_Manager_Name with the required number of blanks.

## Design of the Put sample program

The program uses the MQOPEN call with the OOOUT option to open the target queue for putting messages. The results are output to a spool file. If it cannot open the queue, the program writes an error message containing the reason code returned by the MQOPEN call. To keep the program simple, on this and on subsequent MQI calls, the program uses default values for many of the options.

For each line of data contained in the source code, the program reads the text into a buffer and uses the MQPUT call to create a datagram message containing the text of that line. The program continues until either it reaches the end of the input or the MQPUT call fails. If the program reaches the end of the input, it closes the queue using the MQCLOSE call.

### *The Browse sample program on IBM i*

The Browse sample program, AMQ3GBR4, browses messages on a queue using the MQGET call.

The program retrieves copies of all the messages on the queue you specify when you call the program; the messages remain on the queue. You could use the supplied queue SYSTEM.SAMPLE.LOCAL; run the Put sample program first to put some messages on the queue. You could use the queue SYSTEM.SAMPLE.ALIAS, which is an alias name for the same local queue. The program continues until it reaches the end of the queue or an MQI call fails.

An example of a command to call the RPG program is:

```
CALL PGM(QMQMSAMP/AMQ3GBR4) PARM('Queue_Name','Queue_Manager_Name')
```

Where Queue_Name and Queue_Manager_Name *must* be 48 characters in length, which you achieve by padding the Queue_Name and Queue_Manager_Name with the required number of blanks. Therefore, if you are using SYSTEM.SAMPLE.LOCAL as your target queue, you will need 29 blank characters.

## Design of the Browse sample program

The program opens the target queue using the MQOPEN call with the OOBRW option. If it cannot open the queue, the program writes an error message to its spool file, containing the reason code returned by the MQOPEN call.

For each message on the queue, the program uses the MQGET call to copy the message from the queue, then displays the data contained in the message. The MQGET call uses these options:

**GMBRWN**
After the MQOPEN call, the browse cursor is positioned logically before the first message in the queue, so this option causes the *first* message to be returned when the call is first made.

**GMNWT**
The program does not wait if there are no messages on the queue.

**GMATM**
The MQGET call specifies a buffer of fixed size. If a message is longer than this buffer, the program displays the truncated message, together with a warning that the message has been truncated.

The program demonstrates how you must clear the *MDMID* and *MDCID* fields of the MQMD structure after each MQGET call because the call sets these fields to the values contained in the message it retrieves. Clearing these fields means that successive MQGET calls retrieve messages in the order in which the messages are held in the queue.

The program continues to the end of the queue; here, the MQGET call returns the RC2033 (no message available) reason code and the program displays a warning message. If the MQGET call fails, the program writes an error message that contains the reason code in its spool file.

The program then closes the queue using the MQCLOSE call.

### *The Get sample program on IBM i*

The Get sample program, AMQ3GET4, gets messages from a queue using the MQGET call.

When the program is called, it removes messages from the specified queue. You could use the supplied queue SYSTEM.SAMPLE.LOCAL; run the Put sample program first to put some messages on the queue. You could use the SYSTEM.SAMPLE.ALIAS queue, which is an alias name for the same local queue. The program continues until the queue is empty or an MQI call fails.

An example of a command to call the RPG program is:

```
CALL PGM(QMQMSAMP/AMQ3GET4) PARM('Queue_Name','Queue_Manager_Name')
```

where `Queue_Name` and `Queue_Manager_Name` *must* be 48 characters in length, which you achieve by padding the `Queue_Name` and `Queue_Manager_Name` with the required number of blanks. Therefore, if you are using SYSTEM.SAMPLE.LOCAL as your target queue, you will need 29 blank characters.

## Design of the Get sample program

The program opens the target queue for getting messages; it uses the MQOPEN call with the OOINPQ option. If it cannot open the queue, the program writes an error message containing the reason code returned by the MQOPEN call in its spool file.

For each message on the queue, the program uses the MQGET call to remove the message from the queue; it then displays the data contained in the message. The MQGET call uses the GMWT option, specifying a wait interval (*GMWI*) of 15 seconds, so that the program waits for this period if there is no message on the queue. If no message arrives before this interval expires, the call fails and returns the RC2033 (no message available) reason code.

The program demonstrates how you must clear the *MDMID* and *MDCID* fields of the MQMD structure after each MQGET call because the call sets these fields to the values contained in the message it retrieves. Clearing these fields means that successive MQGET calls retrieve messages in the order in which the messages are held in the queue.

The MQGET call specifies a buffer of fixed size. If a message is longer than this buffer, the call fails and the program stops.

The program continues until either the MQGET call returns the RC2033 (no message available) reason code or the MQGET call fails. If the call fails, the program displays an error message that contains the reason code.

The program then closes the queue using the MQCLOSE call.

### *The Request sample program on IBM i*

The Request sample program, AMQ3REQ4, demonstrates client/server processing. The sample is the client that puts request messages on a queue that is processed by a server program. It waits for the server program to put a reply message on a reply-to queue.

The Request sample puts a series of request messages on a queue using the MQPUT call. These messages specify SYSTEM.SAMPLE.REPLY as the reply-to queue. The program waits for reply messages, then displays them. Replies are sent only if the target queue (which we will call the *server queue* ) is being processed by a server application, or if an application is triggered for that purpose (the Inquire and Set sample programs are designed to be triggered). The sample waits 5 minutes for the first reply to arrive (to allow time for a server application to be triggered) and 15 seconds for subsequent replies, but it can end without getting any replies.

To start the program, call the program and give the name of your target queue as a program parameter. The program puts a set of fixed messages on the queue; these messages are taken from the data block at the end of the program source code.

## Design of the Request sample program

The program opens the server queue so that it can put messages. It uses the MQOPEN call with the OOOUT option. If it cannot open the queue, the program displays an error message containing the reason code returned by the MQOPEN call.

The program then opens the reply-to queue called SYSTEM.SAMPLE.REPLY so that it can get reply messages. For this, the program uses the MQOPEN call with the OOINPX option. If it cannot open the queue, the program displays an error message containing the reason code returned by the MQOPEN call.

For each line of input, the program then reads the text into a buffer and uses the MQPUT call to create a request message containing the text of that line. On this call the program uses the ROEXCD report option to request that any report messages sent about the request message will include the first 100 bytes of the message data. The program continues until either it reaches the end of the input or the MQPUT call fails.

The program then uses the MQGET call to remove reply messages from the queue, and displays the data contained in the replies. The MQGET call uses the GMWT option, specifying a wait interval (*GMWI*) of 5 minutes for the first reply (to allow time for a server application to be triggered) and 15 seconds for subsequent replies. The program waits for these periods if there is no message on the queue. If no message arrives before this interval expires, the call fails and returns the RC2033 (no message available) reason code. The call also uses the GMATM option, so messages longer than the declared buffer size are truncated.

The program demonstrates how you must clear the *MDMID* and *MDCOD* fields of the MQMD structure after each MQGET call because the call sets these fields to the values contained in the message it retrieves. Clearing these fields means that successive MQGET calls retrieve messages in the order in which the messages are held in the queue.

The program continues until either the MQGET call returns the RC2033 (no message available) reason code or the MQGET call fails. If the call fails, the program displays an error message that contains the reason code.

The program then closes both the server queue and the reply-to queue using the MQCLOSE call. Table 630 on page 1387 shows the changes to the Echo sample program that are necessary to run the Inquire and Set sample programs.

**Note:** The details for the Echo sample program are included as a reference.

| Table 630. Client/Server sample program details | | |
|---|---|---|
| **Program name** | **SYSTEM/SAMPLE queue** | **Program started** |
| Echo | ECHO | AMQ3ECH4 |
| Inquire | INQ | AMQ3INQ4 |
| Set | SET | AMQ3SET4 |

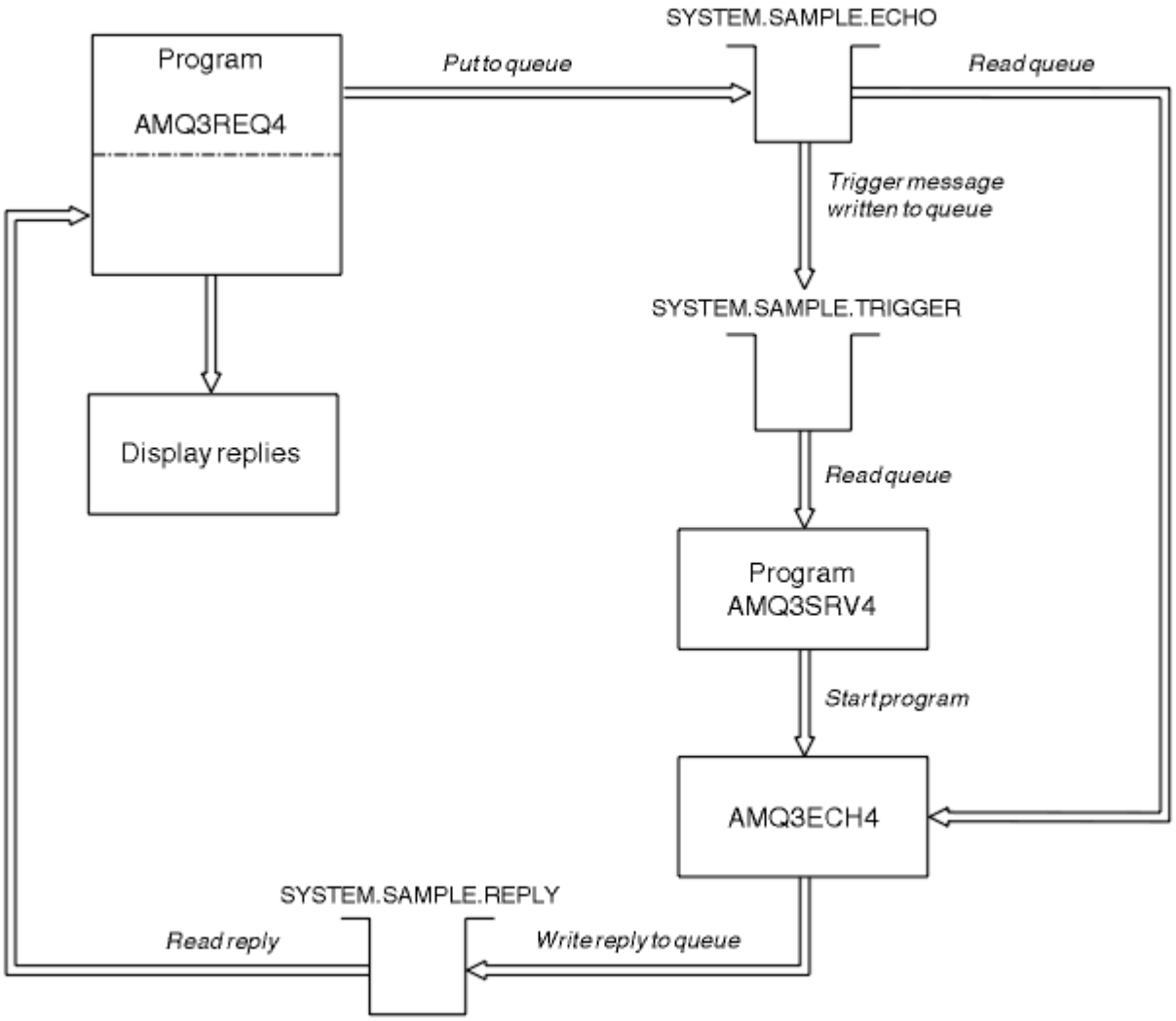


*Figure 9. Sample Client/Server (Echo) program flowchart*

*Using triggering with the Request sample*
To run the sample using triggering, start the trigger server program, AMQ3SRV4, against the required initiation queue in one job, then start AMQ3REQ4 in another job.

This means that the trigger server is ready when the Request sample program sends a message.

**Note:**

1. The samples use the SYSTEM SAMPLE TRIGGER queue as the initiation queue for SYSTEM.SAMPLE.ECHO, SYSTEM.SAMPLE.INQ, or SYSTEM.SAMPLE.SET local queues. Alternatively, you can define your own initiation queue.
2. The sample definitions created by AMQSAMP4 cause the C version of the sample to be triggered. If you want to trigger the RPG version, you must change the process definitions SYSTEM.SAMPLE.ECHOPROCESS and SYSTEM.SAMPLE.INQPROCESS and

SYSTEM.SAMPLE.SETPROCESS. You can use the CHGMQMPRC command (see Change MQ Process (CHGMQMPRC) for more details) to do this, or edit and run your own version of AMQSAMP4.

3. You must compile the trigger server program from the source provided in QMQMSAMP/QRPGLESRC.

Depending on the trigger process you want to run, AMQ3REQ4 should be called with the parameter specifying request messages to be placed on one of these sample server queues:

- SYSTEM.SAMPLE.ECHO (for the Echo sample programs)
- SYSTEM.SAMPLE.INQ (for the Inquire sample programs)
- SYSTEM.SAMPLE.SET (for the Set sample programs)

A flow chart for the SYSTEM.SAMPLE.ECHO program is shown in Figure 9 on page 1387. Using the example the command to issue the RPG program request to this server is:

```
CALL PGM(QMQMSAMP/AMQ3REQ4) PARM('SYSTEM.SAMPLE.ECHO
+ 30 blank characters','Queue_Manager_Name')
```

because the queue name and queue manager name *must* be 48 characters in length.

**Note:** This sample queue has a trigger type of FIRST, so if there are already messages on the queue before you run the Request sample, server applications are not triggered by the messages you send.

If you want to attempt further examples, you can try the following variations:

- Use AMQ3TRG4 instead of AMQ3SRV4 to submit the job instead, but potential job submission delays could make it less easy to follow what is happening.
- Use the SYSTEM.SAMPLE.INQ and SYSTEM.SAMPLE.SET sample queues. Using the example data file, the commands to issue the RPG program requests to these servers are:

  ```
  CALL PGM(QMQMSAMP/AMQ3INQ4) PARM('SYSTEM.SAMPLE.INQ
  + 31 blank characters')
  CALL PGM(QMQMSAMP/AMQ3SET4) PARM('SYSTEM.SAMPLE.SET
  + 31 blank characters')
  ```

  because the queue name *must* be 48 characters in length.

  These sample queues also have a trigger type of FIRST.

### *The Echo sample program on IBM i*

The Echo sample programs return the message send to a reply queue. The program is named AMQ3ECH4

For the triggering process to work, you must ensure that the Echo sample program you want to use is triggered by messages arriving on queue SYSTEM.SAMPLE.ECHO. To do this, specify the name of the Echo sample program you want to use in the *ApplId* field of the process definition SYSTEM.SAMPLE.ECHOPROCESS. (For this, you can use the CHGMQMPRC command, described in Administering IBM i .) The sample queue has a trigger type of FIRST, so if there are already messages on the queue before you run the Request sample, the Echo sample is not triggered by the messages you send.

When you have set the definition correctly, first start AMQ3SRV4 in one job, then start AMQ3REQ4 in another. You could use AMQ3TRG4 instead of AMQ3SRV4, but potential job submission delays could make it less easy to follow what is happening.

Use the Request sample programs to send messages to queue SYSTEM.SAMPLE.ECHO. The Echo sample programs send a reply message containing the data in the request message to the reply-to queue specified in the request message.

## Design of the Echo sample program

When the program is triggered, it explicitly connects to the default queue manager using the MQCONN call. Although this is not necessary for IBM MQ for IBM i, this means you could use the same program on other platforms without changing the source code.

The program then opens the queue named in the trigger message structure it was passed when it started. (For clarity, we will call this the *request queue*.) The program uses the MQOPEN call to open this queue for shared input.

The program uses the MQGET call to remove messages from this queue. This call uses the GMATM and GMWT options, with a wait interval of 5 seconds. The program tests the descriptor of each message to see if it is a request message; if it is not, the program discards the message and displays a warning message.

For each request message removed from the request queue, the program uses the MQPUT call to put a reply message on the reply-to queue. This message contains the contents of the request message.

When there are no messages remaining on the request queue, the program closes that queue and disconnects from the queue manager.

This program can also respond to messages sent to the queue from platforms other than IBM MQ for IBM i, although no sample is supplied for this situation. To make the ECHO program work, you:

- Write a program, correctly specifying the *Format*, *Encoding*, and *CCSID* fields, to send text request messages.

  The ECHO program requests the queue manager to perform message data conversion, if this is needed.
- Specify CONVERT(*YES) on the IBM MQ for IBM i sending channel, if the program you have written does not provide similar conversion for the reply.

### *The Inquire sample program on IBM i*

The Inquire sample program, AMQ3INQ4, inquires about some of the attributes of a queue using the MQINQ call.

The program is intended to run as a triggered program, so its only input is an MQTMC (trigger message) structure. This structure contains the name of a target queue with attributes that are to be inquired upon.

For the triggering process to work, you must ensure that the Inquire sample program is triggered by messages arriving on queue SYSTEM.SAMPLE.INQ. To do ao, specify the name of the Inquire sample program in the *ApplId* field of the SYSTEM.SAMPLE.INQPROCESS process definition. (For this, you can use the CHGMQMPRC command, described in Change MQ Process (CHGMQMPRC) ). The sample queue has a trigger type of FIRST, so if there are already messages on the queue before you run the Request sample, the Inquire sample is not triggered by the messages you send.

When you have set the definition correctly, first start AMQ3SRV4 in one job, then start AMQ3REQ4 in another. You could use AMQ3TRG4 instead of AMQ3SRV4, but potential job submission delays might make it less easy to follow what is happening.

Use the Request sample program to send request messages, each containing just a queue name, to queue SYSTEM.SAMPLE.INQ. For each request message, the Inquire sample program sends a reply message containing information about the queue specified in the request message. The replies are sent to the reply-to queue specified in the request message.

## Design of the Inquire sample program

When the program is triggered, it explicitly connects to the default queue manager using the MQCONN call. Although not necessary for IBM MQ for IBM i, this design feature means you could use the same program on other platforms without changing the source code.

The program then opens the queue named in the trigger message structure it was passed when it started. (For clarity, we will call this the *request queue*.) The program uses the MQOPEN call to open this queue for shared input.

The program uses the MQGET call to remove messages from this queue. This call uses the GMATM and GMWT options, with a wait interval of 5 seconds. The program tests the descriptor of each message to see if it is a request message; if it is not, the program discards the message, and displays a warning message.

For each request message removed from the request queue, the program reads the name of the queue (which we will call the *target queue* ) contained in the data and opens that queue using the MQOPEN call with the OOINQ option. The program then uses the MQINQ call to inquire about the values of the *InhibitGet*, *CurrentQDepth*, and *OpenInputCount* attributes of the target queue.

If the MQINQ call is successful, the program uses the MQPUT call to put a reply message on the reply-to queue. This message contains the values of the three attributes.

If the MQOPEN or MQINQ call is unsuccessful, the program uses the MQPUT call to put a *report* message on the reply-to queue. In the *MDFB* field of the message descriptor of this report message is the reason code returned by either the MQOPEN or MQINQ call, depending on which one failed.

After the MQINQ call, the program closes the target queue using the MQCLOSE call.

When there are no messages remaining on the request queue, the program closes that queue and disconnects from the queue manager.

### *The Set sample program on IBM i*

The Set sample program, AMQ3SET4, inhibits put operations on a queue by using the MQSET call to change the queue's *InhibitPut* attribute.

The program is intended to run as a triggered program, so its only input is an MQTMC (trigger message) structure that contains the name of a target queue with attributes that are to be inquired upon.

For the triggering process to work, you must ensure that the Set sample program is triggered by messages arriving on queue SYSTEM.SAMPLE.SET. To do this, specify the name of the Set sample program in the *ApplId* field of the process definition SYSTEM.SAMPLE.SETPROCESS. (For this, you can use the CHGMQMPRC command, described in the Administering IBM i .) The sample queue has a trigger type of FIRST, so if there are already messages on the queue before you run the Request sample, the Set sample is not triggered by the messages you send.

When you have set the definition correctly, first start AMQ3SRV4 in one job, then start AMQ3REQ4 in another. You could use AMQ3TRG4 instead of AMQ3SRV4, but potential job submission delays could make it less easy to follow what is happening.

Use the Request sample program to send request messages, each containing just a queue name, to queue SYSTEM.SAMPLE.SET. For each request message, the Set sample program sends a reply message containing a confirmation that put operations have been inhibited on the specified queue. The replies are sent to the reply-to queue specified in the request message.

## Design of the Set sample program

When the program is triggered, it explicitly connects to the default queue manager using the MQCONN call. Although this is not necessary for IBM MQ for IBM i, this means you could use the same program on other platforms without changing the source code.

The program then opens the queue named in the trigger message structure it was passed when it started. (For clarity, we will call this the *request queue*.) The program uses the MQOPEN call to open this queue for shared input.

The program uses the MQGET call to remove messages from this queue. This call uses the GMATM and GMWT options, with a wait interval of 5 seconds. The program tests the descriptor of each message to see if it is a request message; if it is not, the program discards the message and displays a warning message.

For each request message removed from the request queue, the program reads the name of the queue (which we will call the *target queue* ) contained in the data and opens that queue using the MQOPEN call with the OOSET option. The program then uses the MQSET call to set the value of the *InhibitPut* attribute of the target queue to QAPUTI.

If the MQSET call is successful, the program uses the MQPUT call to put a reply message on the reply-to queue. This message contains the string PUT `inhibited`.

If the MQOPEN or MQSET call is unsuccessful, the program uses the MQPUT call to put a *report* message on the reply-to queue. In the *MDFB* field of the message descriptor of this report message is the reason code returned by either the MQOPEN or MQSET call, depending on which one failed.

After the MQSET call, the program closes the target queue using the MQCLOSE call.

When there are no messages remaining on the request queue, the program closes that queue and disconnects from the queue manager.

### *The Triggering sample programs on IBM i*

IBM MQ for IBM i supplies two Triggering sample programs that are written in ILE/RPG.

The programs are:

**AMQ3TRG4**
: This is a trigger monitor for the IBM i environment. It submits an IBM i job for the application to be started, but this means that there is additional processing cost associated with each trigger message.

**AMQ3SRV4**
: This is a trigger server for the IBM i environment. For each trigger message, this server runs the start command in its own job to start the specified application. The trigger server can call CICS transactions.

C language versions of these samples are also available as executable programs in library QMQM, called AMQSTRG4 and AMQSERV4.

*The AMQ3TRG4 sample trigger monitor on IBM i*

AMQ3TRG4 is a trigger monitor. It takes one parameter: the name of the initiation queue it is to serve. AMQSAMP4 defines a sample initiation queue, SYSTEM.SAMPLE.TRIGGER, that you can use when you try the sample programs.

AMQ3TRG4 submits an IBM i job for each valid trigger message it gets from the initiation queue.

## Design of the trigger monitor

The trigger monitor opens the initiation queue and gets messages from the queue, specifying an unlimited wait interval.

The trigger monitor submits an IBM i job to start the application specified in the trigger message, and passes an MQTMC (a character version of the trigger message) structure. The environment data in the trigger message is used as job submission parameters.

Finally, the program closes the initiation queue.

*The AMQ3SRV4 sample trigger server*

AMQ3SRV4 is a trigger server. It takes one parameter: the name of the initiation queue it is to serve. AMQSAMP4 defines a sample initiation queue, SYSTEM.SAMPLE.TRIGGER, that you can use when you try the sample programs.

For each trigger message, AMQ3SRV4 runs a start command in its own job to start the specified application.

Using the example trigger queue the command to issue is:

```
CALL PGM(QMQM/AMQ3SRV4) PARM('Queue Name')
```

Where `Queue Name` *must* be 48 characters in length, which you achieve by padding the queue name with the required number of blanks. Therefore, if you are using SYSTEM.SAMPLE.TRIGGER as your target queue, you will need 28 blank characters.

### Design of the trigger server

The design of the trigger server is like that of the trigger monitor, except the trigger server:

- Allows CICS as well as IBM i applications
- Does not use the environment data from the trigger message
- Calls IBM i applications in its own job (or uses STRCICSUSR to start CICS applications) rather than submitting an IBM i job
- Opens the initiation queue for shared input, so many trigger servers can run at the same time

**Note:** Programs started by AMQ3SRV4 must not use the MQDISC call because this will stop the trigger server. If programs started by AMQ3SRV4 use the MQCONN call, they will get the RC2002 reason code.

*Ending the Triggering sample programs on IBM i*
A trigger monitor program can be ended by the sysrequest option 2 (ENDRQS) or by inhibiting gets from the trigger queue.

If the sample trigger queue is used the command is:

```
CHGMQMQ QNAME('SYSTEM.SAMPLE.TRIGGER') GETENBL(*NO)
```

**Note:** To start triggering again on this queue, you *must* enter the command:

```
CHGMQMQ QNAME('SYSTEM.SAMPLE.TRIGGER') GETENBL(*YES)
```

### *Running the samples using remote queues on IBM i*

You can demonstrate remote queuing by running the samples on connected message queue managers.

Program AMQSAMP4 provides a local definition of a remote queue (SYSTEM.SAMPLE.REMOTE) that uses a remote queue manager named 0THER. To use this sample definition, change 0THER to the name of the second message queue manager you want to use. You must also set up a message channel between your two message queue managers; for information about how to do so, see Channel-exit programs for messaging channels.

The Request sample program puts its own local queue manager name in the *MDRM* field of messages it sends. The Inquire and Set samples send reply messages to the queue and message queue manager named in the *MDRQ* and *MDRM* fields of the request messages they process.

## Return codes for IBM i (ILE RPG)

This information describes the return codes associated with the MQI and MQAI.

The return codes associated with:

- Programmable Command Format (PCF) commands are listed in Programmable command formats reference.
- C++ calls are listed in Using C++.

For each call, a completion code and a reason code are returned by the queue manager or by an exit routine, to indicate the success or failure of the call.

Applications must not depend upon errors being checked for in a specific order, except where specifically noted. If more than one completion code or reason code could arise from a call, the particular error reported depends on the implementation.

### Completion codes for IBM i (ILE RPG)

The completion code parameter (*CMPCOD*) allows the caller to see quickly whether the call completed successfully, completed partially, or failed.

**CCOK**
(MQCC_OK on other platforms)

Successful completion.

The call completed fully; all output parameters have been set. The *REASON* parameter always has the value RCNONE in this case.

**CCWARN**
(MQCC_WARN on other platforms)

Warning (partial completion).

The call completed partially. Some output parameters might have been set in addition to the *CMPCOD* and *REASON* output parameters. The *REASON* parameter gives additional information about the partial completion.

**CCFAIL**
(MQCC_FAIL on other platforms)

Call failed.

The processing of the call did not complete, and the state of the queue manager is normally unchanged; exceptions are specifically noted. The *CMPCOD* and *REASON* output parameters have been set; other parameters are unchanged, except where noted.

The reason might be a fault in the application program, or it might be a result of some situation external to the program, for example the user's authority might have been revoked. The *REASON* parameter gives additional information about the error.

## Reason codes for IBM i (ILE RPG)

The reason code parameter (*REASON*) is a qualification to the completion code parameter (*CMPCOD*).

If there is no special reason to report, RCNONE is returned. A successful call returns CCOK and RCNONE.

If the completion code is either CCWARN or CCFAIL, the queue manager always reports a qualifying reason; details are given under each call description.

Where user exit routines set completion codes and reasons, they should adhere to these rules. In addition, any special reason values defined by user exits should be less than zero, to ensure that they do not conflict with values defined by the queue manager. Exits can set reasons already defined by the queue manager, where these are appropriate.

Reason codes also occur in:

- The *DLREA* field of the MQDLH structure
- The *MDFB* field of the MQMD structure

The full list of reason codes is in API completion and reason codes in .

To find your IBM i reason code in that list, remove the "RC" from the front, for example RC2002 becomes 2002. Also the completion codes there are shown as they are on other platforms:

*Table 631.*

| IBM i | Other platforms |
|---|---|
| CCOK | MQCC_OK |
| CCWARN | MQCC_WARN |
| CCFAIL | MQCC_FAIL |

# Rules for validating MQI options for IBM i (ILE RPG)

This topic gives information about the situations that produce an RC2046 reason code from an MQOPEN, MQPUT, MQPUT1, MQGET, or MQCLOSE call.

## MQOPEN call on IBM i

For the options of the MQOPEN call:

- *At least one* of the following must be specified:
  - OOBRW
  - OOINPQ
  - OOINPX
  - OOINPS
  - OOINQ
  - OOOUT
  - OOSET
- Only *one* of the following is allowed:
  - OOINPQ
  - OOINPX
  - OOINPS
- Only *one* of the following is allowed:
  - OOBNDO
  - OOBNDN
  - OOBNDQ

  **Note:** The options listed previously are mutually exclusive. However, because the value of OOBNDQ is zero, specifying it with either of the other two bind options does not result in reason code RC2046. OOBNDQ is provided to aid program documentation.
- If OOSAVA is specified, one of the OOINP* options must also be specified.
- If one of the OOSET* or OOPAS* options is specified, OOOUT must also be specified.

## MQPUT call on IBM i

For the put-message options:

- The combination of PMSYP and PMNSYP is not allowed.
- Only *one* of the following is allowed:
  - PMDEFC
  - PMNOC
  - PMPASA
  - PMPASI
  - PMSETA
  - PMSETI
- PMALTU is not allowed (it is valid only on the MQPUT1 call).

## MQPUT1 call on IBM i

For the put-message options, the rules are the same as for the MQPUT call, except for the following options:

- PMALTU is allowed.
- PMLOGO is *not* allowed.

## MQGET call on IBM i

For the get-message options:

- Only *one* of the following options is allowed:
  - GMNSYP
  - GMSYP
  - GMPSYP
- Only *one* of the following options is allowed:
  - GMBRWF
  - GMBRWC
  - GMBRWN
  - GMMUC
- GMSYP is not allowed with any of the following options:
  - GMBRWF
  - GMBRWC
  - GMBRWN
  - GMLK
  - GMUNLK
- GMPSYP is not allowed with any of the following options:
  - GMBRWF
  - GMBRWC
  - GMBRWN
  - GMCMPM
  - GMUNLK
- If GMLK is specified, one of the following options must also be specified:
  - GMBRWF
  - GMBRWC
  - GMBRWN
- If GMUNLK is specified, only the following options are allowed:
  - GMNSYP
  - GMNWT

## MQCLOSE call on IBM i

- For the options of the MQCLOSE call. The combination of CODEL and COPURG is not allowed.
- Only one of the following is allowed:
  - COKPSB

- CORMSB

### MQSUB call on IBM i

For the options of the MQSUB call:

- At least one of the following must be specified:
- At least one of the following must be specified:
  - SOALT
  - SORES
  - SOCRT
- Only one of the following is allowed:
  - SODUR
  - SONDUR

  **Note:** The options listed previously are mutually exclusive. However, as the value of SOnDUR is zero, specifying it with SODUR does not result in reason code RC2046. SONDUR is provided to aid program documentation.
- The combination of SOGRP and SOMAN is not allowed.
- SOGRP requires SOSCID to be specified.
- Only one of the following is allowed: SOAUID SOFUID
- The combination of SONEWP and SOPUBR is not allowed.
- SONEWP is only allowed in combination with SOCRT.
- Only one of the following is allowed:
  - SOWCHR
  - SOWTOP

## Machine encodings on IBM i

Use this information to learn about the structure of the *MDENC* field in the message descriptor.

For more information about the message descriptor, see "MQMD - Message descriptor" on page 1077.

The *MDENC* field is a 32-bit integer that is divided into four separate subfields; these subfields identify:

- The encoding used for binary integers
- The encoding used for packed-decimal integers
- The encoding used for floating-point numbers
- Reserved bits

Each subfield is identified by a bit mask which has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined:

**ENIMSK**
Mask for binary-integer encoding.

This subfield occupies bit positions 28 through 31 within the *MDENC* field.

**ENDMSK**
Mask for packed-decimal-integer encoding.

This subfield occupies bit positions 24 through 27 within the *MDENC* field.

**ENFMSK**
Mask for floating-point encoding.

This subfield occupies bit positions 20 through 23 within the *MDENC* field.

**ENRMSK**
Mask for reserved bits.

This subfield occupies bit positions 0 through 19 within the *MDENC* field.

## Binary-integer encoding

Valid values for binary-integer encoding.

The following values are valid for the binary-integer encoding:

**ENIUND**
Undefined integer encoding.

Binary integers are represented using an encoding that is undefined.

**ENINOR**
Normal integer encoding.

Binary integers are represented in the conventional way:

- The least significant byte in the number has the highest address of any of the bytes in the number; the most significant byte has the lowest address.
- The least significant bit in each byte is next to the byte with the next higher address; the most significant bit in each byte is next to the byte with the next lower address.

**ENIREV**
Reversed integer encoding.

Binary integers are represented in the same way as ENINOR, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as ENINOR.

## Packed-decimal-integer encoding

Valid values for packed-decimal-integer encoding

The following values are valid for the packed-decimal-integer encoding:

**ENDUND**
Undefined packed-decimal encoding.

Packed-decimal integers are represented using an encoding that is undefined.

**ENDNOR**
Normal packed-decimal encoding.

Packed-decimal integers are represented in the conventional way:

- Each decimal digit in the printable form of the number is represented in packed decimal by a single hexadecimal digit in the range X'0' through X'9'. Each hexadecimal digit occupies 4 bits, and so each byte in the packed decimal number represents two decimal digits in the printable form of the number.
- The least significant byte in the packed-decimal number is the byte which contains the least significant decimal digit. Within that byte, the most significant 4 bits contain the least significant decimal digit, and the least significant 4 bits contain the sign. The sign is either X'C' (positive), X'D' (negative), or X'F' (unsigned).
- The least significant byte in the number has the highest address of any of the bytes in the number; the most significant byte has the lowest address.
- The least significant bit in each byte is next to the byte with the next higher address; the most significant bit in each byte is next to the byte with the next lower address.

**ENDREV**
Reversed packed-decimal encoding.

Packed-decimal integers are represented in the same way as ENDNOR, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as ENDNOR.

## Floating-point encoding

Valid values for floating-point encoding

The following values are valid for the floating-point encoding:

**ENFUND**
Undefined floating-point encoding.

Floating-point numbers are represented using an encoding that is undefined.

**ENFNOR**
Normal IEEE (The Institute of Electrical and Electronics Engineers) float encoding.

Floating-point numbers are represented using the standard IEEE floating-point format, with the bytes arranged as follows:

- The least significant byte in the mantissa has the highest address of any of the bytes in the number; the byte containing the exponent has the lowest address
- The least significant bit in each byte is next to the byte with the next higher address; the most significant bit in each byte is next to the byte with the next lower address

Details of the IEEE float encoding might be found in IEEE Standard 754.

**ENFREV**
Reversed IEEE float encoding.

Floating-point numbers are represented in the same way as ENFNOR, but with the bytes arranged in reverse order. The bits within each byte are arranged in the same way as ENFNOR.

**ENF390**
System/390 architecture float encoding.

Floating-point numbers are represented using the standard System/390 floating-point format; this is also used by System/370.

## Constructing encodings

To construct a value for the *MDENC* field in MQMD, the relevant constants that describe the required encodings should be added.

Be sure to combine only one of the ENI* encodings with one of the END* encodings and one of the ENF* encodings.

## Analyzing encodings

The *MDENC* field contains subfields; because of this, applications that need to examine the integer, packed decimal, or float encoding should use the technique described in this topic.

### Using arithmetic

The following steps should be performed using integer arithmetic:

1. Select one of the following values, according to the type of encoding required:
   - 1 for the binary integer encoding
   - 16 for the packed decimal integer encoding
   - 256 for the floating point encoding

   Call the value A.
2. Divide the value of the *MDENC* field by A ; call the result B.

3. Divide B by 16; call the result C.
4. Multiply C by 16 and subtract from B ; call the result D.
5. Multiply D by A ; call the result E.
6. E is the encoding required, and can be tested for equality with each of the values that is valid for that type of encoding.

### Summary of machine architecture encodings

A table summarizing encodings for machine architectures.

Encodings for machine architectures are shown in Table 632 on page 1399.

*Table 632. Summary of encodings for machine architectures*

| Machine architecture | Binary integer encoding | Packed-decimal integer encoding | Floating-point encoding |
|---|---|---|---|
| IBM i | normal | normal | IEEE normal |
| Intel x86 | reversed | reversed | IEEE reversed |
| PowerPC | normal | normal | IEEE normal |
| System/390 | normal | normal | System/390 |

## Report options and message flags

This topic concerns the *MDREP* and *MDMFL* fields that are part of the message descriptor MQMD specified on the MQGET, MQPUT, and MQPUT1 calls.

For more information about the message descriptor, see "MQMD - Message descriptor" on page 1077. This information describes:

- The structure of the report field and how the queue manager processes it
- How an application should analyze the report field
- The structure of the message-flags field

### Structure of the report field

The *MDREP* field is a 32-bit integer that is divided into three separate subfields.

These subfields identify:

- Report options that are rejected if the local queue manager does not recognize them
- Report options that are always accepted, even if the local queue manager does not recognize them
- Report options that are accepted only if certain other conditions are satisfied

Each subfield is identified by a bit mask which has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. Note that the bits in a subfield are not necessarily adjacent. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined to identify the subfields:

**RORUM**
Mask for unsupported report options that are rejected.

This mask identifies the bit positions within the *MDREP* field where report options which are not supported by the local queue manager will cause the MQPUT or MQPUT1 call to fail with completion code CCFAIL and reason code RC2061.

This subfield occupies bit positions 3, and 11 through 13.

**ROAUM**
Mask for unsupported report options that are accepted.

This mask identifies the bit positions within the *MDREP* field where report options which are not supported by the local queue manager will nevertheless be accepted on the MQPUT or MQPUT1 calls. Completion code CCWARN with reason code RC2104 are returned in this case.

This subfield occupies bit positions 0 through 2, 4 through 10, and 24 through 31.

The following report options are included in this subfield:

- ROCMTC
- RODLQ
- RODISC
- ROEXC
- ROEXCD
- ROEXCF
- ROEXP
- ROEXPD
- ROEXPF
- RONAN
- RONMI
- RONONE
- ROPAN
- ROPCI
- ROPMI

**ROAUXM**

Mask for unsupported report options that are accepted only in certain circumstances.

This mask identifies the bit positions within the *MDREP* field where report options which are not supported by the local queue manager will nevertheless be accepted on the MQPUT or MQPUT1 calls *provided* that both of the following conditions are satisfied:

- The message is destined for a remote queue manager.
- The application is not putting the message directly on a local transmission queue (that is, the queue identified by the *ODMN* and *ODON* fields in the object descriptor specified on the MQOPEN or MQPUT1 call is not a local transmission queue).

Completion code CCWARN with reason code RC2104 are returned if these conditions are satisfied, and CCFAIL with reason code RC2061 if not.

This subfield occupies bit positions 14 through 23.

The following report options are included in this subfield:

- ROCOA
- ROCOAD
- ROCOAF
- ROCOD
- ROCODD
- ROCODF

If there are any options specified in the *MDREP* field which the queue manager does not recognize, the queue manager checks each subfield in turn by using the bitwise AND operation to combine the *MDREP* field with the mask for that subfield. If the result of that operation is not zero, the completion code and reason codes described previously are returned.

If CCWARN is returned, it is not defined which reason code is returned if other warning conditions exist.

The ability to specify and have accepted report options which are not recognized by the local queue manager is useful when it is necessary to send a message with a report option which will be recognized and processed by a *remote* queue manager.

## Analyzing the report field

The MDREP field contains subfields. Because of this, some applications need to check whether the sender of the message requested a particular report. Those applications should use the technique described in this topic.

### Using arithmetic

The following steps should be performed using integer arithmetic:

1. Select one of the following values, according to the type of report to be checked:
   - ROCOA for COA report
   - ROCOD for COD report
   - ROEXC for exception report
   - ROEXP for expiration report

   Call the value A.
2. Divide the *MDREP* field by A ; call the result B.
3. Divide B by 8 ; call the result C.
4. Multiply C by 8 and subtract from B ; call the result D.
5. Multiply D by A ; call the result E.
6. Test E for equality with each of the values that is possible for that type of report.

   For example, if A is ROEXC, test E for equality with each of the following to determine what was specified by the sender of the message:
   - RONONE
   - ROEXC
   - ROEXCD
   - ROEXCF

   The tests can be performed in whatever order is most convenient for the application logic.

The following pseudocode illustrates this technique for exception report messages:

```
A = ROEXC
B = Report/A
C = B/8
D = B - C*8
E = D*A
```

A similar method can be used to test for the ROPMI or ROPCI options; select as the value A whichever of these two constants is appropriate, and then proceed as described previously, but replacing the value 8 in the previous steps by the value 2.

## Structure of the message-flags field

The *MDMFL* field is a 32-bit integer that is divided into three separate subfields.

These subfields identify:

- Message flags that are rejected if the local queue manager does not recognize them
- Message flags that are always accepted, even if the local queue manager does not recognize them
- Message flags that are accepted only if certain other conditions are satisfied

**Note:** All subfields in *MDMFL* are reserved for use by the queue manager.

Each subfield is identified by a bit mask which has 1-bits in the positions corresponding to the subfield, and 0-bits elsewhere. The bits are numbered such that bit 0 is the most significant bit, and bit 31 the least significant bit. The following masks are defined to identify the subfields:

**MFRUM**
Mask for unsupported message flags that are rejected.

This mask identifies the bit positions within the *MDMFL* field where message flags which are not supported by the local queue manager will cause the MQPUT or MQPUT1 call to fail with completion code CCFAIL and reason code RC2249.

This subfield occupies bit positions 20 through 31.

The following message flags are included in this subfield:

- MFLMIG
- MFLSEG
- MFMIG
- MFSEG
- MFSEGA
- MFSEGI

**MFAUM**
Mask for unsupported message flags that are accepted.

This mask identifies the bit positions within the *MDMFL* field where message flags which are not supported by the local queue manager will nevertheless be accepted on the MQPUT or MQPUT1 calls. The completion code is CCOK.

This subfield occupies bit positions 0 through 11.

**MFAUXM**
Mask for unsupported message flags that are accepted only in certain circumstances.

This mask identifies the bit positions within the *MDMFL* field where message flags which are not supported by the local queue manager will nevertheless be accepted on the MQPUT or MQPUT1 calls *provided* that both of the following conditions are satisfied:

- The message is destined for a remote queue manager.
- The application is not putting the message directly on a local transmission queue (that is, the queue identified by the *ODMN* and *ODON* fields in the object descriptor specified on the MQOPEN or MQPUT1 call is not a local transmission queue).

Completion code CCOK is returned if these conditions are satisfied, and CCFAIL with reason code RC2249 if not.

This subfield occupies bit positions 12 through 19.

If there are flags specified in the *MDMFL* field that the queue manager does not recognize, the queue manager checks each subfield in turn by using the bitwise AND operation to combine the *MDMFL* field with the mask for that subfield. If the result of that operation is not zero, the completion code and reason codes described previously are returned.

# Data conversion

This topic describes the interface to the data-conversion exit, and the processing performed by the queue manager when data conversion is required.

The data-conversion exit is invoked as part of the processing of the MQGET call in order to convert the application message data to the representation required by the receiving application. Conversion of the application message data is optional - it requires the GMCONV option to be specified on the MQGET call.

The following are described:

- The processing performed by the queue manager in response to the GMCONV option; see "Conversion processing" on page 1403.
- Processing conventions used by the queue manager when processing a built-in format; these conventions are recommended for user-written exits too. See "Processing conventions" on page 1404.
- Special considerations for the conversion of report messages; see "Conversion of report messages" on page 1408.
- The parameters passed to the data-conversion exit; see "MQCONVX - Data conversion exit" on page 1418.
- A call that can be used from the exit in order to convert character data between different representations; see "MQXCNVC - Convert characters" on page 1414.
- The data-structure parameter which is specific to the exit; see "MQDXP - Data-conversion exit parameter" on page 1409.

## Conversion processing

This information describes the processing performed by the queue manager in response to the GMCONV option.

The queue manager performs the following actions if the GMCONV option is specified on the MQGET call, and there is a message to be returned to the application:

1. If one or more of the following is true, no conversion is necessary:
   - The message data is already in the character set and encoding required by the application issuing the MQGET call. The application must set the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter of the MQGET call to the values required, before issuing the call.
   - The length of the message data is zero.
   - The length of the *BUFFER* parameter of the MQGET call is zero.

   In these cases the message is returned without conversion to the application issuing the MQGET call; the *MDCSI* and *MDENC* values in the *MSGDSC* parameter are set to the values in the control information in the message, and the call completes with one of the following combinations of completion code and reason code:

   **Completion code**
   **Reason code**

   **CCOK**
   RCNONE

   **CCWARN**
   RC2079

   **CCWARN**
   RC2080

The following steps are performed only if the character set or encoding of the message data differs from the corresponding value in the *MSGDSC* parameter, and there is data to be converted:

1. If the *MDFMT* field in the control information in the message has the value FMNONE, the message is returned unconverted, with completion code CCWARN and reason code RC2110.

   In all other cases conversion processing continues.
2. The message is removed from the queue and placed in a temporary buffer which is the same size as the *BUFFER* parameter. For browse operations, the message is copied into the temporary buffer, instead of being removed from the queue.
3. If the message has to be truncated to fit in the buffer, the following is done:
   - If the GMATM option was *not* specified, the message is returned unconverted, with completion code CCWARN and reason code RC2080.

- If the GMATM option *was* specified, the completion code is set to CCWARN, the reason code is set to RC2079, and conversion processing continues.

4. If the message can be accommodated in the buffer without truncation, or the GMATM option was specified, the following is done:
   - If the format is a built-in format, the buffer is passed to the queue manager's data-conversion service.
   - If the format is not a built-in format, the buffer is passed to a user-written exit which has the same name as the format. If the exit cannot be found, the message is returned unconverted, with completion code CCWARN and reason code RC2110.

   If no error occurs, the output from the data-conversion service or from the user-written exit is the converted message, plus the completion code and reason code to be returned to the application issuing the MQGET call.
5. If the conversion is successful, the queue manager returns the converted message to the application. In this case, the completion code and reason code returned by the MQGET call will typically be one of the following combinations:

   **Completion code**
   **Reason code**

   **CCOK**
   RCNONE

   **CCWARN**
   RC2079

   However, if the conversion is performed by a user-written exit, other reason codes can be returned, even when the conversion is successful.

   If the conversion fails (for whatever reason), the queue manager returns the unconverted message to the application, with the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter set to the values in the control information in the message, and with completion code CCWARN.

## Processing conventions

When converting a built-in format, the queue manager follows the processing conventions described in this topic.

Consider applying these conventions to user-written exits, although this is not enforced by the queue manager. The built-in formats converted by the queue manager are:

| Built in formats |
| --- |
| FMADMN |
| FMMDE |
| FMCICS |
| FMPCF |
| FMCMD1 |
| FMRMH |
| FMCMD2 |
| FMRFH |
| FMDLH |
| FMRFH2 |
| FMDH |
| FMSTR |

| Built in formats |
| --- |
| FMEVNT |
| FMTM |
| FMIMS |
| FMXQH |
| FMIMVS |

1. If the message expands during conversion, and exceeds the size of the *BUFFER* parameter, the following is done:
   - If the GMATM option was *not* specified, the message is returned unconverted, with completion code CCWARN and reason code RC2120.
   - If the GMATM option *was* specified, the message is truncated, the completion code is set to CCWARN, the reason code is set to RC2079, and conversion processing continues.
2. If truncation occurs (either before or during conversion), it is possible for the number of valid bytes returned in the *BUFFER* parameter to be *less than* the length of the buffer.

   This can occur, for example, if a 4-byte integer or a DBCS character straddles the end of the buffer. The incomplete element of information is not converted, and so those bytes in the returned message do not contain valid information. This can also occur if a message that was truncated before conversion shrinks during conversion.

   If the number of valid bytes returned is less than the length of the buffer, the unused bytes at the end of the buffer are set to nulls.
3. If an array or string straddles the end of the buffer, as much of the data as possible is converted; only the particular array element or DBCS character which is incomplete is not converted - preceding array elements or characters are converted.
4. If truncation occurs (either before or during conversion), the length returned for the *DATLEN* parameter is the length of the *unconverted* message before truncation.
5. When strings are converted between single-byte character sets (SBCS), double-byte character sets (DBCS), or multi-byte character sets (MBCS), the strings can expand or contract.
   - In the PCF formats FMADMN, FMEVNT, and FMPCF, the strings in the MQCFST and MQCFSL structures expand or contract as necessary to accommodate the string after conversion.

     For the string-list structure MQCFSL, the strings in the list might expand or contract by different amounts. If this happens, the queue manager pads the shorter strings with blanks to make them the same length as the longest string after conversion.
   - In the format FMRMH, the strings addressed by the *RMSEO*, *RMSNO*, *RMDEO*, and *RMDNO* fields expand or contract as necessary to accommodate the strings after conversion.
   - In the format FMRFH, the *RFNVS* field expands or contracts as necessary to accommodate the name/value pairs after conversion.
   - In structures with fixed field sizes, the queue manager allows strings to expand or contract within their fixed fields, if no significant information is lost. In this regard, trailing blanks and characters following the first null character in the field are treated as insignificant.
     - If the string expands, but only insignificant characters need to be discarded to accommodate the converted string in the field, the conversion succeeds and the call completes with CCOK and reason code RCNONE (assuming no other errors).
     - If the string expands, but the converted string requires significant characters to be discarded in order to fit in the field, the message is returned unconverted and the call completes with CCWARN and reason code RC2190.

       **Note:** Reason code RC2190 results in this case whether the GMATM option was specified.
     - If the string contracts, the queue manager pads the string with blanks to the length of the field.

6. For messages consisting of one or more IBM MQ header structures followed by user data, it is possible for one or more of the header structures to be converted, while the remainder of the message is not. However, with two exceptions, the *MDCSI* and *MDENC* fields in each header structure always correctly indicate the character set and encoding of the data that follows the header structure.

   The two exceptions are the MQCIH and MQIIH structures, where the values in the *MDCSI* and *MDENC* fields in those structures are not significant. For those structures, the data following the structure is in the same character set and encoding as the MQCIH or MQIIH structure itself.

7. If the *MDCSI* or *MDENC* fields in the control information of the message being retrieved, or in the *MSGDSC* parameter, specify values which are undefined or not supported, the queue manager might ignore the error if the undefined or unsupported value does not need to be used in converting the message.

   For example, if the *MDENC* field in the message specifies an unsupported float encoding, but the message contains only integer data, or contains floating-point data which does not require conversion (because the source and target float encodings are identical), the error might or might not be diagnosed.

   If the error is diagnosed, the message is returned unconverted, with completion code CCWARN and one of the RC2111, RC2112, RC2113, RC2114 or RC2115, RC2116, RC2117, RC2118 reason codes (as appropriate); the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter are set to the values in the control information in the message.

   If the error is not diagnosed and the conversion completes successfully, the values returned in the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter, are those specified by the application issuing the MQGET call.

8. In all cases, if the message is returned to the application unconverted the completion code is set to CCWARN, and the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter are set to the values appropriate to the unconverted data. This is done for FMNONE also.

   The *REASON* parameter is set to a code that indicates why the conversion could not be carried out, unless the message also had to be truncated; reason codes related to truncation take precedence over reason codes related to conversion. (To determine if a truncated message was converted, check the values returned in the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter.)

   When an error is diagnosed, either a specific reason code is returned, or the general reason code RC2119. The reason code returned depends on the diagnostic capabilities of the underlying data-conversion service.

9. If completion code CCWARN is returned, and more than one reason code is relevant, the order of precedence is as follows:

   a. The following reason takes precedence over all others:

      - RC2079

   b. Next in precedence is the following reason:

      - RC2110

   c. The order of precedence within the remaining reason codes is not defined.

10. On completion of the MQGET call:

    - The following reason code indicates that the message was converted successfully:
      - RCNONE
    - The following reason code indicates that the message *may* have been converted successfully (check the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter to find out):
      - RC2079
    - All other reason codes indicate that the message was not converted.

The following processing is specific to the built-in formats; it is not applicable to user-defined formats:

1. Except for the following formats:

- FMADMN
- FMEVNT
- FMIMVS
- FMPCF
- FMSTR

none of the built-in formats can be converted from or to character sets that do not have SBCS characters for the characters that are valid in queue names. If an attempt is made to perform such a conversion, the message is returned unconverted, with completion code CCWARN and reason code RC2111 or RC2115, as appropriate.

The Unicode character set UCS-2 is an example of a character set that does not have SBCS characters for the characters that are valid in queue names.

2. If the message data for a built-in format is truncated, fields within the message which contain lengths of strings, or counts of elements or structures, are *not* adjusted to reflect the length of the data returned to the application; the values returned for such fields within the message data are the values applicable to the message *before truncation*.

   When processing messages such as a truncated FMADMN message, care must be taken to ensure that the application does not attempt to access data beyond the end of the data returned.

3. If the format name is FMDLH, the message data begins with an MQDLH structure, and this may be followed by zero or more bytes of application message data. The format, character set, and encoding of the application message data are defined by the *DLFMT*, *DLCSI*, and *DLENC* fields in the MQDLH structure at the start of the message. Since the MQDLH structure and application message data can have different character sets and encodings, it is possible for one, other, or both of the MQDLH structure and application message data to require conversion.

   The queue manager converts the MQDLH structure first, as necessary. If conversion is successful, or the MQDLH structure does not require conversion, the queue manager checks the *DLCSI* and *DLENC* fields in the MQDLH structure to see if conversion of the application message data is required. If conversion *is* required, the queue manager invokes the user-written exit with the name given by the *DLFMT* field in the MQDLH structure, or performs the conversion itself (if *DLFMT* is the name of a built-in format).

   If the MQGET call returns a completion code of CCWARN, and the reason code is one of those indicating that conversion was not successful, one of the following applies:

   - The MQDLH structure could not be converted. In this case the application message data will not have been converted either.
   - The MQDLH structure was converted, but the application message data was not.

   The application can examine the values returned in the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter, and those in the MQDLH structure, in order to determine which of the previous applies.

4. If the format name is FMXQH, the message data begins with an MQXQH structure, and this may be followed by zero or more bytes of additional data. This additional data is typically the application message data (which may be of zero length), but there can also be one or more further IBM MQ header structures present, at the start of the additional data.

   The MQXQH structure must be in the character set and encoding of the queue manager. The format, character set, and encoding of the data following the MQXQH structure are given by the *MDFMT*, *MDCSI*, and *MDENC* fields in the MQMD structure contained *within* the MQXQH. For each subsequent IBM MQ header structure present, the *MDFMT*, *MDCSI*, and *MDENC* fields in the structure describe the data that follows that structure; that data is either another IBM MQ header structure, or the application message data.

   If the GMCONV option is specified for an FMXQH message, the application message data and certain of the MQ header structures are converted, *but the data in the MQXQH structure is not*. On return from the MQGET call, therefore:

- The values of the *MDFMT*, *MDCSI*, and *MDENC* fields in the *MSGDSC* parameter, describe the data in the MQXQH structure, and *not* the application message data; the values will therefore *not* be the same as those specified by the application that issued the MQGET call.

  The effect of this is that an application which repeatedly gets messages from a transmission queue with the GMCONV option specified must reset the *MDCSI* and *MDENC* fields in the *MSGDSC* parameter to the values necessary for the application message data, before each MQGET call.
- The values of the *MDFMT*, *MDCSI*, and *MDENC* fields in the last MQ header structure present describe the application message data. If there are no other IBM MQ header structures present, the application message data is described by these fields in the MQMD structure within the MQXQH structure. If conversion is successful, the values will be the same as those specified in the *MSGDSC* parameter by the application that issued the MQGET call.

If the message is a distribution-list message, the MQXQH structure is followed by an MQDH structure (plus its arrays of MQOR and MQPMR records), which in turn may be followed by zero or more further IBM MQ header structures and zero or more bytes of application message data. Like the MQXQH structure, the MQDH structure must be in the character set and encoding of the queue manager, and it is not converted on the MQGET call, even if the GMCONV option is specified.

The processing of the MQXQH and MQDH structures described previously are primarily intended for use by message channel agents when they get messages from transmission queues.

## Conversion of report messages

A report message can contain varying amounts of application message data, according to the report options specified by the sender of the original message.

In particular, a report message can contain either:

1. No application message data
2. Some of the application message data from the original message

   This occurs when the sender of the original message specifies RO*D and the message is longer than 100 bytes.
3. All of the application message data from the original message

   This occurs when the sender of the original message specifies RO*F, or specifies RO*D and the message is 100 bytes or shorter.

When the queue manager or message channel agent generates a report message, it copies the format name from the original message into the *MDFMT* field in the control information in the report message. The format name in the report message might therefore imply a length of data which is different from the length present in the report message (cases 1 and 2 described previously).

If the GMCONV option is specified when the report message is retrieved:

- For case 1 described previously, the data-conversion exit will not be invoked (because the report message will have no data).
- For case 3 described previously, the format name correctly implies the length of the message data.
- But for case 2 described previously, the data-conversion exit will be invoked to convert a message which is *shorter* than the length implied by the format name.

  In addition, the reason code passed to the exit will typically be RCNONE (that is, the reason code will not indicate that the message has been truncated). This happens because the message data was truncated by the *sender* of the report message, and not by the receiver's queue manager in response to the MQGET call.

Because of these possibilities, the data-conversion exit should *not* use the format name to deduce the length of data passed to it; instead the exit should check the length of data provided, and be prepared to convert *less* data than the length implied by the format name. If the data can be converted successfully, completion code CCOK and reason code RCNONE should be returned by the exit. The length of the message data to be converted is passed to the exit as the *INLEN* parameter.

### Product-sensitive programming interface

If a report message contains information about an activity that has taken place, it is known as an activity report. Examples of activities are:

- an MCA sending a message from a queue down a channel
- an MCA receiving a message from a channel and putting it onto a queue
- an MCA dead-letter queuing an undeliverable message
- an MCA getting a message off a queue and discarding it
- a dead-letter handler placing a message back on a queue
- the command server processing a PCF request - a broker processing a publish request
- a user application getting a message from a queue - a user application browsing a message on a queue

Any application, including the queue manager, can add some of the message data to the activity report following the report header. The amount of data that should be supplied if some is sent is not fixed, and is decided by the application. The information returned should be useful to the application processing the activity report. Queue manager activity reports will return with them any standard IBM MQ header structures (beginning 'MQH') contained in the original message. This includes, for example, any MQRFH2 headers that were included in the original message. Also the queue manager will return an MQCFH header found, but not the PCF parameters associated with it. This gives monitoring applications an idea of what the message was about.

## MQDXP - Data-conversion exit parameter

Data-conversion exit parameter block.

### Overview

**Purpose**: The MQDXP structure is a parameter that the queue manager passes to the data-conversion exit when the exit is invoked to convert the message data as part of the processing of the MQGET call. See the description of the MQCONVX call for details of the data conversion exit.

**Character set and encoding**: Character data in MQDXP is in the character set of the local queue manager; this is given by the *CodedCharSetId* queue manager attribute. Numeric data in MQDXP is in the native machine encoding; this is given by ENNAT.

**Usage**: Only the *DXLEN*, *DXCC*, *DXREA* and *DXRES* fields in MQDXP might be changed by the exit; changes to other fields are ignored. However, the *DXLEN* field *cannot* be changed if the message being converted is a segment that contains only part of a logical message.

When control returns to the queue manager from the exit, the queue manager checks the values returned in MQDXP. If the values returned are not valid, the queue manager continues processing as though the exit had returned XRFAIL in *DXRES* ; however, the queue manager ignores the values of the *DXCC* and *DXREA* fields returned by the exit in this case, and uses instead the values those fields had on *input* to the exit. The following values in MQDXP cause this processing to occur:

- *DXRES* field not XROK and not XRFAIL
- *DXCC* field not CCOK and not CCWARN
- *DXLEN* field less than zero, or *DXLEN* field changed when the message being converted is a segment that contains only part of a logical message.


- "Fields" on page 1409
- "RPG declaration (copy file CMQDXPH)" on page 1413


### Fields

The MQDXP structure contains the following fields; the fields are described in **alphabetical order**:

**DXAOP (10-digit signed integer)**

Application options.

This is a copy of the *GMOPT* field of the MQGMO structure specified by the application issuing the MQGET call. The exit may need to examine these to ascertain whether the GMATM option was specified.

This is an input field to the exit.

**DXCC (10-digit signed integer)**

Completion code.

When the exit is invoked, this contains the completion code that will be returned to the application that issued the MQGET call, if the exit chooses to do nothing. It is always CCWARN, because either the message was truncated, or the message requires conversion and this has not yet been done.

On output from the exit, this field contains the completion code to be returned to the application in the *CMPCOD* parameter of the MQGET call; only CCOK and CCWARN are valid. See the description of the *DXREA* field for suggestions on how the exit should set this field on output.

This is an input/output field to the exit.

**DXCSI (10-digit signed integer)**

Character set required by application.

This is the coded character-set identifier of the character set required by the application issuing the MQGET call; see the *MDCSI* field in the MQMD structure for more details. If the application specifies the special value CSQM on the MQGET call, the queue manager changes this to the actual character-set identifier of the character set used by the queue manager, before invoking the exit.

If the conversion is successful, the exit should copy this to the *MDCSI* field in the message descriptor.

This is an input field to the exit.

**DXENC (10-digit signed integer)**

Numeric encoding required by application.

This is the numeric encoding required by the application issuing the MQGET call; see the *MDENC* field in the MQMD structure for more details.

If the conversion is successful, the exit should copy this to the *MDENC* field in the message descriptor.

This is an input field to the exit.

**DXHCN (10-digit signed integer)**

Connection handle.

This is a connection handle which can be used on the MQXCNVC call. This handle is not necessarily the same as the handle specified by the application which issued the MQGET call.

**DXLEN (10-digit signed integer)**

Length in bytes of message data.

When the exit is invoked, this field contains the original length of the application message data. If the message was truncated in order to fit into the buffer provided by the application, the size of the message provided to the exit will be *smaller* than the value of *DXLEN*. The size of the message provided to the exit is always given by the *INLEN* parameter of the exit, irrespective of any truncation that may have occurred.

Truncation is indicated by the *DXREA* field having the value RC2079 on input to the exit.

Most conversions will not need to change this length, but an exit can do so if necessary; the value set by the exit is returned to the application in the *DATLEN* parameter of the MQGET call. However, this length *cannot* be changed if the message being converted is a segment that contains only part of a

logical message. This is because changing the length would cause the offsets of later segments in the logical message to be incorrect.

Note that, if the exit wants to change the length of the data, be aware that the queue manager has already decided whether the message data will fit into the application's buffer, based on the length of the *unconverted* data. This decision determines whether the message is removed from the queue (or the browse cursor moved, for a browse request), and is not affected by any change to the data length caused by the conversion. For this reason it is recommended that conversion exits do not cause a change in the length of the application message data.

If character conversion does imply a change of length, a string can be converted into another string with the same length in bytes, truncating trailing blanks, or padding with blanks as necessary.

The exit is not invoked if the message contains no application message data; hence *DXLEN* is always greater than zero.

This is an input/output field to the exit.

**DXREA (10-digit signed integer)**

Reason code qualifying *DXCC*.

When the exit is invoked, this contains the reason code that will be returned to the application that issued the MQGET call, if the exit chooses to do nothing. Among possible values are RC2079, indicating that the message was truncated in order fit into the buffer provided by the application, and RC2119, indicating that the message requires conversion but that this has not yet been done.

On output from the exit, this field contains the reason to be returned to the application in the *REASON* parameter of the MQGET call; the following is recommended:

- If *DXREA* had the value RC2079 on input to the exit, the *DXREA* and *DXCC* fields should not be altered, irrespective of whether the conversion succeeds or fails.

  (If the *DXCC* field is not CCOK, the application which retrieves the message can identify a conversion failure by comparing the returned *MDENC* and *MDCSI* values in the message descriptor with the values requested; in contrast, the application cannot distinguish a truncated message from a message that just fitted the buffer. For this reason, RC2079 should be returned in preference to any of the reasons that indicate conversion failure.)
- If *DXREA* had any other value on input to the exit:
  - If the conversion succeeds, *DXCC* should be set to CCOK and *DXREA* set to RCNONE.
  - If the conversion fails, or the message expands and has to be truncated to fit in the buffer, *DXCC* should be set to CCWARN (or left unchanged), and *DXREA* set to one of the values i the following list, to indicate the nature of the failure.

    Note that, if the message after conversion is too big for the buffer, it should be truncated only if the application that issued the MQGET call specified the GMATM option:

    - If it did specify that option, reason RC2079 should be returned.
    - If it did not specify that option, the message should be returned unconverted, with reason code RC2120.

The reason codes in the following list are recommended for use by the exit to indicate the reason that conversion failed, but the exit can return other values from the set of RC* codes if deemed appropriate. In addition, the range of values RC0900 through RC0999 are allocated for use by the exit to indicate conditions that the exit wants to communicate to the application issuing the MQGET call.

**Note:** If the message cannot be converted successfully, the exit *must* return XRFAIL in the *DXRES* field, in order to cause the queue manager to return the unconverted message. This is true regardless of the reason code returned in the *DXREA* field.

**RC0900**
(900, X'384') Lowest value for application-defined reason code.

**RC0999**
(999, X'3E7') Highest value for application-defined reason code.

**RC2120**
(2120, X'848') Converted data too big for buffer.

**RC2119**
(2119, X'847') Message data not converted.

**RC2111**
(2111, X'83F') Source coded character set identifier not valid.

**RC2113**
(2113, X'841') Packed-decimal encoding in message not recognized.

**RC2114**
(2114, X'842') Floating-point encoding in message not recognized.

**RC2112**
(2112, X'840') Source integer encoding not recognized.

**RC2115**
(2115, X'843') Target coded character set identifier not valid.

**RC2117**
(2117, X'845') Packed-decimal encoding specified by receiver not recognized.

**RC2118**
(2118, X'846') Floating-point encoding specified by receiver not recognized.

**RC2116**
(2116, X'844') Target integer encoding not recognized.

**RC2079**
(2079, X'81F') Truncated message returned (processing completed).

This is an input/output field to the exit.

**DXRES (10-digit signed integer)**

Response from exit.

This is set by the exit to indicate the success or otherwise of the conversion. It must be one of the following:

**XROK**
Conversion was successful.

If the exit specifies this value, the queue manager returns the following to the application that issued the MQGET call:

- The value of the *DXCC* field on output from the exit
- The value of the *DXREA* field on output from the exit
- The value of the *DXLEN* field on output from the exit
- The contents of the exit's output buffer *OUTBUF*. The number of bytes returned is the lesser of the exit's *OUTLEN* parameter, and the value of the *DXLEN* field on output from the exit

If the *MDENC* and *MDCSI* fields in the exit's message descriptor parameter are *both* unchanged, the queue manager returns:

- The value of the *MDENC* and *MDCSI* fields in the MQDXP structure on *input* to the exit

If one or both of the *MDENC* and *MDCSI* fields in the exit's message descriptor parameter has been changed, the queue manager returns:

- The value of the *MDENC* and *MDCSI* fields in the exit's message descriptor parameter on output from the exit
-

**XRFAIL**
Conversion was unsuccessful.

If the exit specifies this value, the queue manager returns the following to the application that issued the MQGET call:

- The value of the *DXCC* field on output from the exit
- The value of the *DXREA* field on output from the exit
- The value of the *DXLEN* field on *input* to the exit
- The contents of the exit's input buffer *INBUF*. The number of bytes returned is given by the *INLEN* parameter

If the exit has altered *INBUF*, the results are undefined.

*DXRES* is an output field from the exit.

**DXSID (4-byte character string)**

Structure identifier.

The value must be:

**DXSIDV**
Identifier for data conversion exit parameter structure.

This is an input field to the exit.

**DXVER (10-digit signed integer)**

Structure version number.

The value must be:

**DXVER1**
Version number for data-conversion exit parameter structure.

The following constant specifies the version number of the current version:

**DXVERC**
Current version of data-conversion exit parameter structure.

**Note:** When a new version of this structure is introduced, the layout of the existing part is not changed. The exit should therefore check that the *DXVER* field is equal to or greater than the lowest version which contains the fields that the exit needs to use.

This is an input field to the exit.

**DXXOP (10-digit signed integer)**

Reserved.

This is a reserved field; its value is `0`.

## RPG declaration (copy file CMQDXPH)

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
D* MQDXP Structure
D*
D* Structure identifier
D  DXSID                  1      4
D* Structure version number
D  DXVER                  5      8I 0
D* Reserved
D  DXXOP                  9     12I 0
D* Application options
D  DXAOP                 13     16I 0
D* Numeric encoding required by application
D  DXENC                 17     20I 0
D* Character set required by application
```

```
     D  DXCSI                 21     24I 0
     D* Length in bytes of message data
     D  DXLEN                 25     28I 0
     D* Completion code
     D  DXCC                  29     32I 0
     D* Reason code qualifying DXCC
     D  DXREA                 33     36I 0
     D* Response from exit
     D  DXRES                 37     40I 0
     D* Connection handle
     D  DXHCN                 41     44I 0
```

# MQXCNVC - Convert characters

The MQXCNVC call converts characters from one character set to another.

This call is part of the IBM MQ Data Conversion Interface (DCI), which is one of the IBM MQ framework interfaces. Note: This call can be used only from a data-conversion exit.


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- "Parameters" on page 1414
- "RPG invocation (ILE)" on page 1418


## Syntax

**MQXCNVC** ***(HCONN, OPTS, SRCCSI, SRCLEN, SRCBUF, TGTCSI, TGTLEN,***
***TGTBUF, DATLEN, CMPCOD, REASON)***

## Parameters

The MQXCNVC call has the following parameters:

**HCONN (10-digit signed integer) - input**

Connection handle.

This handle represents the connection to the queue manager. It should normally be the handle passed to the data-conversion exit in the *DXHCN* field of the MQDXP structure; this handle is not necessarily the same as the handle specified by the application which issued the MQGET call.

On IBM i, the following special value can be specified for *HCONN*:

**HCDEFH**
Default connection handle.

**OPTS (10-digit signed integer) - input**

Options that control the action of MQXCNVC.

Zero or more of the options described later in this section can be specified. If more than one is required, the values can be added (do not add the same constant more than once).

**Default-conversion option**: The following option controls the use of default character conversion:

**DCCDEF**
Default conversion.

This option specifies that default character conversion can be used if one or both of the character sets specified on the call is not supported. This allows the queue manager to use an installation-specified default character set that approximates the specified character set, when converting the string.

**Note:** The result of using an approximate character set to convert the string is that some characters may be converted incorrectly. This can be avoided by using in the string only characters which are common to both the specified character set and the default character set.

The default character sets are defined by a configuration option when the queue manager is installed or restarted.

If DCCDEF is not specified, the queue manager uses only the specified character sets to convert the string, and the call fails if one or both of the character sets is not supported.

**Padding option**: The following option allows the queue manager to pad the converted string with blanks or discard insignificant trailing characters, in order to make the converted string fit the target buffer:

**DCCFIL**
Fill target buffer.

This option requests that conversion take place in such a way that the target buffer is filled completely:

- If the string contracts when it is converted, trailing blanks are added in order to fill the target buffer.
- If the string expands when it is converted, trailing characters that are not significant are discarded to make the converted string fit the target buffer. If this can be done successfully, the call completes with CCOK and reason code RCNONE.

  If there are too few insignificant trailing characters, as much of the string as will fit is placed in the target buffer, and the call completes with CCWARN and reason code RC2120.

  Insignificant characters are:

  – Trailing blanks

  – Characters following the first null character in the string (but excluding the first null character itself)
- If the string, *TGTCSI* , and *TGTLEN* are such that the target buffer cannot be set completely with valid characters, the call fails with CCFAIL and reason code RC2144. This can occur when *TGTCSI* is a pure DBCS character set (such as UCS-2), but *TGTLEN* specifies a length that is an odd number of bytes.
- *TGTLEN* can be less than or greater than *SRCLEN*. On return from MQXCNVC, *DATLEN* has the same value as *TGTLEN*.

If this option is not specified:

- The string is allowed to contract or expand within the target buffer as required. Insignificant trailing characters are not added or discarded.

  If the converted string fits in the target buffer, the call completes with CCOK and reason code RCNONE.

  If the converted string is too large for the target buffer, as much of the string as will fit is placed in the target buffer, and the call completes with CCWARN and reason code RC2120. Note that fewer than *TGTLEN* bytes can be returned in this case.
- *TGTLEN* can be less than or greater than *SRCLEN*. On return from MQXCNVC, *DATLEN* is less than or equal to *TGTLEN*.

**Encoding options**: The following options can be used to specify the integer encodings of the source and target strings. The relevant encoding is used *only* when the corresponding character set identifier indicates that the representation of the character set in main storage is dependent on the encoding used for binary integers. This affects only certain multibyte character sets (for example,UCS-2 character sets).

The encoding is ignored if the character set is a single-byte character set (SBCS), or a multibyte character set with representation in main storage that is not dependent on the integer encoding.

Only one of the DCCS* values should be specified, combined with one of the DCCT* values:

**DCCSNA**
Source encoding is the default for the environment and programming language.

**DCCSNO**
Source encoding is normal.

**DCCSRE**
Source encoding is reversed.

**DCCSUN**
Source encoding is undefined.

**DCCTNA**
Target encoding is the default for the environment and programming language.

**DCCTNO**
Target encoding is normal.

**DCCTRE**
Target encoding is reversed.

**DCCTUN**
Target encoding is undefined.

The encoding values defined previously can be added directly to the *OPTS* field. However, if the source or target encoding is obtained from the *MDENC* field in the MQMD or other structure, the following processing must be done:

1. The integer encoding must be extracted from the *MDENC* field by eliminating the float and packed-decimal encodings; see "Analyzing encodings" on page 1398 for details of how to do this.
2. The integer encoding resulting from step 1 must be multiplied by the appropriate factor before being added to the *OPTS* field. These factors are:

   **DCCSFA**
   Factor for source encoding

   **DCCTFA**
   Factor for target encoding

If not specified, the encoding options default to undefined (DCC*UN). In most cases, this does not affect the successful completion of the MQXCNVC call. However, if the corresponding character set is a multibyte character set with representation that is dependent on the encoding (for example, a UCS-2 character set), the call fails with reason code RC2112 or RC2116 as appropriate.

**Default option**: If none of the options described previously is specified, the following option can be used:

**DCCNON**
No options specified.

DCCNON is defined to aid program documentation. It is not intended that this option be used with any other, but as its value is zero, such use cannot be detected.

**SRCCSI (10-digit signed integer) - input**

Coded character set identifier of string before conversion.

This is the coded character set identifier of the input string in *SRCBUF*.

**SRCLEN (10-digit signed integer) - input**

Length of string before conversion.

This is the length in bytes of the input string in *SRCBUF* ; it must be zero or greater.

**SRCBUF (1-byte character string x SRCLEN) - input**

String to be converted.

This is the buffer containing the string to be converted from one character set to another.

**TGTCSI (10-digit signed integer) - input**

Coded character set identifier of string after conversion.

This is the coded character set identifier of the character set to which *SRCBUF* is to be converted.

**TGTLEN (10-digit signed integer) - input**

Length of output buffer.

This is the length in bytes of the output buffer *TGTBUF* ; it must be zero or greater. It can be less than or greater than *SRCLEN*.

**TGTBUF (1-byte character string x TGTLEN) - output**

String after conversion.

This is the string after it has been converted to the character set defined by *TGTCSI*. The converted string can be shorter or longer than the unconverted string. The *DATLEN* parameter indicates the number of valid bytes returned.

**DATLEN (10-digit signed integer) - output**

Length of output string.

This is the length of the string returned in the output buffer *TGTBUF*. The converted string can be shorter or longer than the unconverted string.

**CMPCOD (10-digit signed integer) - output**

Completion code.

It is one of the following:

**CCOK**
Successful completion.

**CCWARN**
Warning (partial completion).

**CCFAIL**
Call failed.

**REASON (10-digit signed integer) - output**

Reason code qualifying *CMPCOD*.

If *CMPCOD* is CCOK:

**RCNONE**
(0, X'000') No reason to report.

If *CMPCOD* is CCWARN:

**RC2120**
(2120, X'848') Converted data too large for buffer.

If *CMPCOD* is CCFAIL:

**RC2010**
(2010, X'7DA') Data length parameter not valid.

**RC2150**
(2150, X'866') DBCS string not valid.

**RC2018**
(2018, X'7E2') Connection handle not valid.

**RC2046**
(2046, X'7FE') Options not valid or not consistent.

**RC2102**
(2102, X'836') Insufficient system resources available.

**RC2145**
(2145, X'861') Source buffer parameter not valid.

**RC2111**
(2111, X'83F') Source coded character set identifier not valid.

**RC2112**
(2112, X'840') Source integer encoding not recognized.

**RC2143**
(2143, X'85F') Source length parameter not valid.

**RC2071**
(2071, X'817') Insufficient storage available.

**RC2146**
(2146, X'862') Target buffer parameter not valid.

**RC2115**
(2115, X'843') Target coded character set identifier not valid.

**RC2116**
(2116, X'844') Target integer encoding not recognized.

**RC2144**
(2144, X'860') Target length parameter not valid.

**RC2195**
(2195, X'893') Unexpected error occurred.

For more information about these reason codes, see "Return codes for IBM i (ILE RPG)" on page 1392.

### RPG invocation (ILE)

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                     CALLP     MQXCNVC(HCONN : OPTS : SRCCSI :
C                                       SRCLEN : SRCBUF : TGTCSI :
C                                       TGTLEN : TGTBUF : DATLEN :
C                                       CMPCOD : REASON)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
DMQXCNVC          PR                  EXTPROC('MQXCNVC')
D* Connection handle
D HCONN                         10I 0 VALUE
D* Options that control the action of MQXCNVC
D OPTS                          10I 0 VALUE
D* Coded character set identifier of string before conversion
D SRCCSI                        10I 0 VALUE
D* Length of string before conversion
D SRCLEN                        10I 0 VALUE
D* String to be converted
D SRCBUF                          *   VALUE
D* Coded character set identifier of string after conversion
D TGTCSI                        10I 0 VALUE
D* Length of output buffer
D TGTLEN                        10I 0 VALUE
D* String after conversion
D TGTBUF                          *   VALUE
D* Length of output string
D DATLEN                        10I 0
D* Completion code
D CMPCOD                        10I 0
D* Reason code qualifying CMPCOD
D REASON                        10I 0
```

## MQCONVX - Data conversion exit

This call definition describes the parameters that are passed to the data-conversion exit.

No entry point called MQCONVX is provided by the queue manager (see usage note "11" on page 1420 ).

This definition is part of the IBM MQ Data Conversion Interface (DCI), which is one of the IBM MQ framework interfaces.


- "Syntax" on page 1419
- "Usage notes" on page 1419
- "Parameters" on page 1420
- "RPG invocation (ILE)" on page 1422


## Syntax

**MQCONVX** ***(MQDXP, MQMD, INLEN, INBUF, OUTLEN, OUTBUF)***

## Usage notes

1. A data-conversion exit is a user-written exit which receives control during the processing of an MQGET call. The function performed by the data-conversion exit is defined by the provider of the exit; however, the exit must conform to the rules described here, and in the associated parameter structure MQDXP.

   The programming languages that can be used for a data-conversion exit are determined by the environment.

2. The exit is invoked only if *all* of the following are true:

   - The GMCONV option is specified on the MQGET call
   - The *MDFMT* field in the message descriptor is not FMNONE
   - The message is not already in the required representation; that is, one or both of the message's *MDCSI* and *MDENC* is different from the value specified by the application in the message descriptor supplied on the MQGET call
   - The queue manager has not already done the conversion successfully
   - The length of the application's buffer is greater than zero
   - The length of the message data is greater than zero
   - The reason code so far during the MQGET operation is RCNONE or RC2079

3. When an exit is being written, consideration should be given to coding the exit in a way that will allow it to convert messages that have been truncated. Truncated messages can arise in the following ways:

   - The receiving application provides a buffer that is smaller than the message, but specifies the GMATM option on the MQGET call.

     In this case, the *DXREA* field in the *MQDXP* parameter on input to the exit will have the value RC2079.

   - The sender of the message truncated it before sending it. This can happen with report messages, for example (see "Conversion of report messages" on page 1408 for more details).

     In this case, the *DXREA* field in the *MQDXP* parameter on input to the exit will have the value RCNONE (if the receiving application provided a buffer that was large enough for the message).

   Thus the value of the *DXREA* field on input to the exit cannot always be used to decide whether the message has been truncated.

   The distinguishing characteristic of a truncated message is that the length provided to the exit in the *INLEN* parameter will be *less than* the length implied by the format name contained in the *MDFMT* field in the message descriptor. The exit should therefore check the value of *INLEN* before attempting to convert any of the data; the exit *should not* assume that the full amount of data implied by the format name has been provided.

If the exit has *not* been written to convert truncated messages, and *INLEN* is less than the value expected, the exit should return XRFAIL in the *DXRES* field of the *MQDXP* parameter, with the *DXCC* field set to CCWARN and the *DXREA* field set to RC2110.

If the exit *has* been written to convert truncated messages, the exit should convert as much of the data as possible (see next usage note), taking care not to attempt to examine or convert data beyond the end of *INBUF*. If the conversion completes successfully, the exit should leave the *DXREA* field in the *MQDXP* parameter unchanged. This returns RC2079 if the message was truncated by the receiver's queue manager, and RCNONE if the message was truncated by the sender of the message.

It is also possible for a message to expand *during* conversion, to the point where it is bigger than *OUTBUF*. In this case the exit must decide whether to truncate the message; the *DXAOP* field in the *MQDXP* parameter will indicate whether the receiving application specified the GMATM option.

4. Generally it is recommended that all of the data in the message provided to the exit in *INBUF* is converted, or that none of it is. An exception to this, however, occurs if the message is truncated, either before conversion or during conversion; in this case there may be an incomplete item at the end of the buffer (for example: one byte of a double-byte character, or 3 bytes of a 4-byte integer). In this situation it is recommended that the incomplete item should be omitted, and unused bytes in *OUTBUF* set to nulls. However, complete elements or characters within an array or string *should* be converted.
5. When an exit is needed for the first time, the queue manager attempts to load an object that has the same name as the format (apart from extensions). The object loaded must contain the exit that processes messages with that format name. It is recommended that the exit name, and the name of the object that contain the exit, should be identical, although not all environments require this.
6. A new copy of the exit is loaded when an application attempts to retrieve the first message that uses that *MDFMT* since the application connected to the queue manager. A new copy might also be loaded at other times, if the queue manager has discarded a previously loaded copy. For this reason, an exit should not attempt to use static storage to communicate information from one invocation of the exit to the next - the exit may be unloaded between the two invocations.
7. If there is a user-supplied exit with the same name as one of the built-in formats supported by the queue manager, the user-supplied exit does not replace the built-in conversion routine. The only circumstances in which such an exit is invoked are:
   - If the built-in conversion routine cannot handle conversions to or from either the *MDCSI* or *MDENC* involved, or
   - If the built-in conversion routine has failed to convert the data (for example, because there is a field or character which cannot be converted).
8. The scope of the exit is environment-dependent. *MDFMT* names should be chosen so as to minimize the risk of clashes with other formats. It is recommended that they start with characters that identify the application defining the format name.
9. The data-conversion exit runs in an environment like that of the program which issued the MQGET call; environment includes address space and user profile (where applicable). The program could be a message channel agent sending messages to a destination queue manager that does not support message conversion. The exit cannot compromise the queue manager's integrity, since it does not run in the queue manager's environment.
10. The only MQI call which can be used by the exit is MQXCNVC; attempting to use other MQI calls fails with reason code RC2219, or other unpredictable errors.
11. No entry point called MQCONVX is provided by the queue manager. The name of the exit should be the same as the format name (the name contained in the *MDFMT* field in MQMD), although this is not required in all environments.

## Parameters

The MQCONVX call has the following parameters:

**MQDXP (MQDXP) - input/output**

Data-conversion exit parameter block.

This structure contains information relating to the invocation of the exit. The exit sets information in this structure to indicate the outcome of the conversion. See "MQDXP - Data-conversion exit parameter" on page 1409 for details of the fields in this structure.

**MQMD (MQMD) - input/output**

Message descriptor.

On input to the exit, this is the message descriptor that would be returned to the application if no conversion were performed. It therefore contains the *MDFMT*, *MDENC*, and *MDCSI* of the unconverted message contained in *INBUF*.

**Note:** The *MQMD* parameter passed to the exit is always the most recent version of MQMD supported by the queue manager which invokes the exit. If the exit is intended to be portable between different environments, the exit should check the *MDVER* field in *MQMD* to verify that the fields that the exit needs to access are present in the structure.

On IBM i, the exit is passed a version-2 MQMD.

On output, the exit should change the *MDENC* and *MDCSI* fields to the values requested by the application, if conversion was successful; these changes will be reflected back to the application. Any other changes that the exit makes to the structure are ignored; they are not reflected back to the application.

If the exit returns XROK in the *DXRES* field of the MQDXP structure, but does not change the *MDENC* or *MDCSI* fields in the message descriptor, the queue manager returns for those fields the values that the corresponding fields in the MQDXP structure had on input to the exit.

**INLEN (10-digit signed integer) - input**

Length in bytes of *INBUF*.

This is the length of the input buffer *INBUF*, and specifies the number of bytes to be processed by the exit. *INLEN* is the lesser of the length of the message data before conversion, and the length of the buffer provided by the application on the MQGET call.

The value is always greater than zero.

**INBUF (1-byte bit string x INLEN) - input**

Buffer containing the unconverted message.

This contains the message data before conversion. If the exit is unable to convert the data, the queue manager returns the contents of this buffer to the application after the exit has completed.

**Note:** The exit should not alter *INBUF* ; if this parameter is altered, the results are undefined.

**OUTLEN (10-digit signed integer) - input**

Length in bytes of *OUTBUF*.

This is the length of the output buffer *OUTBUF*, and is the same as the length of the buffer provided by the application on the MQGET call.

The value is always greater than zero.

**OUTBUF (1-byte bit string x OUTLEN) - output**

Buffer containing the converted message.

On output from the exit, if the conversion was successful (as indicated by the value XROK in the *DXRES* field of the *MQDXP* parameter), *OUTBUF* contains the message data to be delivered to the application, in the requested representation. If the conversion was unsuccessful, any changes that the exit has made to this buffer are ignored.

### RPG invocation (ILE)

```
C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
C                    CALLP     exitname(MQDXP : MQMD : INLEN :
C                                       INBUF : OUTLEN : OUTBUF)
```

The prototype definition for the call is:

```
D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
Dexitname         PR                  EXTPROC('exitname')
D* Data-conversion exit parameter block
D MQDXP                         44A
D* Message descriptor
D MQMD                         364A
D* Length in bytes of INBUF
D INLEN                         10I 0 VALUE
D* Buffer containing the unconverted message
D INBUF                          *   VALUE
D* Length in bytes of OUTBUF
D OUTLEN                        10I 0 VALUE
D* Buffer containing the converted message
D OUTBUF                         *   VALUE
```

**End of product-sensitive programming interface**

# SOAP reference

IBM MQ transport for SOAP reference information arranged alphabetically.

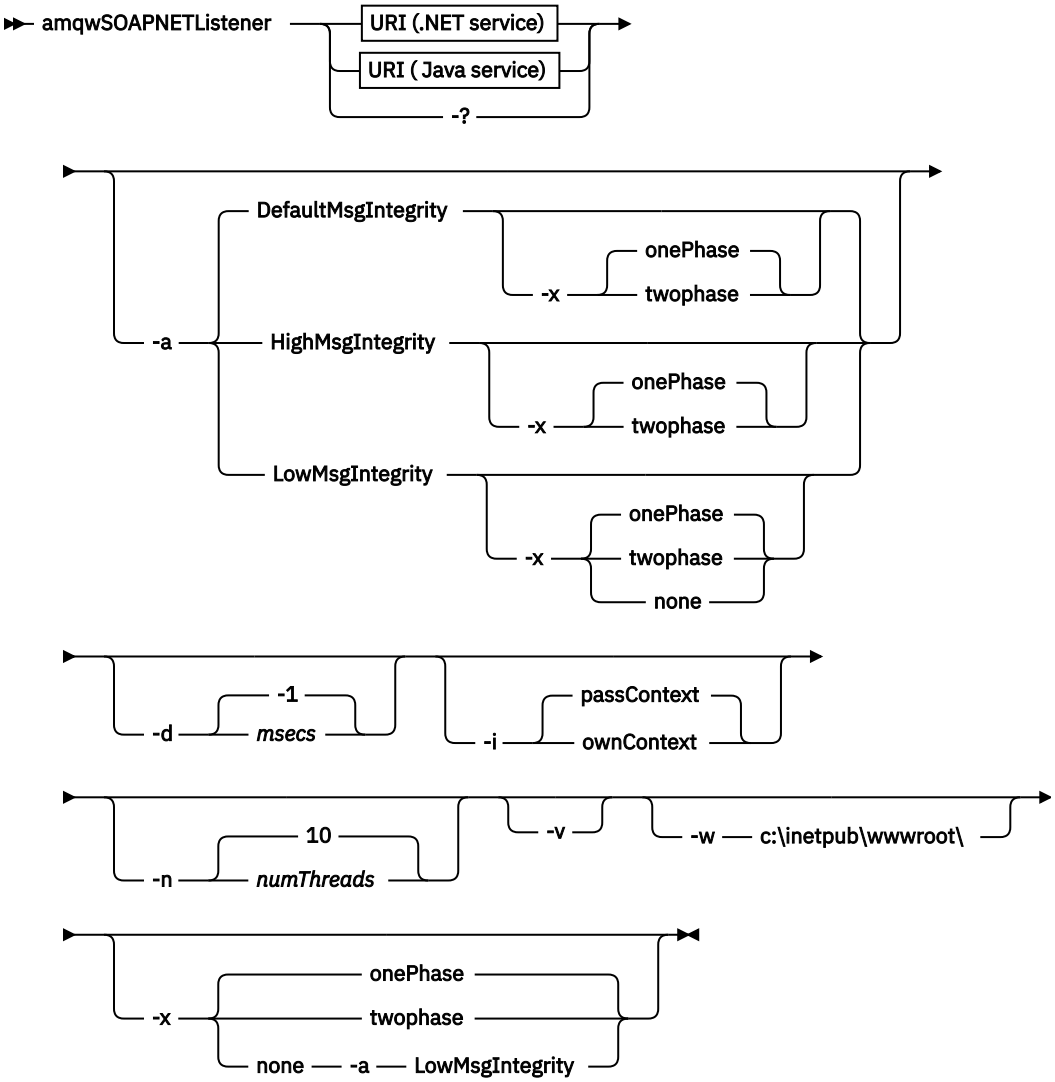
## amqwSOAPNETListener: IBM MQ SOAP listener for .NET Framework 1 or 2

Syntax and parameters for the IBM MQ SOAP listener for .NET Framework 1 or 2.

### Purpose

Starts the IBM MQ SOAP listener for .NET Framework 1 or 2.

**.NET**




## Required parameters

**URI *platform***
See “URI syntax and parameters for Web service deployment” on page 1460.

**-?**
Print out help text describing how the command is used.

## Optional parameters

**-a *integrityOption***
*integrityOption* specifies the behavior of IBM MQ SOAP listeners if it is not possible to put a failed request message on the dead-letter queue. *integrityOption* can take one of the following values:

**DefaultMsgIntegrity**
For non-persistent messages, the listener displays a warning message and continues to execute with the original message being discarded. For persistent messages, it displays an error message, backs out the request message so it remains on the request queue and exits. DefaultMsgIntegrity applies if the -a option is omitted, or if *integrityOption* is not specified.

**LowMsgIntegrity**
For both persistent and non-persistent messages, the listener displays a warning and continues to execute, discarding the message.

**HighMsgIntegrity**
For both persistent and non-persistent messages, the listener displays an error message, backs out the request message so it remains on the request queue and exits.

The deployment utility checks for the compatibility of the -x and -a flags. If -x none is specified, then -a LowMsgIntegrity must be specified. If the flags are incompatible the deployment utility exits with an error message and with no deployment steps having been undertaken.

**-d** ***msecs***
*msecs* specifies the number of milliseconds for the IBM MQ SOAP listener to stay alive if request messages have been received on any thread. If *msecs* is set to -1, the listener stays alive indefinitely.

**-i** ***Context***
*Context* specifies whether the listeners pass identity context. *Context* takes the following values:

**passContext**
Set the identity context of the original request message into the response message. The SOAP listener checks that it has authority to save the context from the request queue and to pass it to the response queue. It makes the checks at run time when opening the request queue to save context, and the response queue to pass context. If it does not have the required authority, or the MQOPEN call fails, and the response message is not processed. The response message is put on the dead-letter queue with the dead-letter header containing the return code from the failed MQOPEN. The listener then continues to process subsequent incoming messages as normal.

**ownContext**
The SOAP listener does not pass context. The returned context reflects the user ID under which the listener is running rather than the user ID which created the original request message.

The fields in the origin context are set by the queue manager, and not by the SOAP listener.

**-n** ***numThreads***
*numThreads* specifies the number of threads in the generated startup scripts for the IBM MQ SOAP listener. The default is 10. Consider increasing this number if you have high message throughput.

**-v**
-v sets verbose output from external commands. Error messages are always displayed. Use -v to output commands that you can tailor to create customized deployment scripts.

**-w** ***serviceDirectory***
*serviceDirectory* is the directory containing the web service.

**-x** ***transactionality***
*transactionality* specifies the type of transactional control for the listener. *transactionality* can be set to one of the following values:

**onePhase**
IBM MQ one-phase support is used. If the system fails during processing, the request message is redelivered to the application. IBM MQ transactions ensure that the response messages are written exactly once.

**twoPhase**
Two-phase support is used. If the service is written appropriately the message is delivered exactly once, coordinated with other resources, within a single committed execution of the service. This option applies to server bindings connections only.

**none**
No transactional support. If the system fails during processing, the request message can be lost, even if persistent. The service might or might not have executed, and response, report or dead-letter messages might or might not be written.

The deployment utility checks for the compatibility of the -x and -a flags. See the description of the -a flag for details.

### .NET Example

```
amqwSOAPNETlistener
```

```
-u "jms:/queue?destination=myQ&connectionFactory=()
&targetService=myService&initialContextFactory=com.ibm.mq.jms.Nojndi"
-w C:/wmqsoap/demos
-n 20
```

# amqswsdl: generate WSDL for .NET Framework 1 or 2 service

**amqswsdl** takes a Web service written for .NET Framework 1 or 2, and generates the WSDL for the class, inserting the URI you provide for the IBM MQ transport for SOAP into the generated WSDL.

## Purpose

Use **amqswsdl** to generate WSDL containing the URI of the service deployed to IBM MQ. Use the WSDL to generate client proxies.

## Parameters

***escapedUri* (Input)**
The URI of the service, with all "&" escaped to "&amp.". For example:

```
"jms:/queue?destination=REQUESTDOTNET
&amp.initialContextFactory=com.ibm.mq.jms.Nojndi
&amp.connectionFactory=(connectQueueManager(QM1)binding(server))
&amp.targetService=Quote.asmx"
```

***className*.asmx (Input)**
The service class.

***className*.wsdl (Output)**
The service WSDL.

## Description

If the class is implemented using the code-behind programming model, you must build *className*.dll and store it in ./bin.

# amqwclientconfig: create Axis 1.4 Web services client deployment descriptor for IBM MQ transport for SOAP

**amqwclientconfig** creates the client-config.wsdd Axis 1.4 client deployment descriptor file.

## Purpose

It adds the jms:/ transport to the descriptor, and registers java:com.ibm.mq.soap.transport.jms.WMQSender as the class to handle SOAP requests for the jms: transport.

### Syntax

## Description

**amqwclientconfig** calls **amqwsetcp** to set the CLASSPATH and runs the command:

```
java org.apache.axis.utils.Admin client "%WMQSOAP_HOME%\bin\amqwclientTransport.wsdd"
```

# amqwdeployWMQService: deploy Web service utility

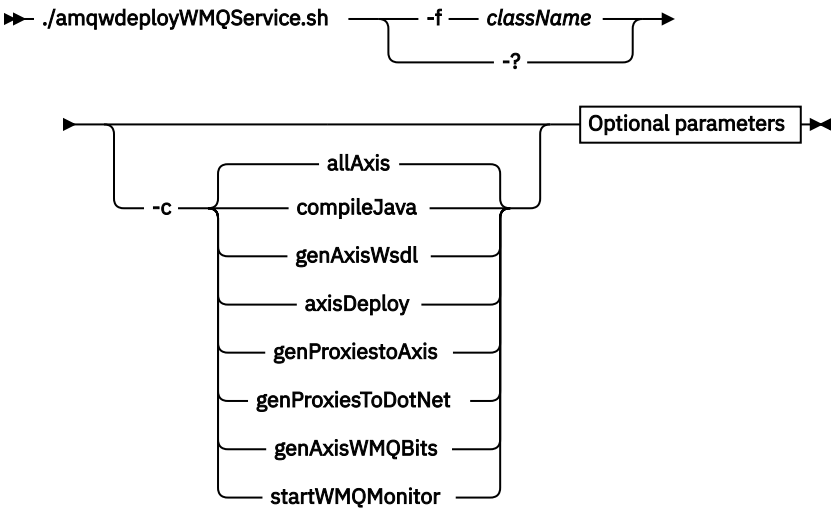
The deployment utility prepares a service class for use as a Web service using IBM MQ as the transport.

## Purpose

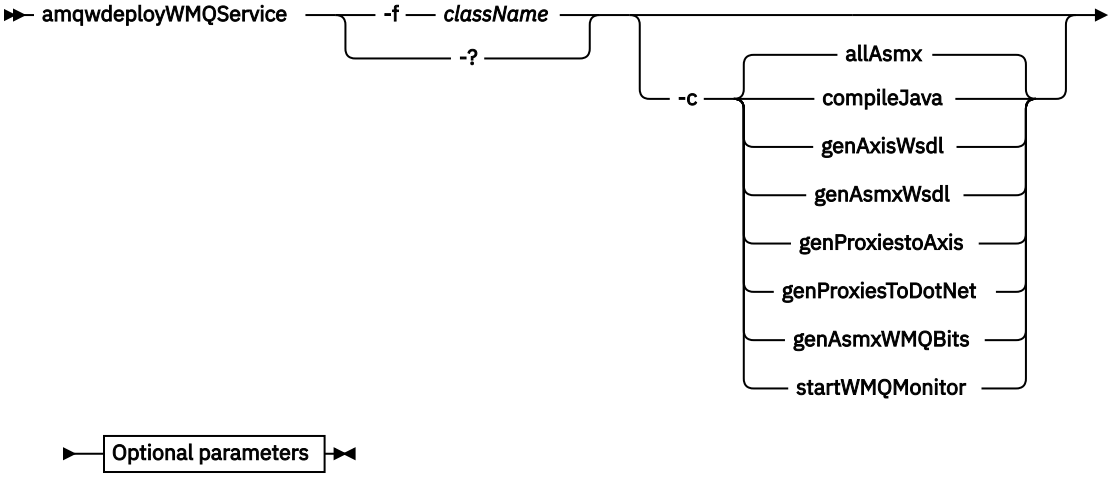
Use the deployment utility to generate the files that are needed to deploy an Axis 1.4, .NET Framework 1 or .NET Framework 2 service. Use the files to deploy a service invoked by IBM MQ. The files generated by **amqwdeployWMQService** are shown in "Output files from amqwdeployWMQService" on page 1430.

### Syntax diagram

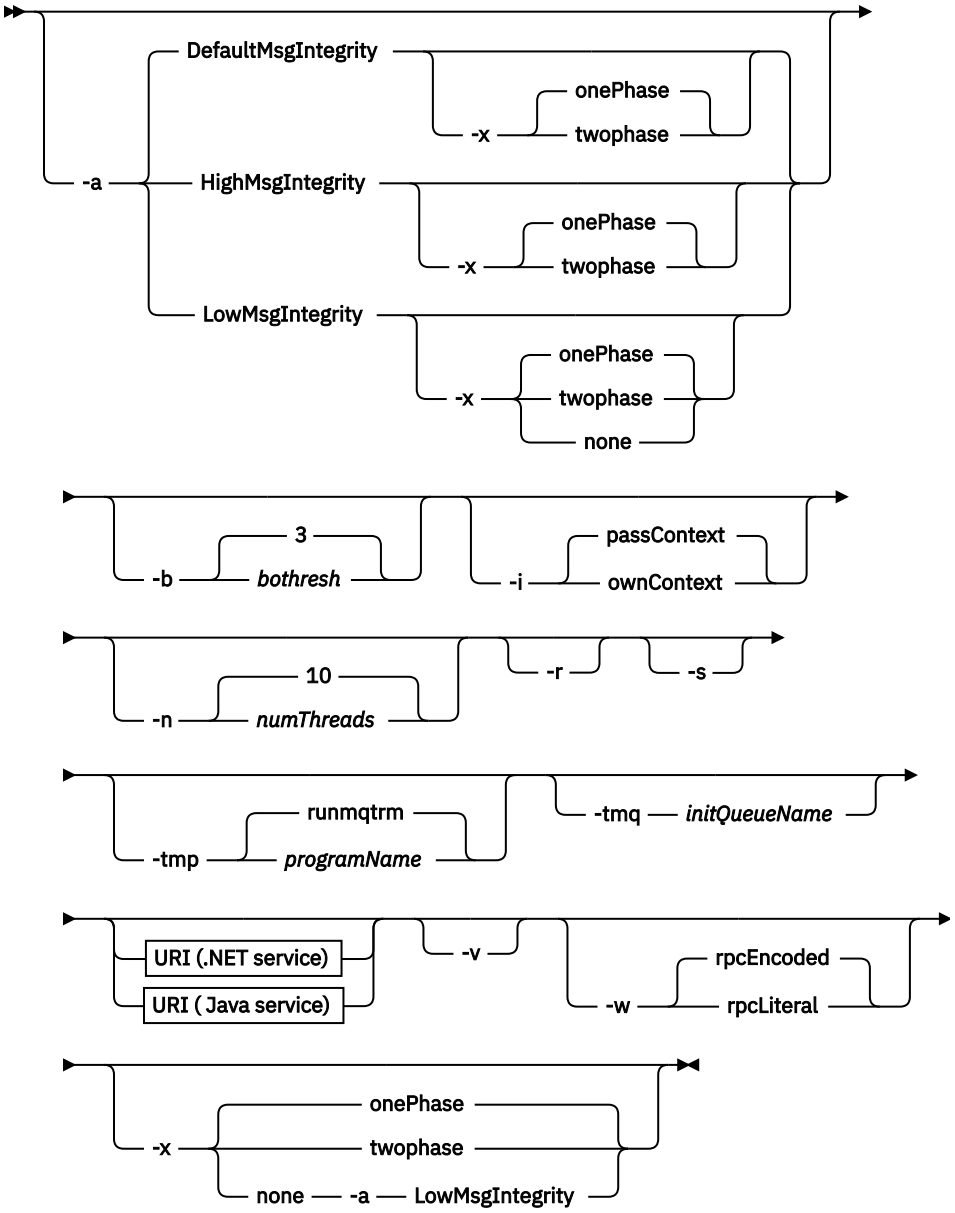
**UNIX and Linux systems**




**Windows**




### Optional parameters




## Required parameters

**-f** ***className***

*className* is the name of the class to be deployed. For Axis services *className* is the Java source file, and for .NET services, the `.asmx` file. Figure 10 on page 1427 illustrates the deployment of an Axis service and Figure 11 on page 1427 of a .NET service.

```
amqwdeployWMQService -f javaDemos/service/StockQuoteAxis.java
```

*Figure 10. Example deployment of Axis service*

```
amqwdeployWMQService -f StockQuoteDotNet.asmx
```

*Figure 11. Example deployment of .NET service*

For Java, *className* must be fully qualified by the package name. It can be specified as a path name with directory separators or as a class name with period separators. The generated class is

located in `./generated/client/remote/`*`path name`* . For a .NET service, although the directory can be specified, generated Java proxies are always located in `./generated/client/remote/dotNetService`.

If you specify a URI with the -u option and within the URI specify *targetService*, the deployment utility checks the *className*. *className* must match *targetService*. If the class and service do not match, the deployment utility displays an error message and exits.

**-?**
Print out help text describing how the command is used.

## Optional parameters

**-a *integrityOption***
*integrityOption* specifies the behavior of IBM MQ SOAP listeners if it is not possible to put a failed request message on the dead-letter queue. *integrityOption* can take one of the following values:

**DefaultMsgIntegrity**
For non-persistent messages, the listener displays a warning message and continues to execute with the original message being discarded. For persistent messages, it displays an error message, backs out the request message so it remains on the request queue and exits. DefaultMsgIntegrity applies if the -a option is omitted, or if *integrityOption* is not specified.

**LowMsgIntegrity**
For both persistent and non-persistent messages, the listener displays a warning and continues to execute, discarding the message.

**HighMsgIntegrity**
For both persistent and non-persistent messages, the listener displays an error message, backs out the request message so it remains on the request queue and exits.

The deployment utility checks for the compatibility of the -x and -a flags. If -x none is specified, then -a LowMsgIntegrity must be specified. If the flags are incompatible the deployment utility exits with an error message and with no deployment steps having been undertaken.

**-b *bothresh***
*bothresh* specifies the backout threshold setting for the request queue. The default is 3.

**-c *operation***
*operation* specifies which part of the deployment process to execute. *operation* is one of the following options:

**allAxis**
Perform all compile and setup steps for an Axis or Java service [5] .

**compileJava**
Compile the Java service: `.java` to `.class`.

**genAxisWsdl**
Generate WSDL: `.class` to `.wsdl`.

**axisDeploy**
Deploy the class file: `.wsdl` to `.wsdd`, apply `.wsdd`.

**genProxiestoAxis**
Generate proxies: `.wsdl` to `.java` and `.class`.

**genAxisWMQBits**
Set up IBM MQ queues, IBM MQ SOAP listeners and triggers for an Axis service.

**allAsmx**
Perform all setup steps for a .NET service [6] .

**genAsmxWsdl**
Generate WSDL: `.asmx` to `.wsdl`.

[5] Default if *className* has a .java extension
[6] Default if *className* has a .asmx extension.

**genProxiesToDotNet**
Generate proxies: `.wsdl` to `.java`, `.class`, `.cs` and `.vb`.

**genAsmxWMQBits**
Set up IBM MQ queues, IBM MQ SOAP listeners and triggers

**startWMQMonitor**
Start the trigger monitor for IBM MQ SOAP services.

**Note: runmqtrm** runs under the `mqm` user ID. If security is an issue, you must ensure that the listeners are started under appropriate user IDs.

**-i *Context***
*Context* specifies whether the listeners pass identity context. *Context* takes the following values:

**passContext**
Set the identity context of the original request message into the response message. The SOAP listener checks that it has authority to save the context from the request queue and to pass it to the response queue. It makes the checks at run time when opening the request queue to save context, and the response queue to pass context. If it does not have the required authority, or the `MQOPEN` call fails, and the response message is not processed. The response message is put on the dead-letter queue with the dead-letter header containing the return code from the failed `MQOPEN`. The listener then continues to process subsequent incoming messages as normal.

**ownContext**
The SOAP listener does not pass context. The returned context reflects the user ID under which the listener is running rather than the user ID which created the original request message.

The fields in the origin context are set by the queue manager, and not by the SOAP listener.

**-n *numThreads***
*numThreads* specifies the number of threads in the generated startup scripts for the IBM MQ SOAP listener. The default is 10. Consider increasing this number if you have high message throughput.

**-r**
*-r* specifies that any existing request or trigger monitor queue definitions are replaced. Trigger monitor queues are replaced only if -tmq is also specified. Queues are re-created with standard default attributes and existing messages on the queues are deleted. If the -r option is not used then any existing queue definitions are not altered and existing messages are not deleted. By not specifying -r, you ensure that any customized queue attributes are preserved.

**-s**
Configure the listener to run as an IBM MQ service. If -s and -tmq are both specified, the deployment utility displays an error message and exits.

**-tmp *programName***
*programName* specifies the name of a trigger monitor program. Use `-tmp` *programName* in a UNIX or Linux environment as an alternative to using **runmqtrm**. Programs it initiates run under `mqm` authority.

For example:

```
amqwdeployWMQService -f javaDemos/service/StockQuoteAxis.java
-tmq trigger.monitor.queue -tmp trigmon
```

**-tmq *queueName***
*queueName* specifies a trigger monitor queue name. IBM MQ process definitions are created to configure automatic triggering of IBM MQ SOAP listeners with the associated trigger monitor queue name. If the option is not specified then no triggering configuration is defined by the deployment utility. If -s and -tmq are both specified, the deployment utility displays an error message and exits.

**URI *platform***
See “URI syntax and parameters for Web service deployment” on page 1460.

**-v**
-v sets verbose output from external commands. Error messages are always displayed. Use -v to output commands that you can tailor to create customized deployment scripts.

**-w**
-w controls the style of WSDL to generate. The default is rpcEncloded, for compatibility with previous releases of IBM MQ transport for SOAP. Use rpcLiteral to create WSDL compatible with Axis2 client proxy generation. rpcEncoded is not compatible with WS-I recommendations.

**-x** ***transactionality***
*transactionality* specifies the type of transactional control for the listener. *transactionality* can be set to one of the following values:

**onePhase**
IBM MQ one-phase support is used. If the system fails during processing, the request message is redelivered to the application. IBM MQ transactions ensure that the response messages are written exactly once.

**twoPhase**
Two-phase support is used. If the service is written appropriately the message is delivered exactly once, coordinated with other resources, within a single committed execution of the service. This option applies to server bindings connections only.

**none**
No transactional support. If the system fails during processing, the request message can be lost, even if persistent. The service might or might not have executed, and response, report or dead-letter messages might or might not be written.

The deployment utility checks for the compatibility of the -x and -a flags. See the description of the -a flag for details.

### Errors

On Windows, if errors are reported from **amqswsdl**, try issuing the following command to register `.asmx` files as services.

```
%windir%/Microsoft.NET/Framework/ version number /aspnet_regiis.exe -ir
```

The problem typically occurs on systems where IIS has not been installed, or IIS has been installed after NET. The problem is encountered when **amqswsdl** generates the `.wsdl` files.

**Note:** The registry keys are also required to permit the listener to invoke the services. If you use your own customized deployment procedures, you might not encounter the problem until run time.

## Output files from amqwdeployWMQService

A list of the directories and files output from **amqwdeployWMQService**

*Table 633. Output files from **amqwdeployWMQService***

| Outputs | Description | Output directory | Filename |
|---|---|---|---|
| `.class` | Compiled Java source file | `./generated/server/`*`server package`* | *`classname`*`.class` |
| `.wsdl` | Service description | `./generated` | *`className`* `Axis_Wmq.wsdl`<br>*`className`* `DotNet_Wmq.wsdl` |
| `.wsdd` | Axis client and service deployment files | `./` | `client-config.wsdd`<br>`server-config.wsdd` |
| | | `./generated/server/`*`server package`* | *`className`* `_deploy.wsdd`<br>*`className`* `_undeploy.wsdd` |

| *Table 633. Output files from **amqwdeployWMQService** (continued)* | | | |
|---|---|---|---|
| **Outputs** | **Description** | **Output directory** | **Filename** |
| Client source (`.vb`, `.cs`, `.java`) | .Net client stubs to Axis service | `./generated/client` | *classname* AxisService.cs<br>*classname* AxisService.vb |
| | .Net client stubs to .Net service | `./generated/client` | *classname* DotNet.cs<br>*classname* DotNet.vb |
| Client helper (`.java` and `.class`) | Java client proxies to .Net service | `./generated/server/soap/client/remote/dotnetService` | *className* DotNet.class<br>*className* DotNet.java<br>*className* DotNetLocator.class<br>*className* DotNetLocator.java<br>*className* DotNetSoap12Stub.class<br>*className* DotNetSoap12Stub.java<br>*className* DotNetSoap_BindingStub.class<br>*className* DotNetSoap_BindingStub.java<br>*className* DotNetSoap_PortType.class<br>*className* DotNetSoap_PortType.java |
| | Java client proxies to Axis service | `./generated/server/soap/client/remote/`*client package* | SoapServer *className*<br>AxisBindingSoapStub.class<br>SoapServer *className*<br>AxisBindingSoapStub.java<br>*className* Axis.class<br>*className* Axis.java<br>*className* AxisService.class<br>*className* AxisService.java<br>*className* AxisServiceLocator.class<br>*className* AxisServiceLocator.java |
| Scripts (`.cmd` and `.sh`) | Listener scripts | `/generated/server` | startWMQJListener.cmd<br>startWMQJListener.sh<br>startWMQNListener.cmd<br>endWMQJListener.cmd<br>endWMQJListener.sh<br>endWMQNListener.cmd |

## Usage notes for amqwdeployWMQService

Describes the tasks performed by **amqwdeployWMQService**.

The deployment utility performs the following actions.

1. Checks paths to the following files:
   - `axis.jar`.
   - *WMQSOAP_HOME*`/java/lib/com.ibm.mq.soap.jar`.
   - On Windows, `csc.exe`
2. On Windows, uses either `%SystemRoot%\Microsoft.NET\Framework\v1.1.432` or, if the C# compiler is installed, the path to `csc.exe` as the path to the .NET Framework.

**Note:** If you have Microsoft Visual Studio 2008 installed (Version 9), `wsdl.exe` is not in the path to `csc.exe`. You need to add the path to the .NET framework to your Path variable; for example:

```
Set Path=C:\WINDOWS\Microsoft.NET\Framework\v2.0.50727;%Path%
```

3. Creates the `./generated` directory, and required subdirectories, if they do not exist.
4. For Java services, compiles the source into *className*.class.
5. Generates WSDL.
6. For Java services, creates deployment descriptor files *className* `_deploy.wsdd` and *className* `_undeploy.wsdd`
7. For Java services, creates or updates the Axis deployment descriptor file, `server-config.wsdd`.
8. Generates the client proxies for Java, C# and Visual Basic from the WSDL.

   **Note:** On Windows, the deploy utility generates proxies for Visual Basic and C# regardless of the language in which the service is written. The WSDL and the proxies generated from it include the appropriate URI to call the service:

   a.
   ```
   jms:/queue?destination=SOAPN.demos@WMQSOAP.DEMO.QM
   &connectionFactory=(connectQueueManager(WMQSOAP.DEMO.QM))
   &initialContextFactory=com.ibm.mq.jms.Nojndi
   &targetService=StockQuoteDotNet.asmx
   &replyDestination=SYSTEM.SOAP.RESPONSE.QUEUE
   ```

   *Figure 12. Example URI in generated .NET client to call .NET service*

   b.
   ```
   jms:/queue?destination=SOAPJ.demos@WMQSOAP.DEMO.QM
   &connectionFactory=(connectQueueManager(WMQSOAP.DEMO.QM))
   &initialContextFactory=com.ibm.mq.jms.Nojndi
   &targetService=soap.server.StockQuoteAxis.java
   &replyDestination=SYSTEM.SOAP.RESPONSE.QUEUE
   ```

   *Figure 13. Example URI in generated .NET client to call Axis 1 service*
9. Compiles the Java proxies.
10. Creates an IBM MQ queue, *requestQueue* to hold requests for the service. The default queue name is of the form SOAPJ. *directory* , or you can specify *requestQueue* in the -u URI option.
11. Creates command and shell script files to start the IBM MQ SOAP listeners that process the request queue.
12. If the -tmq option has been used, the deployment utility creates IBM MQ definitions to trigger IBM MQ SOAP listener processes automatically.
    - The deployment utility uses the APPLICID attribute of the **runmqsc** DEFINE PROCESS command to contain a command to start the listener. The command has the name of the deployment directory embedded in it. The APPLICID field has a maximum length of 256, which limits the maximum length of the deployment directory. The directory limit for Java services is as follows:
      - UNIX and Linux systems: 218
      - Windows: 197 minus the length of the request queue name.

      For .NET services, the directory limit is as follows:
      - Windows: 209 minus length of the service name, minus the `.asmx` extension.
    - The deployment utility checks whether the limit for APPLICID is exceeded. If the limit is exceeded, the utility does not attempt to define the triggering process. It displays an error message and the deployment process fails without performing any deployment steps.

The following examples show the configuration and start commands generated by the deployment utility to start an IBM MQ SOAP listener.

```
DEFINE PROCESS(requestQueue) APPLICID(applicIDStr) REPLACE
ALTER  QLOCAL (requestQueue) TRIGTYPE(FIRST) TRIGGER
       PROCESS(requestQueue) INITQ(initQueueName) TRIGMPRI(0)
```

*Figure 14. IBM MQ configuration commands to trigger a SOAP listener.*

```
applicIDStr = start "Java WMQSoapListener -requestQueue"
                    /min .\generated\server\startWMQJListener.cmd;
```

*Figure 15. Starting Axis SOAP listener on Windows*

```
applicIDStr = start "WMQAsmxListener -className\
                    /min .\generated\server\startWMQNListener.cmd;
```

*Figure 16. Starting .NET SOAP listener on Windows*

```
applicIDStr = xterm -iconic -T \"Java WMQSoapListener_requestQueue\"
                  -e ./generated/server/startWMQJListener.sh & #
```

*Figure 17. Starting Axis SOAP listener on UNIX and Linux systems*

# amqwRegisterdotNet: register IBM MQ transport for SOAP to .NET

Register IBM MQ transport for SOAP to the global assembly cache on .NET.

## Purpose

**amqwRegisterdotNet** registers the IBM MQ SOAP sender, SOAP listener, and WSDL processor with .NET Framework 1 or 2.

## Syntax

## Description

**amqwRegisterdotNet** is run automatically during installation. You do not need to run it again if the .NET Framework you are using was installed before IBM MQ transport for SOAP. You can run it as many times as you want. Use it to reregister IBM MQ transport for SOAP with different .NET Framework versions.

**Note:** On Windows 2003 Server, you must also run the **aspnet_regiis** utility, even if you are not deploying to Internet Information Server (IIS). The location of the `aspnet_regiis.exe` utility might vary with different versions of the Microsoft.NET Framework, but it is typically located in: `%SystemRoot%/Microsoft.NET/Framework/version number/aspnet_regiis`. If multiple versions are installed, use **aspnet_regiis** for the version of .NET Framework you are using.

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# MQMD SOAP settings

The IBM MQ SOAP sender and IBM MQ SOAP listener create a message descriptor ( **MQMD** ). The topic describes the fields you must set in the MQMD if you create your own SOAP sender or listener.

## Purpose

The values set in the **MQMD** control the exchange of messages between the IBM MQ SOAP sender, the IBM MQ SOAP listener, and the SOAP client program. If you create your own SOAP sender or listener, follow the rules in Table 634 on page 1438.

## Description

Table 634 on page 1438 describes how the **MQMD** fields are set by the IBM MQ SOAP sender and IBM MQ SOAP listener. If you write your own sender or listener you must set these fields in accordance with the rules for exchanging messages. The IBM MQ SOAP listener conforms to typical IBM MQ message exchange protocols. If you write your own sender to work with the IBM MQ SOAP listeners, you can set different **MQMD** values.

In Table 634 on page 1438, the values in the Setting column are organized as follows:

**Request, One way**
Settings made by IBM MQ SOAP sender.

**Response, Report**
Settings made by IBM MQ SOAP listener in response to IBM MQ SOAP sender request.

**ALL**
Settings made by both the IBM MQ SOAP sender and IBM MQ SOAP listener.

**Customized sender**
You can write your own sender. Typically, a customized sender overrides the standard report options.

| *Table 634. MQMD SOAP settings* | | |
|---|---|---|
| **Field name** | **Setting** | **Values** |
| *StrucId* | **ALL**<br>MQMD_STRUC_ID | 'MD¬¬' [1] |
| *Version* | **ALL**<br>MQMD_VERSION_2 | 2 |
| *Report* | **ALL**<br>MQRO_NONE + MQRO_NEW_MSG_ID + MQRO_COPY_MSG_ID_TO_CORREL_ID + MQRO_EXCEPTION + MQRO_EXPIRY + MQRO_DISCARD<br>**Customized sender**<br>See “Customized report options” on page 1442 | 52428800 |
| *MsgType* | **Request**<br>MQMT_REQUEST<br>**Response**<br>MQMT_REPLY<br>**Report**<br>MQMT_REPORT<br>**One way**<br>MQMT_DATAGRAM | **MQMT_REQUEST**<br>1<br>**MQMT_REPLY**<br>2<br>**MQMT_REPORT**<br>4<br>**MQMT_DATAGRAM**<br>8 |
| *Expiry* | **Request, One way**<br>Specified by Expiry option in URI. Defaults to MQEI_UNLIMITED.<br>**Response**<br>Value of Expiry in request message<br>**Report**<br>MQEI_UNLIMITED | **MQEI_UNLIMITED**<br>-1 |

*Table 634. MQMD SOAP settings (continued)*

| Field name | Setting | Values |
|---|---|---|
| *Feedback* | **Request, Response, One way**<br>MQFB_NONE.<br>**Report**<br>• Generated by queue manager - value set according to normal rules.<br>• Generated by IBM MQ SOAP Listener:<br>**MQRC_BACKOUT_THRESHOLD_REACHED**<br>Backout threshold for multiple attempts exceeded.<br>**MQRCCF_MD_FORMAT_ERROR**<br>The message is not recognized as having an MQRFH2 header.<br>**MQRC_RFH_PARM_MISSING**<br>A required parameter, for example, SoapAction, in **MQRFH2** is missing.<br>**MQRC_RFH_FORMAT_ERROR**<br>A basic integrity check of the **MQRFH2** failed, for example, internal lengths are corrupted.<br>**MQRC_RFH_ERROR**<br>The **MQRFH2** passed an integrity check, but the body of the message is not set to MQFMT_NONE. | **MQFB_NONE**<br>0<br>**MQRC_BACKOUT_THRESHOLD_REACHED**<br>2362<br>**MQRCCF_MD_FORMAT_ERROR**<br>3023<br>**MQRC_RFH_PARM_MISSING**<br>2339<br>**MQRC_RFH_FORMAT_ERROR**<br>2421<br>**MQRC_RFH_ERROR**<br>2334 |
| *Encoding* | **ALL**<br>MQENC_NATIVE | Depends on environment |
| *CodedCharSetId* | **ALL**<br>Set to UTF-8 | 1208 |
| *Format* | **Request, Response, One way**<br>MQFMT_RF_HEADER_2<br>**Report**<br>**Queue manager reports**<br>Follows IBM MQ rules<br>**IBM MQ SOAP listener reports**<br>Format of the original request message. | **MQFMT_RF_HEADER_2**<br>"MQRFH2 " |
| *Priority* | **Request, One way**<br>Specified by Priority option in URI. Defaults to MQPRI_PRIORITY_AS_Q_DEF.<br>**Response, Report**<br>Value of Priority in the request message. | **MQPRI_PRIORITY_AS_Q_DEF**<br>-1 |

| Table 634. MQMD SOAP settings (continued) | | |
|---|---|---|
| **Field name** | **Setting** | **Values** |
| *Persistence* | **Request, One way**<br>MQPER_PERSISTENCE_AS_Q_DEF.<br>**Response, Report**<br>Value of Persistence in the request message. | **MQPER_PERSISTENCE_AS_Q_DEF**<br>2 |
| *MsgId* | **Request, One way**<br>Generated by the queue manager.<br>**Response, Report**<br>The IBM MQ SOAP sender sets MQRO_NEW_MSG_ID and *MsgId* is generated | **Generated**<br>Unique value generated by the queue manager |
| *CorrelId* | **Request, One way, Report**<br>MQCI_NONE<br>**Response, Report**<br>The IBM MQ SOAP sender sets MQRO_COPY_MSG_ID_TO_CORREL_ID and the listener copies *MsgId* from the request message. | **MQCI_NONE**<br>0 |
| *BackoutCount* | **ALL**<br>Not used | 0 |
| *ReplyToQ* | **Request**<br>Specified by replyDestination option in URI. Defaults to SYSTEM.SOAP.RESPONSE.QUEUE.<br>**Response, One way, Report**<br>Left blank | |
| *ReplyToQMgr* | **ALL**<br>Field left blank | Generated by the queue manager; see Reply-to queue and queue manager. |
| *UserIdentifier* | **Request, One way, Report**<br>Left blank<br>**Response**<br>Depends on the -i *passContext* option supplied to the listener, and the authority the listener is running under. | **Request, One way, Report**<br>Generated by the queue manager; see "UserIdentifier (MQCHAR12)" on page 446<br>**Response**<br>*Variable* |
| *AccountingToken* | **ALL**<br>MQACT_NONE | **MQACT_NONE**<br>Null string or blanks<br>Set by the queue manager; see "AccountingToken (MQBYTE32)" on page 405 |
| *ApplIdentityData* | **ALL**<br>None | Null string or blanks [2] |

*Table 634. MQMD SOAP settings (continued)*

| Field name | Setting | Values |
|---|---|---|
| *PutApplType* | **ALL**<br>MQAT_NO_CONTEXT | **MQAT_NO_CONTEXT**<br>0<br>Value generated by queue manager; see "PutApplType (MQLONG)" on page 433. |
| *PutApplName* | **ALL**<br>None | Value generated by queue manager; see "PutApplName (MQCHAR28)" on page 432. |
| *PutDate* | **ALL**<br>None | Value generated by queue manager; see "PutDate (MQCHAR8)" on page 435. |
| *PutTime* | **ALL**<br>None | Value generated by queue manager; see "PutTime (MQCHAR8)" on page 435. |
| *ApplOriginData* | **ALL**<br>None | Null string or blanks [2] |
| *GroupId* | **Request, One way, Report**<br>MQGI_NONE<br>**Response**<br>Field is copied from the request message | Nulls |
| *MsgSeqNumber* | **Request, One way, Report**<br>Not used<br>**Response**<br>Field is copied from the request message | Generated by the queue manager; see Physical order on a queue. |
| *Offset* | **Request, One way, Report**<br>Not used<br>**Response**<br>Field is copied from the request message | 0 |
| *MsgFlags* | **Request, One way, Report**<br>MQMF_NONE<br>**Response**<br>Field is copied from the request message | **MQMF_NONE**<br>0<br>See "MsgFlags (MQLONG)" on page 422 |
| *OriginalLength* | **Request, One way, Response**<br>MQOL_UNDEFINED<br>**Report**<br>Length of original request message | **MQOL_UNDEFINED**<br>-1 |

| *Table 634. MQMD SOAP settings (continued)* | | |
|---|---|---|
| **Field name** | **Setting** | **Values** |
| **Notes:**<br>1. The symbol ¬ represents a single blank character.<br>2. The value Null string or blanks denotes the null string in C, and blank characters in other programming languages. | | |

## Customized report options

You can write your own SOAP sender and use it with the supplied listeners. Typically you might write a sender to change the choice of report options. The IBM MQ SOAP listeners support most combinations of report options, as described in the following lists.

- Report options supported by IBM MQ SOAP listeners:
  - MQRO_EXCEPTION
  - MQRO_EXCEPTION_WITH_DATA
  - MQRO_EXCEPTION_WITH_FULL_DATA
  - MQRO_DEAD_LETTER_Q
  - MQRO_DISCARD_MSG
  - MQRO_NONE
  - MQRO_NEW_MSG_ID
  - MQRO_PASS_MSG_ID
  - MQRO_COPY_MSG_ID_TO_CORREL_ID
  - MQRO_PASS_CORREL_ID
- Report options supported by the queue manager:
  - MQRO_COA
  - MQRO_COA_WITH_DATA
  - MQRO_COA_WITH_FULL_DATA
  - MQRO_COD
  - MQRO_COD_WITH_DATA
  - MQRO_COD_WITH_FULL_DATA
  - MQRO_EXPIRATION
  - MQRO_EXPIRATION_WITH_DATA
  - MQRO_EXPIRATION_WITH_FULL_DATA
- The following report options are not supported by the IBM MQ SOAP listeners.
  - MQRO_PAN
  - MQRO_NAN

The behavior of IBM MQ SOAP listeners in response to combinations of MQRO_EXCEPTION_* and MQRO_DISCARD is described in Table 635 on page 1443.

The notation MQRO_EXCEPTION_* indicates the use of either MQRO_EXCEPTION, MQRO_EXCEPTION_WITH_DATA or MQRO_EXCEPTION_WITH_FULL_DATA.

| Table 635. Listener behavior resulting from MQRO_EXCEPTION_* and MQRO_DISCARD settings | | |
|---|---|---|
| | **MQRO_DISCARD enabled** | **MQRO_DISCARD not enabled** |
| **MQRO_EXCEPTION_* enabled** | Default behavior. Report messages are automatically generated if necessary and the original request discarded. If a report message could not be returned to the response queue the report message is sent to the dead letter queue. | Report messages are automatically generated if necessary and the original message is sent to the dead letter queue. If the report message could not be returned to the response queue it is also be sent to the dead-letter queue. In this case there are therefore two dead letter queue entries for the failed request. |
| **MQRO_EXCEPTION_* not enabled** | Report messages are not automatically generated when the incoming format is not recognized or the number of backout attempts is exceeded. The message is not sent to the dead letter queue. No notification is returned that the client can inspect, and the original request message is lost. | Report messages are not automatically generated when the incoming format is not recognized or the number of backout attempts is exceeded. The original request message is however written to the dead letter queue when a report would otherwise have been generated. |

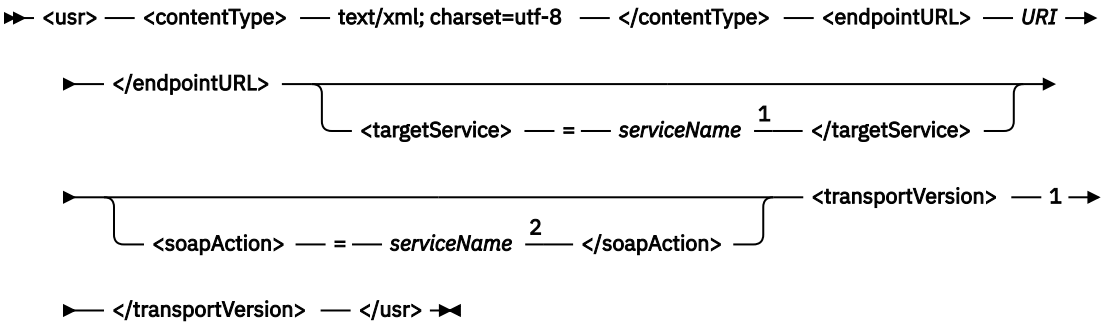
# MQRFH2 SOAP settings

The IBM MQ SOAP senders and listeners create or expect to receive an MQRFH2 with the following settings.

## Purpose

The IBM MQ SOAP senders add properties to the <usr> folder created by IBM MQ JMS. The properties contain information required by the SOAP container in the target environment. "Property syntax" on page 1443 describes the syntax of the properties when they are added to an MQRFH2. For the description an MQRFH2 header, see MQRFH2 - Rules and formatting header 2.

## Property syntax




Notes:

[1] targetService is required for .NET Framework 1 or 2, and not used on Axis 1.4.

[2] soapAction is optional for .NET Framework 1 or 2, and not used on Axis 1.4.

## Parameters

**contentType**
contentType always contains the string `text/xml; charset=utf-8`.

**endpointURL**
See “URI syntax and parameters for Web service deployment” on page 1460.

**targetService**
[7] On Axis, *serviceName* is the fully qualified name of a Java service, for example: `targetService=javaDemos.service.StockQuoteAxis`. If targetService is not specified, a service is loaded using the default Axis mechanism.

[8] On .NET, *serviceName* is the name of a .NET service located in the deployment directory, for example: `targetService=myService.asmx`. In the .NET environment, the targetService parameter makes it possible for a single IBM MQ SOAP listener to be able to process requests for multiple services. These services must be deployed from the same directory.

**soapAction**

**transportVersion**
transportVersion is always set to 1.

### Example

The example shows an MQRFH2 and the following SOAP message. The lengths of the folders are shown in decimal.

**Note:** & in the URI is encoded as &

```
52464820 00000002 000002B0 00000001 RFH/ 0002 1208 0001
000004B8 20202020 20202020 00000000 1208 ? ? ? ? ? ? ? ? 0000
000004B8              1208
32 <mcd>
<Msd>jms_bytes</Msd>
</mcd>?
208 <jms>
<Dst>queue://queue://SOAPJ.demos</Dst>
<Rto>queue://WMQSOAP.DEMO.QM/SYSTEM.SOAP.RESPONSE.QUEUE</Rto>
<Tms>1157388516465</Tms>
<Cid>ID:000000000000000000000000000000000000000000000000</Cid>
<Dlv>1</Dlv>
</jms>
400 <usr>
<contentType>text/xml; charset=utf-8</contentType>
<transportVersion>1</transportVersion>
<endpointURL>
jms:/queue?destination=SOAPJ.demos@WMQSOAP.DEMO.QM
&amp;connectionFactory=connectQueueManager(WMQSOAP.DEMO.QM)
clientConnection(localhost%25289414%2529)
clientChannel(TESTCHANNEL)
&amp;replyDestination=SYSTEM.SOAP.RESPONSE.QUEUE
&amp;initialContextFactory=com.ibm.mq.jms.Nojndi
</endpointURL>
</usr>
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="https://www.w3.org/2001/XMLSchema"
xmlns:xsi="https://www.w3.org/2001/XMLSchema-instance">
<soapenv:Body>
<ns1:getQuote
soapenv:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:ns1="soap.server.StockQuoteAxis_Wmq">
<in0 xsi:type="xsd:string">XXX</in0>
</ns1:getQuote>
</soapenv:Body>
</soapenv:Envelope>
```

[7] Java service only
[8] .NET service only

# runivt: IBM MQ transport for SOAP installation verification test

An installation verification test suite (IVT) is provided with IBM MQ transport for SOAP. **runivt** runs a number of demonstration applications and ensures that the environment is correctly set up after installation.

## Purpose

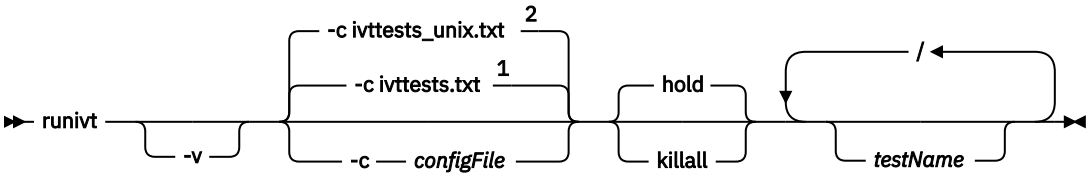
The **runivt** command uses the sample programs provided with the IBM MQ transport for SOAP to send Web service requests from clients to services. It runs tests for Axis 1.4, .NET Framework 1, and .NET Framework 2. The tests are configured in a test script file. The default test script file for Windows runs a combination of tests between Java and .NET clients and services.

## Description

**runivt** must be run from its own directory.

The command starts listeners in a different command window. For this reason, you must run the command from an X Window System session on UNIX and Linux systems.

## runivt syntax




Notes:

[1] Default on Windows
[2] Default on UNIX and Linux systems

## runivt parameters

**-v**
Verbose mode. Write fuller error messages to the console.

**-c** ***configFile***
A configuration file defining the tests to be run. The default configuration file supplied with Windows, UNIX or Linux systems is used by default.

**hold**
Leave the listener running after the tests complete

**killall**
End the listener when the tests complete

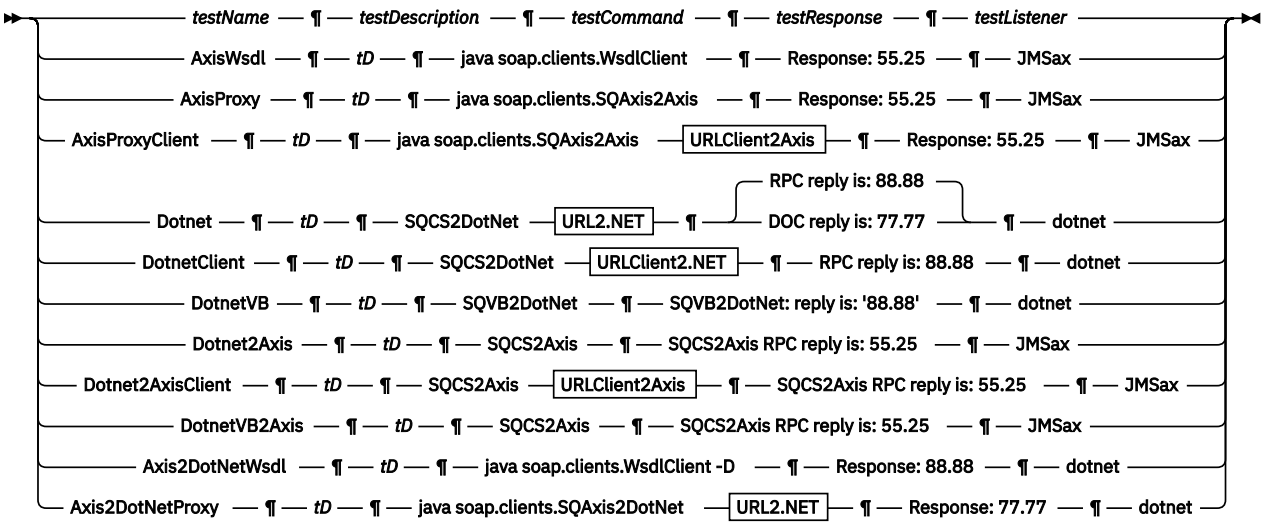
***testName***
A space separated list of the tests to run. The test names are selected from the configuration file. If no names are specified then all the tests in the configuration file are run.

## Configuration file

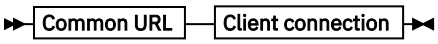
Each configuration file parameter is a separate line of the file. Leave a blank line between each group of parameters.

The parameters in the `ivttests.txt` parameter file are listed.

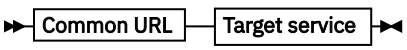
### *configFile* syntax




#### URLClient2Axis

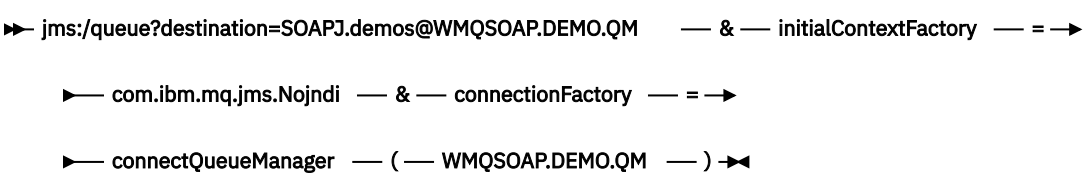



#### URL2.NET



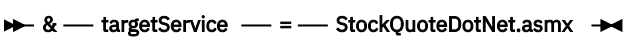

#### URLClient2.NET

#### Common URL




#### Client connection

#### Target service




## *configFile* parameters

***testName***
The name of the test. Use *testName* in the **runivt** command

***testDescription***
Documentation about the test

***testCommand***
The command executed by the **runivt** command to make the client request.

***testResponse***
The exact response string returned by the client request to the console. For the test to succeed *testResponse* must match the actual response.

***testListener***
The name of the IBM MQ SOAP listener that is started by **runivt** to process the SOAP request. **dotnet** and **JMSax** are synonyms for the supplied listeners, **amqwSOAPNETlistener** and **SimpleJavaListener**.

**Examples**

```
runivt
```

*Figure 18. run all the default tests*

```
runivt dotnet
```

*Figure 19. run a specific test from the default tests*

```
runivt -c mytests.txt
```

*Figure 20. run a set of custom tests*

**Related tasks**
Verifying the IBM MQ transport for SOAP

# Secure Web services over IBM MQ transport for SOAP

You might secure Web services that use the IBM MQ transport for SOAP in one of two ways. Either create an SSL channel between the client and server, or use Web services security.

## SSL and the IBM MQ transport for SOAP

The IBM MQ transport for SOAP provides several SSL options that can be specified for use with client channel configured to run in SSL mode. The options differ between the .NET and Java environments. The IBM MQ SOAP senders and listeners process only the SSL options that are applicable to their particular environment. They ignore options that are not applicable.

The presence or absence of the `sslCipherSpec` option for .NET clients and the `sslCipherSuite` option for Java clients determines whether SSL is used or not. If the option is not specified in the URI then by default SSL is not used and all other SSL options are ignored. All SSL options are optional except where indicated.

For IBM MQ clients, set the SSL attributes in the URI or channel definition table. On the server, set the attributes using the facilities of IBM MQ.

By default, the standard IBM MQ SSL option, SSLCAUTH, is set when enabling SSL on the channel. Clients must authenticate themselves before SSL communication can commence. If SSLCAUTH is not set, SSL communications are established without client authentication.

To authenticate themselves, clients must have a certificate assigned in their key repository that is acceptable to the queue manager. For additional security, IBM MQ channels can be configured to accept only certificates from a restricted list. The list is restricted by checking the distinguished name of the certificate against the peer name attribute of the channel.

If you use Java, the first SSL connection from an IBM MQ SOAP client causes the following SSL parameters to be fixed. The same values are used in subsequent connections using the same client process:

- `sslKeyStore`
- `sslKeyStorePassword`
- `sslTrustStore`
- `sslTrustStorePassword`

- `sslFipsRequired`
- `sslLDAPCRLservers`

The effect of varying these parameters on subsequent connections from this client is undefined.

If you use .NET, the first SSL connection from an IBM MQ SOAP client causes the following SSL parameters to be fixed. The same values are used in subsequent connections using the same client process:

- `sslKeyRepository`
- `sslCryptoHardware`
- `sslFipsRequired`
- `sslLDAPCRLservers`

The effect of varying these parameters on subsequent connections from this client is undefined. These parameters are reset if all SSL connections become inactive and a new SSL connection is made.

The following properties can also be specified as system properties:

- `sslKeyStore`
- `sslKeyStorePassword`
- `sslTrustStore`
- `sslTrustStorePassword`

If they are specified both as system properties and in the URI, and the values differ, the deployment utility displays a warning. The URI values take precedence.

**Related tasks**

Specifying that only FIPS-certified CipherSpecs are used at run time on the MQI client

**Related reference**

SSL connection factory parameters in the IBM MQ Web services URI
Add SSL options to the list of connection factory options in the IBM MQ Web services URI.

Federal Information Processing Standards (FIPS) for UNIX, Linux and Windows

## SSL connection factory parameters in the IBM MQ Web services URI

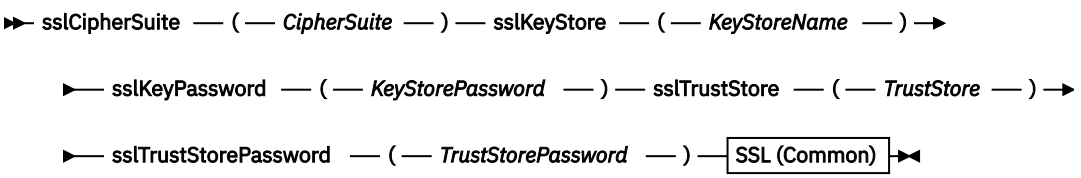
Add SSL options to the list of connection factory options in the IBM MQ Web services URI.

### Purpose

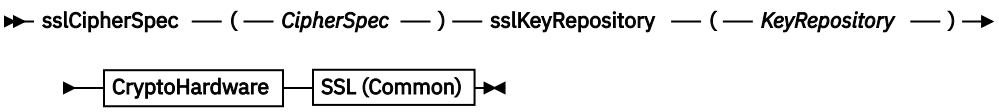
You can use a secure connection between an IBM MQ Web services client and the queue manager hosting the web service. The SSL options control how SSL is configured on the IBM MQ MQI client-server channel connection.

**Syntax diagram**

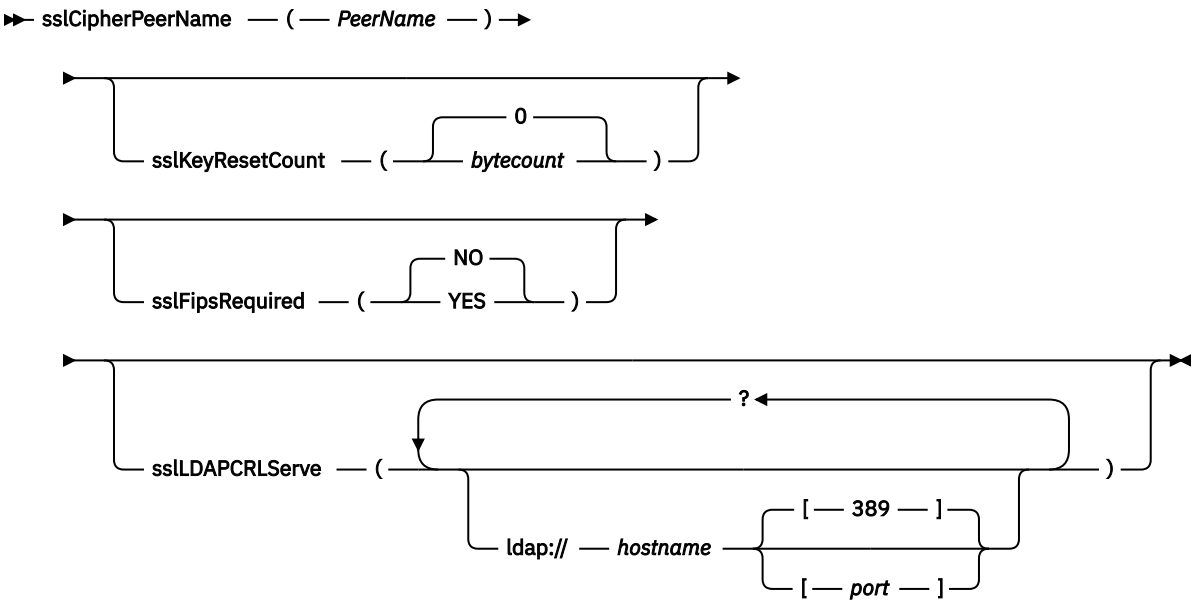
**SSL ( Java )**



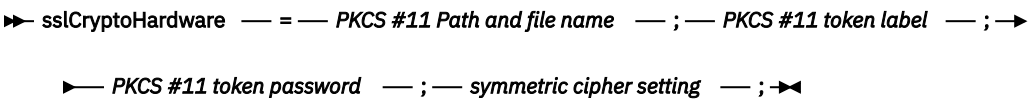

**SSL (.NET)**




**SSL (Common)**




**CryptoHardware**




## Required SSL parameters (Common)

**sslPeerName ( *peerName* )**
*peerName* specifies the sslPeerName used on the channel.

## Required SSL parameters ( Java )

**sslCipherSuite ( *CipherSuite* )**
*CipherSuite* specifies the sslCipherSuite used on the channel. The CipherSuite specified by the client must match the CipherSuite specified on the server connection channel.

**sslKeyStore ( *KeyStoreName* )**
*KeyStoreName* specifies the sslKeyStoreName used on the channel. The keystore holds the private key of the client used to authenticate the client to the server. The keystore is optional if the SSL connection is configured to accept anonymous client connections.

**sslKeyStorePassword ( *KeyStorePassword* )**
*KeyStorePassword* specifies the sslKeyStorePassword used on the channel.

**sslTrustStore ( *TrustStoreName* )**
*TrustStoreName* specifies the sslTrustStoreName used on the channel. The truststore holds the public certificate of the server, or its key chain, to authenticate the server to the client. The truststore is optional if the root certificate of a certificate authority is used to authenticate the server. In Java, root certificates are held in the JRE certificate store, `cacerts`.

**sslTrustStorePassword ( *TrustStorePassword* )**
*TrustStorePassword* specifies the sslTrustStorePassword used on the channel.

## Required SSL parameters (.NET)

**sslCipherSpec ( *CipherSpec* )**
*CipherSpec* specifies the sslCipherSpec used on the channel. If the option is specified then SSL is used on the client channel.

**sslKeyRepository ( *KeyRepository* )**
*KeyRepository* specifies the sslCipherSpec used on the channel where SSL keys and certificates are stored. *KeyRepository* is specified in stem format, that is, a full path with file name but with the file extension omitted. The effect of setting sslKeyRepository is the same as setting the `KeyRepository` field in the **MQSCO** structure on an `MQCONNX` call.

### Optional SSL parameters (.NET)

**sslCryptoHardware ( *CryptoHardware* )**
*CryptoHardware* specifies the sslCryptoHardware used on the channel. The possible values for this field, and the effect of setting it, are the same as for the `CryptoHardware` field of the **MQSCO** structure on an `MQCONNX`.

### Optional SSL parameters (Common)

**sslKeyResetCount ( *bytecount* )**
*bytecount* specifies the number of bytes passed across an SSL channel before the SSL secret key must be renegotiated. To disable the renegotiation of SSL keys omit the field or set it to zero. Zero is the only value supported in some environments, see Renegotiating the secret key in IBM MQ classes for Java . The effect of setting sslKeyResetCount is the same as setting the `KeyResetCount` field in the **MQSCO** structure on an `MQCONNX` call.

**sslFipsRequired ( *fipsCertified* )**
*fipsCertified* specifies whether *CipherSpec* or *CipherSuite* must use FIPS-certified cryptography in IBM MQ on the channel. The effect of setting *fipsCertified* is the same as setting the `FipsRequired` field of the **MQSCO** structure on an `MQCONNX` call.

**sslLDAPCRLServers ( *LDAPServerList* )**

*LDAPServerList* specifies a list of LDAP servers to be used for Certificate Revocation List checking.

For SSL enabled client connections, *LDAPServerList* is a list of LDAP servers to be used for Certificate Revocation List (CRL) checking. The certificate provided by the queue manager is checked against one of the listed LDAP CRL servers; if found, the connection fails. Each LDAP server is tried in turn until connectivity is established to one of them. If it is impossible to connect to any of the servers, the certificate is rejected. Once a connection has been successfully established to one of them, the certificate is accepted or rejected depending on the CRLs present on that LDAP server.

If *LDAPServerList* is blank, the certificate belonging to the queue manager is not checked against a Certificate Revocation List. An error message is displayed if the supplied list of LDAP URIs is not valid. The effect of setting this field is the same as that of including `MQAIR` records and accessing them from an **MQSCO** structure on an `MQCONNX`.

**Related tasks**
Specifying that only FIPS-certified CipherSpecs are used at run time on the MQI client
**Related reference**
SSL and the IBM MQ transport for SOAP
The IBM MQ transport for SOAP provides several SSL options that can be specified for use with client channel configured to run in SSL mode. The options differ between the .NET and Java environments. The IBM MQ SOAP senders and listeners process only the SSL options that are applicable to their particular environment. They ignore options that are not applicable.

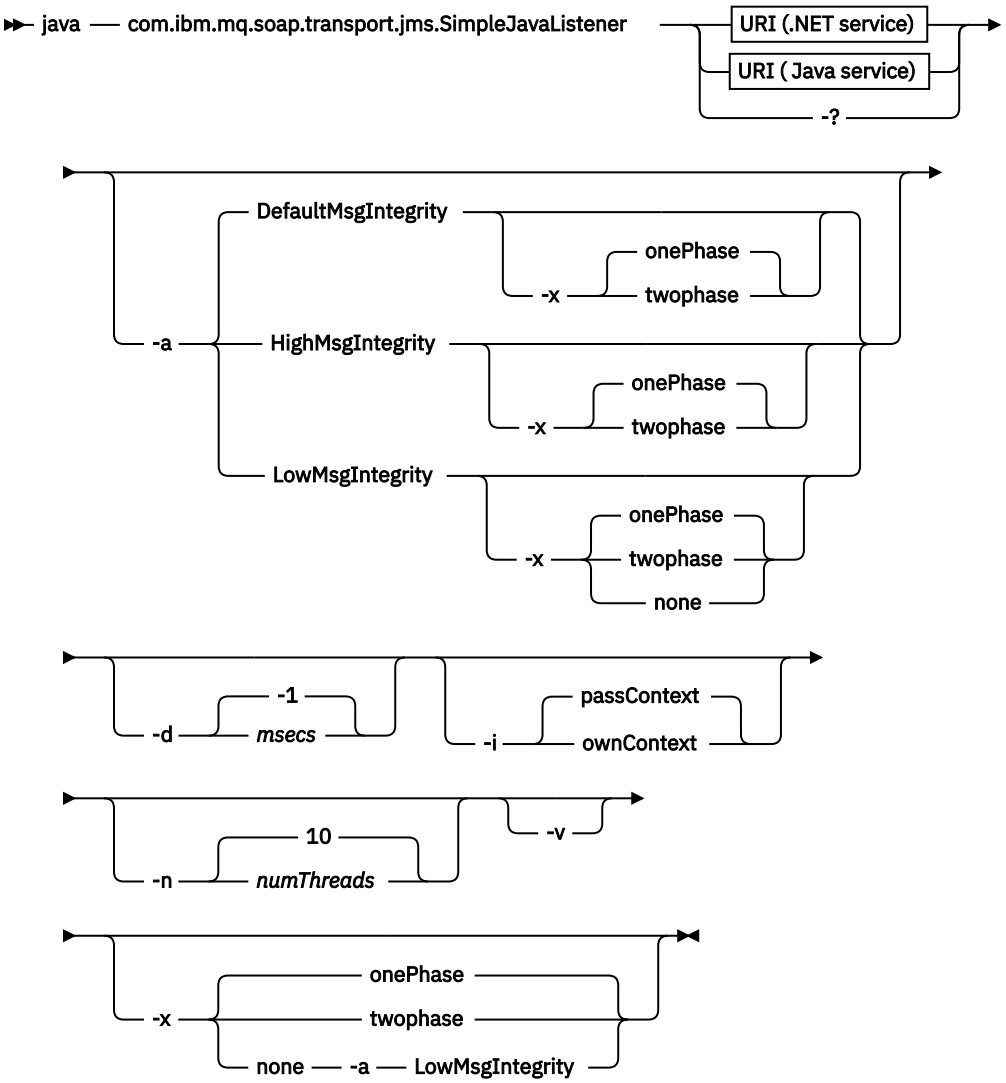
Federal Information Processing Standards (FIPS) for UNIX, Linux and Windows

## `SimpleJavaListener`: IBM MQ SOAP Listener for Axis 1.4

Syntax and parameters for the IBM MQ SOAP listener for Axis 1.4.

### Purpose
Starts the IBM MQ SOAP listener for Axis 1.4.

**Java**




## Required parameters

**URI *platform***
See “URI syntax and parameters for Web service deployment” on page 1460.

**-?**
Print out help text describing how the command is used.

## Optional parameters

**-a *integrityOption***
*integrityOption* specifies the behavior of IBM MQ SOAP listeners if it is not possible to put a failed request message on the dead-letter queue. *integrityOption* can take one of the following values:

**DefaultMsgIntegrity**
For non-persistent messages, the listener displays a warning message and continues to execute with the original message being discarded. For persistent messages, it displays an error message, backs out the request message so it remains on the request queue and exits. DefaultMsgIntegrity applies if the -a option is omitted, or if *integrityOption* is not specified.

**LowMsgIntegrity**
For both persistent and non-persistent messages, the listener displays a warning and continues to execute, discarding the message.

**HighMsgIntegrity**
For both persistent and non-persistent messages, the listener displays an error message, backs out the request message so it remains on the request queue and exits.

The deployment utility checks for the compatibility of the -x and -a flags. If -x none is specified, then -a LowMsgIntegrity must be specified. If the flags are incompatible the deployment utility exits with an error message and with no deployment steps having been undertaken.

**-d** ***msecs***
*msecs* specifies the number of milliseconds for the IBM MQ SOAP listener to stay alive if request messages have been received on any thread. If *msecs* is set to -1, the listener stays alive indefinitely.

**-i** ***Context***
*Context* specifies whether the listeners pass identity context. *Context* takes the following values:

**passContext**
Set the identity context of the original request message into the response message. The SOAP listener checks that it has authority to save the context from the request queue and to pass it to the response queue. It makes the checks at run time when opening the request queue to save context, and the response queue to pass context. If it does not have the required authority, or the MQOPEN call fails, and the response message is not processed. The response message is put on the dead-letter queue with the dead-letter header containing the return code from the failed MQOPEN. The listener then continues to process subsequent incoming messages as normal.

**ownContext**
The SOAP listener does not pass context. The returned context reflects the user ID under which the listener is running rather than the user ID which created the original request message.

The fields in the origin context are set by the queue manager, and not by the SOAP listener.

**-n** ***numThreads***
*numThreads* specifies the number of threads in the generated startup scripts for the IBM MQ SOAP listener. The default is 10. Consider increasing this number if you have high message throughput.

**-v**
-v sets verbose output from external commands. Error messages are always displayed. Use -v to output commands that you can tailor to create customized deployment scripts.

**-w** ***serviceDirectory***
*serviceDirectory* is the directory containing the web service.

**-x** ***transactionality***
*transactionality* specifies the type of transactional control for the listener. *transactionality* can be set to one of the following values:

**onePhase**
IBM MQ one-phase support is used. If the system fails during processing, the request message is redelivered to the application. IBM MQ transactions ensure that the response messages are written exactly once.

**twoPhase**
Two-phase support is used. If the service is written appropriately the message is delivered exactly once, coordinated with other resources, within a single committed execution of the service. This option applies to server bindings connections only.

**none**
No transactional support. If the system fails during processing, the request message can be lost, even if persistent. The service might or might not have executed, and response, report or dead-letter messages might or might not be written.

The deployment utility checks for the compatibility of the -x and -a flags. See the description of the -a flag for details.

### Java Example

```
java com.ibm.mq.soap.transport.jms.SimpleJavaListener
```

```
-u "jms:/queue?destination=myQ&connectionFactory=()
&initialContextFactory=com.ibm.mq.jms.Nojndi"
-n 20
```

# IBM MQ SOAP listeners

An IBM MQ SOAP listener reads an incoming SOAP request from the queue specified as the destination in the URI. It checks the format of the request message and then invokes a Web service using the Web services infrastructure. An IBM MQ SOAP listener returns any response or error from a Web service using the reply destination queue in the URI. It returns IBM MQ reports to the reply queue.

The term listener is used here in its standard Web services sense. It is distinct from the standard IBM MQ listener invoked by the **runmqlsr** command.

## Description

The Java SOAP listener is implemented as a Java class and run services using Axis 1.4. The .NET listener is a console application and runs .NET Framework 1 or .NET Framework 2 services. For .NET Framework 3 services, use the IBM MQ custom channel for Microsoft Windows Communication Foundation (WCF).

The deployment utility creates scripts to start Java or .NET SOAP listeners automatically. A SOAP Listener can be started manually using either the **amqSOAPNETListener** command, or by calling the `SimpleJavaListener` class. You can configure the IBM MQ SOAP listener to be started as an IBM MQ service by setting the -s option in the deployment utility. Alternatively, start listeners using triggering, or use the start and end listener scripts generated by the deployment utility. You can configure triggering manually, or use the -tmq and -tmp deployment options to configure triggering automatically. You can end a listener by setting the request queue to `GET (DISABLED)`.

*Table 636. Command scripts generated by the deployment utility*

| Web service Infrastructure | UNIX and Linux systems | Windows Java | Windows.NET |
|---|---|---|---|
| **Start listener** | **startWMQJListener.sh** | **startWMQJListener.cmd** | **startWMQNListener.cmd** |
| **Stop listener** | **endWMQJListener.sh** | **endWMQJListener.cmd** | **endWMQNListener.cmd** |
| **Define listener service** | **defineWMQJListener.sh** | **defineWMQJListener.cmd** | **defineWMQNListener.cmd** |

The IBM MQ SOAP listener passes the `endpointURL` and `soapAction` fields from the SOAP message to the SOAP infrastructure. The listener invokes the service through the Web Services infrastructure and waits for the response. The listener does not validate `endpointURL` and `soapAction`. The fields are set by the IBM MQ SOAP sender from the data that is provided in the URI set by a SOAP client.

The listener creates the response message and sends it to the reply destination supplied in the request message URI. In addition, the listener sets the correlation ID in the response message according to the report option in the request message. It returns the expiry, persistence, and priority settings from the request message. The listener also sends report messages back to clients in some circumstances.

If there are format errors in the SOAP request, the listener returns a report message to the client using the reply destination queue. The queue manager also returns report messages to the client using the reply destination queue, if a report has been requested. Full report messages are written to the response queue, in response to a number of events:

- An exception.
- Message expiry.
- Format of the request message is not recognized.
- Failure of the integrity check of the **MQRFH2** header.

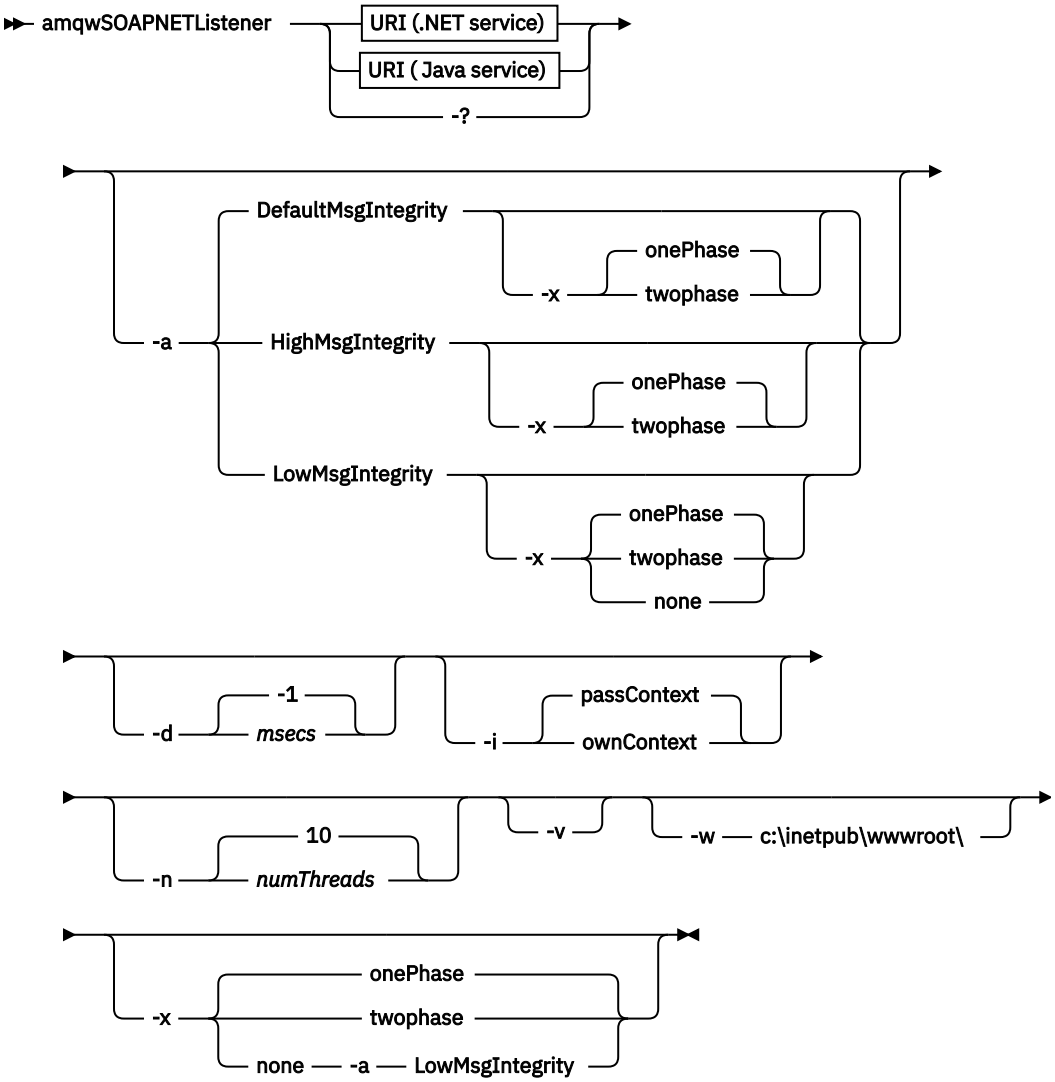
- The format of the main message body is not MQFMT_NONE.
- The backout/retry threshold is exceeded while the IBM MQ SOAP listener is processing the request.

The IBM MQ SOAP sender sets MQRO_EXCEPTION_WITH_FULL_DATA and MQRO_EXPIRATION_WITH_FULL_DATA report options. As a result of the report options set by the IBM MQ SOAP sender, the report message contains the entire originating request message. The IBM MQ SOAP sender also sets the MQRO_DISCARD option, which causes the message to be discarded after a report message has been returned. If the report options do not meet your requirements, write your own senders to use different MQRO_EXCEPTION and MQRO_DISCARD report options. If the SOAP request is sent by a different sender that did not set MQRO_DISCARD, the failing message is written to the dead letter queue (DLQ).

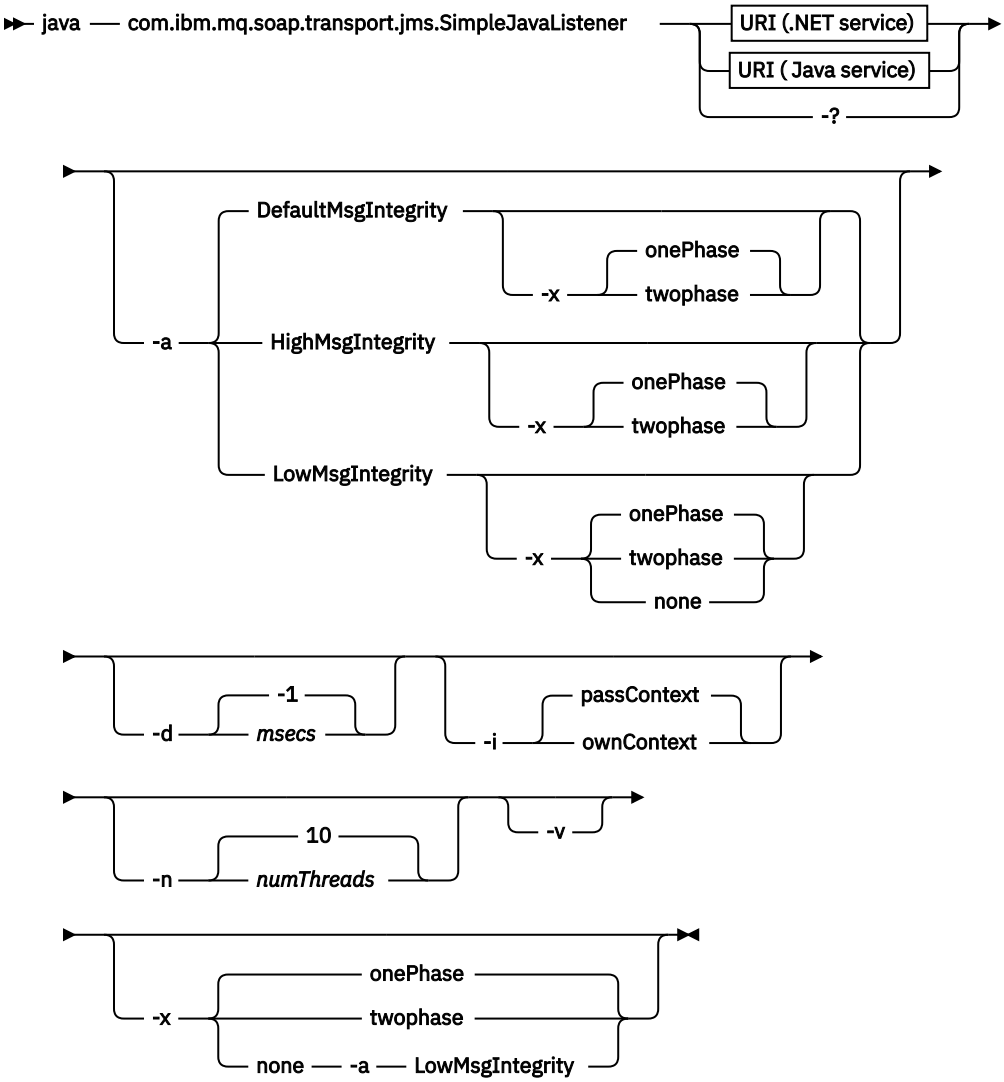
If the listener generates a report message but fails in the process of sending the report, the report message is sent to the DLQ. Ensure that your DLQ handler handles these messages correctly.

If an error occurs when attempting to write to the dead-letter queue a message is written to the IBM MQ error log. Whether the listener continues to process more messages depends on which message persistence and transactional options are selected. If the listener is running in one-phase transactional mode and is processing a non-persistent request message, the original message is discarded. The IBM MQ SOAP listener continues to execute. If the request message is persistent the request message is backed out to the request queue and the listener exits. The request queue is set to get-inhibited to prevent an accidental triggered restart.

**Syntax diagram**
**.NET**


amqwSOAPNETListener
URI (.NET service)
URI ( Java service)
-?
-a
DefaultMsgIntegrity
-x
onePhase
twophase
HighMsgIntegrity
-x
onePhase
twophase
LowMsgIntegrity
-x
onePhase
twophase
none
-d
-1
msecs
-i
passContext
ownContext
-n
10
numThreads
-v
-w
c:\inetpub\wwwroot\
-x
onePhase
twophase
none
-a
LowMsgIntegrity

**Java**




## Required parameters

**URI *platform***
See "URI syntax and parameters for Web service deployment" on page 1460.

**-?**
Print out help text describing how the command is used.

## Optional parameters

**-a *integrityOption***
*integrityOption* specifies the behavior of IBM MQ SOAP listeners if it is not possible to put a failed request message on the dead-letter queue. *integrityOption* can take one of the following values:

**DefaultMsgIntegrity**
For non-persistent messages, the listener displays a warning message and continues to execute with the original message being discarded. For persistent messages, it displays an error message, backs out the request message so it remains on the request queue and exits. DefaultMsgIntegrity applies if the -a option is omitted, or if *integrityOption* is not specified.

**LowMsgIntegrity**
For both persistent and non-persistent messages, the listener displays a warning and continues to execute, discarding the message.

**HighMsgIntegrity**
For both persistent and non-persistent messages, the listener displays an error message, backs out the request message so it remains on the request queue and exits.

The deployment utility checks for the compatibility of the -x and -a flags. If -x none is specified, then -a LowMsgIntegrity must be specified. If the flags are incompatible the deployment utility exits with an error message and with no deployment steps having been undertaken.

**-d** ***msecs***
*msecs* specifies the number of milliseconds for the IBM MQ SOAP listener to stay alive if request messages have been received on any thread. If *msecs* is set to -1, the listener stays alive indefinitely.

**-i** ***Context***
*Context* specifies whether the listeners pass identity context. *Context* takes the following values:

**passContext**
Set the identity context of the original request message into the response message. The SOAP listener checks that it has authority to save the context from the request queue and to pass it to the response queue. It makes the checks at run time when opening the request queue to save context, and the response queue to pass context. If it does not have the required authority, or the MQOPEN call fails, and the response message is not processed. The response message is put on the dead-letter queue with the dead-letter header containing the return code from the failed MQOPEN. The listener then continues to process subsequent incoming messages as normal.

**ownContext**
The SOAP listener does not pass context. The returned context reflects the user ID under which the listener is running rather than the user ID which created the original request message.

The fields in the origin context are set by the queue manager, and not by the SOAP listener.

**-n** ***numThreads***
*numThreads* specifies the number of threads in the generated startup scripts for the IBM MQ SOAP listener. The default is 10. Consider increasing this number if you have high message throughput.

**-v**
-v sets verbose output from external commands. Error messages are always displayed. Use -v to output commands that you can tailor to create customized deployment scripts.

**-w** ***serviceDirectory***
*serviceDirectory* is the directory containing the web service.

**-x** ***transactionality***
*transactionality* specifies the type of transactional control for the listener. *transactionality* can be set to one of the following values:

**onePhase**
IBM MQ one-phase support is used. If the system fails during processing, the request message is redelivered to the application. IBM MQ transactions ensure that the response messages are written exactly once.

**twoPhase**
Two-phase support is used. If the service is written appropriately the message is delivered exactly once, coordinated with other resources, within a single committed execution of the service. This option applies to server bindings connections only.

**none**
No transactional support. If the system fails during processing, the request message can be lost, even if persistent. The service might or might not have executed, and response, report or dead-letter messages might or might not be written.

The deployment utility checks for the compatibility of the -x and -a flags. See the description of the -a flag for details.

### .NET Example

```
amqwSOAPNETlistener
```

```
-u "jms:/queue?destination=myQ&connectionFactory=()
&targetService=myService&initialContextFactory=com.ibm.mq.jms.Nojndi"
-w C:/wmqsoap/demos
-n 20
```

**Java Example**

```
java com.ibm.mq.soap.transport.jms.SimpleJavaListener
-u "jms:/queue?destination=myQ&connectionFactory=()
&initialContextFactory=com.ibm.mq.jms.Nojndi"
-n 20
```

# IBM MQ transport for SOAP sender

Sender classes are provided for Axis and .NET Framework 1 and .NET Framework 2. The sender constructs a SOAP request and puts it on a queue, it then blocks until it has read a response from the response queue. You can alter the behavior of the classes by passing different URIs from a SOAP client. For .NET Framework 3 use IBM MQ custom channel for Microsoft Windows Communication Foundation (WCF).

## Purpose

The IBM MQ SOAP sender puts a SOAP request to invoke a Web service onto an IBM MQ request queue. The sender sets fields in the **MQRFH2** header according to options specified in the URI, or according to defaults.

If you need to change the behavior of a sender beyond what is possible using the URI options, write your own sender. Your sender can work with the IBM MQ transport for SOAP listeners, or with other SOAP environments. Your sender must construct SOAP messages in the format defined by IBM MQ. The format is supported by the IBM MQ SOAP listener, and also SOAP listeners provided by WebSphere Application Server and CICS. Your sender must follow the rules for an IBM MQ requestor. The IBM MQ SOAP listener returns reply and report messages. See “MQMD SOAP settings” on page 1437 for details how to set the report options in the **MQMD**. The report options control the report messages returned by the IBM MQ SOAP listener.

## Description

The IBM MQ SOAP Java sender is registered with the Axis host environment for the `jms:` URI prefix. The sender is implemented in the class `com.ibm.mq.soap.transport.jms.WMQSender`, which is derived from `org.apache.axis.handlers.BasicHandler`. If the Axis host environment detects a `jms:` URI prefix it invokes the `com.ibm.mq.soap.transport.jms.WMQSender` class. The class blocks after placing the message until it has read a response from the response queue. If no response is received within a timeout interval the sender throws an exception. If a response is received within the timeout interval the response message is returned to the client using the Axis framework. Your client application must be able to handle these response messages.

For Microsoft.NET Framework 1 and .NET Framework 2 services, the IBM MQ SOAP sender is implemented in the class `IBM.WMQSOAP.MQWebRequest`, which is derived from `System.Net.WebRequest` and `System.Net.IwebRequestCreate`. If .NET Framework 1 or .NET Framework 2 detects a `jms:` URI prefix it invokes the `IBM.WMQSOAP.MQWebRequest` class. The sender creates an `MQWebResponse` object to read the response message from the response queue and return it to the client.

`com.ibm.mq.soap.transport.jms.WMQSender` is a final class, and `IBM.WMQSOAP.MQWebRequest` is sealed. You cannot modify their behavior by creating subclasses.

### Parameters

Set the URI to control the behavior of the IBM MQ SOAP sender in a Web service SOAP client. The deployment utility creates Web service client stubs incorporating the URI options supplied to the deployment utility.

## Use a channel definition table with the IBM MQ SOAP transport for SOAP sender

A client connection channel definition is an alternative to setting connection properties in the ConnectionFactory attribute of the Web service URI. The connection properties are clientChannel, clientConnection, and SSL parameters.

### Description

Create the client channel description table by defining client connections. Even if a Web services client connects to different queue managers, create all the connections in the connection table on a single queue manager. The default name and location of the connection table is *queue manager directory*/@ipcc/AMQCLCHL.TAB.

Pass the location of the connection table to a Java client by setting the com.ibm.mq.soap.transport.jms.mqchlurl system property.

Pass the location of the connection table to a .NET client by setting the MQCHLLIB and MQCHLTAB environment variables.

You might provide both a channel connection table and channel connection parameters in the ConnectionFactory attribute of the Web service URI. The values set in the ConnectionFactory take precedence over the values in the channel definition table.

#### Using a channel definition table in Java

```
java -Dcom.ibm.msg.client.config.location=file:/C:/mydir/myjms.config MyAppClass
```

*Figure 21. Starting Java client using a configuration file*

```
com.ibm.mq.soap.transport.jms.mqchlurl=file:/C:/ibm/wmq/qmgrs/QM1/@ipcc/AMQCLCHL.TAB
```

*Figure 22. myjms.config*

# Transactions

Use the -x option when starting the listener, to run Web services transactionally. Select the integrity of messages by setting the persistence option in the service URI.

### Web services

Use the -x option when starting the listener, to run Web services transactionally. On .NET Framework 1 and 2 the SOAP listener uses Microsoft Transaction Coordinator (MTS). On Axis 1.4, the SOAP listener uses queue manager coordinated transactions.

### Web service clients

The SOAP senders are not transactional.

### IBM MQ bindings

You can set the binding type for the SOAP sender. It can connect as an IBM MQ server application, or as a client application. You can also bind the SOAP sender as an XA-client on .NET.

### Message persistence

Select the level of persistence by setting the `Persistence` option in the URI.

### Web service transactions

You can use Web service transactions, because the SOAP sender is not transactional. If you write your own SOAP sender, and intend to use Web service transactions, do not create a transactional SOAP sender. You cannot send the request message and receive the reply message in the same transaction. The send and receive must not be coordinated by the Web service transaction.

## URI syntax and parameters for Web service deployment

The syntax and parameters to deploy an IBM MQ Web service are defined in a URI. The deployment utility generates a default URI based on the name of the Web service. You can override the defaults by defining your own URI as a parameter to the deployment utility. The deployment utility incorporates the URI in the generated Web service client stubs.

### Purpose

A web service is specified using a Universal Resource Identifier (URI). The syntax diagram specifies the URI that is supported in the IBM MQ transport for SOAP. The URI controls over IBM MQ -specific SOAP parameters and options used to access target services. The URI is compatible with Web services hosted by .NET, Apache Axis 1, WebSphere Application Server, CICS.

### Description

The URI is incorporated into the Web service client classes generated by the deployment utility. The client passes the URI to IBM MQ SOAP Sender in an IBM MQ message. The URI controls the processing performed by both the IBM MQ SOAP Sender and IBM MQ SOAP listener.

### Syntax

The URI syntax is as follows:

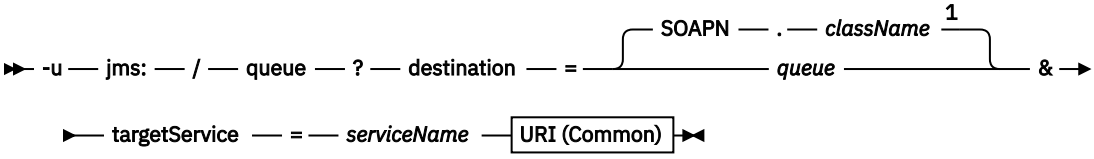
```
jms:/queue?name=value&name=value...
```

where `name` is a parameter name and *value* is an appropriate value, and the `name` = *value* element can be repeated any number of times with the second and subsequent occurrences being preceded by an ampersand (&).

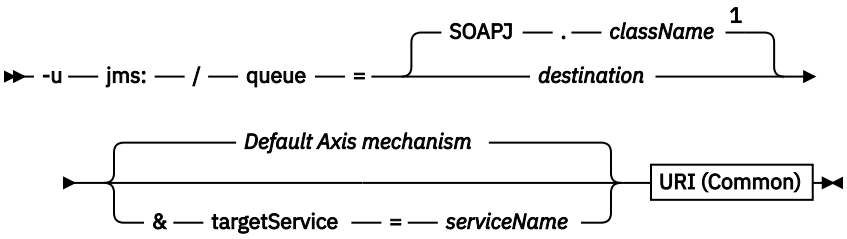
Parameter names are case-sensitive, as are names of IBM MQ objects. If any parameter is specified more than once, the final occurrence of the parameter takes effect. Client applications can override a generated parameter by appending another copy of the parameter to the URI. If any additional unrecognized parameters are included, they are ignored.

If you store a URI in an XML string, you must represent the ampersand character as `&`. Similarly, if a URI is coded in a script, take care to escape characters such as & that would otherwise be interpreted by the shell.

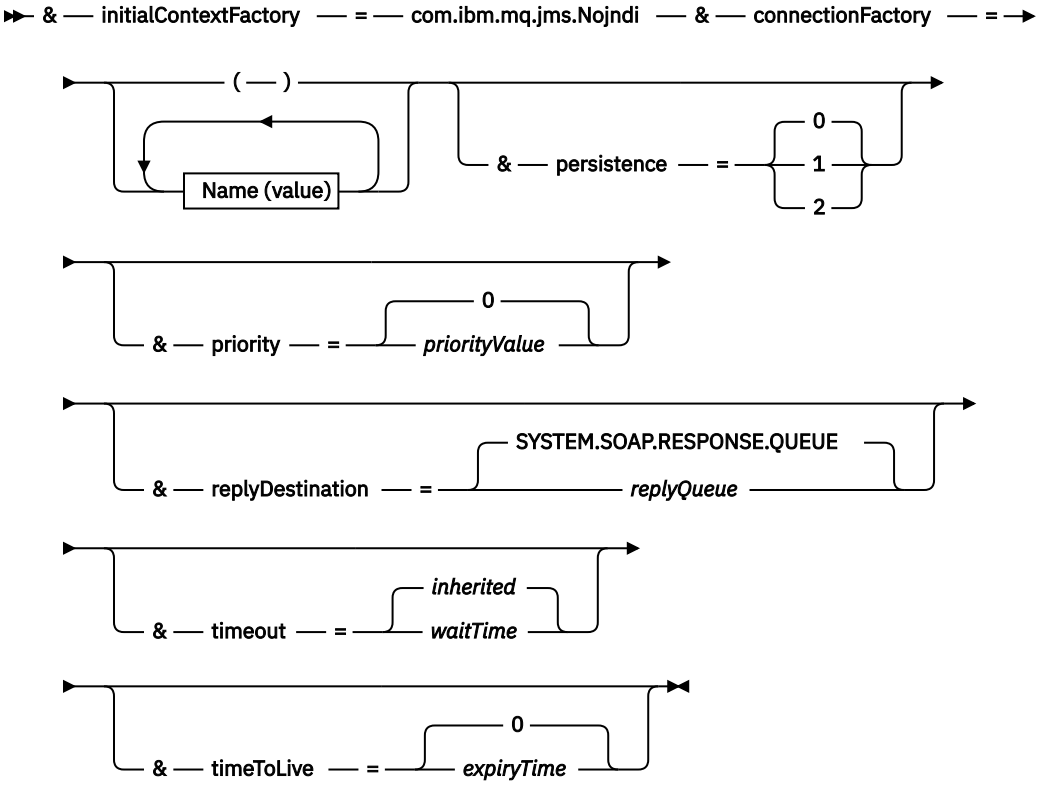
**Syntax diagram**
**URI (.NET service)**



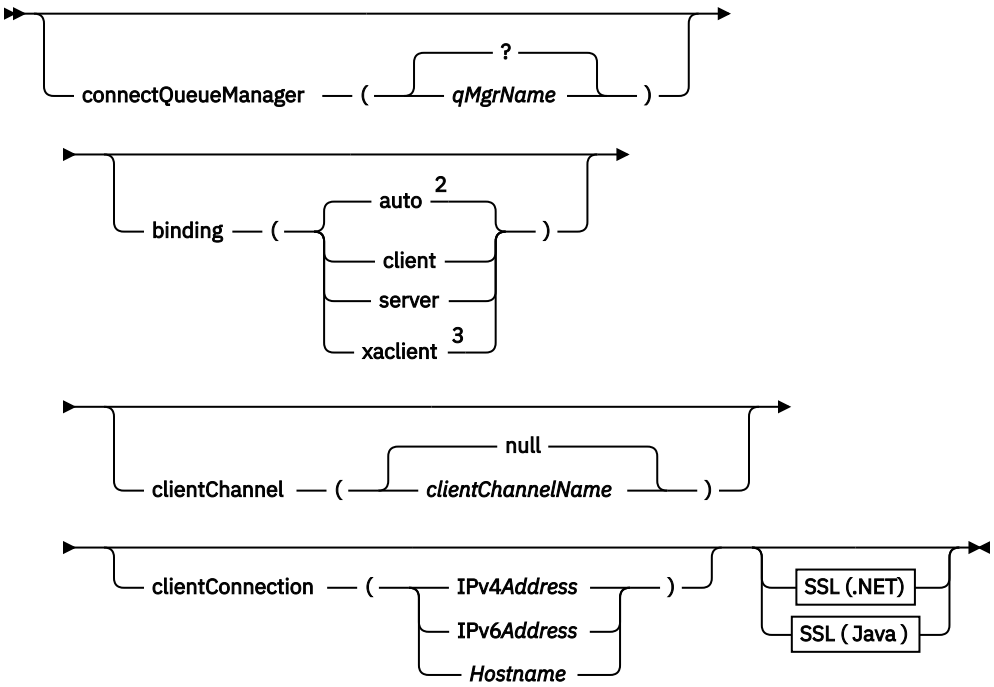

**URI ( Java service)**




**URI (Common)**




***Name* (*value*)**




Notes:

[1] The queue manager transforms *className* to a queue name following the steps described in "Destination to queue name transformation" on page 1462

[2] `client` is the default if other options appropriate for a client are specified; for example `clientConnection` .

[3] `xaclient` applies to .NET only

## Destination to queue name transformation

1. *className* is prefixed with `SOAPJ.` for Java services or with `SOAPN.` for .NET services.
2. The file extension is removed from the full path name given in the *className* parameter.
3. The resulting string is truncated to no more than 48 characters
4. Directory separator characters are replaced with period characters.
5. Embedded spaces are replaced with underscore characters.
6. The colon following a drive prefix letter is replaced with a period for a .NET service.

**Note:** In some environments, a queue name generated by the deployment utility might not be unique. The deployment utility makes checks whether to create the queue. You might choose to override the deployment utility by restructuring the deployment directory hierarchy, or by customizing the supplied deployment process.

## Required URI parameters

**`destination` = *queue***

*queue* is the name of the request destination. It can be a queue or a queue alias. If it is queue alias, the alias can resolve to a topic.

- If the `-u` parameter is omitted *queue* is generated from *classname* using the steps described in "Destination to queue name transformation" on page 1462.
- If the `-u` parameter is specified *queue* is required and must be the first parameter of the URI after the initial `jms: / queue ?` string. Specify either an IBM MQ queue name, or a queue name and queue manager name connected by an @ symbol, for example `SOAPN.trandemos@WMQSOAP.DEMO.QM`.

- The deployment utility checks whether the queue name, generated or provided, matches the name of an existing queue. The action taken is described in Table 637 on page 1463.

*Table 637. queue validation*

| **Listener script exists?** | **Listener script exists in the `./generated/server` directory** | | **Listener script does not exist in the `./generated/server` directory** |
|---|---|---|---|
| **Queue in listener script matches *queue* ?** | ***queue* does not match request queue being used in listener script** | ***queue* matches request queue being used in listener script** | |
| ***queue* exists** | – *Deployment exits with an error.*<br>– The service has already been deployed in `./generated/server`, but using a different queue. | – **Deployment continues normally.**<br>– The service has already been deployed in `./generated/server` | – *Deployment exits with an error.*<br>– The listener startup script is not found in `./generated/server`, but *queue* is in use by a different service or application. |
| ***queue* does not exist** | | – **Deployment continues with a warning.**<br>– The previous deployment might have failed, because the startup is valid, but *queue* is missing. | – **Deployment continues normally.**<br>– No service has been deployed from this directory. |

**`&connectionFactory` = *Name(value)***

*Name* is one of the following parameters:

- connectQueueManager(qMgrName)
- binding(bindingType)
- clientChannel(channel)
- clientConnection(connection)
- "Required SSL parameters ( Java )" on page 1449

See "Connection factory parameters" on page 1464 for a description of the values of these parameters.

**`&targetService` = *serviceName***

[9] On .NET, *serviceName* is the name of a .NET service located in the deployment directory, for example: `targetService=myService.asmx`. In the .NET environment, the targetService parameter makes it possible for a single IBM MQ SOAP listener to be able to process requests for multiple services. These services must be deployed from the same directory.

## Optional URI parameters

**`&initialContextFactory` = *contextFactory***

*contextFactory* is required and must be set to `com.ibm.mq.jms.Nojndi`. Make sure `Nojndi.jar` is in the class path for a WebSphere Application Server Web services client. `Nojndi.jar` returns Java

[9] .NET service only

objects based on the contents of the connectionFactory and destination parameters, rather than by reference to a directory.

**&targetService = *serviceName***
[10] On Axis, *serviceName* is the fully qualified name of a Java service, for example: targetService=javaDemos.service.StockQuoteAxis. If targetService is not specified, a service is loaded using the default Axis mechanism.

**&persistence = *messagePersistence***
*messagePersistence* takes one of the following values:

**0**
Persistence is inherited from the queue definition.

**1**
The message is non-persistent.

**2**
The message is persistent

**&priority = *priorityValue***
*priorityValue* is in the range 0 - 9. 0 is low priority. The default value is environment-specific, which in the case of IBM MQ is 0.

**&replyDestination = *replyToQueue***
The queue at the client side to be used for the response message. The default reply queue is SYSTEM.SOAP.RESPONSE.QUEUE.

- Run the setupWMQSOAP script to create the default IBM MQ SOAP objects.
- Specify a model queue for *replyToQueue* to create either a temporary or permanent dynamic response queue. For both temporary and permanent dynamic response queues, a separate instance of dynamic queue is created for each request. If any of the following events happen the queue is deleted:
  - The response arrives and is processed.
  - The request times out.
  - The requesting program terminates.

  For the best performance, use temporary dynamic queues rather than permanent dynamic queues. Do not send a persistent request message to a URI with a temporary dynamic queue. The IBM MQ listener SOAP fails to process the message and outputs an error. The client times out waiting for the reply.
- The setupWMQSOAP script creates a default permanent dynamic model queue called SYSTEM.SOAP.MODEL.RESPONSE.QUEUE.

**&timeout = *waitTime***
The time, in milliseconds, that the client waits for a response message. *waitTime* overrides values set by the infrastructure or client application. If not specified the application value, if specified, or infrastructure default is inherited.

**Note:** No relationship is enforced between timeout and timeToLive.

**&timeToLive = *expiryTime***
*expiryTime* is the time, specified in milliseconds, before the message expires. The default is zero, which indicates an unlimited lifetime.

**Note:** No relationship is enforced between timeout and timeToLive.

## Connection factory parameters

**connectQueueManager ( *qMgrName* )**
*qMgrName* specifies the queue manager to which the client connects. The default is blank.

[10] Java service only

**binding ( *bindingType* )**

*bindingType* specifies how the client is connected to *qMgrName*. The default is auto. *bindingType* takes the following values:

**auto**

The sender tries the following connection types, in order:

1. If other options appropriate to a client connection are specified, the sender uses a client binding. The other options are clientConnection or clientChannel.
2. Use a server connection.
3. Use a client connection.

Use `binding ( auto )` in the *URI* if there is no local queue manager at the SOAP client. A client connection is built for the SOAP client.

**client**

Use `binding ( client )` in the *URI* to build a client configuration for the SOAP sender.

**server**

Use `binding ( server )` in the *URI* to build a server configuration for the SOAP sender. If the connection has client type parameters the connection fails and an error is displayed by the IBM MQ SOAP sender. Client type parameters are clientConnection, clientChannel, or SSL parameters.

**xaclient**

xaclient is applicable only on .NET and not for Java clients. Use an XA-client connection.

**clientChannel ( *channel* )**

The SOAP client uses *channel* to make an IBM MQ client connection. *channel* must match the name of a server connection channel, unless channel auto definition is enabled at the server. clientChannel is a required parameter, unless you have provided a Client Connection Definition table (CCDT).

Provide a CCDT in Java by setting `com.ibm.mq.soap.transport.jms.mqchlurl`. In .NET set the `MQCHLLIB` and `MQCHLTAB` environment variables; see "Use a channel definition table with the IBM MQ SOAP transport for SOAP sender" on page 1459.

**clientConnection ( *connection* )**

The SOAP client uses *connection* to make an IBM MQ client connection. The default hostname is localhost, and default port is 1414. If *connection* is a TCP/IP address, it takes one of three formats, and can be suffixed with a port number.

JMS clients can either use the format `: hostname:port` or 'escape' the brackets using the format %X where X is the hexadecimal value that represents the bracket character in the code page of the URI. For example, in ASCII, %28 and %29 for ( and ) respectively.

.Net clients can use the brackets explicitly `: hostname(port)` or use the 'escaped' format.

**IPv4 address**

For example, `192.0.2.0`.

**IPv6 address**

For example, `2001:DB8:0:0:0:0:0:0`.

**Host name**

For example, `www.example.com%281687%29`, `www.example.com:1687`, or `www.example.com(1687)`.

**SSL *platform***

See "Required SSL parameters ( Java )" on page 1449

**Sample URIs**

**Note:**

1. & in the URI is encoded as `&`
2. All the parameter listed previously are applicable to the clients.

3. Only **destination**, **connectionFactory** and **initialContextFactory** are applicable to the WCF service.

```
jms:/queue?
destination=myQ&amp;connectionFactory=()&amp;initialContextFactory=com.ibm.mq.jms.Nojndi
```

*Figure 23. URI for an Axis service, supplying only required parameters*

```
jms:/queue?destination=myQ&amp;connectionFactory=()&amp;targetService=MyService.asmx
&amp;initialContextFactory=com.ibm.mq.jms.Nojndi
```

*Figure 24. URI for a .NET service, supplying only required parameters*

```
jms:/queue?destination=myQ@myRQM&amp;connectionFactory=connectQueueManager(myconnQM)
binding(client)clientChannel(myChannel)clientConnection(myConnection)
&amp;initialContextFactory=com.ibm.mq.jms.Nojndi
```

*Figure 25. URI for an Axis service, supplying some optional connectionFactory parameters*

```
jms:/queue?destination=myQ@myRQM&amp;connectionFactory=connectQueueManager(myconnQM)
binding(client)clientChannel(myChannel)clientConnection(myConnection)
sslPeerName(CN=MQ Test 1,O=IBM,S=Hampshire,C=GB)
&amp;initialContextFactory=com.ibm.mq.jms.Nojndi
```

*Figure 26. URI for an Axis service, supplying the sslPeerName option of the connectionFactory parameter*

### The `Nojndi` mechanism

The `Nojndi` mechanism enables JMS programs, which use JNDI interfaces, to use the same URI as IBM MQ programs, which do not use JNDI.

You can use the IBM MQ transport for SOAP to invoke Web services on WebSphere Application Server. WebSphere Application Server SOAP over JMS looks up the JMS resources using JNDI. The Web service client might be running on .NET, or using Axis 1.4, to invoke the Web service and not using JNDI. To use the same URL for the client and server, it must provide the same information whether the environment is using JNDI or not.

The URI passed to the IBM MQ transport for SOAP by a Web service client contains a specific IBM MQ queue manager and queue names. These names are parsed and used directly by IBM MQ SOAP support.

The `Nojndi` mechanism directs the initialContextFactory used by a JMS program to `com.ibm.mq.jms.Nojndi`. The `com.ibm.mq.jms.Nojndi` class is an implementation of the JNDI interface that returns the connectionFactory and destination from the URL as ConnectionFactory and Queue Java objects. If the JMS implementation is IBM MQ, MQConnectionFactory and MQQueue inherit from the ConnectionFactory and Queue classes.

By using the `Nojndi` mechanism, you are able to provide the same connection information to WebSphere Application server and .NET using the same URL.

## W3C SOAP over JMS URI for the IBM MQ Axis 2 client

Define a W3C SOAP over JMS URI to call a Web service from an Axis 2 client using IBM MQ JMS as the SOAP transport. The Web service must be provided by a server that supports IBM MQ JMS and the W3C SOAP over JMS candidate recommendation for the SOAP/JMS binding.

### Description

The W3C candidate recommendation defines the SOAP over JMS binding; SOAP over Java Message Service 1.0. Also useful for its examples is URI Scheme for Java(tm) Message Service 1.0[11].

Use the syntax diagram to create W3C SOAP over JMS URIs that are syntactically correct, and are accepted by the IBM MQ Axis 2 client. It is limited to defining the URI that is accepted by the IBM MQ Axis 2 client. It is a subset of the W3C recommendation in two respects:

1. The jms-variant topic is not supported, and must not be specified in a URI passed to the IBM MQ Axis 2 client.
2. The following properties are omitted from the syntax diagram because they are JMS properties, and not part of the URI.
   a. bindingVersion
   b. contentType
   c. soapAction
   d. requestURI
   e. isFault

The JMS properties are set by the Axis 2 client or the server.

The diagram extends the W3C recommendation by defining a custom parameter, connectionFactory. connectionFactory is used as an alternative to JNDI to specify how the Axis 2 client connects to a queue manager using a queue.

The IBM MQ Axis 2 client only accepts properties as part of the URI passed to the client by the client application or as environment variables. The IBM MQ Axis 2 client has no capability to process a WSDL document. The client application or a development tool might process the WSDL and create the URI to pass to the Axis 2 client. An IBM MQ Axis 2 client application cannot set the JMS message properties directly.

## Syntax

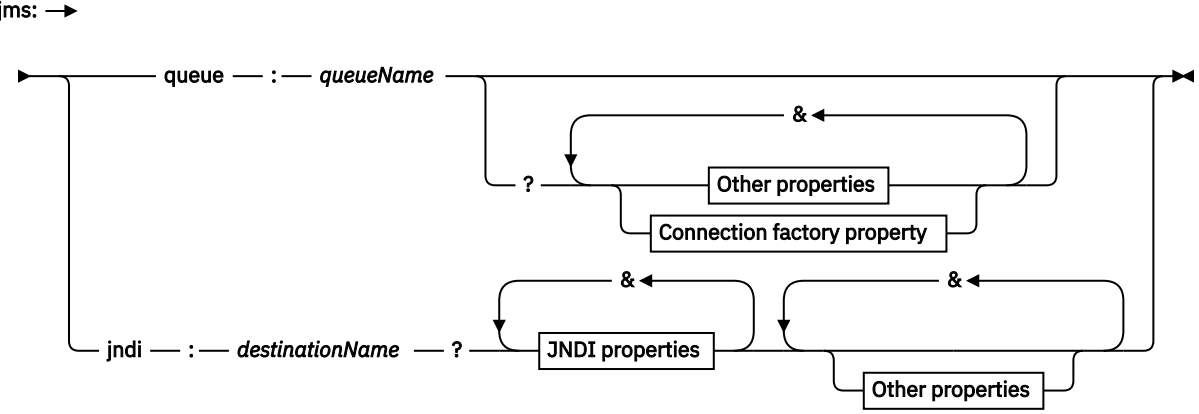
In accordance with the W3C recommendation, all the parameters can be obtained from environment variables. The environment variable names are formed by prefacing the parameter name with `soapjms_`. The syntax is: `soapjms_` *parameterName* ; for example,

```
set soapjms_targetServer=com.example.org.stockquote
```

If a parameter is set using an environment variable it overrides the value set in the URI.

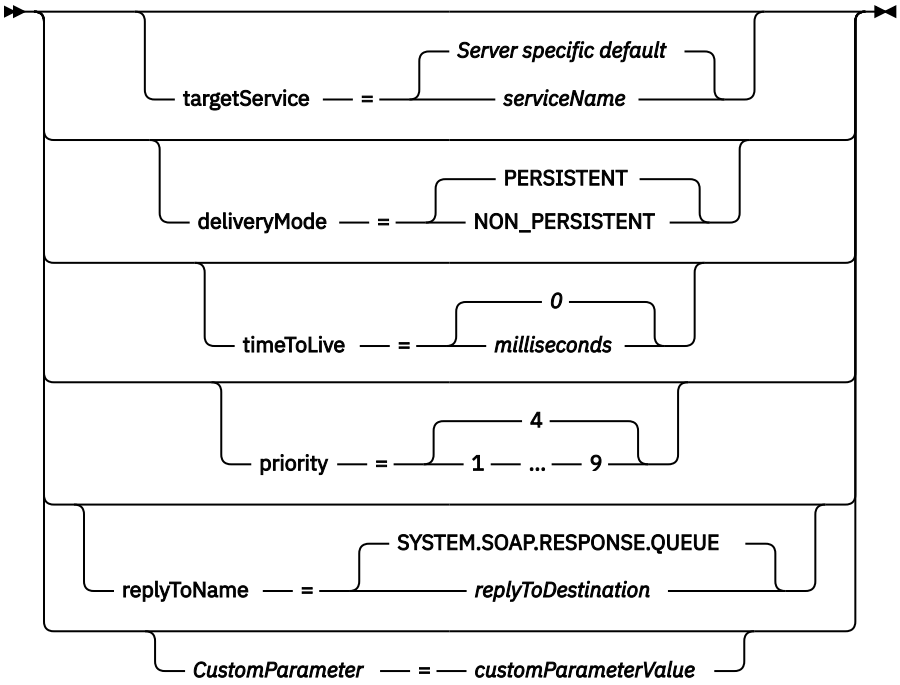
In accordance with the W3C recommendation, all the parameters can be repeated. The last instance of a parameter is used, unless overridden by an environment variable.

**jms-uri**

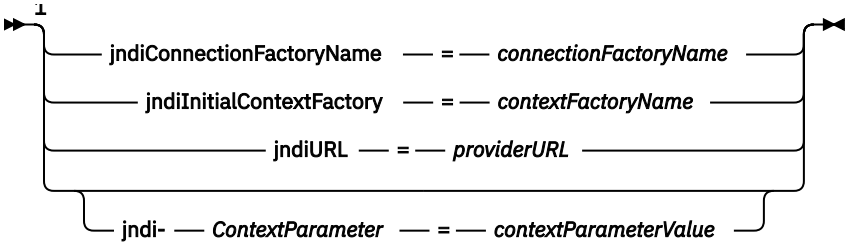



**Other properties**

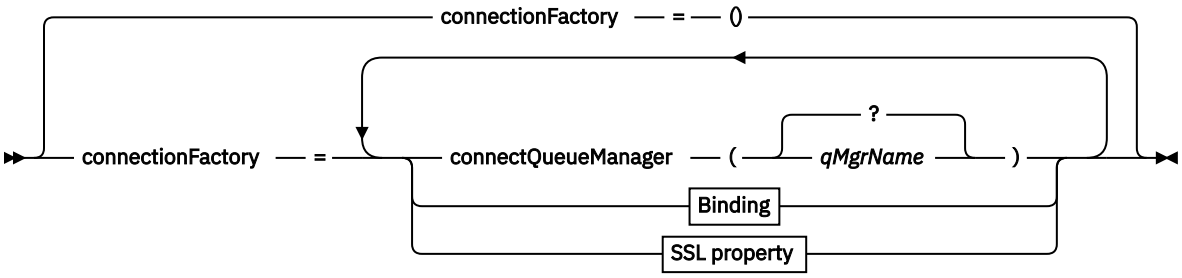
11 Look for *URI Scheme for JMS*, in the W3C specification references, for the latest draft.



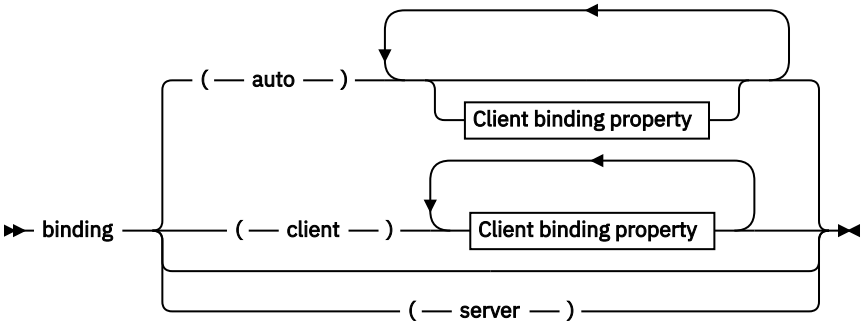

**JNDI properties**



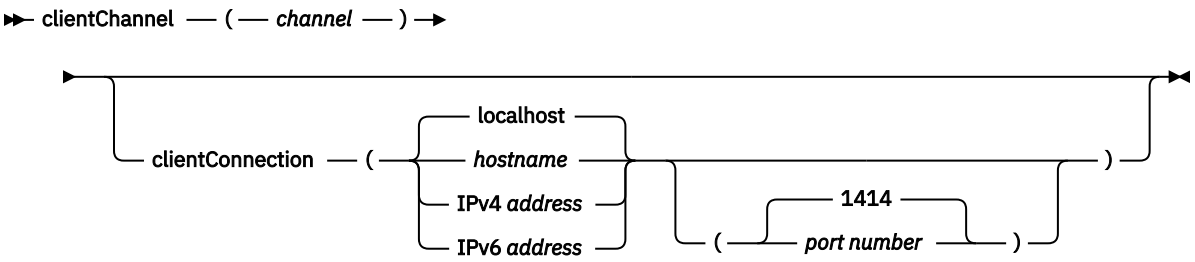

**Connection factory property**



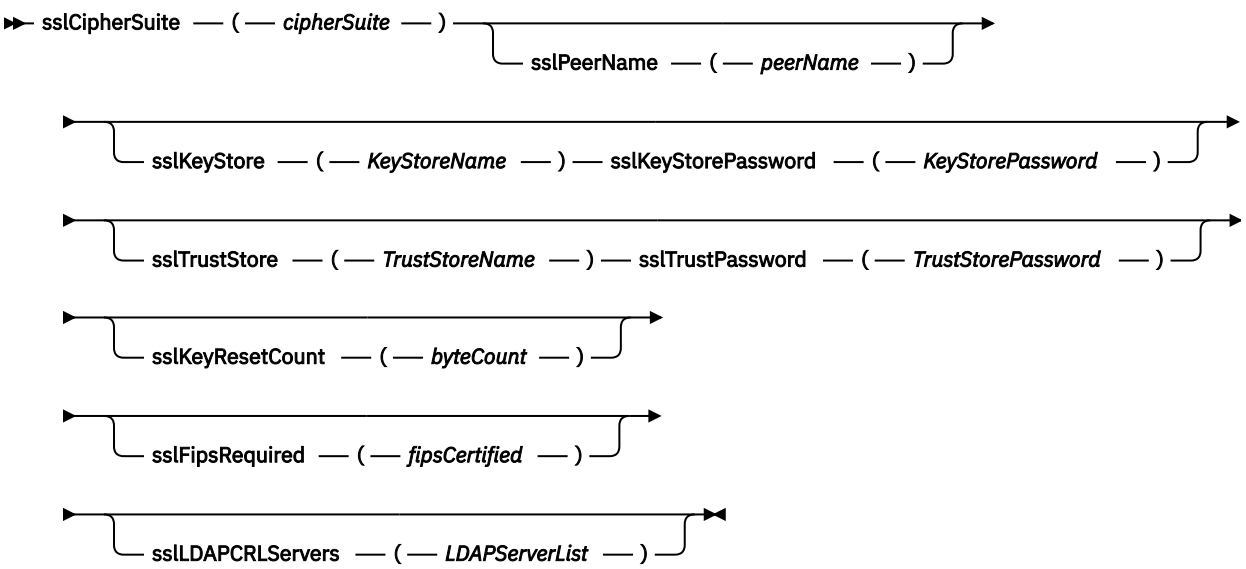

**Binding**




**Client binding property**




**SSL property**




Notes:

[1] **jndiConnectionFactoryName**, **jndiConnectionFactoryName** and **jndiURL** are all required parameters. **jndi-** *ContextParameter* is optional.

## Parameters

**connectionFactory = *connectionFactoryParameterList***

*connectionFactoryParameterList* are parameters that qualify how the Axis 2 client connects to a queue manager when the destination variant is queue.

connectionFactory must not be specified with the jndi destination variant.

The parameters are not passed to the server in the request URI.

If connectionFactory is omitted, the queue must belong to a default queue manager running on the same server as the Axis 2 client.

The *connectionFactoryParameterList*:

**binding ( *bindingType* )**

*bindingType* specifies how the client is connected to *qMgrName*. The default is auto. *bindingType* takes the following values:

**auto**

The sender tries the following connection types, in order:

1. If other options appropriate to a client connection are specified, the sender uses a client binding. The other options are clientConnection or clientChannel.
2. Use a server connection.
3. Use a client connection.

Use `binding ( auto )` in the *URI* if there is no local queue manager at the SOAP client. A client connection is built for the SOAP client.

**client**
Use `binding ( client )` in the *URI* to build a client configuration for the SOAP sender.

**server**
Use `binding ( server )` in the *URI* to build a server configuration for the SOAP sender. If the connection has client type parameters the connection fails and an error is displayed by the IBM MQ SOAP sender. Client type parameters are clientConnection, clientChannel, or SSL parameters.

**xaclient**
xaclient is applicable only on .NET and not for Java clients. Use an XA-client connection.

**clientChannel ( *channel* )**

The SOAP client uses *channel* to make an IBM MQ client connection. *channel* must match the name of a server connection channel, unless channel auto definition is enabled at the server. clientChannel is a required parameter, unless you have provided a Client Connection Definition table (CCDT).

Provide a CCDT in Java by setting `com.ibm.mq.soap.transport.jms.mqchlurl`. In .NET set the `MQCHLLIB` and `MQCHLTAB` environment variables; see "Use a channel definition table with the IBM MQ SOAP transport for SOAP sender" on page 1459.

**clientConnection ( *connection* )**
The SOAP client uses *connection* to make an IBM MQ client connection. The default hostname is localhost, and default port is 1414. If *connection* is a TCP/IP address, it takes one of three formats, and can be suffixed with a port number.

JMS clients can either use the format `: hostname:port` or 'escape' the brackets using the format %X where X is the hexadecimal value that represents the bracket character in the code page of the URI. For example, in ASCII, %28 and %29 for ( and ) respectively.

.Net clients can use the brackets explicitly `: hostname(port)` or use the 'escaped' format.

**IPv4 address**
For example, `192.0.2.0`.

**IPv6 address**
For example, `2001:DB8:0:0:0:0:0:0`.

**Host name**
For example, `www.example.com%281687%29`, `www.example.com:1687`, or `www.example.com(1687)`.

**sslCipherSuite ( *CipherSuite* )**
*CipherSuite* specifies the sslCipherSuite used on the channel. The CipherSuite specified by the client must match the CipherSuite specified on the server connection channel.

**sslFipsRequired ( *fipsCertified* )**
*fipsCertified* specifies whether *CipherSpec* or *CipherSuite* must use FIPS-certified cryptography in IBM MQ on the channel. The effect of setting *fipsCertified* is the same as setting the `FipsRequired` field of the **MQSCO** structure on an `MQCONNX` call.

**sslKeyStore ( *KeyStoreName* )**
*KeyStoreName* specifies the sslKeyStoreName used on the channel. The keystore holds the private key of the client used to authenticate the client to the server. The keystore is optional if the SSL connection is configured to accept anonymous client connections.

**sslKeyResetCount ( *bytecount* )**
*bytecount* specifies the number of bytes passed across an SSL channel before the SSL secret key must be renegotiated. To disable the renegotiation of SSL keys omit the field or set it to zero. Zero is the only value supported in some environments, see Renegotiating the secret key in IBM MQ classes for Java . The effect of setting sslKeyResetCount is the same as setting the `KeyResetCount` field in the **MQSCO** structure on an `MQCONNX` call.

**sslKeyStorePassword ( *KeyStorePassword* )**
*KeyStorePassword* specifies the sslKeyStorePassword used on the channel.

**sslLDAPCRLServers ( *LDAPServerList* )**

*LDAPServerList* specifies a list of LDAP servers to be used for Certificate Revocation List checking.

For SSL enabled client connections, *LDAPServerList* is a list of LDAP servers to be used for Certificate Revocation List (CRL) checking. The certificate provided by the queue manager is checked against one of the listed LDAP CRL servers; if found, the connection fails. Each LDAP server is tried in turn until connectivity is established to one of them. If it is impossible to connect to any of the servers, the certificate is rejected. Once a connection has been successfully established to one of them, the certificate is accepted or rejected depending on the CRLs present on that LDAP server.

If *LDAPServerList* is blank, the certificate belonging to the queue manager is not checked against a Certificate Revocation List. An error message is displayed if the supplied list of LDAP URIs is not valid. The effect of setting this field is the same as that of including MQAIR records and accessing them from an **MQSCO** structure on an MQCONNX.

**sslPeerName ( *peerName* )**
*peerName* specifies the sslPeerName used on the channel.

**sslTrustStore ( *TrustStoreName* )**
*TrustStoreName* specifies the sslTrustStoreName used on the channel. The truststore holds the public certificate of the server, or its key chain, to authenticate the server to the client. The truststore is optional if the root certificate of a certificate authority is used to authenticate the server. In Java, root certificates are held in the JRE certificate store, `cacerts`.

**sslTrustStorePassword ( *TrustStorePassword* )**
*TrustStorePassword* specifies the sslTrustStorePassword used on the channel.

***CustomParameter* = *customParameterValue***

*CustomParameter* is the user-defined name of a custom parameter, and *customParameterValue* is the value of the parameter.

Custom parameters that are not used by the Axis 2 client are sent by the Axis 2 client to the SOAP server. Consult the server documentation. connectionFactory is a custom parameter that is used by the Axis 2 client and is not passed to the server.

*CustomParameter* must not match the name of an existing parameter.

If *CustomParameter* starts with the string `jndi-` it is used in looking up a JNDI destination; see jndi-.

**deliveryMode = *deliveryMode***
*deliveryMode* sets the message persistence. The default is PERSISTENT.

**jndi : *destinationName***
*destinationName* is a JNDI destination name that maps to a JMS queue. If the jndi destination variant is specified, you must provide a *destinationName*.

**jndiConnectionFactoryName = *connectionFactoryName***
*connectionFactoryName* sets the JNDI name of the connection factory. If the destination variant is jndi, *connectionFactoryName* must be provided.

**jndiInitialContextFactory = *contextFactoryName***
*contextFactoryName* sets the JNDI name of the initial context factory. If the destination variant is jndi, *contextFactoryName* must be provided. See Using JNDI to retrieve administered objects in a JMS application.

**jndiURL = *providerURL***
*jndiURL* sets the URL name of the JNDI provider. If the destination variant is jndi, *jndiURL* must be specified.

**jndi- *ContextParameter* = *contextParameterValue***
jndi- *ContextParameter* is the user-defined name of a custom parameter that used to pass information to the JNDI provider. *contextParameterValue* is the information that is passed.

**priority = *priorityValue***
*priorityValue* sets the JMS message priority. 0 is low, 9 is high. The default value is 4.

**queue : *queueName***
*queueName* is the name of a JMS queue on which the SOAP request is placed. If the queue variant is specified, a queue name must be provided. If the queue does not belong to a default queue manager on the same server as the client, set the connectionFactory parameter.

**replyToName = *replyToDestination***
*replyToDestination* sets the destination queue name. If the destination variant is jndi, the name is a JNDI name that must map to a queue. If the variant is queue the name is a JMS queue. The default value is `SYSTEM.SOAP.RESPONSE.QUEUE`.

**targetService = *serviceName***
The name used by the SOAP server to start the target Web service.

On Axis, *serviceName* is the fully qualified name of a Java service, for example: `targetService=www.example.org.StockQuote`. If targetService is not specified, a service is loaded using the default Axis mechanism.

**timeToLive = *milliseconds***
Set *milliseconds* to the time before the message expires. The default, `0`, is the message never expires.

### Examples

```
jms:jndi:REQUESTQ
    ?jndiURL=file:/C:/JMSAdmin
    &jndiInitialContextFactory=com.sun.jndi.fscontext.RefFSContextFactory
    &jndiConnectionFactoryName=ConnectionFactory
    &replyToName=RESPONSEQ
    &deliveryMode(NON_PERSISTENT)
```

*Figure 27. Use jms:jndi to send a SOAP/JMS request*

```
jms:queue:SOAPJ.demos
    ?connectionFactory=connectQueueManager(QM1)
     Bind(Client)
     ClientChannel(SOAPClient)
     ClientConnection(www.example.org(1418))
     &deliveryMode(NON_PERSISTENT)
```

*Figure 28. Use jms:queue to send a SOAP/JMS request*

## Supported Web services

Code that has been written to run as a Web service does not need to be modified to use the IBM MQ transport for SOAP. You do need to deploy services differently to run with the IBM MQ transport for SOAP rather than using HTTP.

### Description

V 8.0.0.2 From IBM MQ 8.0.0, Fix Pack 2, the IBM MQ transport for SOAP is deprecated. For more information, see Deprecations: IBM MQ transport SOAP client and HTTP Bridge.

The IBM MQ transport for SOAP provides a SOAP listener to run services for .NET Framework 1 and .NET 2, and for Axis 1.4. The IBM MQ custom channel for Microsoft Windows Communication Foundation runs services for .NET Framework 3. WebSphere Application Server and CICS provide support for running services over IBM MQ transport for SOAP. Create a custom Export to use WebSphere Enterprise Service Bus or WebSphere Process Server.

The IBM MQ SOAP listener can process SOAP requests transactionally. Run **amqwdeployWMQService** using the -x option. The two-phase option is only supported for listeners using server bindings. Other environments might provide transactional support for the IBM MQ transport for SOAP. Consult their documentation.

IBM MQ transport for SOAP currently does not support the emerging industry standard SOAP over JMS protocol that has been submitted to W3C. You can distinguish a SOAP/JMS message written to the new standard by looking for the JMS BindingVersion property. IBM MQ transport for SOAP does not set the BindingVersion property.

## Axis 1.4

A Java class can typically be used without modification. The types of any arguments to the methods in the web service must be supported by the Axis engine. Refer to Axis documentation for further details. If the service uses a complex object as an argument, or returns one, that object must comply to the Java bean specification. See the examples in Figure 31 on page 1475, Figure 32 on page 1475, and Figure 33 on page 1475:

1. Have a public parameter-less constructor.
2. Any complex types of the bean must have public getters and setters of the form:

Prepare the service for deployment using the **amqwdeployWMQService** utility. The service is invoked by the IBM MQ SOAP listener which uses `axis.jar` to run the service.

The only two-phase transaction manager supported for Axis 1.4 is IBM MQ.

The supplied deployment utility does not support the case where a service returns an object in a different package to the service itself. To use an object returned in a different package, write your own deployment utility. You can base your deployment utility on the supplied sample, or capture the commands it produces, using the -v option. Amend the commands to produce a tailored script.

If the service uses classes that are external to the Axis infrastructure and the IBM MQ SOAP run time environment, you must set the correct CLASSPATH. To change CLASSPATH, amend the generated script that starts or defines the listeners to include the services required, in one of the following ways:

- Amend the CLASSPATH directly in the script after the call to **amqwsetcp**.
- Create a service-specific script to customize the CLASSPATH and invoke this script in the generated script after the call to **amqwsetcp**.
- Create a customized deployment process to customize the CLASSPATH in the generated script automatically.

## .NET Framework 1 and .NET Framework 2

A service that has already been prepared as an HTTP Web service does not need to be modified for use as an IBM MQ Web service. It needs to be deployed using the **amqwdeployWMQService** utility.

The only two-phase transaction manager supported for .NET Framework 1 and .NET 2 is Microsoft Transaction Server (MTS).

If the service code has not been prepared as an HTTP Web service you must convert it to a Web service. Declare the class as a web service and identify how the parameters of each method are formatted. You must check that any arguments to the methods of the service are compatible with the environment. Figure 29 on page 1474 and Figure 30 on page 1474 show a .NET class that has been prepared as a web service. The additions made are shown in bold type.

Figure 29 on page 1474 uses the code-behind programming model for a .NET Web service. In the code-behind model, the source for the service is separated from the `.asmx` file. The `.asmx` file declares the name of the associated source file with the Codebehind keyword. IBM MQ has samples of both inline and code-behind .NET Web services.

.NET Web services source must be compiled before deployment by the **amqwdeployWMQService** deployment utility. The service is compiled into a library ( `.dll` ). The library must be placed in the `./bin` subdirectory of the deployment directory.

### .NET Framework 3

Create an IBM MQ custom channel for Microsoft Windows Communication Foundation (WCF) to invoke services deployed to .NET Framework 3. See Developing WCF applications with IBM MQ for a description of how to configure WCF to use the IBM MQ transport for SOAP.

### WebSphere Application Server

You can invoke web services hosted by WebSphere Application Server using the IBM MQ Transport for SOAP. See Using SOAP over JMS to transport web services.

You need to modify the WSDL generated by deployment of a JMS service to WebSphere Application Server in order to generate a Web services client. The WSDL created by deployment to WebSphere Application Server includes a URI with a JNDI reference to the JMS `InitialContextFactory`. You need to modify the JNDI reference to Nojndi and provide connection attributes as described in "URI syntax and parameters for Web service deployment" on page 1460.

### CICS

You can invoke CICS applications using the IBM MQ Transport for SOAP. See Configuring your CICS system for Web services.

### WebSphere Enterprise Service Bus and WebSphere Process Server for Multiplatforms

WebSphere ESB and WebSphere Process Server for Multiplatforms support SOAP over JMS, with a ready built binding, only when using the default WebSphere Application Server messaging provider. Create a custom binding for JMS to support IBM MQ transport for SOAP. See JMS data bindings..

#### Example

```
<%@ WebService Language="C#" CodeBehind="Quote.asmx.cs" Class="Quote.QuoteDotNet" %>
```

*Figure 29. Service definition for .NET Framework 2: `Quote.asmx`*

```
 <%@ WebService Language="C#" CodeBehind="Quote.asmx.cs" Class="Quote.QuoteDotNet" %>
using System;
using System.Web;
using System.Web.Services;
using System.Web.Services.Protocols;

namespace Quote {
    [WebService(Namespace = "http://www.example.org/")]
    [WebServiceBinding(ConformsTo = WsiProfiles.BasicProfile1_1)]
    public class QuoteDotNet : System.Web.Services.WebService {
        [WebMethod]
        public string getQuote(String symbol){
            return symbol.ToUpper();
        }
    }
}
```

*Figure 30. Service implementation for .NET Framework 2: `Quote.asmx.cs`*

```
package org.example.www;
public interface CustomerInfoInterface extends java.rmi.Remote {
    public org.example.www.CustomerRecord
           getCustomerName(org.example.www.CustomerRecord request)
           throws java.rmi.RemoteException, org.example.www.GetCustomerName_faultMsg;
}
```

*Figure 31. Java JAX-RPC service interface using a complex type*

```
package org.example.www;
public class CustomerInfoPortImpl implements org.example.www.CustomerInfoInterface{
    public org.example.www.CustomerRecord
           getCustomerName(org.example.www.CustomerRecord request)
           throws java.rmi.RemoteException, org.example.www.GetCustomerName_faultMsg {
        request.setName(request.getID().toString());
        return request;
    }
}
```

*Figure 32. Java JAX-RPC service implementation using a complex type*

```
package org.example.www;
public class CustomerRecord {
    private java.lang.String name;
    private java.lang.Integer ID;
    public CustomerRecord() {}
    public java.lang.String getName() {
        return name; }
    public void setName(java.lang.String name) {
        this.name = name; }
    public java.lang.Integer getID() {
        return ID; }
    public void setID(java.lang.Integer ID) {
        this.ID = ID; }
}
```

*Figure 33. Java JAX-RPC service bean implementation of a complex type*

# IBM MQ transport for SOAP Web service clients

You can reuse an existing SOAP over HTTP client with IBM MQ transport for SOAP. You must make some small modifications to the code and build process to convert the client to work with IBM MQ transport for SOAP.

## Coding

JAX-RPC clients must be written in Java. .NET Framework 1 and 2 clients can be written in any language that uses the Common Language Runtime. Code examples are provided in C# and Visual Basic.

The level of transactional support depends on the client environment and the pattern of the SOAP interaction. The SOAP request and SOAP reply can not be part of the same atomic transaction.

You must call `IBM.WMQSOAP.Register.Extension()` in a .NET Framework 1, .NET Framework 2 client. In a JAX-RPC Java Web service client call `com.ibm.mq.soap.Register.extension` to register the IBM MQ SOAP sender. The method registers the IBM MQ transport for SOAP sender as the handler for SOAP messages using the `jms:` protocol.

To create a .NET Framework 3 client, generate a Windows Communication Foundation client proxy using the **svcutil** tool; see Generating a WCF client proxy and application configuration files using the svcutil tool with metadata from a running service.

## Libraries required to build and run .NET Framework 1 and 2 clients

- amqsoap
- System

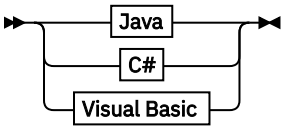
- System.Web.Services
- System.Xml

## Libraries required to build and run Axis 1.4 clients

- *MQ_Install*\java\lib\com.ibm.mq.soap.jar;
- *MQ_Install*\java\lib\com.ibm.mq.commonservices.jar;
- *MQ_Install*\java\lib\soap\axis.jar;
- *MQ_Install*\java\lib\soap\jaxrpc.jar
- *MQ_Install*\java\lib\soap\saaj.jar;
- *MQ_Install*\java\lib\soap\commons-logging-1.0.4.jar;
- *MQ_Install*\java\lib\soap\commons-discovery-0.2.jar;
- *MQ_Install*\java\lib\soap\wsdl4j-1.5.1.jar;
- *MQ_Install*\java\jre\lib\xml.jar;
- *MQ_Install*\java\lib\soap\servlet.jar;
- *MQ_Install*\java\lib\com.ibm.mq.jar;
- *MQ_Install*\java\lib\com.ibm.mq.headers.jar;
- *MQ_Install*\java\lib\com.ibm.mq.pcf.jar;
- *MQ_Install*\java\lib\com.ibm.mq.jmqi.jar;

**Note:** From IBM MQ 8.0, `ldap.jar`, `jndi.jar` and `jta.jar` have been removed from this list as they are now part of the JDK.

## Register SOAP extension




**Java**

**C#**

**Visual Basic**

### Client examples

Figure 34 on page 1477 is an example of a .NET Framework 1 or .NET Framework 2 C# client that uses the inline programming model. The **`IBM.WMQSOAP.Register.Extension()`** method registers the IBM MQ SOAP sender with .NET as the `jms:` protocol handler.

```
using System;
namespace QuoteClientProgram {
    class QuoteMain {
        static void Main(string[] args) {
            try {
                IBM.WMQSOAP.Register.Extension();
                Quote q = new Quote();
                Console.WriteLine("Response is: " + q.getQuote("ibm"));
             }  catch (Exception e) {
                Console.WriteLine("Exception is: " + e);
             }
        }
    }
}
```

*Figure 34. C# Web service client sample*

Figure 35 on page 1477 is an example of a Java client that uses the JAX-RPC static proxy client interface. The **`com.ibm.mq.soap.Register.extension();`** method registers the IBM MQ SOAP sender with the service proxy to handle the `jms:` protocol.

```
package org.example.www;
import com.ibm.mq.soap.Register;
public class QuoteClient {
   public static void main(String[] args) {
      try {
         Register.extension();
         QuoteSOAPImplServiceLocator locator = new QuoteSOAPImplServiceLocator();
         System.out.println("Response = "
                  + locator.getOrgExampleWwwQuoteSOAPImpl_Wmq().getQuote("IBM"));
      } catch (Exception e) {
         System.out.println("Exception = " + e.getMessage());
      }
   }
}
```

*Figure 35. Java Web service client example*

# User exits, API exits, and installable services reference

Use the links provided in this section to help you develop your User exits, API exits, and installable services applications:

- "MQIEP structure" on page 1478
- "Data-conversion exit reference" on page 1481
- "MQ_PUBLISH_EXIT - Publish exit" on page 1485
- "Channel-exit calls and data structures" on page 1493
- "API exit reference" on page 1580
- "Installable services interface reference information" on page 1640
- IBM i "Installable services interface reference information" on page 1703

**Related concepts**

"MQI applications reference" on page 7
Use the links provided in this section to help you develop your Message Queue Interface (MQI) applications.

The IBM MQ Classes for Java libraries

**Related tasks**

Developing applications

**Related reference**

“SOAP reference” on page 1422
IBM MQ transport for SOAP reference information arranged alphabetically.

“Reference material for IBM MQ bridge for HTTP” on page 1742
Reference topics for IBM MQ bridge for HTTP, arranged alphabetically

“The IBM MQ .NET classes and interfaces” on page 1777
IBM MQ .NET classes and interfaces are listed alphabetically. The properties, methods and constructors are described.

“IBM MQ C++ classes” on page 1839
The IBM MQ C++ classes encapsulate the IBM MQ Message Queue Interface (MQI). There is a single C++ header file, **imqi.hpp**, which covers all of these classes.

IBM MQ Classes for JMS

# MQIEP structure

The MQIEP structure contains an entry point for each function call that exits are permitted to make.

## Fields

**StrucId**
Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQIEP_STRUC_ID**

**Version**
Type: MQLONG - input

Structure version number. The value is as follows:

**MQIEP_VERSION_1**
Version 1 structure version number.

**MQIEP_CURRENT_VERSION**
Current version of the structure.

**StrucLength**
Type: MQLONG

Size of the MQIEP structure in bytes. The value is as follows:

**MQIEP_LENGTH_1**

**Flags**
Type: MQLONG

Provides information about the function addresses. A flag to indicate if the library is threaded can be used with a flag to indicate if the library is a client or server library.

The following value is used to specify no library information:

**MQIEPF_NONE**

One of the following values is used to specify if the shared library is threaded or non-threaded:

**MQIEPF_NON_THREADED_LIBRARY**
A non-threaded shared library

**MQIEPF_THREADED_LIBRARY**
A threaded shared library

One of the following values is used to specify if the shared library is a client or a server shared library:

**MQIEPF_CLIENT_LIBRARY**
A client shared library

**MQIEPF_LOCAL_LIBRARY**
A server shared library

**Reserved**
Type: MQPTR

**MQBACK_Call**
Type: PMQ_BACK_CALL

Address of the MQBACK call.

**MQBEGIN_Call**
Type: PMQ_BEGIN_CALL

Address of the MQBEGIN call.

**MQBUFMH_Call**
Type: PMQ_BUFMH_CALL

Address of the MQBUFMH call.

**MQCB_Call**
Type: PMQ_CB_CALL

Address of the MQCB call.

**MQCLOSE_Call**
Type: PMQ_CLOSE_CALL

Address of the MQCLOSE call.

**MQCMIT_Call**
Type: PMQ_CMIT_CALL

Address of the MQCMIT call.

**MQCONN_Call**
Type: PMQ_CONN_CALL

Address of the MQCONN call.

**MQCONNX_Call**
Type: PMQ_CONNX_CALL

Address of the MQCONNX call.

**MQCRTMH_Call**
Type: PMQ_CRTMH_CALL

Address of the MQCRTMH call.

**MQCTL_Call**
Type: PMQ_CTL_CALL

Address of the MQCTL call.

**MQDISC_Call**
Type: PMQ_DISC_CALL

Address of the MQDISC call.

**MQDLTMH_Call**
Type: PMQ_DLTMH_CALL

Address of the MQDLTMH call.

**MQDLTMP_Call**
Type: PMQ_DLTMP_CALL

Address of the MQDLTMP call.

**MQGET_Call**
Type: PMQ_GET_CALL

Address of the MQGET call.

**MQINQ_Call**
Type: PMQ_INQ_CALL

Address of the MQINQ call.

**MQINQMP_Call**
Type: PMQ_INQMP_CALL

Address of the MQINQMP call.

**MQMHBUF_Call**
Type: PMQ_MHBUF_CALL

Address of the MQMHBUF call.

**MQOPEN_Call**
Type: PMQ_OPEN_CALL

Address of the MQOPEN call.

**MQPUT_Call**
Type: PMQ_PUT_CALL

Address of the MQPUT call.

**MQPUT1_Call**
Type: PMQ_PUT1_CALL

Address of the MQPUT1 call.

**MQSET_Call**
Type: PMQ_SET_CALL

Address of the MQSET call.

**MQSETMP_Call**
Type: PMQ_SETMP_CALL

Address of the MQSETMP call.

**MQSTAT_Call**
Type: PMQ_STAT_CALL

Address of the MQSTAT call.

**MQSUB_Call**
Type: PMQ_SUB_CALL

Address of the MQSUB call.

**MQSUBRQ_Call**
Type: PMQ_SUBRQ_CALL

Address of the MQSUBRQ call.

**MQXCNVC_Call**
Type: PMQ_XCNVC_CALL

Address of the MQXCNVC call.

**MQXCLWLN_Call**
Type: PMQ_XCLWLN_CALL

Address of the MQXCLWLN call.

**MQXDX_Call**
Type: PMQ_XDX_CALL

Address of the MQXDX call.

**MQXEP_Call**
Type: PMQ_XEP_CALL

Address of the MQXEP call.

**MQZEP_Call**
Type: PMQ_ZEP_CALL

Address of the MQZEP call.

### C Declaration

```
struct tagMQIEP {
   MQCHAR4          StrucId;          /* Structure identifier */
   MQLONG           Version;          /* Structure version number */
   MQLONG           StrucLength;      /* Structure length */
   MQLONG           Flags;            /* Flags */
   MQPTR            Reserved;         /* Reserved */
   PMQ_BACK_CALL    MQBACK_Call;      /* Address of MQBACK */
   PMQ_BEGIN_CALL   MQBEGIN_Call;     /* Address of MQBEGIN */
   PMQ_BUFMH_CALL   MQBUFMH_Call;     /* Address of MQBUFMH */
   PMQ_CB_CALL      MQCB_Call;        /* Address of MQCB */
   PMQ_CLOSE_CALL   MQCLOSE_Call;     /* Address of MQCLOSE */
   PMQ_CMIT_CALL    MQCMIT_Call;      /* Address of MQCMIT */
   PMQ_CONN_CALL    MQCONN_Call;      /* Address of MQCONN */
   PMQ_CONNX_CALL   MQCONNX_Call;     /* Address of MQCONNX */
   PMQ_CRTMH_CALL   MQCRTMH_Call;     /* Address of MQCRTMH */
   PMQ_CTL_CALL     MQCTL_Call;       /* Address of MQCTL */
   PMQ_DISC_CALL    MQDISC_Call;      /* Address of MQDISC */
   PMQ_DLTMH_CALL   MQDLTMH_Call;     /* Address of MQDLTMH */
   PMQ_DLTMP_CALL   MQDLTMP_Call;     /* Address of MQDLTMP */
   PMQ_GET_CALL     MQGET_Call;       /* Address of MQGET */
   PMQ_INQ_CALL     MQINQ_Call;       /* Address of MQINQ */
   PMQ_INQMP_CALL   MQINQMP_Call;     /* Address of MQINQMP */
   PMQ_MHBUF_CALL   MQMHBUF_Call;     /* Address of MQMHBUF */
   PMQ_OPEN_CALL    MQOPEN_Call;      /* Address of MQOPEN */
   PMQ_PUT_CALL     MQPUT_Call;       /* Address of MQPUT */
   PMQ_PUT1_CALL    MQPUT1_Call;      /* Address of MQPUT1 */
   PMQ_SET_CALL     MQSET_Call;       /* Address of MQSET */
   PMQ_SETMP_CALL   MQSETMP_Call;     /* Address of MQSETMP */
   PMQ_STAT_CALL    MQSTAT_Call;      /* Address of MQSTAT */
   PMQ_SUB_CALL     MQSUB_Call;       /* Address of MQSUB */
   PMQ_SUBRQ_CALL   MQSUBRQ_Call;     /* Address of MQSUBRQ */
   PMQ_XCLWLN_CALL  MQXCLWLN_Call;    /* Address of MQXCLWLN */
   PMQ_XCNVC_CALL   MQXCNVC_Call;     /* Address of MQXCNVC */
   PMQ_XDX_CALL     MQXDX_Call;       /* Address of MQXDX */
   PMQ_XEP_CALL     MQXEP_Call;       /* Address of MQXEP */
   PMQ_ZEP_CALL     MQZEP_Call;       /* Address of MQZEP */
};
```

## Data-conversion exit reference

For z/OS, you must write data-conversion exits in assembler language. For other platforms, it is recommended that you use the C programming language.

To help you to create a data-conversion exit program, the following are supplied:

- A skeleton source file
- A convert characters call
- A utility that creates a fragment of code that performs data conversion on data type structures This utility takes C input only. On z/OS, it produces assembler code.

For the procedure for writing the programs see:

- IBM i Writing a data-conversion exit program for IBM MQ for IBM i
- z/OS Writing a data-conversion exit program for IBM MQ for z/OS

- Writing a data-conversion exit for IBM MQ on UNIX and Linux systems
- Writing a data-conversion exit for IBM MQ for Windows

## Skeleton source file

These can be used as your starting point when writing a data-conversion exit program.

The files supplied are listed in Table 638 on page 1482.

*Table 638. Skeleton source files*

| Platform | File |
|---|---|
| AIX | amqsvfc0.c |
| IBM i | QMQMSAMP/QCSRC(AMQSVFC4) |
| HP-UX | amqsvfc0.c |
| Linux | amqsvfc0.c |
| z/OS | CSQ4BAX8 ( "1" on page 1482 )<br>CSQ4BAX9 ( "2" on page 1482 )<br>CSQ4CAX9 ( "3" on page 1482 ) |
| Solaris | amqsvfc0.c |
| Windows systems | amqsvfc0.c |

**Notes:**

1. Illustrates the MQXCVNC call.
2. A wrapper for the code fragments generated by the utility for use in all environments except CICS.
3. A wrapper for the code fragments generated by the utility for use in the CICS environment.

## Convert characters call

Use the MQXCNVC (convert characters) call from within a data-conversion exit program to convert character message data from one character set to another. For certain multibyte character sets (for example, UCS-2 character sets), the appropriate options must be used.

No other MQI calls can be made from within the exit; an attempt to make such a call fails with reason code MQRC_CALL_IN_PROGRESS.

See "MQXCNVC - Convert characters" on page 891 for further information on the MQXCNVC call and appropriate options.

## Utility for creating conversion-exit code

Use this information to learn more about creating conversion-exit code.

The commands for creating conversion-exit code are:

**IBM i**
CVTMQMDTA (Convert IBM MQ Data Type)

**Windows, UNIX and Linux systems**
`crtmqcvx` (Create IBM MQ conversion-exit)

**z/OS**
CSQUCVX

The command for your platform produces a fragment of code that performs data conversion on data type structures, for use in your data-conversion exit program. The command takes a file containing one or more C language structure definitions. On z/OS, it then generates a data set containing assembler code fragments and conversion functions. On other platforms, it generates a file with a C function to convert each structure definition. On z/OS, the utility requires access to the LE/370 runtime library SCEERUN.

## Invoking the CSQUCVX utility on z/OS

Figure 36 on page 1483 shows an example of the JCL used to invoke the CSQUCVX utility.

```
//CVX    EXEC PGM=CSQUCVX
//STEPLIB  DD DISP=SHR,DSN=thlqual.SCSQANLE
//         DD DISP=SHR,DSN=thlqual.SCSQLOAD
//         DD DISP=SHR,DSN=le370qual.SCEERUN
//SYSPRINT DD SYSOUT=*
//CSQUINP  DD DISP=SHR,DSN=MY.MQSERIES.FORMATS(MSG1)
//CSQUOUT  DD DISP=OLD,DSN=MY.MQSERIES.EXITS(MSG1)
```

*Figure 36. Sample JCL used to invoke the CSQUCVX utility*

## z/OS data definition statements

The CSQUCVX utility requires DD statements with the following DDnames:

*Table 639. Data definition statement names and descriptions*

| DD statement | Description |
|---|---|
| SYSPRINT | Specifies a data set or print spool class for reports and error messages. |
| CSQUINP | Specifies the partitioned data set containing the definitions of the data structures to be converted. |
| CSQUOUT | Specifies the partitioned data set where the conversion code fragments are to be written. The logical record length (LRECL) must be 80 and the record format (RECFM) must be FB. |

## Error messages in Windows, UNIX and Linux systems

The `crtmqcvx` command returns messages in the range AMQ7953 through AMQ7970.

These messages are listed in Messages and reason codes *IBM MQ Messages*.

There are two main types of error:

- Major errors, such as syntax errors, when processing cannot continue.

  A message is displayed on the screen giving the line number of the error in the input file. The output file might have been partially created.
- Other errors when a message is displayed stating that a problem has been found but that parsing of the structure can continue.

The output file has been created and contains error information about the problems that have occurred. This error information is prefixed by `#error` so that the code produced is not accepted by any compiler without intervention to rectify the problems.

## Valid syntax

Your input file for the utility must conform to the C language syntax.

If you are unfamiliar with C, refer to the C example in this topic.

In addition, be aware of the following rules:

- typedef is recognized only before the struct keyword.
- A structure tag is required on your structure declarations.
- You can use empty square brackets [ ] to denote a variable length array or string at the end of a message.
- Multidimensional arrays and arrays of strings are not supported.
- The following additional data types are recognized:
  - MQBOOL
  - MQBYTE
  - MQCHAR
  - MQFLOAT32
  - MQFLOAT64
  - MQSHORT
  - MQLONG
  - MQINT8
  - MQUINT8
  - MQINT16
  - MQUINT16
  - MQINT32
  - MQUINT32
  - MQINT64
  - MQUINT64

  MQCHAR fields are code page converted, but MQBYTE, MQINT8 and MQUINT8 are left untouched. If the encoding is different, MQSHORT, MQLONG, MQINT16, MQUINT16, MQINT32, MQUINT32, MQINT64, MQUINT64, MQFLOAT32, MQFLOAT64 and MQBOOL are converted accordingly.
- Do *not* use the following types of data:
  - double
  - pointers
  - bit-fields

  This is because the utility for creating conversion-exit code does not provide the facility to convert these data types. To overcome this, you can write your own routines and call them from the exit.

Other points to note:

- Do not use sequence numbers in the input data set.
- If there are fields for which you want to provide your own conversion routines, declare them as MQBYTE, and then replace the generated CMQXCFBA macros with your own conversion code.

### C example

```
  struct TEST { MQLONG    SERIAL_NUMBER;
                MQCHAR    ID[5];
                MQINT16   VERSION;
                MQBYTE    CODE[4];
                MQLONG    DIMENSIONS[3];
                MQCHAR    NAME[24];
              } ;
```

This corresponds to the following declarations in other programming languages:

### COBOL

```
      10 TEST.
       15 SERIAL-NUMBER  PIC S9(9) BINARY.
       15 ID             PIC X(5).
       15 VERSION        PIC S9(4) BINARY.
     * CODE IS NOT TO BE CONVERTED
       15 CODE           PIC X(4).
       15 DIMENSIONS     PIC S9(9) BINARY OCCURS 3 TIMES.
       15 NAME           PIC X(24).
```

### System/390

```
TEST           EQU *
SERIAL_NUMBER  DS  F
ID             DS  CL5
VERSION        DS  H
CODE           DS  XL4
DIMENSIONS     DS  3F
NAME           DS  CL24
```

### PL/I

**Supported on z/OS only**

```
 DCL 1 TEST,
       2 SERIAL_NUMBER  FIXED BIN(31),
       2 ID             CHAR(5),
       2 VERSION        FIXED BIN(15),
       2 CODE           CHAR(4),        /* not to be converted */
       2 DIMENSIONS(3)  FIXED BIN(31),
       2 NAME           CHAR(24);
```

# MQ_PUBLISH_EXIT - Publish exit

The MQ_PUBLISH_EXIT call can inspect and alter messages delivered to subscribers.

## Purpose

Use the publish exit to inspect and alter messages delivered to subscribers:

- Examine the contents of a message published to each subscriber
- Modify the contents of a message published to each subscriber
- Alter the queue to which a message is put
- Stop the delivery of a message to a subscriber

This exit is not available on IBM MQ for z/OS.

### Syntax

**MQ_PUBLISH_EXIT** (*ExitParms*, *PubContext*, *SubContext*)

### Parameters

***ExitParms* (MQPSXP)- Input/Output**

*ExitParms* contains information about the invocation of the exit.

***PubContext* (MQPBC) - Input**

*PubContext* contains contextual information about the publisher of the publication.

***SubContext* (MQSBC) - Input/Output**

*SubContext* contains contextual information about the subscriber receiving the publication.

## MQPSXP - Publish exit data structure

The MQPSXP structure describes the information that is passed to and returned from the publish exit.

Table 640 on page 1486 summarizes the fields in the structure:

*Table 640. Fields in MQPSXP*

| Field | Description |
|---|---|
| *StrucID* | Structure identifier |
| *Version* | Structure version number |
| *ExitId* | Type of exit that is being called |
| *ExitReason* | Reason for calling the exit |
| *ExitResponse* | Response from the exit |
| *ExitResponse2* | Secondary response from exit |
| *Feedback* | Feedback code |
| *ExitUserArea* | Exit user area |
| *ExitData* | Exit data |
| *QMgrName* | Name of local queue manager |
| *Hconn* | Connection handle |
| *MsgDescPtr* | Address of message descriptor (MQMD) |
| *MsgHandle* | Handle to message properties (MQHMSG) |
| *MsgInPtr* | Address of input message |
| *MsgInLength* | Length of input message |
| *MsgOutPtr* | Address of output message |
| *MsgOutLength* | Length of output message |
| *pEntryPoints* | Address of the MQIEP structure |

### Fields

***StrucID* (MQCHAR4)**

*StrucID* is the structure identifier. The value is as follows:

**MQPSXP_STRUCID**
MQPSXP_STRUCID is the identifier for the publish exit parameter structure. For the C programming language, the constant MQPSXP_STRUC_ID_ARRAY is also defined; it has the same value as MQPSXP_STRUC_ID, but is an array of characters instead of a string.

*StrucID* is an input field to the exit.

***Version* (MQLONG)**
*Version* is the structure version number. The value is as follows:

**MQPSXP_VERSION_1**
MQPSXP_VERSION_1 is the Version 1 publish exit parameter structure. The constant MQPSXP_CURRENT_VERSION is also defined with the same value.

*Version* is an input field to the exit.

***ExitId* (MQLONG)**
*ExitId* is the type of exit that is being called. The value is as follows:

**MQXT_PUBLISH_EXIT**
Publish exit.

*ExitId* is an input field to the exit.

***ExitReason* (MQLONG)**
*ExitReason* is the reason for calling the exit. The possible values are:

**MQXR_INIT**
The exit for this connection is called for initialization. The exit might acquire and initialize the resources that it needs; for example, main storage.

**MQXR_TERM**
The exit for this connection is called because the exit is about to be stopped. The exit must free any resources that it has acquired since it was initialized; for example, main storage.

**MQXR_PUBLICATION**
The exit is called by the queue manager before it puts a publication onto a message queue of a subscriber. The exit can change the message, not put the message on the queue, or halt publication.

*ExitReason* is an input field to the exit.

***ExitResponse* (MQLONG)**
Set *ExitResponse* in the exit to specify how processing must continue. *ExitResponse* is one of the following values:

**MQXCC_OK**
Set MQXCC_OK to continue processing normally. Set MQXCC_OK in response to any values of ExitReason.

If ExitReason has the value MQXR_PUBLICATION, the *DestinationQName* and *DestinationQMgrName* fields of the MQSBC structure identify the destination to which the message is sent.

**MQXCC_FAILED**
Set MQXCC_FAILED to stop the publish operation. The completion code MQCC_FAILED and reason code 2557 (09FD) (RC2557): MQRC_PUBLISH_EXIT_ERROR is set on return from the exit.

**MQXCC_SUPPRESS_FUNCTION**
Set MQXCC_SUPPRESS_FUNCTION to stop normal processing of the message. Only set MQXCC_SUPPRESS_FUNCTION if *ExitReason* has the value MQXR_PUBLICATION.

The message continues to be processed by the queue manager according to the MQRO_DISCARD_MSG option in the *Report* field in the message descriptor of the message.

- If the MQRO_DISCARD_MSG option is specified, the message is not delivered to the subscriber.
- If the MQRO_DISCARD_MSG option is not specified, the message is placed on the dead-letter queue. If there is no dead-letter queue, or the message cannot be placed successfully on

the dead-letter queue, the publication is not delivered to the subscriber. The delivery of the publication to other subscribers depends on the values of the PMSGDLV and NPMSGDLV topic object attributes. For an explanation of these attributes, see the parameter descriptions for the DEFINE TOPIC command.

*ExitResponse* is an output field from the exit.

***ExitResponse2* (MQLONG)**
*ExitResponse2* is reserved for future use.

***Feedback* (MQLONG)**
*Feedback* is the feedback code to be used if the exit returns MQXCC_SUPPRESS_FUNCTION in *ExitResponse*.

On input to the exit, *Feedback* always has the value MQFB_NONE. If the exit returns MQXCC_SUPPRESS_FUNCTION, set *Feedback* to the value to be used for the message when the queue manager places it on the dead-letter queue. On return from the exit, if *Feedback* has the original value MQFB_NONE, the queue manager sets *Feedback* to MQFB_STOPPED_BY_PUBSUB_EXIT.

*Feedback* is an input/output field to the exit.

***ExitUserArea* (MQBYTE16)**
*ExitUserArea* is a field that is available for the exit to use. Each connection has a separate *ExitUserArea*. The length of *ExitUserArea* is given by MQ_EXIT_USER_AREA_LENGTH.

The *ExitReason* field has the value MQXR_INIT on the first invocation of the exit. *ExitUserArea* is initialized to MQXUA_NONE on the first invocation of the exit for a connection. Subsequent changes to *ExitUserArea* are preserved across invocations of the exit.

*ExitUserArea* is an input/output field to the exit.

***ExitData* (MQCHAR32)**
*ExitData* is fixed exit data defined by the *PublishExitData* parameter of the stanza in the initialization file of the queue manager. The data is padded with blanks to the full length of the field. If there is no fixed exit data defined in the initialization file, *ExitData* is blank. The length of *ExitData* is given by MQ_EXIT_DATA_LENGTH.

*ExitData* is an input field to the exit.

***QMgrName* (MQCHAR48)**
*QMgrName* is the name of the local queue manager. The name is padded with blanks to the full length of the field. The length of this field is given by MQ_Q_MGR_NAME_LENGTH.

*QMgrName* is an input field to the exit.

***Hconn* (MQHCONN)**
*Hconn* is the handle representing a connection to the queue manager. Only use *Hconn* as a parameter to the MQSETMP, MQINQMMP, or MQDLTMP message property function calls to work with message properties.

*Hconn* is an input field to the exit.

***MsgDescPtr* (PMQMD)**
*MsgDescPtr* is the address of message descriptor ( MQMD) of the message being processed, and is a copy of the MQMD returned from the MQPUT call. The exit can change the contents of the message descriptor. Any change to the contents of the message descriptor must be done with care. In particular, in the case where the *SubType* field of the MQSBC structure is of value MQSUBTYPE_PROXY, the *CorrelId* field in the message descriptor must not be changed.

No message descriptor is passed to the exit if *ExitReason* is MQXR_INIT or MQXR_TERM ; in these cases, *MsgDescPtr* is the null pointer.

*MsgDescPtr* is an input field to the exit.

***MsgHandle* (MQHMSG)**
*MsgHandle* is the handle to message properties. Only use *MsgHandle* with the MQSETMP, MQINQMMP, or MQDLTMP message property function calls to work with message properties.

*MsgHandle* is an input field to the exit.

***MsgInPtr* (PMQVOID)**
*MsgInPtr* is the address of the input message data. The contents of the buffer addressed by *MsgInPtr* can be modified by the exit; see *MsgOutPtr* .

*MsgInPtr* is an input field to the exit.

***MsgInLength* (MQLONG)**
*MsgInLength* is the length in bytes of the message data passed to the exit. The address of the data is given by *MsgInPtr*.

*MsgInLength* is an input field to the exit.

***MsgOutPtr* (PMQVOID)**
*MsgOutPtr* is the address of a buffer containing message data that is returned from the exit. On entry to the exit, *MsgOutPtr* is null. On return from the exit, if the value is still null, the queue manager sends the message specified by *MsgInPtr*, with the length given by *MsgInLength*.

If the exit modifies the message data, use one of the following procedures:

- If the length of the data does not change, the data can be modified in the buffer addressed by *MsgInPtr*. In this case, do not change *MsgOutPtr* and *MsgOutLength*.
- If the modified data is shorter than the original data, the data can be modified in the buffer addressed by *MsgInPtr*. In this case *MsgOutPtr* must be set to the address of the input message buffer, and *MsgOutLength* set to the new length of the message data.
- If the modified data is, or might be, longer than the original data, the exit must obtain a new message buffer. Copy the modified data into it. Set *MsgOutPtr* to the address of the new buffer, and set *MsgOutLength* to the length of the new message data. The exit is responsible for freeing the buffer addressed by *MsgOutPtr* when the exit is next called.

**Note:** *MsgOutPtr* is always the null pointer on input to the exit, and not the address of a previously obtained message buffer. To free the previously obtained buffer, the exit must save its address and length. Save the information either in *ExitUserArea*, or in a control block that has its address saved in *ExitUserArea*.

*MsgOutPtr* is an input/output field to the exit.

***MsgOutLength* (MQLONG)**
*MsgOutLength* is the length in bytes of the message data returned by the exit. On input to the exit, this field is always zero. On return from the exit, this field is ignored if *MsgOutPtr* is null. See *MsgOutPtr* for information about modifying the message data.

*MsgOutLength* is an input/output field to the exit.

***pEntryPoints* (PMQIEP)**
*pEntryPoints* is the address of an MQIEP structure through which MQI and DCI calls can be made.

## C language declaration - MQPSXP

```
typedef struct tagMQPSXP {
    MQCHAR4    StrucId;            /* Structure identifier */
    MQLONG     Version;            /* Structure version number */
    MQLONG     ExitId;             /* Type of exit */
    MQLONG     ExitReason;         /* Reason for invoking exit */
    MQLONG     ExitResponse;       /* Response from exit */
    MQLONG     ExitResponse2;      /* Reserved */
    MQLONG     Feedback;           /* Feedback code */
    MQBYTE16   ExitUserArea;       /* Exit user area */
    MQCHAR32   ExitData;           /* Exit data */
    MQCHAR48   QMgrName;           /* Name of local queue manager */
    MQHCONN    Hconn;              /* Connection handle */
```

```
    MQHMSG     MsgHandle;           /* Handle to message properties */
    PMQMD      MsgDescPtr;          /* Address of message descriptor */
    PMQVOID    MsgInPtr;            /* Address of input message data */
    MQLONG     MsgInLength;         /* Length of input message data */
    PMQVOID    MsgOutPtr;           /* Address of output message data */
    MQLONG     MsgOutLength;        /* Length of output message data */
    /* Ver:1 */
    PMQIEP     pEntryPoints;        /* Address of the MQIEP structure */
    /* Ver:2 */
}    MQPSXP;
```

## MQPBC - Publication context data structure

The MQPBC structure contains the contextual information, relating to the publisher of the publication, that is passed to the publish exit.

Table 641 on page 1490 summarizes the fields in the structure:

*Table 641. Fields in MQPBC*

| Field | Description |
|---|---|
| *StrucID* | Structure identifier |
| *Version* | Structure version number |
| *PubTopicString* | Publish topic string |
| *MsgDescPtr* | Address of message descriptor (MQMD) |

### Fields

***StrucID* (MQCHAR4)**

*StrucID* is the structure identifier. The value is as follows:

**MQPBC_STRUCID**
MQPBC_STRUCID is the identifier for the publication context structure. For the C programming language, the constant MQPBC_STRUC_ID_ARRAY is also defined; it has the same value as MQPBC_STRUC_ID, but is an array of characters instead of a string.

*StrucID* is an input field to the exit.

***Version* (MQLONG)**

*Version* is the structure version number. The value is as follows:

**MQPBC_VERSION_1**
MQPBC_VERSION_1 is the Version 1 publish exit parameter structure.

**MQPBC_VERSION_2**
MQPBC_VERSION_2 is the Version 2 publish exit parameter structure. The constant MQPBC_CURRENT_VERSION is also defined with the same value.

*Version* is an input field to the exit.

***PubTopicString* (MQCHARV)**

*PubTopicString* is the topic string being published to.

*PubTopicString* is an input field to the exit.

***MsgDescPtr* (PMQMD)**

*MsgDescPtr* is the address of a copy of the message descriptor (MQMD) for the message being processed.

*MsgDescPtr* is an input field to the exit.

## C language declaration - MQPBC

```
typedef struct tagMQPBC {
```

```
  MQCHAR4    StrucId;             /* Structure identifier */
  MQLONG     Version;             /* Structure version number */
  MQCHARV    PubTopicString;      /* Publish topic string */
  PMQMD      MsgDescPtr;          /* Address of message descriptor */
} MQPBC;
```

## MQSBC - Subscription context data structure

The MQSBC structure contains the contextual information, relating to the subscriber that is receiving the publication, that is passed to the publish exit.

Table 642 on page 1491 summarizes the fields in the structure:

*Table 642. Fields in MQSBC*

| Field | Description |
|---|---|
| *StrucID* | Structure identifier |
| *Version* | Structure version number |
| *DestinationQMgrName* | Name of destination queue manager |
| *DestinationQName* | Name of destination queue |
| *SubType* | Type of subscription |
| *SubOptions* | Subscription options |
| *ObjectName* | Object name |
| *ObjectString* | Object string |
| *SubTopicString* | Subscription topic string |
| *SubName* | Subscription name |
| *SubId* | Subscription identifier |
| *SelectionString* | Address of selection string |
| *SubLevel* | Subscription level |
| *PSProperties* | Publish/subscribe properties |

### Fields

***StrucID* (MQCHAR4)**

Structure identifier. The value is as follows:

**MQSBC_STRUCID**

MQSBC_STRUCID is the identifier for the publish exit parameter structure. For the C programming language, the constant MQSBC_STRUC_ID_ARRAY is also defined; MQSBC_STRUC_ID_ARRAY has the same value as MQSBC_STRUC_ID, but is an array of characters instead of a string.

*StrucID* is an input field to the exit.

***Version* (MQLONG)**

Structure version number. The value is as follows:

**MQSBC_VERSION_1**

Version 1 publish exit parameter structure. The constant MQSBC_CURRENT_VERSION is also defined with the same value.

*Version* is an input field to the exit.

***DestinationQMgrName* (MQCHAR48)**
*DestinationQMgrName* is the name of the queue manager to which the message is being sent. The name is padded with blanks to the full length of the field. The name can be altered by the exit. The length of this field is given by MQ_Q_MGR_NAME_LENGTH.

*DestinationQMgrName* is an input/output field to the exit; see note.

***DestinationQName* (MQCHAR48)**
*DestinationQName* is the name of the queue to which the message is being sent. The name is padded with blanks to the full length of the field. The name can be altered by the exit. The length of this field is given by MQ_Q_NAME_LENGTH.

*DestinationQName* is an input/output field to the exit; see note.

***SubType* (MQLONG)**
*SubType* indicates how the subscription was created. Valid values are MQSUBTYPE_API, MQSUBTYPE_ADMIN and MQSUBTYPE_PROXY ; see Inquire Subscription Status (Response).

*SubType* is an input field to the exit.

***SubOptions* (MQLONG)**
*SubOptions* are the subscription options; see "Options (MQLONG)" on page 548 for a description of values this field can take.

*SubOptions* is an input field to the exit.

***ObjectName* (MQCHAR48)**
*ObjectName* is the name of the topic object as defined on the local queue manager. The length of this field is given by MQ_TOPIC_NAME_LENGTH. The object name is the name of the administrative topic object that the queue manager has associated with the topic string. Even if the subscriber provided a topic object as part of the subscription, the *ObjectName* might be a different topic object. The association of a topic object with a subscription depends upon the full resolution of *SubTopicString*.

*ObjectName* is an input field to the exit.

***ObjectString* (MQCHARV)**
*ObjectString* is the full topic string of the publication that was subscribed to. Any wildcards in the original subscription string are resolved. It is different to the MQSD subscription *ObjectString* field described in "ObjectString (MQCHARV)" on page 547, which might contain wildcards, and is exclusive of any object name provided by the subscriber.

*ObjectString* is an input field to the exit.

***SubTopicString* (MQCHARV)**
*SubTopicString* is the complete topic string as supplied by the subscriber. *SubTopicString* is the combination of the topic string defined in a topic object, and a topic string. A subscriber must provide either a topic object, a topic string, or both. If the subscriber provides a topic string, it might contain wildcards.

*SubTopicString* is an input field to the exit.

***SubName* (MQCHARV)**
*SubName* is the subscription name that is provided either by the subscriber, or is a generated name.

*SubName* is an input field to the exit.

***SubId* (MQBYTE 24)**
*SubId* is the unique internal subscription identifier.

*SubId* is an input field to the exit.

***SelectionString* (MQCHARV)**
*SelectionString* is the selection criteria used when subscribing for messages from a topic; see Selectors.

*SelectionString* is an input field to the exit.

***SubLevel* (MQLONG)**
*SubLevel* is the interception level associated with the subscription; see "SubLevel (MQLONG)" on page 558 for further details.

*SubLevel* is an input field to the exit.

***PSProperties* (MQLONG)**
*PSProperties* are the publish/subscribe properties. They specify how publish/subscribe related message properties are added to messages sent to this subscription. Possible values are MQPSPROP_NONE, MQPSPROP_COMPAT, MQPSPROP_RFH2, MQPSPROP_MSGPROP. See Optional parameters (Change, Copy, and Create Subscription) for a description of these values.

*PSProperties* is an input field to the exit.

**Note:** Authorization checks are only performed on the original values of *DestinationQMgrName* and *DestinationQName* before they are passed to the publish exit. No new authorization checks are performed when the exit changes the destination queue, either by changing *DestinationQMgrName* or *DestinationQName*.

### C language declaration - MQSBC

```
typedef struct tagMQSBC {
  MQCHAR4    StrucId;             /* Structure identifier */
  MQLONG     Version;             /* Structure version number */
  MQCHAR48   DestinationQMgrName; /* Destination queue manager */
  MQCHAR48   DestinationQName;    /* Destination queue name */
  MQLONG     SubType;             /* Type of subscription */
  MQLONG     SubOptions;          /* Subscription options */
  MQCHAR48   ObjectName;          /* Object name */
  MQCHARV    ObjectString;        /* Object string */
  MQCHARV    SubTopicString;      /* Subscription topic string */
  MQCHARV    SubName;             /* Subscription name */
  MQBYTE24   SubId;               /* Subscription identifier */
  MQCHARV    SelectionString;     /* Subscription selection string */
  MQLONG     SubLevel;            /* Subscription level */
  MQLONG     PSProperties;        /* Publish/subscribe properties */
} MQSBC;
```

## Channel-exit calls and data structures

This collection of topics provide reference information about the special IBM MQ calls and data structures that you can use when you write channel exit programs.

This information is product-sensitive programming interface information. You can write IBM MQ user exits in the following programming languages:

| Platform | Programming languages |
|---|---|
| IBM MQ for z/OS | Assembler and C (which must conform to the C system programming environment for system exits, described in the *z/OS C/C++ Programming Guide*.) |
| IBM MQ for IBM i | ILE C, ILE COBOL, and ILE RPG |
| All other IBM MQ platforms | C |

You can also write user exits in Java for use only with Java and JMS applications. For more information about creating and using channel exits with the IBM MQ classes for Java, see Using channel exits in IBM MQ classes for Java and for IBM MQ classes for JMS, see Using channel exits with IBM MQ classes for JMS.

You cannot write IBM MQ user exits in TAL or Visual Basic. However, a declaration for the MQCD structure is provided in Visual Basic for use on the MQCONNX call from an IBM MQ MQI client program.

In a number of cases in the descriptions that follow, parameters are arrays or character strings with a size that is not fixed. For these parameters, a lowercase "n" is used to represent a numeric constant. When the declaration for that parameter is coded, the "n" must be replaced by the numeric value required. For further information about the conventions used in these descriptions, see the “Elementary data types” on page 232.

### Data definition files

Data definition files are supplied with IBM MQ for each of the supported programming languages. For details of these files, see Copy, header, include, and module files.

## MQ_CHANNEL_EXIT - Channel exit

The MQ_CHANNEL_EXIT call describes the parameters that are passed to each of the channel exits called by the Message Channel Agent.

No entry point called MQ_CHANNEL_EXIT is provided by the queue manager; the name MQ_CHANNEL_EXIT is of no special significance since the names of the channel exits are provided in the channel definition MQCD.

There are five types of channel exit:

- Channel security exit
- Channel message exit
- Channel send exit
- Channel receive exit
- Channel message-retry exit

The parameters are similar for each type of exit, and the description given here applies to all of them, except where specifically noted.

### Syntax

**MQ_CHANNEL_EXIT** *(**ChannelExitParms, ChannelDefinition, DataLength,***
*AgentBufferLength, AgentBuffer, ExitBufferLength, ExitBufferAddr)*

### Parameters

The MQ_CHANNEL_EXIT call has the following parameters.

**ChannelExitParms (MQCXP) - input/output**

Channel exit parameter block.

This structure contains additional information relating to the invocation of the exit. The exit sets information in this structure to indicate how the MCA proceeds.

**ChannelDefinition (MQCD) - input/output**

Channel definition.

This structure contains parameters set by the administrator to control the behavior of the channel.

**DataLength (MQLONG) - input/output**

Length of data.

The data depends on the type of exit:

- For a channel security exit, when the exit is invoked this parameter contains the length of any security message in the *AgentBuffer* field, if *ExitReason* is MQXR_SEC_MSG. It is zero if there is no message. The exit must set this field to the length of any security message to be sent to its partner if it sets *ExitResponse* to MQXCC_SEND_SEC_MSG

or MQXCC_SEND_AND_REQUEST_SEC_MSG. The message data is in either *AgentBuffer* or *ExitBufferAddr*.

The content of security messages is the sole responsibility of the security exits.

- For a channel message exit, when the exit is invoked this parameter contains the length of the message (including the transmission queue header). The exit must set this field to the length of the message in either *AgentBuffer* or *ExitBufferAddr* that is to proceed. This must be greater than or equal to the length of the transmission queue header (MQXQH).
- For a channel send or channel receive exit, when the exit is invoked this parameter contains the length of the transmission. The exit must set this field to the length of the transmission in either *AgentBuffer* or *ExitBufferAddr* that is to proceed.

If a security exit sends a message, and there is no security exit at the other end of the channel, or the other end sets an *ExitResponse* of MQXCC_OK, the initiating exit is re-invoked with MQXR_SEC_MSG and a null response (*DataLength* =0).

**AgentBufferLength (MQLONG) - input**

Length of agent buffer.

This parameter can be greater than *DataLength* on invocation.

For channel message, send, and receive exits, any unused space on invocation can be used by the exit to expand the data in place. If this is done, the *DataLength* parameter must be set appropriately by the exit.

In the C programming language, this parameter is passed by address.

**AgentBuffer (MQBYTE x AgentBufferLength) - input/output**

Agent buffer.

The contents of this parameter depend upon the exit type:

- For a channel security exit, on invocation of the exit it contains a security message if *ExitReason* is MQXR_SEC_MSG. To send a security message back, the exit can either use this buffer or its own buffer (*ExitBufferAddr*).
- For a channel message exit, on invocation of the exit this parameter contains:
  - The transmission queue header (MQXQH), which includes the message descriptor (which itself contains the context information for the message), immediately followed by
  - The message data

  If the message is to proceed, the exit can do one of the following:
  - Leave the contents of the buffer untouched
  - Modify the contents in place (returning the new length of the data in *DataLength* ; this must not be greater than *AgentBufferLength*)
  - Copy the contents to the *ExitBufferAddr*, making any required changes

  Any changes that the exit makes to the transmission queue header are not checked; however, erroneous modifications might mean that the message cannot be put at the destination.
- For a channel send or receive exit, on invocation of the exit this contains the transmission data. The exit can do one of the following:
  - Leave the contents of the buffer untouched
  - Modify the contents in place (returning the new length of the data in *DataLength* ; this must not be greater than *AgentBufferLength*)
  - Copy the contents to the *ExitBufferAddr*, making any required changes

  The first 8 bytes of the data must not be changed by the exit.

**ExitBufferLength (MQLONG) - input/output**

Length of exit buffer.

On the first invocation of the exit, this parameter is set to zero. Thereafter whatever value is passed back by the exit, on each invocation, is presented to the exit next time it is invoked. The value is not used by the MCA.

**Note:** This parameter must not be used by exits written in programming languages which do not support the pointer data type.

**ExitBufferAddr (MQPTR) - input/output**

Address of exit buffer.

This parameter is a pointer to the address of a buffer of storage managed by the exit, where it can choose to return message or transmission data (depending upon the type of exit) to the agent if the buffer of the agent is or might not be large enough, or if it is more convenient for the exit to do so.

On the first invocation of the exit, the address passed to the exit is null. Thereafter whatever address is passed back by the exit, on each invocation, is presented to the exit the next time it is invoked.

If ExitBufferAddr is null the data used is taken from the AgentBuffer parameter.

If ExitBufferAddr is not null the data used is taken from the buffer pointed to by the ExitBufferAddr parameter.

**Note:** This parameter must not be used by exits written in programming languages that do not support the pointer data type.

## C invocation

```
exitname (&ChannelExitParms, &ChannelDefinition,
&DataLength, &AgentBufferLength, AgentBuffer,
&ExitBufferLength, &ExitBufferAddr);
```

The parameters passed to the exit are declared as follows:

```
MQCXP   ChannelExitParms;   /* Channel exit parameter block */
MQCD    ChannelDefinition;  /* Channel definition */
MQLONG  DataLength;         /* Length of data */
MQLONG  AgentBufferLength;  /* Length of agent buffer */
MQBYTE  AgentBuffer[n];     /* Agent buffer */
MQLONG  ExitBufferLength;   /* Length of exit buffer */
MQPTR   ExitBufferAddr;     /* Address of exit buffer */
```

## COBOL invocation

```
     CALL 'exitname' USING CHANNELEXITPARMS, CHANNELDEFINITION,
                           DATALENGTH, AGENTBUFFERLENGTH, AGENTBUFFER,
                           EXITBUFFERLENGTH, EXITBUFFERADDR.
```

The parameters passed to the exit are declared as follows:

```
**   Channel exit parameter block
 01  CHANNELEXITPARMS.
     COPY CMQCXPV.
**   Channel definition
 01  CHANNELDEFINITION.
     COPY CMQCDV.
**   Length of data
 01  DATALENGTH         PIC S9(9) BINARY.
**   Length of agent buffer
 01  AGENTBUFFERLENGTH  PIC S9(9) BINARY.
**   Agent buffer
 01  AGENTBUFFER        PIC X(n).
```

```
**   Length of exit buffer
 01  EXITBUFFERLENGTH   PIC S9(9) BINARY.
**   Address of exit buffer
 01  EXITBUFFERADDR     POINTER.
```

## RPG invocation (ILE)

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                   CALLP     exitname(MQCXP : MQCD : DATLEN :
     C                                      ABUFL : ABUF : EBUFL :
     C                                      EBUF)
```

The prototype definition for the call is:

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     Dexitname         PR                  EXTPROC('exitname')
     D* Channel exit parameter block
     D MQCXP                         160A
     D* Channel definition
     D MQCD                         1328A
     D* Length of data
     D DATLEN                         10I 0
     D* Length of agent buffer
     D ABUFL                          10I 0
     D* Agent buffer
     D ABUF                             *   VALUE
     D* Length of exit buffer
     D EBUFL                          10I 0
     D* Address of exit buffer
     D EBUF                             *
```

## System/390 assembler invocation

```
         CALL EXITNAME,(CHANNELEXITPARMS,CHANNELDEFINITION,DATALENGTH, X
               AGENTBUFFERLENGTH,AGENTBUFFER,EXITBUFFERLENGTH,         X
               EXITBUFFERADDR)
```

The parameters passed to the exit are declared as follows:

```
CHANNELEXITPARMS   CMQCXPA  ,      Channel exit parameter block
CHANNELDEFINITION  CMQCDA   ,      Channel definition
DATALENGTH         DS       F      Length of data
AGENTBUFFERLENGTH  DS       F      Length of agent buffer
AGENTBUFFER        DS       CL(n)  Agent buffer
EXITBUFFERLENGTH   DS       F      Length of exit buffer
EXITBUFFERADDR     DS       F      Address of exit buffer
```

## Usage notes

1. The function performed by the channel exit is defined by the provider of the exit. The exit, however, must conform to the rules defined here and in the associated control block, the MQCXP.
2. The *ChannelDefinition* parameter passed to the channel exit might be one of several versions. See the *Version* field in the MQCD structure for more information.
3. If the channel exit receives an MQCD structure with the *Version* field set to a value greater than MQCD_VERSION_1, the exit must use the *ConnectionName* field in MQCD, in preference to the *ShortConnectionName* field.
4. In general, channel exits are allowed to change the length of message data. This can arise as a result of the exit adding data to the message, or removing data from the message, or compressing or encrypting the message. However, special restrictions apply if the message is a segment that contains only part of a logical message. In particular, there must be no net change in the length of the message as a result of the actions of complementary sending and receiving exits.

For example, it is permissible for a sending exit to shorten the message by compressing it, but the complementary receiving exit must restore the original length of the message by decompressing it, so that there is no net change in the length of the message.

This restriction arises because changing the length of a segment would cause the offsets of later segments in the message to be incorrect, and this would inhibit the ability of the queue manager to recognize that the segments formed a complete logical message.

## MQ_CHANNEL_AUTO_DEF_EXIT - Channel auto-definition exit

The MQ_CHANNEL_AUTO_DEF_EXIT call describes the parameters that are passed to the channel auto-definition exit called by the Message Channel Agent.

No entry point called MQ_CHANNEL_AUTO_DEF_EXIT is provided by the queue manager; the name MQ_CHANNEL_AUTO_DEF_EXIT is of no special significance because the names of the auto-definition exits are provided in the queue manager.

### Syntax

**MQ_CHANNEL_AUTO_DEF_EXIT** ***(ChannelExitParms, ChannelDefinition)***

### Parameters

The MQ_CHANNEL_AUTO_DEF_EXIT call has the following parameters.

**ChannelExitParms (MQCXP) - input/output**

Channel exit parameter block.

This structure contains additional information relating to the invocation of the exit. The exit sets information in this structure to indicate how the MCA proceeds.

**ChannelDefinition (MQCD) - input/output**

Channel definition.

This structure contains parameters set by the administrator to control the behavior of channels which are created automatically. The exit sets information in this structure to modify the default behavior set by the administrator.

The MQCD fields listed must not be altered by the exit:

- *ChannelName*
- *ChannelType*
- *StrucLength*
- *Version*

If other fields are changed, the value set by the exit must be valid. If the value is not valid, an error message is written to the error log file or displayed on the console (as appropriate to the environment).

**Attention:** Auto-defined channels created by a channel automatic definition (CHAD) exit cannot set the certificate label, because the SSL or TLS handshake has occurred by the time the channel is created. Setting the certificate label in a CHAD exit for inbound channels has no effect.

### C invocation

```
exitname (&ChannelExitParms, &ChannelDefinition);
```

The parameters passed to the exit are declared as follows:

```
MQCXP  ChannelExitParms;   /* Channel exit parameter block */
MQCD   ChannelDefinition;  /* Channel definition */
```

## COBOL invocation

```
     CALL 'exitname' USING CHANNELEXITPARMS, CHANNELDEFINITION.
```

The parameters passed to the exit are declared as follows:

```
**   Channel exit parameter block
 01  CHANNELEXITPARMS.
     COPY CMQCXPV.
**   Channel definition
 01  CHANNELDEFINITION.
     COPY CMQCDV.
```

## RPG invocation (ILE)

```
     C*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     C                    CALLP     exitname(MQCXP : MQCD)
```

The prototype definition for the call is:

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     Dexitname         PR                  EXTPROC('exitname')
     D* Channel exit parameter block
     D MQCXP                         160A
     D* Channel definition
     D MQCD                         1328A
```

## System/390 assembler invocation

```
         CALL EXITNAME,(CHANNELEXITPARMS,CHANNELDEFINITION)
```

The parameters passed to the exit are declared as follows:

```
CHANNELEXITPARMS   CMQCXPA  ,  Channel exit parameter block
CHANNELDEFINITION  CMQCDA   ,  Channel definition
```

## Usage notes

1. The function performed by the channel exit is defined by the provider of the exit. The exit, however, must conform to the rules defined here and in the associated control block, the MQCXP.
2. The *ChannelExitParms* parameter passed to the channel auto-definition exit is an MQCXP structure. The version of MQCXP passed depends on the environment in which the exit is running; see the description of the *Version* field in “MQCXP - Channel exit parameter” on page 1540 for details.
3. The *ChannelDefinition* parameter passed to the channel auto-definition exit is an MQCD structure. The version of MQCD passed depends on the environment in which the exit is running; see the description of the *Version* field in “MQCD - Channel definition” on page 1501 for details.

## MQXWAIT - Wait in exit

The MQXWAIT call waits for an event to occur. It can be used only from a channel exit on z/OS.

The use of MQXWAIT helps to avoid performance problems that might otherwise occur if a channel exit does something that causes a wait. The event MQXWAIT is waiting on is signaled by an MVS ECB (event control block). The ECB is described in the MQXWD control block description.

z/OS For more information about the use of MQXWAIT and writing channel-exit programs, see Writing channel exit programs on z/OS

### Syntax

**MQXWAIT** ***(Hconn, WaitDesc, CompCode, Reason)***

## Parameters

The MQXWAIT call has the following parameters.

**Hconn (MQHCONN) - input**

Connection handle.

This handle represents the connection to the queue manager. The value of *Hconn* was returned by a previous MQCONN call issued in the same or earlier invocation of the exit.

**WaitDesc (MQXWD) - input/output**

Wait descriptor.

This parameter describes the event to wait for. See “MQXWD - Exit wait descriptor” on page 1554 for details of the fields in this structure.

**CompCode (MQLONG) - output**

Completion code.

It is one of the following codes:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

**MQRC_ADAPTER_NOT_AVAILABLE**
(2204, X'89C') Adapter not available.

**MQRC_OPTIONS_ERROR**
(2046, X'7FE') Options not valid or not consistent.

**MQRC_XWAIT_CANCELED**
(2107, X'83B') MQXWAIT call canceled.

**MQRC_XWAIT_ERROR**
(2108, X'83C') Invocation of MQXWAIT call not valid.

### C invocation

```
MQXWAIT (Hconn, &WaitDesc, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;     /* Connection handle */
MQXWD    WaitDesc;  /* Wait descriptor */
MQLONG   CompCode;  /* Completion code */
MQLONG   Reason;    /* Reason code qualifying CompCode */
```

### System/390 assembler invocation

```
         CALL MQXWAIT,(HCONN,WAITDESC,COMPCODE,REASON)
```

Declare the parameters as follows:

```
HCONN     DS       F  Connection handle
WAITDESC  CMQXWDA  ,  Wait descriptor
COMPCODE  DS       F  Completion code
REASON    DS       F  Reason code qualifying COMPCODE
```

## MQCD - Channel definition

The MQCD structure contains the parameters which control execution of a channel. It is passed to each channel exit that is called from a Message Channel Agent (MCA).

For more information about channel exits, see "MQ_CHANNEL_EXIT - Channel exit" on page 1494. The description in this topic relates both to message channels and to MQI channels.

### Exit name fields

When an exit is called, the relevant field from *SecurityExit*, *MsgExit*, *SendExit*, *ReceiveExit*, and *MsgRetryExit* contains the name of the exit currently being invoked. The meaning of the name in these fields depends on the environment in which the MCA is running. Except where noted, the name is left-aligned within the field, with no embedded blanks; the name is padded with blanks to the length of the field. In the descriptions that follow, square brackets ([ ]) denote optional information:

**UNIX systems**

The exit name is the name of a dynamically loadable module or library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path:

```
[ path ] library ( function )
```

The name is limited to a maximum of 128 characters.

**z/OS**

The exit name is the name of a load module that is valid for specification on the EP parameter of the LINK or LOAD macro. The name is limited to a maximum of eight characters.

**Windows**

The exit name is the name of a dynamic-link library, suffixed with the name of a function residing in that library. The function name must be enclosed in parentheses. The library name can optionally be prefixed with a directory path and drive:

```
[d:][ path ] library ( function )
```

The name is limited to a maximum of 128 characters.

**IBM i**
The exit name is a 10 byte program name followed by a 10 byte library name. If the names are less than 10 bytes long, each name is padded with blanks to make it 10 bytes. The library name can be `*LIBL` except when calling a channel auto-definition exit, in which case a fully qualified name is required.

## Changing MQCD fields in a channel exit

A channel exit can change fields in the MQCD. The changed value remains in the MQCD and is passed to any remaining exits in an exit chain and to any conversation sharing the channel instance. The changed MQCD is also used by the MCA for its normal processing during the continuing lifetime of the channel.

The following MQCD fields must not be altered by the exit:

- ChannelName
- ChannelType
- StrucLength
- Version

**Related reference**
"Fields" on page 1502
This topic lists all the fields in the MQCD structure and describes each field.

"C declaration" on page 1527
This declaration is the C declaration for the MQCD structure.

"COBOL declaration" on page 1529
This declaration is the COBOL declaration for the MQCD structure.

"RPG declaration (ILE)" on page 1531
This declaration is the RPG declaration for the MQCD structure.

"System/390 assembler declaration" on page 1534
This declaration is the System/390 assembler declaration for the MQCD structure.

"Visual Basic declaration" on page 1535
This declaration is the Visual Basic declaration of the MQCD structure.

"Changing MQCD fields in a channel exit" on page 1537
A channel exit can change fields in the MQCD. However, these changes are not typically acted on, except in the circumstances listed.

## *Fields*
This topic lists all the fields in the MQCD structure and describes each field.

*BatchDataLimit (MQLONG)*
This field specifies the the limit, in kilobytes, of the amount of data that can be sent through a channel before taking a sync point.

A sync point is taken after the message that caused the limit to be reached has flowed across the channel.

The batch is terminated when one of the following conditions is met:

- **`BatchSize`** messages have been sent.
- **`BatchDataLimit`** bytes have been sent.
- The transmission queue is empty and **`BatchInterval`** is exceeded.

The value must be in the range 0 - 999999. The default value is 5000.

A value of zero in this attribute means that no data limit is applied to batches over this channel.

This parameter only applies to channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSRCVR, or MQCHT_CLUSSDR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_11.

*BatchHeartbeat (MQLONG)*
This field specifies the time interval that is used to trigger a batch heartbeat for the channel.

Batch heartbeating allows sender channels to determine whether the remote channel instance is still active before going indoubt. A batch heartbeat occurs if a sender channel has not communicated with the remote channel instance within the specified time interval.

The value is in the range 0 through 999 999; the units are milliseconds. A value of zero indicates that batch heartbeating is not enabled.

This field is relevant only for channels that have a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

*BatchInterval (MQLONG)*
This field specifies the approximate time in milliseconds that a channel keeps a batch open, if fewer than *BatchSize* messages have been transmitted in the current batch.

If *BatchInterval* is greater than zero, the batch is terminated by whichever of the following events occur first:

- *BatchSize* messages have been sent, or
- *BatchInterval* milliseconds have elapsed since the start of the batch.

If *BatchInterval* is zero, the batch is terminated by whichever of the following events occur first:

- *BatchSize* messages have been sent, or
- the transmission queue becomes empty.

*BatchInterval* must be in the range zero through 999 999 999.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present when *Version* is less than MQCD_VERSION_4.

*BatchSize (MQLONG)*
This field specifies the maximum number of messages that can be sent through a channel before synchronizing the channel.

This field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_CLNTCONN.

*CertificateLabel (MQCHAR64)*
This field gives details of the certificate label being used.

IBM MQ initializes the default value for the *CertificateLabel* field as blanks.

This is interpreted at runtime as the default value, and is backwards compatible.

For example, specifying a MQCD version less than 11, or using the default value of blanks for the *CertificateLabel* field, means that this field is ignored.

The length of this field is given by MQ_CERT_LABEL_LENGTH.

*ChannelMonitoring (MQLONG)*
This field specifies the current level of monitoring data collection for the channel.

This field is not relevant for channels with a ChannelType of MQCHT_CLNTCONN.

It is one of the following values:

- MQMON_OFF

- MQMON_LOW
- MQMON_MEDIUM
- MQMON_HIGH

This is an input field to the exit. It is not present if *Version* is less than MQCD_VERSION_8.

*ChannelName (MQCHAR20)*
This field specifies the channel definition name.

There must be a channel definition of the same name at the remote machine to be able to communicate.

The name must use only the characters:

- Uppercase A-Z
- Lowercase a-z
- Numerics 0-9
- Period (.)
- Forward slash (/)
- Underscore (_)
- Percent sign (%)

and be padded to the right with blanks. Leading or embedded blanks are not allowed.

The length of this field is given by MQ_CHANNEL_NAME_LENGTH.

*ChannelStatistics (MQLONG)*
This field specifies the current level of statistics data collection for the channel.

This field is not relevant for channels with a ChannelType of MQCHT_CLNTCONN or MQCHT_SVRCONN.

It is one of the following values:

- MQMON_OFF
- MQMON_LOW
- MQMON_MEDIUM
- MQMON_HIGH

This is an input field to the exit. It is not present if *Version* is less than MQCD_VERSION_8.

*ChannelType (MQLONG)*
This field specifies the type of channel.

It is one of the following values:

**MQCHT_SENDER**
Sender.

**MQCHT_SERVER**
Server.

**MQCHT_RECEIVER**
Receiver.

**MQCHT_REQUESTER**
Requester.

**MQCHT_CLNTCONN**
Client connection.

**MQCHT_SVRCONN**
Server-connection (for use by clients).

**MQCHT_CLUSSDR**
Cluster sender.

**MQCHT_CLUSRCVR**
Cluster receiver.

*ClientChannelWeight (MQLONG)*
This field specifies a weighting to influence which client-connection channel definition is used.

The ClientChannelWeight attribute is used so that client channel definitions can be selected at random based on their weighting when more than one suitable definition is available. When a client issues an MQCONN requesting connection to a queue manager group, by specifying a queue manager name starting with an asterisk, and more than one suitable channel definition is available in the client channel definition table (CCDT), the definition to use is randomly selected based on the weighting, with any applicable ClientChannelWeight(0) definitions selected first in alphabetical order.

Specify a value in the range 0 - 99. The default is 0.

A value of 0 indicates that no load balancing is performed and applicable definitions are selected in alphabetical order. To enable load balancing choose a value in the range 1 - 99 where 1 is the lowest weighting and 99 is the highest. The distribution of messages between two or more channels with non-zero weightings is proportional to the ratio of those weightings. For example, three channels with ClientChannelWeight values of 2, 4, and 14 are selected approximately 10%, 20%, and 70% of the time. This distribution is not guaranteed.

This attribute is valid for the client-connection channel type only.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_9.

*ClusterPtr (MQPTR)*
This field specifies the address a list of cluster names.

If *ClustersDefined* is greater than zero, this address is the address of a list of cluster names. The channel belongs to each cluster listed.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

*ClustersDefined (MQLONG)*
This field specifies the number of clusters to which the channel belongs.

This field is the number of cluster names pointed to by *ClusterPtr*. It is zero or greater.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

*CLWLChannelPriority (MQLONG)*
This field specifies the cluster workload channel priority.

The workload manager choose algorithm selects a destination with the highest priority from the set of destinations selected based on rank. If there are two possible destination queue managers, this attribute can be used to make one queue manager failover onto the other queue manager. All the messages go to the queue manager with the highest priority until that ends, then the messages go to the queue manager with the next highest priority.

The value is in the range 0 through 9. The default is 0.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_8.

For further information, see Configuring a queue manager cluster.

*CLWLChannelRank (MQLONG)*
This field specifies the cluster workload channel rank.

The workload manager choose algorithm selects a destination with the highest rank. When the final destination is a queue manager on a different cluster, you can set the rank of intermediate gateway

queue managers (at the intersection of neighboring clusters) so the choose algorithm correctly chooses a destination queue manager nearer the final destination.

The value is in the range 0 through 9. The default is 0.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_8.

For further information, see Configuring a queue manager cluster.

*CLWLChannelWeight (MQLONG)*
This field specifies the cluster workload channel weight.

Cluster workload channel weight.

The workload manager choose algorithm uses the "weight" attribute of the channel to the skew the destination choice so that more messages can be sent to a particular machine. For example, you can give a channel on a large UNIX server a larger "weight" than another channel on small desktop PC, and the choose algorithm chooses the UNIX server more frequently than the PC.

The value is in the range 1 through 99. The default is 50.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_8.

For further information, see Configuring a queue manager cluster.

*ConnectionAffinity (MQLONG)*
This field specifies whether client applications that connect multiple times using the same queue manager name, use the same client channel.

Use this attribute when multiple applicable channel definitions are available.

The value is one of the following:

**MQCAFTY_PREFERRED**
The first connection in a process reading a client channel definition table (CCDT) creates a list of applicable definitions based on the weighting with any applicable CLNTWGHT(0) definitions first and in alphabetical order. Each connection in the process attempts to connect using the first definition in the list. If a connection is unsuccessful the next definition is used. Unsuccessful definitions with CLNTWGHT values other than 0 are moved to the end of the list. CLNTWGHT(0) definitions remain at the start of the list and are selected first for each connection.

Each client process with the same host name always creates the same list.

For client applications written in C, C++, or the .NET programming framework (including fully managed .NET) the list is updated if the CCDT has been modified since the list was created.

This value is the default value.

**MQCAFTY_NONE**
The first connection in a process reading a CCDT creates a list of applicable definitions. All connections in a process select an applicable definition based on the weighting with any applicable CLNTWGHT(0) definitions selected first in alphabetical order.

For client applications written in C, C++, or the .NET programming framework (including fully managed .NET) the list is updated if the CCDT has been modified since the list was created.

This attribute is valid for the client-connection channel type only.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_9.

*ConnectionName (MQCHAR264)*
This field specifies the connection name for the channel.

For cluster-receiver channels (when specified) CONNAME relates to the local queue manager, and for other channels it relates to the target queue manager. The value you specify depends on the transmission protocol (*TransportType*) to be used:

- For MQXPT_LU62, it is the fully-qualified name of the partner Logical Unit.

- For MQXPT_NETBIOS, it is the NetBIOS name defined on the remote machine.
- For MQXPT_TCP, it is either the host name, the network address of the remote machine specified in IPv4 dotted decimal or IPv6 hexadecimal format, or the local machine for cluster-receiver channels.
- For MQXPT_SPX, it is an SPX-style address comprising a 4 byte network address, a 6 byte node address, and a 2 byte socket number.

When defining a channel, this field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_RECEIVER. However, when the channel definition is passed to an exit, this field contains the address of the partner, whatever the channel type.

The length of this field is given by MQ_CONN_NAME_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_2.

*DataConversion (MQLONG)*
This field specifies whether the sending message channel agent attempts conversion of the application message data if the receiving message channel agent is unable to perform this conversion.

This field applies only to messages that are not segments of logical messages; the MCA never attempts to convert messages which are segments.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR. It is one of the following:

**MQCDC_SENDER_CONVERSION**
Conversion by sender.

**MQCDC_NO_SENDER_CONVERSION**
No conversion by sender.

*DefReconnect ( MQLONG)*
The `DefReconnect` channel attribute sets the default reconnection attribute value for a client connection channel.

The default automatic client reconnection option. You can configure a IBM MQ MQI client to automatically reconnect a client application. The IBM MQ MQI client tries to reconnect to a queue manager after a connection failure. It tries to reconnect without the application client issuing an `MQCONN` or `MQCONNX` MQI call.

Reconnection is an `MQCONNX` option. By using the `DefReconnect` channel attribute you can add reconnection behavior to existing applications that use `MQCONN`. You can also change the reconnection behavior of applications that use `MQCONNX`.

You can also set the `DefRecon` value from the `mqclient.ini` file to set or modify reconnection behavior. The `DefRecon` value from the `mqclient.ini` file takes precedence over the `DefReconnect` channel attribute.

## Syntax

`DefReconnect ( MQRCN_NO | MQRCN_YES | MQRCN_Q_MGR | MQRCN_DISABLED )`

## Parameters

**MQRCN_NO**
`MQRCN_NO` is the default value.

Unless overridden by `MQCONNX`, the client is not reconnected automatically.

**MQRCN_YES**
Unless overridden by `MQCONNX`, the client reconnects automatically.

**MQRCN_Q_MGR**
Unless overridden by `MQCONNX`, the client reconnects automatically, but only to the same queue manager. The `QMGR` option has the same effect as `MQCNO_RECONNECT_Q_MGR`.

**MQRCN_DISABLED**
Reconnection is disabled, even if requested by the client program using the MQCONNX MQI call.

Automatic client reconnection is not supported by IBM MQ classes for Java.

*Table 643. Automatic reconnection depends on the values set in the application and in the channel definition*

| **DefReconnect** | **Reconnection options set in the application** | | | |
|---|---|---|---|---|
| | MQCNO_RECONNECT | MQCNO_RECONNECT_Q_MGR | MQCNO_RECONNECT_AS_DEF | MQCNO_RECONNECT_DISABLED |
| MQRCN_NO | YES | QMGR | NO | NO |
| MQRCN_YES | YES | QMGR | YES | NO |
| MQRCN_Q_MGR | YES | QMGR | QMGR | NO |
| MQRCN_DISABLED | NO | NO | NO | NO |

**Related concepts**
Automatic client reconnection
Channel and client reconnection
CHANNELS stanza of the client configuration file
**Related reference**
Connection options
Options that control the action of MQCONNX.

*Desc (MQCHAR64)*
This field can be used for descriptive commentary.

The content of the field is of no significance to Message Channel Agents. However, it must contain only characters that can be displayed. It cannot contain any null characters; if necessary, it is padded to the right with blanks. In a DBCS installation, the field can contain DBCS characters (subject to a maximum field length of 64 bytes).

**Note:** If this field contains characters that are not in the character set of the queue manager (as defined by the *CodedCharSetId* queue manager attribute), those characters might be translated incorrectly if this field is sent to another queue manager.

The length of this field is given by MQ_CHANNEL_DESC_LENGTH.

*DiscInterval (MQLONG)*
This field specifies the maximum time in seconds for which the channel waits for a message to arrive on the transmission queue, before terminating the channel.

In other words, it specifies the disconnect interval.

The A value of zero causes the MCA to wait indefinitely.

For server-connection channels using the TCP protocol, the interval represents the client inactivity disconnect value, specified in seconds. If a server-connection has received no communication from its partner client for this duration, it terminates the connection. The server-connection inactivity interval only applies between IBM MQ API calls from a client, so no client is disconnected during a long-running MQGET with wait call.

This attribute is not applicable for server-connection channels using protocols other than TCP.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, MQCHT_CLUSRCVR, or MQCHT_SVRCONN.

*ExitDataLength (MQLONG)*
This field specifies length in bytes of each of the user data items in the lists of exit user data items addressed by the *MsgUserDataPtr*, *SendUserDataPtr*, and *ReceiveUserDataPtr* fields.

This length is not necessarily the same as MQ_EXIT_DATA_LENGTH.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*ExitNameLength (MQLONG)*
This field specifies the length in bytes of each of the names in the lists of exit names addressed by the *MsgExitPtr*, *SendExitPtr*, and *ReceiveExitPtr* fields.

This length is not necessarily the same as MQ_EXIT_NAME_LENGTH.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*HdrCompList [2] (MQLONG)*
This field specifies the list of header data compression techniques which are supported by the channel.

The list contains one or more of the following values:

**MQCOMPRESS_NONE**
No header data compression is performed.

**MQCOMPRESS_SYSTEM**
Header data compression is performed.

Unused values in the array are set to MQCOMPRESS_NOT_AVAILABLE.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_8.

*HeartbeatInterval (MQLONG)*
This field specifies the time in seconds between heartbeat flows.

The interpretation of this field depends on the channel type, as follows:

- For a channel type of MQCHT_SENDER, MQCHT_SERVER, MQCHT_RECEIVER MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR, this field is the time in seconds between heartbeat flows passed from the sending MCA when there are no messages on the transmission queue. This gives the receiving MCA the opportunity to quiesce the channel. To be useful, *HeartbeatInterval* must be less than *DiscInterval*.
- For a channel type of MQCHT_CLNTCONN or MQCHT_SVRCONN with the MQCD Sharing Conversations field set to zero, this field is the time in seconds between heartbeat flows passed from the server MCA when that MCA has issued an MQGET call with the MQGMO_WAIT option on behalf of a client application. This allows the server MCA to handle situations where the client connection fails during an MQGET with MQGMO_WAIT.
- For a channel type of MQCHT_CLNTCONN or MQCHT_SVRCONN with the MQCD Sharing Conversations field set to a non-zero value, this field is the time in seconds between heartbeat flow when there are no data flows sent or received. This allows the channel to be quiesced efficiently.

The value is in the range 0 through 999 999. The value that is used is the larger of the values specified at the sending side and receiving side unless a value of 0 is specified at either side, in which case no heartbeat exchange occurs.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*KeepAliveInterval (MQLONG)*
This field specifies the value passed to the communications stack for keepalive timing for the channel.

The value is applicable for the TCP/IP and SPX communications protocols, though not all implementations support this parameter.

The value is in the range 0 through 99 999; the units are seconds. A value of zero indicates that channel keepalive is not enabled, although keepalive might still occur if TCP/IP keepalive (rather than channel keepalive) is enabled. The following special value is also valid:

**MQKAI_AUTO**
Automatic.

This value indicates that the keepalive interval is calculated from the negotiated heartbeat interval, as follows:

- If the negotiated heartbeat interval is greater than zero, the keepalive interval that is used is the heartbeat interval plus 60 seconds.
- If the negotiated heartbeat interval is zero, the keepalive interval that is used is zero.

- On z/OS, TCP/IP keepalive occurs when TCPKEEP(YES) is specified on the queue manager object.
- In other environments, TCP/IP keepalive occurs when the KEEPALIVE=YES parameter is specified in the TCP stanza in the distributed queuing configuration file.

This field is relevant only for channels that have a *TransportType* of MQXPT_TCP or MQXPT_SPX.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

*LocalAddress (MQCHAR48)*
This field specifies the local TCP/IP address defined for the channel for outbound communications.

This field is blank if no specific address is defined for outbound communications. The address can optionally include a port number or range of port numbers. The format of this address is:

```
[ip-addr][(low-port[,high-port])]
```

where square brackets ([ ]) denote optional information, `ip-addr` is specified in IPv4 dotted decimal, IPv6 hexadecimal, or alphanumeric form, and `low-port` and `high-port` are port numbers enclosed in parentheses. All are optional.

A specific IP address, port, or port range for outbound communications is useful in recovery scenarios where a channel is restarted on a different TCP/IP stack.

*LocalAddress* is similar in form to *ConnectionName*, but must not be confused with it. *LocalAddress* specifies the characteristics of the local communications, whereas *ConnectionName* specifies how to reach a remote queue manager.

This field is relevant only for channels with a *TransportType* of MQXPT_TCP, and a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, MQCHT_CLNTCONN, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_LOCAL_ADDRESS_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_7.

*LongMCAUserIdLength (MQLONG)*
This field specifies the length in bytes of the full MCA user identifier pointed to by *LongMCAUserIdPtr*.

This field is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

*LongMCAUserIdPtr (MQPTR)*
This field specifies the address of the long MCA user identifier.

If *LongMCAUserIdLength* is greater than zero, this field is the address of the full MCA user identifier. The length of the full identifier is given by *LongMCAUserIdLength*. The first 12 bytes of the MCA user identifier are also contained in the field *MCAUserIdentifier*.

See the description of the *MCAUserIdentifier* field for details of the MCA user identifier.

This field is not relevant for channels with a *ChannelType* of MQCHT_SDR, MQCHT_SVR, MQCHT_CLNTCONN, or MQCHT_CLUSSDR.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

*LongRemoteUserIdLength (MQLONG)*
This field specifies the length in bytes of the full remote user identifier pointed to by *LongRemoteUserIdPtr*.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

*LongRemoteUserIdPtr (MQPTR)*
This field specifies the address of the long remote user identifier.

If *LongRemoteUserIdLength* is greater than zero, this flag is the address of the full remote user identifier. The length of the full identifier is given by *LongRemoteUserIdLength*. The first 12 bytes of the remote user identifier are also contained in the field *RemoteUserIdentifier*.

See the description of the *RemoteUserIdentifier* field for details of the remote user identifier.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_6.

*LongRetryCount (MQLONG)*
This field specifies the count used after the count specified by the *ShortRetryCount* has been exhausted.

It specifies the maximum number of further attempts that are made to connect to the remote machine, at intervals specified by *LongRetryInterval*, before logging an error to the operator.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

*LongRetryInterval (MQLONG)*
This field specifies the maximum number of seconds to wait before reattempting connection to the remote machine.

The interval between retries can be extended if the channel has to wait to become active.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

*MaxInstances (MQLONG)*
This field specifies the maximum number of simultaneous instances of an individual server-connection channel that can be started.

This field is used only on server-connection channels.

The field can have a value in the range 0 - 999 999 999. A value of zero prevents all client access.

The default value of this field is 999 999 999.

If the value of this field is reduced to a number that is less than the number of instances of the server-connection channel that are currently running, then those running instances are not affected. However, new instances cannot start until sufficient existing instances have ceased to run so that the number of currently running instances is less than the value of the field.

*MaxInstancesPerClient (MQLONG)*
This field specifies the maximum number of simultaneous instances of an individual server-connection channel that can be started from a single client.

In this context, connections that originate from the same remote network address are regarded as coming from the same client.

This field is used only on server-connection channels.

The field can have a value in the range 0 - 999 999 999. A value of zero prevents all client access.

The default value of this field is 999 999 999.

If the value of this field is reduced to a number that is less than the number of instances of the server-connection channel that are currently running from individual clients, then those running instances are not affected. However, new instances from any of those clients cannot start until sufficient existing instances have ceased to run such that the number of currently running instances, originating from the client attempting to start a new one, is less than the value of the field.

*MaxMsgLength (MQLONG)*
This field specifies the maximum message length that can be transmitted on the channel.

This is compared with the value for the remote channel and the actual maximum is the lower of the two values.

*MCAName (MQCHAR20)*
This field is a reserved field.

The value of this field is blank.

The length of this field is given by MQ_MCA_NAME_LENGTH.

*MCASecurityId (MQBYTE40)*
This field specifies the security identifier for the MCA.

This field is not relevant for channels with a *ChannelType* of MQCHT_CLNTCONN.

The following special value indicates that there is no security identifier:

**MQSID_NONE**
No security identifier specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQSID_NONE_ARRAY is also defined; this constant has the same value as MQSID_NONE, but is an array of characters instead of a string.

This is an input/output field to the exit. The length of this field is given by MQ_SECURITY_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_6.

*MCAType (MQLONG)*
This field specifies the type of message channel agent program.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The value is one of the following:

**MQMCAT_PROCESS**
Process.

The message channel agent runs as a separate process.

**MQMCAT_THREAD**
Thread ( IBM i, UNIX, and Windows ).

The message channel agent runs as a separate thread.

This field is not present when *Version* is less than MQCD_VERSION_2.

*MCAUserIdentifier (MQCHAR12)*
This field specifies the user identifier for the message channel agent (MCA).

This field uses the first 12 bytes of the MCA user identifier, and can be set by a security agent.

There are two fields that contain the MCA user identifier:

- *MCAUserIdentifier* contains the first 12 bytes of the MCA user identifier, and is padded with blanks if the identifier is shorter than 12 bytes. *MCAUserIdentifier* can be blank.
- *LongMCAUserIdPtr* points to the full MCA user identifier, which can be longer than 12 bytes. Its length is given by *LongMCAUserIdLength*. The full identifier contains no trailing blanks, and is not null-terminated. If the identifier is blank, *LongMCAUserIdLength* is zero, and the value of *LongMCAUserIdPtr* is undefined.

  **Note:** *LongMCAUserIdPtr* is not present if *Version* is less than MQCD_VERSION_6.

If the MCA user identifier is nonblank, it specifies the user identifier to be used by the message channel agent for authorization to access IBM MQ resources. For channel types MQCHT_REQUESTER, MQCHT_RECEIVER, and MQCHT_CLUSRCVR, if PutAuthority is MQPA_DEFAULT this is the user identifier used for authorization checks for the put operation to destination queues.

If the MCA user identifier is blank, the message channel agent uses its default user identifier.

The MCA user identifier can be set by a security exit to indicate the user identifier that the message channel agent must use. The exit can change either *MCAUserIdentifier*, or the string pointed at by *LongMCAUserIdPtr*. If both are changed but differ from each other, the MCA uses *LongMCAUserIdPtr* in preference to *MCAUserIdentifier*. If the exit changes the length of the string addressed by *LongMCAUserIdPtr*, *LongMCAUserIdLength* must be set correspondingly. If the exit increases the length of the identifier, the exit must allocate storage of the required length, set that storage to the required identifier, and place the address of that storage in *LongMCAUserIdPtr*. The exit is responsible for freeing that storage when the exit is later invoked with the MQXR_TERM reason.

For channels with a *ChannelType* of MQCHT_SVRCONN, if *MCAUserIdentifier* in the channel definition is blank, any user identifier transferred from the client is copied into it. This user identifier (after any modification by the security exit at the server) is the one which the client application is assumed to be running under.

The MCA user identifier is not relevant for channels with a *ChannelType* of MQCHT_SDR, MQCHT_SVR, MQCHT_CLNTCONN, MQCHT_CLUSSDR.

This is an input/output field to the exit. The length of this field is given by MQ_USER_ID_LENGTH. This field is not present when *Version* is less than MQCD_VERSION_2.

*ModeName (MQCHAR8)*
This field specifies the LU 6.2 mode name.

This field is relevant only if the transmission protocol (*TransportType*) is MQXPT_LU62, and the *ChannelType* is not MQCHT_SVRCONN or MQCHT_RECEIVER.

This field is always blank. The information is contained in the communications Side Object instead.

The length of this field is given by MQ_MODE_NAME_LENGTH.

*MsgCompList [16] (MQLONG)*
This field specifies the list of message data compression techniques which are supported by the channel.

The list contains one or more of the following values:

**MQCOMPRESS_NONE**
No message data compression is performed.

**MQCOMPRESS_RLE**
Message data compression is performed using run-length encoding.

**MQCOMPRESS_ZLIBFAST**
Message data compression is performed using the zlib compression technique. A fast compression time is preferred.

**MQCOMPRESS_ZLIBHIGH**
Message data compression is performed using the zlib compression technique. A high level of compression is preferred.

Unused values in the array are set to MQCOMPRESS_NOT_AVAILABLE.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_8.

*MsgExit (MQCHARn)*
This field specifies the channel message exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately after a message has been retrieved from the transmission queue (sender or server), or immediately before a message is put to a destination queue (receiver or requester).

  The exit is given the entire application message and transmission queue header for modification.
- At initialization and termination of the channel.

This field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_CLNTCONN; a message exit is never invoked for such channels.

See "MQCD - Channel definition" on page 1501 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

**Note:** The value of this constant is environment-specific.

*MsgExitPtr (MQPTR)*
This field specifies the address of the first *MsgExit* field.

If *MsgExitsDefined* is greater than zero, this address is the address of the list of names of each channel message exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another - one for each exit.

Any changes made to these names by an exit are preserved, although the message channel exit takes no explicit action - it does not change which exits are invoked.

If *MsgExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*MsgExitsDefined (MQLONG)*
This field specifies the number of channel message exits defined in the chain.

It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*MsgRetryCount (MQLONG)*
This field specifies the number of times MCA tries to put the message, after the first attempt has failed.

This field indicates the number of times that the MCA tries the open or put operation, if the first MQOPEN or MQPUT fails with completion code MQCC_FAILED. The effect of this attribute depends on whether *MsgRetryExit* is blank or nonblank:

- If *MsgRetryExit* is blank, the *MsgRetryCount* attribute controls whether the MCA attempts retries. If the attribute value is zero, no retries are attempted. If the attribute value is greater than zero, the retries are attempted at intervals given by the *MsgRetryInterval* attribute.

  Retries are attempted only for the following reason codes:

  – MQRC_PAGESET_FULL
  – MQRC_PUT_INHIBITED
  – MQRC_Q_FULL

  For other reason codes, the MCA proceeds immediately to its normal failure processing, without retrying the failing message.
- If *MsgRetryExit* is nonblank, the *MsgRetryCount* attribute does not affect the MCA; instead it is the message-retry exit which determines how many times the retry is attempted, and at what intervals; the exit is invoked even if the *MsgRetryCount* attribute is zero.

  The *MsgRetryCount* attribute is made available to the exit in the MQCD structure, but the exit it not required to honor it - retries continue indefinitely until the exit returns MQXCC_SUPPRESS_FUNCTION in the *ExitResponse* field of MQCXP.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

This field is not present when *Version* is less than MQCD_VERSION_3.

*MsgRetryExit (MQCHARn)*
This field specifies the channel message retry exit name.

The message retry exit is an exit that is invoked by the MCA when the MCA receives a completion code of MQCC_FAILED from an MQOPEN or MQPUT call. The purpose of the exit is to specify a time interval for which the MCA waits before trying the MQOPEN or MQPUT operation again. Alternatively, the exit can be set to not try the operation again.

The exit is invoked for all reason codes that have a completion code of MQCC_FAILED - the settings of the exit determine which reason codes it wants the MCA to try again, for how many attempts, and at what time intervals.

When the operation is not to be attempted any more, the MCA performs its normal failure processing; this processing includes generating an exception report message (if specified by the sender), and either placing the original message on the dead-letter queue or discarding the message (according to whether the sender specified MQRO_DEAD_LETTER_Q or MQRO_DISCARD_MSG). Failures involving the dead-letter queue (for example, dead-letter queue full) do not cause the message-retry exit to be invoked.

If the exit name is nonblank, the exit is called at the following times:

- Immediately before performing the wait before trying to deliver a message again
- At initialization and termination of the channel

See "MQCD - Channel definition" on page 1501 for a description of the content of this field in various environments.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

**Note:** The value of this constant is environment-specific.

This field is not present when *Version* is less than MQCD_VERSION_3.

*MsgRetryInterval (MQLONG)*
This field specifies the minimum interval in milliseconds after which the open or put operation is retried.

The effect of this attribute depends on whether *MsgRetryExit* is blank or nonblank:

- If *MsgRetryExit* is blank, the *MsgRetryInterval* attribute specifies the minimum period that the MCA waits before retrying a message, if the first MQOPEN or MQPUT fails with completion code MQCC_FAILED. A value of zero means that the retry will be performed as soon as possible after the previous attempt. Retries are performed only if *MsgRetryCount* is greater than zero.

  This attribute is also used as the wait time if the message-retry exit returns an invalid value in the *MsgRetryInterval* field in MQCXP.
- If *MsgRetryExit* is not blank, the *MsgRetryInterval* attribute does not affect the MCA; instead it is the message-retry exit which determines how long the MCA waits. The *MsgRetryInterval* attribute is made available to the exit in the MQCD structure, but the exit it not required to honor it.

The value is in the range 0 through 999 999 999.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

This field is not present when *Version* is less than MQCD_VERSION_3.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_4.

*MsgRetryUserData (MQCHAR32)*
This field specifies the channel message retry exit user data.

This data is passed to the channel message-retry exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes do not affect the channel definition used by other MCA instances. Any characters (including binary data) can be used.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR.

The length of this field is given by MQ_EXIT_DATA_LENGTH. This field is not present when *Version* is less than MQCD_VERSION_3.

This field is not relevant in IBM MQ for IBM i.

*MsgUserData (MQCHAR32)*
This field specifies channel message exit user data.

This data is passed to the channel message exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. Such changes do not affect the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This field is not relevant in IBM MQ for IBM i.

*MsgUserDataPtr (MQPTR)*
This field specifies the address of the first *MsgUserData* field.

If *MsgExitsDefined* is greater than zero, this address is the address of the list of user data items for each channel message exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another - one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely,

if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *MsgExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*NetworkPriority (MQLONG)*
This field specifies the priority of the network connection for the channel.

When multiple paths to a particular destination are available, the path with the highest priority is chosen. The value is in the range 0 through 9; 0 is the lowest priority.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLUSSDR or MQCHT_CLUSRCVR.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_5.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_6.

*NonPersistentMsgSpeed (MQLONG)*
This field specifies the speed at which nonpersistent messages travel through the channel.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_RECEIVER, MQCHT_REQUESTER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

The value is one of the following:

**MQNPMS_NORMAL**
Normal speed.

If a channel is defined to be MQNPMS_NORMAL, nonpersistent messages travel through the channel at normal speed. This has the advantage that these messages are not lost if there is a channel failure. Also, persistent and nonpersistent messages on the same transmission queue maintain their order relative to each other.

**MQNPMS_FAST**
Fast speed.

If a channel is defined to be MQNPMS_FAST, nonpersistent messages travel through the channel at fast speed. This improves the throughput of the channel, but means that nonpersistent messages are lost if there is a channel failure. Also, it is possible for nonpersistent messages to jump ahead of persistent messages waiting on the same transmission queue, that is, the order of nonpersistent messages is not maintained relative to persistent messages. However the order of nonpersistent messages relative to each other is maintained. Similarly, the order of persistent messages relative to each other is maintained.

*Password (MQCHAR12)*
This field specifies the password used by the message channel agent when attempting to initiate a secure SNA session with a remote message channel agent.

This field can be nonblank only on UNIX systems, and Windows, and is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, or MQCHT_CLNTCONN. On z/OS, this field is not relevant.

The length of this field is given by MQ_PASSWORD_LENGTH. However, only the first 10 characters are used.

This field is not present if *Version* is less than MQCD_VERSION_2.

*PropertyControl (MQLONG)*
This field specifies what happens to properties of messages when the message is about to be sent to a V6 or prior queue manager (a queue manager that does not understand the concept of a property descriptor).

The value can be any of the following values:

**MQPROP_COMPATIBILITY**
If the message contains a property with a prefix of **mcd.**, **jms.**, **usr.**, or **mqext.**, all message properties are delivered to the application in an MQRFH2 header. Otherwise all properties of the message, except those properties contained in the message descriptor (or extension), are discarded and are no longer accessible to the application.

This value is the default value; it allows applications, which expect JMS-related properties to be in an MQRFH2 header in the message data, to continue to work unmodified.

**MQPROP_NONE**
All properties of the message, except those properties in the message descriptor (or extension), are removed from the message before the message is sent to the remote queue manager.

**MQPROP_ALL**
All properties of the message are included with the message when it is sent to the remote queue manager. The properties, except those properties in the message descriptor (or extension), are placed in one or more MQRFH2 headers in the message data.

This attribute is applicable to Sender, Server, Cluster Sender, and Cluster Receiver channels.

"MQIA_* (Integer Attribute Selectors)" on page 127
"MQPROP_* (Queue and Channel Property Control Values and Maximum Properties Length)" on page 166

*PutAuthority (MQLONG)*
This field specifies whether the user identifier in the context information associated with a message is used to establish authority to put the message to the destination queue.

This field is relevant only for channels with a *ChannelType* of MQCHT_REQUESTER, MQCHT_RECEIVER, or MQCHT_CLUSRCVR. It is one of the following:

**MQPA_DEFAULT**
Default user identifier is used.

**MQPA_CONTEXT**
Context user identifier is used.

**MQPA_ALTERNATE_OR_MCA**
The user ID from the UserIdentifier field of the message descriptor is used. Any user ID received from the network is not used. This value is supported only on z/OS.

**MQPA_ONLY_MCA**
The default user ID is used. Any user ID received from the network is not used. This value is supported only on z/OS.

*QMgrName (MQCHAR48)*
This field specifies the name of the queue manager that an exit can connect to.

For channels with a *ChannelType* other than MQCHT_CLNTCONN, this field is the name of the queue manager that an exit can connect to, which on UNIX, Linux and Windows systems, is always nonblank.

The length of this field is given by MQ_Q_MGR_NAME_LENGTH.

*ReceiveExit (MQCHARn)*
This field specifies the channel receive exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately before the received network data is processed.

The exit is given the complete transmission buffer as received. The contents of the buffer can be modified as required.

- At initialization and termination of the channel.

See "MQCD - Channel definition" on page 1501 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

**Note:** The value of this constant is environment-specific.

*ReceiveExitPtr (MQPTR)*
This field specifies the address of the first *ReceiveExit* field.

If *ReceiveExitsDefined* is greater than zero, this address is the address of the list of names of each channel receive exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *ReceiveExitsDefined* fields adjoining one another - one for each exit.

Any changes made to these names by an exit are preserved, although the message channel exit takes no explicit action - it does not change which exits are invoked.

If *ReceiveExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*ReceiveExitsDefined (MQLONG)*
This field specifies the number of channel receive exits defined in the chain.

It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*ReceiveUserData (MQCHAR32)*
This channel specifies channel receive exit user data.

This data is passed to the channel receive exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. This applies to exits on different conversations. Such changes do not affect the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This field is not relevant in IBM MQ for IBM i.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_2.

*ReceiveUserDataPtr (MQPTR)*
This field specifies the address of the first *ReceiveUserData* field.

If *ReceiveExitsDefined* is greater than zero, this address is the address of the list of user data item for each channel receive exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *ReceiveExitsDefined* fields adjoining one another - one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely, if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *ReceiveExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_5.

*RemotePassword (MQCHAR12)*
This field specifies the password from a partner.

This field contains valid information only if *ChannelType* is MQCHT_CLNTCONN or MQCHT_SVRCONN.

- For a security exit at an MQCHT_CLNTCONN channel, this password is a password which has been obtained from the environment. The exit can choose to send it to the security exit at the server.
- For a security exit at an MQCHT_SVRCONN channel, this field might contain a password which has been obtained from the environment at the client, if there is no client security exit. The exit can use this password to validate the user identifier in *RemoteUserIdentifier*.

  If there is a security exit at the client, then this information can be obtained in a security flow from the client.

The length of this field is given by MQ_PASSWORD_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_2.

*RemoteSecurityId (MQBYTE40)*
This field specifies the security identifier for the remote user.

This field is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

The following special value indicates that there is no security identifier:

**MQSID_NONE**
No security identifier specified.

The value is binary zero for the length of the field.

For the C programming language, the constant MQSID_NONE_ARRAY is also defined; this constant has the same value as MQSID_NONE, but is an array of characters instead of a string.

This is an input field to the exit. The length of this field is given by MQ_SECURITY_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_6.

The following fields in this structure are not present if *Version* is less than MQCD_VERSION_7.

*RemoteUserIdentifier (MQCHAR12)*
This field specifies the first 12 bytes of a user identifier from a partner.

There are two fields that contain the remote user identifier:

- *RemoteUserIdentifier* contains the first 12 bytes of the remote user identifier, and is padded with blanks if the identifier is shorter than 12 bytes. *RemoteUserIdentifier* can be blank.
- *LongRemoteUserIdPtr* points to the full remote user identifier, which can be longer than 12 bytes. Its length is given by *LongRemoteUserIdLength*. The full identifier contains no trailing blanks, and is not null-terminated. If the identifier is blank, *LongRemoteUserIdLength* is zero, and the value of *LongRemoteUserIdPtr* is undefined.

  *LongRemoteUserIdPtr* is not present if *Version* is less than MQCD_VERSION_6.

The remote user identifier is relevant only for channels with a *ChannelType* of MQCHT_CLNTCONN or MQCHT_SVRCONN.

- For a security exit on an MQCHT_CLNTCONN channel, this value is a user identifier that has been obtained from the environment. The exit can choose to send it to the security exit at the server.
- For a security exit on an MQCHT_SVRCONN channel, this field might contain a user identifier which has been obtained from the environment at the client, if there is no client security exit. The exit might validate this user ID (possibly with the password in *RemotePassword*) and update the value in *MCAUserIdentifier*.

  If there is a security exit at the client, then this information can be obtained in a security flow from the client.

The length of this field is given by MQ_USER_ID_LENGTH. This field is not present if *Version* is less than MQCD_VERSION_2.

*SecurityExit (MQCHARn)*
This field specifies the channel security exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately after establishing a channel.

  Before any messages are transferred, the exit is given the opportunity to instigate security flows to validate connection authorization.
- Upon receipt of a response to a security message flow.

  Any security message flows received from the remote processor on the remote machine are given to the exit.
- At initialization and termination of the channel.

See "MQCD - Channel definition" on page 1501 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

**Note:** The value of this constant is environment-specific.

*SecurityUserData (MQCHAR32)*
This channel specifies the channel security exit user data.

This data is passed to the channel security exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. This applies to exits on different conversations. Such changes do not effect on the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This field is not relevant in IBM MQ for IBM i.

*SendExit (MQCHARn)*
This field specifies the channel send exit name.

If this name is nonblank, the exit is called at the following times:

- Immediately before data is sent out on the network.

  The exit is given the complete transmission buffer before it is transmitted. The contents of the buffer can be modified as required.
- At initialization and termination of the channel.

See "MQCD - Channel definition" on page 1501 for a description of the content of this field in various environments.

The length of this field is given by MQ_EXIT_NAME_LENGTH.

**Note:** The value of this constant is environment-specific.

*SendExitPtr (MQPTR)*
This field specifies the address of the first *SendExit* field.

If *SendExitsDefined* is greater than zero, this address is the address of the list of names of each channel send exit in the chain.

Each name is in a field of length *ExitNameLength*, padded to the right with blanks. There are *SendExitsDefined* fields adjoining one another - one for each exit.

Any changes made to these names by an exit are preserved, although the message send exit takes no explicit action - it does not change which exits are invoked.

If *SendExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*SendExitsDefined (MQLONG)*
This field specifies the number of channel send exits defined in the chain.

It is greater than or equal to zero.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*SendUserData (MQCHAR32)*
This field specifies the channel send exit user data.

This data is passed to the channel send exit in the *ExitData* field of the *ChannelExitParms* parameter (see MQ_CHANNEL_EXIT).

This field initially contains the data that was set in the channel definition. However, during the lifetime of this MCA instance, any changes made to the contents of this field by an exit of any type are preserved by the MCA, and made visible to subsequent invocations of exits (regardless of type) for this MCA instance. This applies to exits on different conversations. Such changes do not affect the channel definition used by other MCA instances. Any characters (including binary data) can be used.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This field is not relevant in IBM MQ for IBM i.

*SendUserDataPtr (MQPTR)*
This field specifies the address of the *SendUserData* field.

If *SendExitsDefined* is greater than zero, this address is the address of the list of user data items for each channel message exit in the chain.

Each user data item is in a field of length *ExitDataLength*, padded to the right with blanks. There are *MsgExitsDefined* fields adjoining one another - one for each exit. If the number of user data items defined is less than the number of exit names, undefined user data items are set to blanks. Conversely, if the number of user data items defined is greater than the number of exit names, the excess user data items are ignored and not presented to the exit.

Any changes made to these values by an exit are preserved. This allows one exit to pass information to another exit. No validation is carried out on any changes so, for example, binary data can be written to these fields if required.

If *SendExitsDefined* is zero, this field is the null pointer.

On platforms where the programming language does not support the pointer data type, this field is declared as a byte string of the appropriate length.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_4.

*SeqNumberWrap (MQLONG)*
This field specifies the highest allowable message sequence number.

When this value is reached, sequence numbers wrap to start again at 1.

This value is non-negotiable and must match in both the local and remote channel definitions.

This field is not relevant for channels with a *ChannelType* of MQCHT_SVRCONN or MQCHT_CLNTCONN.

*SharingConversations (MQLONG)*
This field specifies the maximum number of conversations that can share a channel instance associated with this channel.

This field is used on client connection and server-connection channels.

A value of 0 means that the channel operates as it did in versions earlier than IBM WebSphere MQ 7.0 with respect to the following attributes:

- Conversation sharing
- Read ahead
- `STOP CHANNEL(<channelname>) MODE(QUIESCE)`
- Heartbeating
- Client asynchronous consumption

A value of 1 is the minimum value for IBM MQ V7.0 behavior. Although only one conversation is allowed on the channel instance, read ahead, asynchronous consumption, and the Version 7 behavior of `CLNTCONN-SVRCONN` heartbeating and quiescent channel stopping are available.

This is an input field to the exit. It is not present if *Version* is less than MQCD_VERSION_9.

The default value of this field is 10.

**Note:** *MaxInstances* and *MaxInstancesPerClient* limits applied to a channel restrict the number of channel instances, not the number of conversations that might be sharing those instances.

*ShortConnectionName (MQCHAR20)*
This field specifies the first 20 bytes of a connection name.

If the *Version* field is MQCD_VERSION_1, *ShortConnectionName* contains the full connection name.

If the *Version* field is MQCD_VERSION_2 or greater, *ShortConnectionName* contains the first 20 characters of the connection name. The full connection name is given by the *ConnectionName* field; *ShortConnectionName* and the first 20 characters of *ConnectionName* are identical.

See *ConnectionName* for details of the contents of this field.

**Note:** The name of this field was changed for MQCD_VERSION_2 and subsequent versions of MQCD; the field was previously called *ConnectionName*.

The length of this field is given by MQ_SHORT_CONN_NAME_LENGTH.

*ShortRetryCount (MQLONG)*
This field specifies the maximum number of attempts that are made to connect to a remote machine.

This field is the maximum number of attempts that are made to connect to the remote machine, at intervals specified by *ShortRetryInterval*, before the (normally longer) *LongRetryCount* and *LongRetryInterval* are used.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

*ShortRetryInterval (MQLONG)*
This field specifies the maximum number of seconds to wait before reattempting connection to the remote machine.

The interval between retries might be extended if the channel has to wait to become active.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_CLUSSDR, or MQCHT_CLUSRCVR.

*SSLCipherSpec (MQCHAR32)*
This field specifies the Cipher Spec that is in use when using SSL.

If SSLCipherSpec is blank, the channel is not using SSL. If it is not blank, this field contains a string specifying the CipherSpec in use.

This parameter is valid for all channel types. It is supported on AIX, HP-UX, Linux, IBM i, Solaris, Windows, and z/OS. It is valid only for channel types of a transport type (TRPTYPE) of TCP.

This is an input field to the exit. The length of this field is given by MQ_SSL_CIPHER_SPEC_LENGTH. The field is not present if *Version* is less than MQCD_VERSION_7.

*SSLClientAuth (MQLONG)*
This field specifies whether SSL client authentication is required.

This field is relevant only to SVRCONN channel definitions.

It is one of the following values:

**MQSCA_REQUIRED**
Client authentication required.

**MQSCA_OPTIONAL**
Client authentication optional.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

*SSLPeerNameLength (MQLONG)*
This field specifies the length in bytes of the SSL peer name pointed to by *SSLPeerNamePtr*.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

*SSLPeerNamePtr (MQPTR)*
This field specifies the address of the SSL peer name.

When a certificate is received during a successful SSL handshake, the Distinguished Name of the subject of the certificate is copied into the MQCD field accessed by SSLPeerNamePtr at the end of the channel which receives the certificate. It overwrites the SSLPeerName value for the channel if this value is present in the channel definition of the local user. If a security exit is specified at this end of the channel it receives the Distinguished Name from the peer certificate in the MQCD.

This is an input field to the exit. The field is not present if *Version* is less than MQCD_VERSION_7.

**Note:** Security exit applications constructed prior to the release of IBM MQ v7.1 may require updating. For more information see Channel security exit programs.

*StrucLength (MQLONG)*
This field specifies the length in bytes of the MQCD structure.

The length does not include any of the strings addressed by pointer fields contained within the structure. The value is one of the following:

**MQCD_LENGTH_4**
Length of version-4 channel definition structure.

**MQCD_LENGTH_5**
Length of version-5 channel definition structure.

**MQCD_LENGTH_6**
Length of version-6 channel definition structure.

**MQCD_LENGTH_7**
Length of version-7 channel definition structure.

**MQCD_LENGTH_8**
Length of version-8 channel definition structure.

**MQCD_LENGTH_9**
Length of version-9 channel definition structure.

The following constant specifies the length of the current version:

**MQCD_CURRENT_LENGTH**
Length of current version of channel definition structure.

**Note:** These constants have values that are environment-specific.

The field is not present if *Version* is less than MQCD_VERSION_4.

*TpName (MQCHAR64)*
This field specifies the LU 6.2 transaction program name.

This field is relevant only if the transmission protocol (*TransportType*) is MQXPT_LU62, and the *ChannelType* is not MQCHT_SVRCONN or MQCHT_RECEIVER.

This field is always blank on platforms on which the information is contained in the communications Side Object instead.

The length of this field is given by MQ_TP_NAME_LENGTH.

*TransportType (MQLONG)*
This field specifies the transmission protocol to be used.

The value is not checked if the channel was initiated from the other end.

It is one of the following values:

**MQXPT_LU62**
LU 6.2 transport protocol.

**MQXPT_TCP**
TCP/IP transport protocol.

**MQXPT_NETBIOS**
NetBIOS transport protocol.

This value is supported in the following environments: Windows.

**MQXPT_SPX**
SPX transport protocol.

This value is supported in the following environments: Windows, plus IBM MQ clients connected to these systems.

*UseDLQ (MQLONG)*
This field specifies whether the dead-letter queue (or undelivered message queue) is used when messages cannot be delivered by channels.

It can contain one of the following values:

**MQUSEDLQ_NO**
Messages that cannot be delivered by a channel are treated as a failure. The channel either discards the message, or the channel ends, in accordance with the NPMSPEED setting.

**MQUSEDLQ_YES**
When the DEADQ queue manager attribute provides the name of a dead-letter queue, then it is used, else the behavior is as for NO. YES is the default value.

*UserIdentifier (MQCHAR12)*
This field specifies the user identifier used by the message channel agent when attempting to initiate a secure SNA session with a remote message channel agent.

This field can be nonblank only on UNIX systems and Windows, and is relevant only for channels with a *ChannelType* of MQCHT_SENDER, MQCHT_SERVER, MQCHT_REQUESTER, or MQCHT_CLNTCONN. On z/OS, this field is not relevant.

The length of this field is given by MQ_USER_ID_LENGTH. However, only the first 10 characters are used.

This field is not present when *Version* is less than MQCD_VERSION_2.

*Version ( MQLONG)*
The `Version` field specifies the highest version number that you can set for the structure.

The value depends on the environment:

**MQCD _VERSION_1**
Version 1 channel definition structure.

**MQCD _VERSION_2**
Version 2 channel definition structure.

**MQCD _VERSION_3**
Version 3 channel definition structure.

**MQCD _VERSION_4**
Version 4 channel definition structure.

**MQCD _VERSION_5**
Version 5 channel definition structure.

**MQCD _VERSION_6**
Version 6 channel definition structure.

**MQCD _VERSION_7**
Version 7 channel definition structure.

**MQCD _VERSION_8**
Version 8 channel definition structure.

**MQCD _VERSION_9**
Version 9 channel definition structure.

Version 9 is the highest that you can set the field to on IBM WebSphere MQ 7.0 and IBM WebSphere MQ 7.0.1 on all platforms.

**MQCD _VERSION_10**
Version 10 channel definition structure.

Version 10 is the highest that you can set the field to on IBM WebSphere MQ 7.1 and IBM WebSphere MQ 7.5 on all platforms.

**MQCD _VERSION_11**
Version 11 channel definition structure.

Version 11 is the highest that you can set the field to on IBM MQ 8.0 on all platforms.

Fields that exist only in the more recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQCD_CURRENT_VERSION**
The value set in `MQCD_CURRENT_VERSION` is the current version of the channel definition structure being used.

The value of MQCD_CURRENT_VERSION depends on the environment. It contains the highest value supported by the platform.

MQCD_CURRENT_VERSION is not used to initialize the default structures provided in the header, copy, and include files provided for different programming languages. The default initialization of Version depends on the platform and release.

For IBM WebSphere MQ 7.0 and later versions, the MQCD declarations in the header, copy, and include files are initialized to MQCD_VERSION_6. To use additional MQCD fields, applications must set the version number to MQCD_CURRENT_VERSION. If you are writing an application that is portable between several environments, you must choose a version that is supported in all the environments.

**Tip:** When a new version of the MQCD structure is introduced, the layout of the existing part is not changed. The exit must check the version number. It must be equal to or greater than the lowest version that contains the fields that the exit needs to use.

*XmitQName (MQCHAR48)*
This field specifies the name of the transmission queue from which messages are retrieved.

This field is relevant only for channels with a *ChannelType* of MQCHT_SENDER or MQCHT_SERVER.

The length of this field is given by MQ_Q_NAME_LENGTH.

## *C declaration*

This declaration is the C declaration for the MQCD structure.

```
typedef struct tagMQCD MQCD;
 typedef MQCD  MQPOINTER PMQCD;
 typedef PMQCD MQPOINTER PPMQCD;

 struct tagMQCD {
   MQCHAR    ChannelName[20];          /* Channel definition name */
   MQLONG    Version;                  /* Structure version number */
   MQLONG    ChannelType;              /* Channel type */
   MQLONG    TransportType;            /* Transport type */
   MQCHAR    Desc[64];                 /* Channel description */
   MQCHAR    QMgrName[48];             /* Queue-manager name */
   MQCHAR    XmitQName[48];            /* Transmission queue name */
   MQCHAR    ShortConnectionName[20];  /* First 20 bytes of */
                                       /* connection name */
   MQCHAR    MCAName[20];              /* Reserved */
   MQCHAR    ModeName[8];              /* LU 6.2 Mode name */
   MQCHAR    TpName[64];               /* LU 6.2 transaction program */
                                       /* name */
   MQLONG    BatchSize;                /* Batch size */
   MQLONG    DiscInterval;             /* Disconnect interval */
   MQLONG    ShortRetryCount;          /* Short retry count */
   MQLONG    ShortRetryInterval;       /* Short retry wait interval */
   MQLONG    LongRetryCount;           /* Long retry count */
   MQLONG    LongRetryInterval;        /* Long retry wait interval */
   MQCHAR    SecurityExit[128];        /* Channel security exit name */
   MQCHAR    MsgExit[128];             /* Channel message exit name */
   MQCHAR    SendExit[128];            /* Channel send exit name */
   MQCHAR    ReceiveExit[128];         /* Channel receive exit name */
   MQLONG    SeqNumberWrap;            /* Highest allowable message */
                                       /* sequence number */
   MQLONG    MaxMsgLength;             /* Maximum message length */
   MQLONG    PutAuthority;             /* Put authority */
   MQLONG    DataConversion;           /* Data conversion */
   MQCHAR    SecurityUserData[32];     /* Channel security exit user */
                                       /* data */
   MQCHAR    MsgUserData[32];          /* Channel message exit user */
                                       /* data */
   MQCHAR    SendUserData[32];         /* Channel send exit user */
                                       /* data */
   MQCHAR    ReceiveUserData[32];      /* Channel receive exit user */
                                       /* data */
   /* Ver:1 */
   MQCHAR    UserIdentifier[12];       /* User identifier */
   MQCHAR    Password[12];             /* Password */
   MQCHAR    MCAUserIdentifier[12];    /* First 12 bytes of MCA user */
                                       /* identifier */
   MQLONG    MCAType;                  /* Message channel agent type */
   MQCHAR    ConnectionName[264];      /* Connection name */
```

```
  MQCHAR    RemoteUserIdentifier[12];  /* First 12 bytes of user */
                                       /* identifier from partner */
  MQCHAR    RemotePassword[12];        /* Password from partner */
  /* Ver:2 */
  MQCHAR    MsgRetryExit[128];         /* Channel message retry exit */
                                       /* name */
  MQCHAR    MsgRetryUserData[32];      /* Channel message retry exit */
                                       /* user data */
  MQLONG    MsgRetryCount;             /* Number of times MCA will */
                                       /* try to put the message, */
                                       /* after first attempt has */
                                       /* failed */
  MQLONG    MsgRetryInterval;          /* Minimum interval in */
                                       /* milliseconds after which */
                                       /* the open or put operation */
                                       /* will be retried */
  /* Ver:3 */
  MQLONG    HeartbeatInterval;         /* Time in seconds between */
                                       /* heartbeat flows */
  MQLONG    BatchInterval;             /* Batch duration */
  MQLONG    NonPersistentMsgSpeed;     /* Speed at which */
                                       /* nonpersistent messages are */
                                       /* sent */
  MQLONG    StrucLength;               /* Length of MQCD structure */
  MQLONG    ExitNameLength;            /* Length of exit name */
  MQLONG    ExitDataLength;            /* Length of exit user data */
  MQLONG    MsgExitsDefined;           /* Number of message exits */
                                       /* defined */
  MQLONG    SendExitsDefined;          /* Number of send exits */
                                       /* defined */
  MQLONG    ReceiveExitsDefined;       /* Number of receive exits */
                                       /* defined */
  MQPTR     MsgExitPtr;                /* Address of first MsgExit */
                                       /* field */
  MQPTR     MsgUserDataPtr;            /* Address of first */
                                       /* MsgUserData field */
  MQPTR     SendExitPtr;               /* Address of first SendExit */
                                       /* field */
  MQPTR     SendUserDataPtr;           /* Address of first */
                                       /* SendUserData field */
  MQPTR     ReceiveExitPtr;            /* Address of first */
                                       /* ReceiveExit field */
  MQPTR     ReceiveUserDataPtr;        /* Address of first */
                                       /* ReceiveUserData field */
  /* Ver:4 */
  MQPTR     ClusterPtr;                /* Address of a list of */
                                       /* cluster names */
  MQLONG    ClustersDefined;           /* Number of clusters to */
                                       /* which the channel belongs */
  MQLONG    NetworkPriority;           /* Network priority */
  /* Ver:5 */
  MQLONG    LongMCAUserIdLength;       /* Length of long MCA user */
                                       /* identifier */
  MQLONG    LongRemoteUserIdLength;    /* Length of long remote user */
                                       /* identifier */
  MQPTR     LongMCAUserIdPtr;          /* Address of long MCA user */
                                       /* identifier */
  MQPTR     LongRemoteUserIdPtr;       /* Address of long remote */
                                       /* user identifier */
  MQBYTE40  MCASecurityId;             /* MCA security identifier */
  MQBYTE40  RemoteSecurityId;          /* Remote security identifier */
  /* Ver:6 */
  MQCHAR    SSLCipherSpec[32];         /* SSL CipherSpec */
  MQPTR     SSLPeerNamePtr;            /* Address of SSL peer name */
  MQLONG    SSLPeerNameLength;         /* Length of SSL peer name */
  MQLONG    SSLClientAuth;             /* Whether SSL client */
                                       /* authentication is required */
  MQLONG    KeepAliveInterval;         /* Keepalive interval */
  MQCHAR    LocalAddress[48];          /* Local communications */
                                       /* address */
  MQLONG    BatchHeartbeat;            /* Batch heartbeat interval */
  /* Ver:7 */
  MQLONG    HdrCompList[2];            /* Header data compression */
                                       /* list */
  MQLONG    MsgCompList[16];           /* Message data compression */
                                       /* list */
  MQLONG    CLWLChannelRank;           /* Channel rank */
  MQLONG    CLWLChannelPriority;       /* Channel priority */
  MQLONG    CLWLChannelWeight;         /* Channel weight */
  MQLONG    ChannelMonitoring;         /* Channel monitoring */
  MQLONG    ChannelStatistics;         /* Channel statistics */
  /* Ver:8 */
```

```
   MQLONG    SharingConversations;      /* Limit on sharing */
                                        /* conversations */
   MQLONG    PropertyControl;           /* Message property control */
   MQLONG    MaxInstances;              /* Limit on SVRCONN channel */
                                        /* instances */
   MQLONG    MaxInstancesPerClient;     /* Limit on SVRCONN channel */
                                        /* instances per client */
   MQLONG    ClientChannelWeight;       /* Client channel weight */
   MQLONG    ConnectionAffinity;        /* Connection affinity */
   /* Ver:9 */
   MQLONG    BatchDataLimit;            /* Batch data limit */
   MQLONG    UseDLQ;                    /* Use Dead Letter Queue */
   MQLONG    DefReconnect;              /* Default client reconnect */
                                        /* option */
   /* Ver:10 */
   MQCHAR64  CertificateLabel;          /* Certificate label */
 /* Ver:11 */
};
```

### *COBOL declaration*

This declaration is the COBOL declaration for the MQCD structure.

```
** MQCD structure
       10  MQCD.
      ** Channel definition name
       15  MQCD-CHANNELNAME PIC X(20).
      ** Structure version number
       15  MQCD-VERSION PIC S9(9) BINARY.
      ** Channel type
       15  MQCD-CHANNELTYPE PIC S9(9) BINARY.
      ** Transport type
       15  MQCD-TRANSPORTTYPE PIC S9(9) BINARY.
      ** Channel description
       15  MQCD-DESC PIC X(64).
      ** Queue-manager name
       15  MQCD-QMGRNAME PIC X(48).
      ** Transmission queue name
       15  MQCD-XMITQNAME PIC X(48).
      ** First 20 bytes of connection name
       15  MQCD-SHORTCONNECTIONNAME PIC X(20).
      ** Reserved
       15  MQCD-MCANAME PIC X(20).
      ** LU 6.2 Mode name
       15  MQCD-MODENAME PIC X(8).
      ** LU 6.2 transaction program name
       15  MQCD-TPNAME PIC X(64).
      ** Batch size
       15  MQCD-BATCHSIZE PIC S9(9) BINARY.
      ** Disconnect interval
       15  MQCD-DISCINTERVAL PIC S9(9) BINARY.
      ** Short retry count
       15  MQCD-SHORTRETRYCOUNT PIC S9(9) BINARY.
      ** Short retry wait interval
       15  MQCD-SHORTRETRYINTERVAL PIC S9(9) BINARY.
      ** Long retry count
       15  MQCD-LONGRETRYCOUNT PIC S9(9) BINARY.
      ** Long retry wait interval
       15  MQCD-LONGRETRYINTERVAL PIC S9(9) BINARY.
      ** Channel security exit name
       15  MQCD-SECURITYEXIT PIC X(20).
      ** Channel message exit name
       15  MQCD-MSGEXIT PIC X(20).
      ** Channel send exit name
       15  MQCD-SENDEXIT PIC X(20).
      ** Channel receive exit name
       15  MQCD-RECEIVEEXIT PIC X(20).
      ** Highest allowable message sequence number
       15  MQCD-SEQNUMBERWRAP PIC S9(9) BINARY.
      ** Maximum message length
       15  MQCD-MAXMSGLENGTH PIC S9(9) BINARY.
      ** Put authority
       15  MQCD-PUTAUTHORITY PIC S9(9) BINARY.
      ** Data conversion
       15  MQCD-DATACONVERSION PIC S9(9) BINARY.
      ** Channel security exit user data
       15  MQCD-SECURITYUSERDATA PIC X(32).
      ** Channel message exit user data
       15  MQCD-MSGUSERDATA PIC X(32).
```

```
      ** Channel send exit user data
       15  MQCD-SENDUSERDATA PIC X(32).
      ** Channel receive exit user data
       15  MQCD-RECEIVEUSERDATA PIC X(32).
      ** Ver:1 **
      ** User identifier
       15  MQCD-USERIDENTIFIER PIC X(12).
      ** Password
       15  MQCD-PASSWORD PIC X(12).
      ** First 12 bytes of MCA user identifier
       15  MQCD-MCAUSERIDENTIFIER PIC X(12).
      ** Message channel agent type
       15  MQCD-MCATYPE PIC S9(9) BINARY.
      ** Connection name
       15  MQCD-CONNECTIONNAME PIC X(264).
      ** First 12 bytes of user identifier from partner
       15  MQCD-REMOTEUSERIDENTIFIER PIC X(12).
      ** Password from partner
       15  MQCD-REMOTEPASSWORD PIC X(12).
      ** Ver:2 **
      ** Channel message retry exit name
       15  MQCD-MSGRETRYEXIT PIC X(20).
      ** Channel message retry exit user data
       15  MQCD-MSGRETRYUSERDATA PIC X(32).
      ** Number of times MCA will try to put the message, after first
      ** attempt has failed
       15  MQCD-MSGRETRYCOUNT PIC S9(9) BINARY.
      ** Minimum interval in milliseconds after which the open or put
      ** operation will be retried
       15  MQCD-MSGRETRYINTERVAL PIC S9(9) BINARY.
      ** Ver:3 **
      ** Time in seconds between heartbeat flows
       15  MQCD-HEARTBEATINTERVAL PIC S9(9) BINARY.
      ** Batch duration
       15  MQCD-BATCHINTERVAL PIC S9(9) BINARY.
      ** Speed at which nonpersistent messages are sent
       15  MQCD-NONPERSISTENTMSGSPEED PIC S9(9) BINARY.
      ** Length of MQCD structure
       15  MQCD-STRUCLENGTH PIC S9(9) BINARY.
      ** Length of exit name
       15  MQCD-EXITNAMELENGTH PIC S9(9) BINARY.
      ** Length of exit user data
       15  MQCD-EXITDATALENGTH PIC S9(9) BINARY.
      ** Number of message exits defined
       15  MQCD-MSGEXITSDEFINED PIC S9(9) BINARY.
      ** Number of send exits defined
       15  MQCD-SENDEXITSDEFINED PIC S9(9) BINARY.
      ** Number of receive exits defined
       15  MQCD-RECEIVEEXITSDEFINED PIC S9(9) BINARY.
      ** Address of first MsgExit field
       15  MQCD-MSGEXITPTR POINTER.
      ** Address of first MsgUserData field
       15  MQCD-MSGUSERDATAPTR POINTER.
      ** Address of first SendExit field
       15  MQCD-SENDEXITPTR POINTER.
      ** Address of first SendUserData field
       15  MQCD-SENDUSERDATAPTR POINTER.
      ** Address of first ReceiveExit field
       15  MQCD-RECEIVEEXITPTR POINTER.
      ** Address of first ReceiveUserData field
       15  MQCD-RECEIVEUSERDATAPTR POINTER.
      ** Ver:4 **
      ** Address of a list of cluster names
       15  MQCD-CLUSTERPTR POINTER.
      ** Number of clusters to which the channel belongs
       15  MQCD-CLUSTERSDEFINED PIC S9(9) BINARY.
      ** Network priority
       15  MQCD-NETWORKPRIORITY PIC S9(9) BINARY.
      ** Ver:5 **
      ** Length of long MCA user identifier
       15  MQCD-LONGMCAUSERIDLENGTH PIC S9(9) BINARY.
      ** Length of long remote user identifier
       15  MQCD-LONGREMOTEUSERIDLENGTH PIC S9(9) BINARY.
      ** Address of long MCA user identifier
       15  MQCD-LONGMCAUSERIDPTR POINTER.
      ** Address of long remote user identifier
       15  MQCD-LONGREMOTEUSERIDPTR POINTER.
      ** MCA security identifier
       15  MQCD-MCASECURITYID PIC X(40).
      ** Remote security identifier
       15  MQCD-REMOTESECURITYID PIC X(40).
      ** Ver:6 **
```

```
      ** SSL CipherSpec
       15  MQCD-SSLCIPHERSPEC PIC X(32).
      ** Address of SSL peer name
       15  MQCD-SSLPEERNAMEPTR POINTER.
      ** Length of SSL peer name
       15  MQCD-SSLPEERNAMELENGTH PIC S9(9) BINARY.
      ** Whether SSL client authentication is required
       15  MQCD-SSLCLIENTAUTH PIC S9(9) BINARY.
      ** Keepalive interval
       15  MQCD-KEEPALIVEINTERVAL PIC S9(9) BINARY.
      ** Local communications address
       15  MQCD-LOCALADDRESS PIC X(48).
      ** Batch heartbeat interval
       15  MQCD-BATCHHEARTBEAT PIC S9(9) BINARY.
      ** Ver:7 **
      ** Header data compression list
       15  MQCD-HDRCOMPLIST PIC S9(9) BINARY.
      ** Message data compression list
       15  MQCD-MSGCOMPLIST PIC S9(9) BINARY.
      ** Channel rank
       15  MQCD-CLWLCHANNELRANK PIC S9(9) BINARY.
      ** Channel priority
       15  MQCD-CLWLCHANNELPRIORITY PIC S9(9) BINARY.
      ** Channel weight
       15  MQCD-CLWLCHANNELWEIGHT PIC S9(9) BINARY.
      ** Channel monitoring
       15  MQCD-CHANNELMONITORING PIC S9(9) BINARY.
      ** Channel statistics
       15  MQCD-CHANNELSTATISTICS PIC S9(9) BINARY.
      ** Ver:8 **
      ** Limit on sharing conversations
       15  MQCD-SHARINGCONVERSATIONS PIC S9(9) BINARY.
      ** Message property control
       15  MQCD-PROPERTYCONTROL PIC S9(9) BINARY.
      ** Limit on SVRCONN channel instances
       15  MQCD-MAXINSTANCES PIC S9(9) BINARY.
      ** Limit on SVRCONN channel instances per client
       15  MQCD-MAXINSTANCESPERCLIENT PIC S9(9) BINARY.
      ** Client channel weight
       15  MQCD-CLIENTCHANNELWEIGHT PIC S9(9) BINARY.
      ** Connection affinity
       15  MQCD-CONNECTIONAFFINITY PIC S9(9) BINARY.
      ** Ver:9 **
      ** Batch data limit
       15  MQCD-BATCHDATALIMIT PIC S9(9) BINARY.
      ** Use Dead Letter Queue
       15  MQCD-USEDLQ PIC S9(9) BINARY.
      ** Default client reconnect option
       15  MQCD-DEFRECONNECT PIC S9(9) BINARY.
      ** Ver:10 **
```

### *RPG declaration (ILE)*

This declaration is the RPG declaration for the MQCD structure.

```
D* MQCD Structure
     D*
     D* Channel definition name
     D  CDCHN                  1     20
     D* Structure version number
     D  CDVER                 21     24I 0
     D* Channel type
     D  CDCHT                 25     28I 0
     D* Transport type
     D  CDTRT                 29     32I 0
     D* Channel description
     D  CDDES                 33     96
     D* Queue-manager name
     D  CDQM                  97    144
     D* Transmission queue name
     D  CDXQ                 145    192
     D* First 20 bytes of connection name
     D  CDSCN                193    212
     D* Reserved
     D  CDMCA                213    232
     D* LU 6.2 Mode name
     D  CDMOD                233    240
     D* LU 6.2 transaction program name
     D  CDTP                 241    304
```

```
     D* Batch size
     D  CDBS                 305    308I 0
     D* Disconnect interval
     D  CDDI                 309    312I 0
     D* Short retry count
     D  CDSRC                313    316I 0
     D* Short retry wait interval
     D  CDSRI                317    320I 0
     D* Long retry count
     D  CDLRC                321    324I 0
     D* Long retry wait interval
     D  CDLRI                325    328I 0
     D* Channel security exit name
     D  CDSCX                329    348
     D* Channel message exit name
     D  CDMSX                349    368
     D* Channel send exit name
     D  CDSNX                369    388
     D* Channel receive exit name
     D  CDRCX                389    408
     D* Highest allowable message sequence number
     D  CDSNW                409    412I 0
     D* Maximum message length
     D  CDMML                413    416I 0
     D* Put authority
     D  CDPA                 417    420I 0
     D* Data conversion
     D  CDDC                 421    424I 0
     D* Channel security exit user data
     D  CDSCD                425    456
     D* Channel message exit user data
     D  CDMSD                457    488
     D* Channel send exit user data
     D  CDSND                489    520
     D* Channel receive exit user data
     D  CDRCD                521    552
     D* Ver:1 **
     D* User identifier
     D  CDUID                553    564
     D* Password
     D  CDPW                 565    576
     D* First 12 bytes of MCA user identifier
     D  CDAUI                577    588
     D* Message channel agent type
     D  CDCAT                589    592I 0
     D* Connection name
     D  CDCON                593    848
     D  CDCN2                849    856
     D* First 12 bytes of user identifier from partner
     D  CDRUI                857    868
     D* Password from partner
     D  CDRPW                869    880
     D* Ver:2 **
     D* Channel message retry exit name
     D  CDMRX                881    900
     D* Channel message retry exit user data
     D  CDMRD                901    932
     D* Number of times MCA will try to put the message, after first
     D* attempt has failed
     D  CDMRC                933    936I 0
     D* Minimum interval in milliseconds after which the open or put
     D* operation will be retried
     D  CDMRI                937    940I 0
     D* Ver:3 **
     D* Time in seconds between heartbeat flows
     D  CDHBI                941    944I 0
     D* Batch duration
     D  CDBI                 945    948I 0
     D* Speed at which nonpersistent messages are sent
     D  CDNPM                949    952I 0
     D* Length of MQCD structure
     D  CDLEN                953    956I 0
     D* Length of exit name
     D  CDXNL                957    960I 0
     D* Length of exit user data
     D  CDXDL                961    964I 0
     D* Number of message exits defined
     D  CDMXD                965    968I 0
     D* Number of send exits defined
     D  CDSXD                969    972I 0
     D* Number of receive exits defined
     D  CDRXD                973    976I 0
```

```
     D* Address of first MsgExit field
     D  CDMXP                977    992*
     D* Address of first MsgUserData field
     D  CDMUP                993   1008*
     D* Address of first SendExit field
     D  CDSXP                1009   1024*
     D* Address of first SendUserData field
     D  CDSUP                1025   1040*
     D* Address of first ReceiveExit field
     D  CDRXP                1041   1056*
     D* Address of first ReceiveUserData field
     D  CDRUP                1057   1072*
     D* Ver:4 **
     D* Address of a list of cluster names
     D  CDCLP                1073   1088*
     D* Number of clusters to which the channel belongs
     D  CDCLD                1089   1092I 0
     D* Network priority
     D  CDNP                 1093   1096I 0
     D* Ver:5 **
     D* Length of long MCA user identifier
     D  CDLML                1097   1100I 0
     D* Length of long remote user identifier
     D  CDLRL                1101   1104I 0
     D* Address of long MCA user identifier
     D  CDLMP                1105   1120*
     D* Address of long remote user identifier
     D  CDLRP                1121   1136*
     D* MCA security identifier
     D  CDMSI                1137   1176
     D* Remote security identifier
     D  CDRSI                1177   1216
     D* Ver:6 **
     D* SSL CipherSpec
     D  CDSCS                1217   1248
     D* Address of SSL peer name
     D  CDSPN                1249   1264*
     D* Length of SSL peer name
     D  CDSPL                1265   1268I 0
     D* Whether SSL client authentication is required
     D  CDSCA                1269   1272I 0
     D* Keepalive interval
     D  CDKAI                1273   1276I 0
     D* Local communications address
     D  CDLOA                1277   1324
     D* Batch heartbeat interval
     D  CDBHB                1325   1328I 0
     D* Ver:7 **
     D* Header data compression list
     D  CDHCL0
     D  CDHCL1               1329   1332I 0
     D  CDHCL2               1333   1336I 0
     D  CDHCL                        10I 0 DIM(2) OVERLAY(CDHCL0)
     D* Message data compression list
     D  CDMCL0
     D  CDMCL1               1337   1340I 0
     D  CDMCL2               1341   1344I 0
     D  CDMCL3               1345   1348I 0
     D  CDMCL4               1349   1352I 0
     D  CDMCL5               1353   1356I 0
     D  CDMCL6               1357   1360I 0
     D  CDMCL7               1361   1364I 0
     D  CDMCL8               1365   1368I 0
     D  CDMCL9               1369   1372I 0
     D  CDMCL10              1373   1376I 0
     D  CDMCL11              1377   1380I 0
     D  CDMCL12              1381   1384I 0
     D  CDMCL13              1385   1388I 0
     D  CDMCL14              1389   1392I 0
     D  CDMCL15              1393   1396I 0
     D  CDMCL16              1397   1400I 0
     D  CDMCL                        10I 0 DIM(16) OVERLAY(CDMCL0)
     D* Channel rank
     D  CDCWCR               1401   1404I 0
     D* Channel priority
     D  CDCWCP               1405   1408I 0
     D* Channel weight
     D  CDCWCW               1409   1412I 0
     D* Channel monitoring
     D  CDCHLMON             1413   1416I 0
     D* Channel statistics
     D  CDCHLST              1417   1420I 0
```

```
     D* Ver:8 **
     D* Limit on sharing conversations
     D  CDSHC               1421   1424I 0
     D* Message property control
     D  CDPRC               1425   1428I 0
     D* Limit on SVRCONN channel instances
     D  CDMXIN              1429   1432I 0
     D* Limit on SVRCONN channel instances per client
     D  CDMXIC              1433   1436I 0
     D* Client channel weight
     D  CDCLNCHLW           1437   1440I 0
     D* Connection affinity
     D  CDCONNAFF           1441   1444I 0
     D* Ver:9 **
     D* Batch data limit
     D  CDBDL               1445   1448I 0
     D* Use Dead Letter Queue
     D  CDUDLQ              1449   1452I 0
     D* Default client reconnect option
     D  CDDRCN              1453   1456I 0
     D* Ver:10 **
```

### *System/390 assembler declaration*

This declaration is the System/390 assembler declaration for the MQCD structure.

```
MQCD                          DSECT
MQCD_CHANNELNAME              DS   CL20   Channel definition name
MQCD_VERSION                  DS   F      Structure version number
MQCD_CHANNELTYPE              DS   F      Channel type
MQCD_TRANSPORTTYPE            DS   F      Transport type
MQCD_DESC                     DS   CL64   Channel description
MQCD_QMGRNAME                 DS   CL48   Queue-manager name
MQCD_XMITQNAME                DS   CL48   Transmission queue name
MQCD_SHORTCONNECTIONNAME      DS   CL20   First 20 bytes of connection
*                                         name
MQCD_MCANAME                  DS   CL20   Reserved
MQCD_MODENAME                 DS   CL8    LU 6.2 Mode name
MQCD_TPNAME                   DS   CL64   LU 6.2 transaction program name
MQCD_BATCHSIZE                DS   F      Batch size
MQCD_DISCINTERVAL             DS   F      Disconnect interval
MQCD_SHORTRETRYCOUNT          DS   F      Short retry count
MQCD_SHORTRETRYINTERVAL       DS   F      Short retry wait interval
MQCD_LONGRETRYCOUNT           DS   F      Long retry count
MQCD_LONGRETRYINTERVAL        DS   F      Long retry wait interval
MQCD_SECURITYEXIT             DS   CLn    Channel security exit name
MQCD_MSGEXIT                  DS   CLn    Channel message exit name
MQCD_SENDEXIT                 DS   CLn    Channel send exit name
MQCD_RECEIVEEXIT              DS   CLn    Channel receive exit name
MQCD_SEQNUMBERWRAP            DS   F      Highest allowable message
*                                         sequence number
MQCD_MAXMSGLENGTH             DS   F      Maximum message length
MQCD_PUTAUTHORITY             DS   F      Put authority
MQCD_DATACONVERSION           DS   F      Data conversion
MQCD_SECURITYUSERDATA         DS   CL32   Channel security exit user data
MQCD_MSGUSERDATA              DS   CL32   Channel message exit user data
MQCD_SENDUSERDATA             DS   CL32   Channel send exit user data
MQCD_RECEIVEUSERDATA          DS   CL32   Channel receive exit user data
MQCD_USERIDENTIFIER           DS   CL12   User identifier
MQCD_PASSWORD                 DS   CL12   Password
MQCD_MCAUSERIDENTIFIER        DS   CL12   First 12 bytes of MCA user
*                                         identifier
MQCD_MCATYPE                  DS   F      Message channel agent type
MQCD_CONNECTIONNAME           DS   CL264  Connection name
MQCD_REMOTEUSERIDENTIFIER     DS   CL12   First 12 bytes of user
*                                         identifier from partner
MQCD_REMOTEPASSWORD           DS   CL12   Password from partner
MQCD_MSGRETRYEXIT             DS   CLn    Channel message retry exit name
MQCD_MSGRETRYUSERDATA         DS   CL32   Channel message retry exit user
*                                         data
MQCD_MSGRETRYCOUNT            DS   F      Number of times MCA will try to
*                                         put the message, after the
*                                         first attempt has failed
MQCD_MSGRETRYINTERVAL         DS   F      Minimum interval in
*                                         milliseconds after which the
*                                         open or put operation will be
*                                         retried
MQCD_HEARTBEATINTERVAL        DS   F      Time in seconds between
*                                         heartbeat flows
```

```
MQCD_BATCHINTERVAL            DS   F      Batch duration
MQCD_NONPERSISTENTMSGSPEED    DS   F      Speed at which nonpersistent
*                                         messages are sent
MQCD_STRUCLENGTH              DS   F      Length of MQCD structure
MQCD_EXITNAMELENGTH           DS   F      Length of exit name
MQCD_EXITDATALENGTH           DS   F      Length of exit user data
MQCD_MSGEXITSDEFINED          DS   F      Number of message exits defined
MQCD_SENDEXITSDEFINED         DS   F      Number of send exits defined
MQCD_RECEIVEEXITSDEFINED      DS   F      Number of receive exits defined
MQCD_MSGEXITPTR               DS   F      Address of first MSGEXIT field
MQCD_MSGUSERDATAPTR           DS   F      Address of first MSGUSERDATA
*                                         field
MQCD_SENDEXITPTR              DS   F      Address of first SENDEXIT field
MQCD_SENDUSERDATAPTR          DS   F      Address of first SENDUSERDATA
*                                         field
MQCD_RECEIVEEXITPTR           DS   F      Address of first RECEIVEEXIT
*                                         field
MQCD_RECEIVEUSERDATAPTR       DS   F      Address of first
*                                         RECEIVEUSERDATA field
MQCD_CLUSTERPTR               DS   F      Address of a list of cluster
*                                         names
MQCD_CLUSTERSDEFINED          DS   F      Number of clusters to which the
*                                         channel belongs
MQCD_NETWORKPRIORITY          DS   F      Network priority
MQCD_LONGMCAUSERIDLENGTH      DS   F      Length of long MCA user
*                                         identifier
MQCD_LONGREMOTEUSERIDLENGTH   DS   F      Length of long remote user
*                                         identifier
MQCD_LONGMCAUSERIDPTR         DS   F      Address of long MCA user
*                                         identifier
MQCD_LONGREMOTEUSERIDPTR      DS   F      Address of long remote user
*                                         identifier
MQCD_MCASECURITYID            DS   XL40   MCA security identifier
MQCD_REMOTESECURITYID         DS   XL40   Remote security identifier
MQCD_SSLCIPHERSPEC            DS   CL32   SSL CipherSpec
MQCD_SSLPEERNAMEPTR           DS   F      Address of SSL peer name
MQCD_SSLPEERNAMELENGTH        DS   F      Length of SSL peer name
MQCD_SSLCLIENTAUTH            DS   F      Whether SSL client
*                                         authentication is required
MQCD_KEEPALIVEINTERVAL        DS   F      Keepalive interval
MQCD_LOCALADDRESS             DS   CL48   Local communications address
MQCD_BATCHHEARTBEAT           DS   F      Batch heartbeat interval
MQCD_HDRCOMPLIST              DS   CL2    Header data compression list
MQCD_MSGCOMPLIST              DS   CL16   Message data compression list
MQCD_CLWLCHANNELRANK          DS   F      Channel rank
MQCD_CLWLCHANNELPRIORITY      DS   F      Channel priority
MQCD_CLWLCHANNELWEIGHT        DS   F      Channel weight
MQCD_CHANNELMONITORING        DS   F      Channel monitoring
MQCD_CHANNELSTATISTICS        DS   F      Channel statistics
MQCD_SHARINGCONVERSATIONS     DS   F      Limit on sharing
*                                         conversations
MQCD_PROPERTYCONTROL          DS   F      Message property
*                                         control
MQCD_SHARINGCONVERSATIONS     DS   F      Limit on sharing conversations
MQCD_PROPERTYCONTROL          DS   F      Message property control
MQCD_MAXINSTANCES             DS   F      Limit on SVRCONN chl instances
MQCD_MAXINSTANCESPERCLIENT    DS   F      Limit on SVRCONN chl instances
                                          per client
MQCD_CLIENTCHANNELWEIGHT      DS   F      Channel weight
MQCD_CONNECTIONAFFINITY       DS   F      Connection Affinty
MQCD_BATCHDATALIMIT           DS   F      Batch data limit
MQCD_USEDLQ                   DS   F      Use dead-letter queue
MQCD_DEFRECONNECT             DS   F      Default client reconnect option
MQCD_LENGTH                   EQU  *-MQCD
                              ORG  MQCD
MQCD_AREA                     DS   CL(MQCD_LENGTH)
```

### *Visual Basic declaration*

This declaration is the Visual Basic declaration of the MQCD structure.

In Visual Basic, the MQCD structure can be used with the MQCNO structure on the MQCONNX call.

```
Type MQCD
  ChannelName            As String*20  'Channel definition name'
  Version                As Long       'Structure version number'
  ChannelType            As Long       'Channel type'
  TransportType          As Long       'Transport type'
  Desc                   As String*64  'Channel description'
```

```
  QMgrName                As String*48  'Queue-manager name'
  XmitQName               As String*48  'Transmission queue name'
  ShortConnectionName     As String*20  'First 20 bytes of connection'
                                        'name'
  MCAName                 As String*20  'Reserved'
  ModeName                As String*8   'LU 6.2 Mode name'
  TpName                  As String*64  'LU 6.2 transaction program name'
  BatchSize               As Long       'Batch size'
  DiscInterval            As Long       'Disconnect interval'
  ShortRetryCount         As Long       'Short retry count'
  ShortRetryInterval      As Long       'Short retry wait interval'
  LongRetryCount          As Long       'Long retry count'
  LongRetryInterval       As Long       'Long retry wait interval'
  SecurityExit            As String*128 'Channel security exit name'
  MsgExit                 As String*128 'Channel message exit name'
  SendExit                As String*128 'Channel send exit name'
  ReceiveExit             As String*128 'Channel receive exit name'
  SeqNumberWrap           As Long       'Highest allowable message'
                                        'sequence number'
  MaxMsgLength            As Long       'Maximum message length'
  PutAuthority            As Long       'Put authority'
  DataConversion          As Long       'Data conversion'
  SecurityUserData        As String*32  'Channel security exit user data'
  MsgUserData             As String*32  'Channel message exit user data'
  SendUserData            As String*32  'Channel send exit user data'
  ReceiveUserData         As String*32  'Channel receive exit user data'
  UserIdentifier          As String*12  'User identifier'
  Password                As String*12  'Password'
  MCAUserIdentifier       As String*12  'First 12 bytes of MCA user'
                                        'identifier'
  MCAType                 As Long       'Message channel agent type'
  ConnectionName          As String*264 'Connection name'
  RemoteUserIdentifier    As String*12  'First 12 bytes of user'
                                        'identifier from partner'
  RemotePassword          As String*12  'Password from partner'
  MsgRetryExit            As String*128 'Channel message retry exit name'
  MsgRetryUserData        As String*32  'Channel message retry exit user'
                                        'data'
  MsgRetryCount           As Long       'Number of times MCA will try to'
                                        'put the message, after the'
                                        'first attempt has failed'
  MsgRetryInterval        As Long       'Minimum interval in'
                                        'milliseconds after which the'
                                        'open or put operation will be'
                                        'retried'
  HeartbeatInterval       As Long       'Time in seconds between'
                                        'heartbeat flows'
  BatchInterval           As Long       'Batch duration'
  NonPersistentMsgSpeed   As Long       'Speed at which nonpersistent'
                                        'messages are sent'
  StrucLength             As Long       'Length of MQCD structure'
  ExitNameLength          As Long       'Length of exit name'
  ExitDataLength          As Long       'Length of exit user data'
  MsgExitsDefined         As Long       'Number of message exits defined'
  SendExitsDefined        As Long       'Number of send exits defined'
  ReceiveExitsDefined     As Long       'Number of receive exits defined'
  MsgExitPtr              As MQPTR      'Address of first MsgExit field'
  MsgUserDataPtr          As MQPTR      'Address of first MsgUserData'
                                        'field'
  SendExitPtr             As MQPTR      'Address of first SendExit field'
  SendUserDataPtr         As MQPTR      'Address of first SendUserData'
                                        'field'
  ReceiveExitPtr          As MQPTR      'Address of first ReceiveExit'
                                        'field'
  ReceiveUserDataPtr      As MQPTR      'Address of first'
                                        'ReceiveUserData field'
  ClusterPtr              As MQPTR      'Address of a list of cluster'
                                        'names'
  ClustersDefined         As Long       'Number of clusters to which the'
                                        'channel belongs'
  NetworkPriority         As Long       'Network priority'
  LongMCAUserIdLength     As Long       'Length of long MCA user'
                                        'identifier'
  LongRemoteUserIdLength As Long        'Length of long remote user'
                                        'identifier'
  LongMCAUserIdPtr        As MQPTR      'Address of long MCA user'
                                        'identifier'
  LongRemoteUserIdPtr     As MQPTR      'Address of long remote user'
                                        'identifier'
  MCASecurityId           As MQBYTE40   'MCA security identifier'
  RemoteSecurityId        As MQBYTE40   'Remote security identifier'
  SSLCipherSpec           As String*32  'SSL CipherSpec'
```

```
  SSLPeerNamePtr         As MQPTR      'Address of SSL peer name'
  SSLPeerNameLength      As Long       'Length of SSL peer name'
  SSLClientAuth          As Long       'Whether SSL client'
                                       'authentication is required'
  KeepAliveInterval      As Long       'Keepalive interval'
  LocalAddress           As String*48  'Local communications address'
  BatchHeartbeat         As Long       'Batch heartbeat interval'
  HdrCompList(0 to 1)    As Long2      'Header data compression list'
  MsgCompList(0 To 15)   As Long16     'Message data compression list'
  CLWLChannelRank        As Long       'Channel Rank'
  CLWLChannelPriority    As Long       'Channel priority'
  CLWLChannelWeight      As Long       'Channel Weight'
  ChannelMonitoring      As Long       'Channel Monitoring control'
  ChannelStatistics      As Long       'Channel Statistics'
End Type
```

### *Changing MQCD fields in a channel exit*

A channel exit can change fields in the MQCD. However, these changes are not typically acted on, except in the circumstances listed.

If a channel exit program changes a field in the MQCD data structure, the new value is typically ignored by the IBM MQ channel process. However, the new value remains in the MQCD and is passed to any remaining exits in an exit chain and to any conversation sharing the channel instance.

If SharingConversations is set to FALSE in the MQCXP structure, changes to certain fields can be acted on, depending on the type of exit program, the type of channel, and the exit reason code. The following table shows the fields that can be changed and affect the behavior of the channel, and in what circumstances. If an exit program changes one of these fields in any other circumstances, or any field not listed, the new value is ignored by the channel process. The new value remains in the MQCD and is passed to any remaining exits in an exit chain and to any conversation sharing the channel instance.

Any type of exit program when called for initialization (MQXR_INIT) can change the ChannelName field of any type of channel, as long as MQCXP SharingConverstions is set to FALSE. Only a security exit can change the MCAUserIdentifier field, regardless of the value of MQCXP SharingConverstions.

| **Field** | **Exit Reason Code** | **Exit Type** | **Channel Type** |
|---|---|---|---|
| ChannelName | MQXR_INIT | All | All |
| TransportType | MQXR_INIT | All | All |
| XmitQName | MQXR_INIT | All | SDR, RCVR |
| ModeName | MQXR_INIT | All | All |
| TpName | MQXR_INIT | All | All |
| BatchSize | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| DiscInterval | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| ShortRetryCount | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |

| Field | Exit Reason Code | Exit Type | Channel Type |
|---|---|---|---|
| ShortRetryInterval | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| LongRetryCount | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| LongRetryInterval | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| SeqNumberWrap | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| MaxMsgLength | MQXR_INIT | All | All |
| PutAuthority | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| DataConversion | MQXR_INIT | All | All |
| MCAUserIdentifier | MQXR_INIT, MQXR_INIT_SEC, MQXR_SEC_MSG, MQXR_SEC_PARMS | Security | RCVR, RQSTR, SVRCONN, CLUSRCVR |
| ConnectionName | MQXR_INIT | All | SDR, SVR, RQSTR, CLNTCONN, CLUSSDR, CLUSRCVR |
| MsgRetryUserData | MQXR_INIT | All | RCVR, RQSTR, CLUSRCVR |
| MsgRetryCount | MQXR_INIT | All | RCVR, RQSTR, CLUSRCVR |
| MsgRetryInterval | MQXR_INIT | All | RCVR, RQSTR, CLUSRCVR |
| HeartbeatInterval | MQXR_INIT | All | All |

| Field | Exit Reason Code | Exit Type | Channel Type |
|---|---|---|---|
| BatchInterval | MQXR_INIT | All | SDR, SVR, CLUSSDR, CLUSRCVR |
| NonPersistentMsgSpeed | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| MCASecurityId | MQXR_INIT, MQXR_INIT_SEC, MQXR_SEC_MSG, MQXR_SEC_PARMS | Security | SDR, SVR, RCVR, RQSTR, SVRCONN, CLUSSDR, CLUSRCVR |
| SSLCipherSpec | MQXR_INIT | All | All |
| SSLPeerNamePtr | MQXR_INIT | All | All |
| SSLPeerNameLength | MQXR_INIT | All | All |
| SSLClientAuth | MQXR_INIT | All | SVR, RCVR, RQSTR, SVRCONN, CLUSRCVR |
| KeepAliveInterval | MQXR_INIT | All | All |
| LocalAddress | MQXR_INIT | All | SDR, SVR, RQSTR, CLNTCONN, CLUSSDR, CLUSRCVR |
| BatchHeartbeat | MQXR_INIT | All | SDR, SVR, CLUSSDR, CLUSRCVR |
| HdrCompList | MQXR_INIT | All | All |
| MsgCompList | MQXR_INIT | All | All |
| ChannelMonitoring | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, SVRCONN, CLUSSDR, CLUSRCVR |
| ChannelStatistics | MQXR_INIT | All | SDR, SVR, RCVR, RQSTR, CLUSSDR, CLUSRCVR |
| SharingConversations | MQXR_INIT | All | SVRCONN, CLNTCONN |

| Field | Exit Reason Code | Exit Type | Channel Type |
|---|---|---|---|
| PropertyControl | MQXR_INIT | All | SDR, SVR, CLUSSDR, CLUSRCVR |

## MQCXP - Channel exit parameter

The MQCXP structure is passed to each type of exit called by a Message Channel Agent (MCA), client-connection channel, or server-connection channel.

See MQ_CHANNEL_EXIT.

The fields described as "input to the exit" in the descriptions that follow are ignored by the channel when the exit returns control to the channel. Any input fields that the exit changes in the channel exit parameter block will not be preserved for its next invocation. Changes made to input/output fields (for example, the *ExitUserArea* field), are preserved for invocations of that instance of the exit only. Such changes cannot be used to pass data between different exits defined on the same channel, or between the same exit defined on different channels.

**Related reference**

“Fields” on page 1540
This topic lists all the fields in the MQCXP structure and describes each field.

“C declaration” on page 1551
This declaration is the C declaration for the MQCXP structure.

“COBOL declaration” on page 1551
This declaration is the COBOL declaration for the MQCXP structure.

“RPG declaration (ILE)” on page 1552
This declaration is the RPG declaration for the MQCXP structure.

“System/390 assembler declaration” on page 1553
This declaration is the System/390 assembler declaration for the MQCXP structure.

### *Fields*

This topic lists all the fields in the MQCXP structure and describes each field.

*StrucId (MQCHAR4)*
This field specifies the structure identifier.

The value must be:

**MQCXP_STRUC_ID**
Identifier for channel exit parameter structure.

For the C programming language, the constant MQCXP_STRUC_ID_ARRAY is also defined; this constant has the same value as MQCXP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the exit.

*Version (MQLONG)*
This field specifies the structure version number.

The value depends on the environment:

**MQCXP_VERSION_1**
Version-1 channel exit parameter structure.

**MQCXP_VERSION_2**
Version-2 channel exit parameter structure.

The field has this value in the HP Integrity NonStop Server environment.

**MQCXP_VERSION_3**
Version-3 channel exit parameter structure.

The field has this value in the following environments: UNIX systems not listed elsewhere.

**MQCXP_VERSION_4**
Version-4 channel exit parameter structure.

**MQCXP_VERSION_5**
Version-5 channel exit parameter structure.

**MQCXP_VERSION_6**
Version-6 channel exit parameter structure.

**MQCXP_VERSION_8**
Version-8 channel exit parameter structure.

The field has this value in the following environments: z/OS, AIX, HP-UX, Linux, IBM i, Solaris, Windows.

Fields that exist only in the more-recent versions of the structure are identified as such in the descriptions of the fields. The following constant specifies the version number of the current version:

**MQCXP_CURRENT_VERSION**
Current version of channel exit parameter structure.

The value depends on the environment.

**Note:** When a new version of the MQCXP structure is introduced, the layout of the existing part is not changed. The exit must therefore check that the version number is equal to or greater than the lowest version which contains the fields that the exit needs to use.

This is an input field to the exit.

*ExitId (MQLONG)*
This field specifies the type of exit being called and is set on entry to the exit routine.

The following values are possible:

**MQXT_CHANNEL_SEC_EXIT**
Channel security exit.

**MQXT_CHANNEL_MSG_EXIT**
Channel message exit.

**MQXT_CHANNEL_SEND_EXIT**
Channel send exit.

**MQXT_CHANNEL_RCV_EXIT**
Channel receive exit.

**MQXT_CHANNEL_MSG_RETRY_EXIT**
Channel message-retry exit.

**MQXT_CHANNEL_AUTO_DEF_EXIT**
Channel auto-definition exit.

On z/OS, this type of exit is supported only for channels of type MQCHT_CLUSSDR and MQCHT_CLUSRCVR.

This is an input field to the exit.

*ExitReason (MQLONG)*
This field specifies the reason why the exit is being called and is set on entry to the exit routine.

It is not used by the auto-definition exit. The following values are possible:

**MQXR_INIT**
Exit initialization.

This value indicates that the exit is being invoked for the first time. It allows the exit to acquire and initialize any resources that it needs (for example: memory).

**MQXR_TERM**
Exit termination.

This value indicates that the exit is about to be terminated. The exit should free any resources that it has acquired since it was initialized (for example: memory).

**MQXR_MSG**
Process a message.

This value indicates that the exit is being invoked to process a message. This value occurs for channel message exits only.

**MQXR_XMIT**
Process a transmission.

This value occurs for channel send and receive exits only.

**MQXR_SEC_MSG**
Security message received.

This value occurs for channel security exits only.

**MQXR_INIT_SEC**
Initiate security exchange.

This value occurs for channel security exits only.

The security exit of the receiver is always invoked with this reason immediately after being invoked with MQXR_INIT, to give it the opportunity to initiate a security exchange. If it declines the opportunity (by returning MQXCC_OK instead of MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG), the security exit of the sender is invoked with MQXR_INIT_SEC.

If the security exit of the receiver does initiate a security exchange (by returning MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG), the security exit of the sender is never invoked with MQXR_INIT_SEC; instead it is invoked with MQXR_SEC_MSG to process the message of the receiver. (In either case it is first invoked with MQXR_INIT.)

Unless one of the security exits requests termination of the channel (by setting *ExitResponse* to MQXCC_SUPPRESS_FUNCTION or MQXCC_CLOSE_CHANNEL), the security exchange must complete at the side that initiated the exchange. Therefore, if a security exit is invoked with MQXR_INIT_SEC and it does initiate an exchange, the next time the exit is invoked it will be with MQXR_SEC_MSG. This happens whether there is a security message for the exit to process or not. There is a security message if the partner returns MQXCC_SEND_SEC_MSG or MQXCC_SEND_AND_REQUEST_SEC_MSG, but not if the partner returns MQXCC_OK or there is no security exit at the partner. If there is no security message to process, the security exit at the initiating end is re-invoked with a *DataLength* of zero.

**MQXR_RETRY**
Retry a message.

This value occurs for message-retry exits only.

**MQXR_AUTO_CLUSSDR**
Automatic definition of a cluster-sender channel.

This value occurs for channel auto-definition exits only.

**MQXR_AUTO_RECEIVER**
Automatic definition of a receiver channel.

This value occurs for channel auto-definition exits only.

**MQXR_AUTO_SVRCONN**
Automatic definition of a server-connection channel.

This value occurs for channel auto-definition exits only.

**MQXR_AUTO_CLUSRCVR**
Automatic definition of a cluster-receiver channel.

This value occurs for channel auto-definition exits only.

**MQXR_SEC_PARMS**
Security parameters

This value applies to security exits only and indicates that an MQCSP structure is being passed to the exit. For more information, see "MQCSP - Security parameters" on page 325

**Note:**

1. If you have more than one exit defined for a channel, they are each invoked with MQXR_INIT when the MCA is initialized. Also, they are each invoked with MQXR_TERM when the MCA is terminated.
2. For the channel auto-definition exit, *ExitReason* is not set if *Version* is less than MQCXP_VERSION_4. The value MQXR_AUTO_SVRCONN is implied in this case.

This is an input field to the exit.

*ExitResponse (MQLONG)*
This field specifies the response from the exit.

This field is set by the exit to communicate with the MCA. It must be one of the following values:

**MQXCC_OK**
Exit completed successfully.

- For the channel security exit, this value indicates that message transfer can now proceed normally.
- For the channel message retry exit, this value indicates that the MCA must wait for the time interval returned by the exit in the *MsgRetryInterval* field in MQCXP, and then try the message again.

The *ExitResponse2* field might contain additional information.

**MQXCC_SUPPRESS_FUNCTION**
Suppress function.

- For the channel security exit, this value indicates that the channel must be terminated.
- For the channel message exit, this value indicates that the message is not to proceed any further towards its destination. Instead the MCA generates an exception report message (if one was requested by the sender of the original message), and places the message contained in the original buffer on the dead-letter queue (if the sender specified MQRO_DEAD_LETTER_Q), or discards it (if the sender specified MQRO_DISCARD_MSG).

  For persistent messages, if the sender specified MQRO_DEAD_LETTER_Q, but the put to the dead-letter queue fails, or there is no dead-letter queue, the original message is left on the transmission queue and the report message is not generated. The original message is also left on the transmission queue if the report message cannot be generated successfully.

  The *Feedback* field in the MQDLH structure at the start of the message on the dead-letter queue indicates why the message was put on the dead-letter queue; this feedback code is also used in the message descriptor of the exception report message (if one was requested by the sender).
- For the channel message retry exit, this value indicates that the MCA does not wait and try the message again; instead, the MCA continues immediately with its normal failure processing (the message is placed on the dead-letter queue or discarded, as specified by the sender of the message).
- For the channel auto-definition exit, either MQXCC_OK or MQXCC_SUPPRESS_FUNCTION must be specified. If neither of these values is specified, MQXCC_SUPPRESS_FUNCTION is assumed by default and the auto-definition is abandoned.

This response is not supported for the channel send and receive exits.

**MQXCC_SEND_SEC_MSG**
Send security message.

This value can be set only by a channel security exit. It indicates that the exit has provided a security message which must be transmitted to the partner.

**MQXCC_SEND_AND_REQUEST_SEC_MSG**
Send security message that requires a reply.

This value can be set only by a channel security exit. It indicates

- that the exit has provided a security message which can be transmitted to the partner, and
- that the exit requires a response from the partner. If no response is received, the channel must be terminated, because the exit has not yet decided whether communications can proceed.

**MQXCC_SUPPRESS_EXIT**
Suppress exit.

- This value can be set by all types of channel exit other than a security exit or an auto-definition exit. It suppresses any further invocation of that exit (as if its name had been blank in the channel definition), until termination of the channel, when the exit is again invoked with an *ExitReason* of MQXR_TERM.
- If a message retry exit returns this value, message retries for subsequent messages are controlled by the *MsgRetryCount* and *MsgRetryInterval* channel attributes as normal. For the current message, the MCA performs the number of outstanding retries, at intervals given by the *MsgRetryInterval* channel attribute, but only if the reason code is one that the MCA would normally retry (see the *MsgRetryCount* field described in "MQCD - Channel definition" on page 1501 ). The number of outstanding retries is the value of the *MsgRetryCount* attribute, less the number of times the exit returned MQXCC_OK for the current message; if this number is negative, no further retries are performed by the MCA for the current message.

**MQXCC_CLOSE_CHANNEL**
Close channel.

This value can be set by any type of channel exit except an auto-definition exit.

If sharing conversations is not enabled, this value closes the channel.

If sharing conversations is enabled, this value ends the conversation. If this conversation is the only conversation on the channel, the channel also closes.

This field is an input/output field from the exit.

*ExitResponse2 (MQLONG)*
This field specifies the secondary response from the exit.

This field is set to zero on entry to the exit routine. It can be set by the exit to provide further information to the IBM MQ channel functions. It is not used by the auto-definition exit.

The exit can set one or more of the following values. If more than one is required, the values are added. Combinations that are not valid are noted; other combinations are allowed.

**MQXR2_PUT_WITH_DEF_ACTION**
Put with default action.

This value is set by the channel message exit of the receiver. It indicates that the message is to be put with the default action of the MCA, that is either the default user ID of the MCA, or the context *UserIdentifier* in the MQMD (message descriptor) of the message.

The value is zero, which corresponds to the initial value set when the exit is invoked. The constant is provided for documentation purposes.

**MQXR2_PUT_WITH_DEF_USERID**
Put with default user identifier.

This value can only be set by the channel message exit of the receiver. It indicates that the message is to be put with the default user identifier of the MCA.

**MQXR2_PUT_WITH_MSG_USERID**
Put with user identifier of the message.

This value can only be set by the channel message exit of the receiver. It indicates that the message is to be put with the context *UserIdentifier* in the MQMD (message descriptor) of the message (this might have been modified by the exit).

Only one of MQXR2_PUT_WITH_DEF_ACTION, MQXR2_PUT_WITH_DEF_USERID, and MQXR2_PUT_WITH_MSG_USERID should be set.

**MQXR2_USE_AGENT_BUFFER**
Use agent buffer.

This value indicates that any data to be passed on is in *AgentBuffer*, not *ExitBufferAddr*.

The value is zero, which corresponds to the initial value set when the exit is invoked. The constant is provided for documentation purposes.

**MQXR2_USE_EXIT_BUFFER**
Use exit buffer.

This value indicates that any data to be passed on is in *ExitBufferAddr*, not *AgentBuffer*.

Only one of MQXR2_USE_AGENT_BUFFER and MQXR2_USE_EXIT_BUFFER should be set.

**MQXR2_DEFAULT_CONTINUATION**
Default continuation.

Continuation with the next exit in the chain depends on the response from the last exit invoked:

- If MQXCC_SUPPRESS_FUNCTION or MQXCC_CLOSE_CHANNEL are returned, no further exits in the chain are called.
- Otherwise, the next exit in the chain is invoked.

**MQXR2_CONTINUE_CHAIN**
Continue with the next exit.

**MQXR2_SUPPRESS_CHAIN**
Skip remaining exits in chain.

This is an input/output field to the exit.

*Feedback (MQLONG)*
This field specifies the feedback code.

This field is set to MQFB_NONE on entry to the exit routine.

If a channel message exit sets the *ExitResponse* field to MQXCC_SUPPRESS_FUNCTION, the *Feedback* field specifies the feedback code that identifies why the message was put on the dead-letter (undelivered-message) queue, and is also used to send an exception report if one has been requested. In this case, if the *Feedback* field is MQFB_NONE, the following feedback code is used:

**MQFB_STOPPED_BY_MSG_EXIT**
Message stopped by channel message exit.

The value returned in this field by channel security, send, receive, and message-retry exits is not used by the MCA.

The value returned in this field by auto-definition exits is not used if *ExitResponse* is MQXCC_OK, but otherwise is used for the *AuxErrorDataInt1* parameter in the event message.

This is an input/output field from the exit.

*MaxSegmentLength (MQLONG)*
This field specifies the maximum length in bytes that can be sent in a single transmission.

It is not used by the auto-definition exit. It is of interest to a channel send exit, because this exit must ensure that it does not increase the size of a transmission segment to a value greater than *MaxSegmentLength*. The length includes the initial 8 bytes that the exit must not change. The value is negotiated between the IBM MQ channel functions when the channel is initiated. See Writing channel-exit programs for more information about segment lengths.

The value in this field is not meaningful if *ExitReason* is MQXR_INIT.

This is an input field to the exit.

*ExitUserArea (MQBYTE16)*
This field specifies the exit user area - a field available for the exit to use.

It is initialized to binary zero before the first invocation of the exit (which has an *ExitReason* set to MQXR_INIT), and thereafter any changes made to this field by the exit are preserved across invocations of the exit.

The following value is defined:

**MQXUA_NONE**
No user information.

The value is binary zero for the length of the field.

For the C programming language, the constant MQXUA_NONE_ARRAY is also defined; this constant has the same value as MQXUA_NONE, but is an array of characters instead of a string.

The length of this field is given by MQ_EXIT_USER_AREA_LENGTH. This is an input/output field to the exit.

*ExitData (MQCHAR32)*
This field specifies the exit data.

This field is set on entry to the exit routine to information that IBM MQ channel functions took from the channel definition. If no such information is available, this field is all blanks.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

This is an input field to the exit.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_2.

*MsgRetryCount (MQLONG)*
This field specifies the number of times the message has been retried.

The first time the exit is invoked for a particular message, this field has the value zero (no retries yet attempted). On each subsequent invocation of the exit for that message, the value is incremented by one by the MCA.

This is an input field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

*MsgRetryInterval (MQLONG)*
This field specifies the minimum interval in milliseconds after which the put operation is retried.

The first time the exit is invoked for a particular message, this field contains the value of the *MsgRetryInterval* channel attribute. The exit can leave the value unchanged, or modify it to specify a different time interval in milliseconds. If the exit returns MQXCC_OK in *ExitResponse*, the MCA waits for at least this time interval before retrying the MQOPEN or MQPUT operation. The time interval specified must be zero or greater.

The second and subsequent times the exit is invoked for that message, this field contains the value returned by the previous invocation of the exit.

If the value returned in the *MsgRetryInterval* field is less than zero or greater than 999 999 999, and *ExitResponse* is MQXCC_OK, the MCA ignores the *MsgRetryInterval* field in MQCXP and waits instead for the interval specified by the *MsgRetryInterval* channel attribute.

This is an input/output field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

*MsgRetryReason (MQLONG)*
This field specifies the reason code from the previous attempt to put the message.

This field is the reason code from the previous attempt to put the message; it is one of the MQRC_* values.

This is an input field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_2.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_3.

*HeaderLength (MQLONG)*
This field specifies the length of header information.

This field is relevant only for a message exit and a message-retry exit. The value is the length of the routing header structures at the start of the message data; these are the MQXQH structure, the MQMDE (message description extension header), and (for a distribution-list message) the MQDH structure and arrays of MQOR and MQPMR records that follow the MQXQH structure.

The message exit can examine this header information, and modify it if necessary, but the data that the exit returns must still be in the correct format. The exit must not, for example, encrypt or compress the header data at the sending end, even if the message exit at the receiving end makes compensating changes.

If the message exit modifies the header information in such a way as to change its length (for example, by adding another destination to a distribution-list message), it must change the value of *HeaderLength* correspondingly before returning.

This is an input/output field to the exit. The value in this field is not meaningful if *ExitReason* is MQXR_INIT. The field is not present if *Version* is less than MQCXP_VERSION_3.

*PartnerName (MQCHAR48)*
This field specifies the name of the partner.

The name of the partner, as follows:

- For SVRCONN channels, it is the logged-on user ID at the client.
- For all other types of channel, it is the queue-manager name of the partner.

When the exit is initialized this field is blank because the queue manager does not know the name of the partner until after initial negotiation has taken place.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

*FAPLevel (MQLONG)*
Negotiated Formats and Protocols level.

This is an input field to the exit. Changes to this field should only be made under the direction of IBM service. The field is not present if *Version* is less than MQCXP_VERSION_3.

*CapabilityFlags (MQLONG)*
This field specifies the capability flags.

The following are defined:

**MQCF_NONE**
No flags.

**MQCF_DIST_LISTS**
Distribution lists supported.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

*ExitNumber (MQLONG)*
This field specifies the ordinal number of the exit.

The ordinal number of the exit, within the type defined in *ExitId*. For example, if the exit being invoked is the third message exit defined, this field contains the value 3. If the exit type is one for which a list of exits cannot be defined (for example, a security exit), this field has the value 1.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_3.

The following fields in this structure are not present if *Version* is less than MQCXP_VERSION_5.

*ExitSpace (MQLONG)*
This field specifies the number of bytes in the transmission buffer reserved for the exit to use.

This field is relevant only for a send exit. It specifies the amount of space in bytes that the IBM MQ channel functions reserve in the transmission buffer for the exit to use. This field allows the exit to add to the transmission buffer a small amount of data (typically not exceeding a few hundred bytes) for use by a complementary receive exit at the other end. The data added by the send exit must be removed by the receive exit.

The value is always zero on z/OS.

**Note:** This facility must not be used to send large amounts of data, as it might degrade performance, or even inhibit operation of the channel.

By setting *ExitSpace* the exit is guaranteed that there is always at least that number of bytes available in the transmission buffer for the exit to use. However, the exit can use less than the amount reserved, or more than the amount reserved if there is space available in the transmission buffer. The exit space in the buffer is provided following the existing data.

*ExitSpace* can be set by the exit only when *ExitReason* has the value MQXR_INIT; in all other cases the value returned by the exit is ignored. On input to the exit, *ExitSpace* is zero for the MQXR_INIT call, and is the value returned by the MQXR_INIT call in other cases.

If the value returned by the MQXR_INIT call is negative, or there are fewer than 1024 bytes available in the transmission buffer for message data after reserving the requested exit space for all the send exits in the chain, the MCA outputs an error message and closes the channel. Similarly, if during data transfer the exits in the send exit chain allocate more user space than they reserved such that fewer than 1024 bytes remain in the transmission buffer for message data, the MCA outputs an error message and closes the channel. The limit of 1024 allows the control and administrative flows of the channel to be processed by the chain of send exits, without the need for the flows to be segmented.

This is an input/output field to the exit if *ExitReason* is MQXR_INIT, and an input field in all other cases. The field is not present if *Version* is less than MQCXP_VERSION_5.

*SSLCertUserId (MQCHAR12)*
This field specifies the UserId associated with the remote certificate.

It is blank on all platforms except z/OS

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6.

*SSLRemCertIssNameLength (MQLONG)*
This field specifies the length in bytes of the full Distinguished Name of the issuer of the remote certificate pointed to by SSLCertRemoteIssuerNamePtr.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6. The value is zero if it is not an SSL channel.

*SSLRemCertIssNamePtr (PMQVOID)*
This field specifies the address of the full Distinguished Name of the issuer of the remote certificate.

Its value is the null pointer if it is not an SSL channel.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6.

**Note:** The behavior of channel security exits in determining the Subject Distinguished Name and the Issuer Distinguished Name has altered in the release of IBM MQ v7.1. For more information see Channel security exit programs.

*SecurityParms (PMQCSP)*
This field specifies the address of the MQCSP structure used to specify a user ID and password.

The initial value of this field is the null pointer.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6.

The value in this field that is returned by the exit must be usable by IBM MQ until MQXR_TERM.

*CurHdrCompression (MQLONG)*
This field specifies which technique is currently being used to compress the header data.

It is set to one of the following:

**MQCOMPRESS_NONE**
No header data compression is performed.

**MQCOMPRESS_SYSTEM**
Header data compression is performed.

The value can be altered by a sending channel's message exit to one of the negotiated supported values accessed from the HdrCompList field of the MQCD. This enables the technique used to compress the header data to be chosen for each message based on the content of the message. The altered value is used for the current message only. The channel ends if the attribute is altered to an unsupported value. The value is ignored if altered outside a sending channel's message exit.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6.

*CurMsgCompression (MQLONG)*
This field specifies which technique is currently being used to compress the message data.

It is set to one of the following:

**MQCOMPRESS_NONE**
No header data compression is performed.

**MQCOMPRESS_RLE**
Message data compression is performed using run-length encoding.

**MQCOMPRESS_ZLIBFAST**
Message data compression is performed using the zlib compression technique. A fast compression time is preferred.

**MQCOMPRESS_ZLIBHIGH**
Message data compression is performed using the zlib compression technique. A high level of compression is preferred.

The value can be altered by a sending channel's message exit to one of the negotiated supported values accessed from the MsgCompList field of the MQCD. This enables the technique used to compress the message data to be decided for each message based on the content of the message. The altered value is used for the current message only. The channel ends if the attribute is altered to an unsupported value. The value is ignored if altered outside a sending channel's message exit.

This is an input/output field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_6.

*Hconn (MQHCONN)*
This field specifies the connection handle that the exit uses if it needs to make any MQI calls within the exit.

This field is not relevant to exits running on client-connection channels, where it contains the value MQHC_UNUSABLE_HCONN (-1).

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_7.

*SharingConversations (MQBOOL)*
This field specifies whether the conversation is the only one that can currently be running on this channel instance, or whether more than one conversation can currently be running on this channel instance.

It also indicates whether the exit program is subject to the risk of the MQCD being altered by another exit program running at the same time.

This field is only relevant for exit programs running on client-connection or server-connection channels.

It is set to one of the following:

**FALSE**
The exit instance is the only exit instance that can currently be running on this channel instance. This allows the exit to safely update the MQCD fields without contention from other exits running on other channel instances. Whether changes to the MQCD fields are acted upon by the channel is defined by the table of MQCD fields in "Changing MQCD fields in a channel exit" on page 1537.

**TRUE**
The exit instance is not the only exit instance that can currently be running on this channel instance. Any changes made to the MQCD are not acted upon by the channel, except for changes listed in the table of MQCD fields in "Changing MQCD fields in a channel exit" on page 1537 for Exit Reasons other than MQXR_INIT. If this exit updates the MQCD fields, ensure there is no contention from other exits running on other conversations at the same time by providing serialization among the exits that run on this channel instance.

This is an input field to the exit. The field is not present if *Version* is less than MQCXP_VERSION_7.

*MCAUserSource (MQLONG)*
This field specifies the source of the provided MCA user ID.

It can contain one of the following values:

**MQUSRC_MAP**
The user ID is specified in the MCAUSER attribute.

**MQUSRC_CHANNEL**
The user ID is flowed from the inbound partner or specified in the MCAUSER field defined in the channel object.

This is an input field to the exit. The field is not present if Version is less than MQCXP_VERSION_8.

*pEntryPoints (PMQIEP)*
This field specifies the address of the interface entry point for the MQI or DCI call.

The field is not present if *Version* is less than MQCXP_VERSION_8.

*RemoteProduct (MQCHAR4)*
This field specifies the remote product name.

This field identifies the remote product of the client, for example, C or Java, as displayed in the **RPRODUCT** field of DISPLAY CHSATUS.

The field is not present if *Version* is less than MQCXP_VERSION_9.

*RemoteVersion (MQCHAR8)*
This field specifies the name of the remote version.

This field identifies the version of the client libraries, as displayed in the **RVERSION** field of DISPLAY CHSTATUS.

The field is not present if *Version* is less than MQCXP_VERSION_9.

## *C declaration*

This declaration is the C declaration for the MQCXP structure.

```
typedef struct tagMQCXP MQCXP;
struct tagMQCXP {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    ExitId;            /* Type of exit */
  MQLONG    ExitReason;        /* Reason for invoking exit */
  MQLONG    ExitResponse;      /* Response from exit */
  MQLONG    ExitResponse2;     /* Secondary response from exit */
  MQLONG    Feedback;          /* Feedback code */
  MQLONG    MaxSegmentLength;  /* Maximum segment length */
  MQBYTE16  ExitUserArea;      /* Exit user area */
  MQCHAR32  ExitData;          /* Exit data */
  MQLONG    MsgRetryCount;     /* Number of times the message has been
                                  retried */
  MQLONG    MsgRetryInterval;  /* Minimum interval in milliseconds after
                                  which the put operation should be
                                  retried */
  MQLONG    MsgRetryReason;    /* Reason code from previous attempt to
                                  put the message */
  MQLONG    HeaderLength;      /* Length of header information */
  MQCHAR48  PartnerName;       /* Partner Name */
  MQLONG    FAPLevel;          /* Negotiated Formats and Protocols
                                  level */
  MQLONG    CapabilityFlags;   /* Capability flags */
  MQLONG    ExitNumber;        /* Exit number */
  /* Ver:3 */
  /* Ver:4 */
  MQLONG    ExitSpace;         /* Number of bytes in transmission buffer
                                  reserved for exit to use */
  /* Ver:5 */
  MQCHAR12  SSLCertUserid;     /* User identifier associated
                                  with remote SSL certificate */
  MQLONG    SSLRemCertIssNameLength;   /* Length of
                                  distinguished name of issuer
                                  of remote SSL certificate */
  MQPTR     SSLRemCertIssNamePtr;      /* Address of
                                  distinguished name of issuer
                                  of remote SSL certificate */
  PMQVOID   SecurityParms;     /* Security parameters */
  MQLONG    CurHdrCompression; /* Header data compression
                                  used for current message */
  MQLONG    CurMsgCompression; /* Message data compression
                                  used for current message */
  /* Ver:6 */
  MQHCONN   Hconn;             /* Connection handle */
  MQBOOL    SharingConversations;      /* Multiple conversations
                                  possible on channel inst?  */
  /* Ver:7 */
  MQLONG    MCAUserSource;     /* Source of the provided MCA user ID */
  PMQIEP    pEntryPoints;      /* Address of the MQIEP structure */
  /* Ver:8 */
  MQCHAR4   RemoteProduct;     /* The identifier for the remote product */
  MQCHAR8   RemoteVersion;     /* The version of the remote product */
  /* Ver:9 */
};
```

## *COBOL declaration*

This declaration is the COBOL declaration for the MQCXP structure.

```
**   MQCXP structure
  10 MQCXP.
**    Structure identifier
   15 MQCXP-STRUCID          PIC X(4).
```

```
**    Structure version number
   15 MQCXP-VERSION          PIC S9(9) BINARY.
**    Type of exit
   15 MQCXP-EXITID           PIC S9(9) BINARY.
**    Reason for invoking exit
   15 MQCXP-EXITREASON       PIC S9(9) BINARY.
**    Response from exit
   15 MQCXP-EXITRESPONSE     PIC S9(9) BINARY.
**    Secondary response from exit
   15 MQCXP-EXITRESPONSE2    PIC S9(9) BINARY.
**    Feedback code
   15 MQCXP-FEEDBACK         PIC S9(9) BINARY.
**    Maximum segment length
   15 MQCXP-MAXSEGMENTLENGTH PIC S9(9) BINARY.
**    Exit user area
   15 MQCXP-EXITUSERAREA     PIC X(16).
**    Exit data
   15 MQCXP-EXITDATA         PIC X(32).
**    Number of times the message has been retried
   15 MQCXP-MSGRETRYCOUNT    PIC S9(9) BINARY.
**    Minimum interval in milliseconds after which the put operation
**    should be retried
   15 MQCXP-MSGRETRYINTERVAL PIC S9(9) BINARY.
**    Reason code from previous attempt to put the message
   15 MQCXP-MSGRETRYREASON   PIC S9(9) BINARY.
**    Length of header information
   15 MQCXP-HEADERLENGTH     PIC S9(9) BINARY.
**    Partner Name
   15 MQCXP-PARTNERNAME      PIC X(48).
**    Negotiated Formats and Protocols level
   15 MQCXP-FAPLEVEL         PIC S9(9) BINARY.
**    Capability flags
   15 MQCXP-CAPABILITYFLAGS  PIC S9(9) BINARY.
**    Exit number
   15 MQCXP-EXITNUMBER       PIC S9(9) BINARY.
**    Number of bytes in transmission buffer reserved for exit to use
   15 MQCXP-EXITSPACE        PIC S9(9) BINARY.
**    User Id associated with remote certificate
   15  MQCXP-SSLCERTUSERID   PIC X(12).
** Length of distinguished name of issuer of remote SSL
** certificate
   15  MQCXP-SSLREMCERTISSNAMELENGTH PIC S9(9) BINARY.
** Address of distinguished name of issuer of remote SSL
** certificate
   15  MQCXP-SSLREMCERTISSNAMEPTR    POINTER.
** Security parameters
   15  MQCXP-SECURITYPARMS           PIC S9(18) BINARY.
** Header data compression used for current message
   15  MQCXP-CURHDRCOMPRESSION       PIC S9(9) BINARY.
** Message data compression used for current message
   15  MQCXP-CURMSGCOMPRESSION       PIC S9(9) BINARY.
** Connection handle
   15 MQCXP-HCONN                    PIC S9(9) BINARY.
** Multiple conversations possible on channel instance?
   15 MQCXP-SHARINGCONVERSATIONS     PIC S9(9) BINARY.
** Source of the provided MCA user ID
   15 MQCXP-MCAUSERSOURCE            PIC S9(9) BINARY.
```

### *RPG declaration (ILE)*

This declaration is the RPG declaration for the MQCXP structure.

```
     D*..1....:....2....:....3....:....4....:....5....:....6....:....7..
     D* MQCXP Structure
     D*
     D* Structure identifier
     D  CXSID                  1      4
     D* Structure version number
     D  CXVER                  5      8I 0
     D* Type of exit
     D  CXXID                  9     12I 0
     D* Reason for invoking exit
     D  CXREA                 13     16I 0
     D* Response from exit
     D  CXRES                 17     20I 0
     D* Secondary response from exit
     D  CXRE2                 21     24I 0
     D* Feedback code
     D  CXFB                  25     28I 0
```

```
     D* Maximum segment length
     D  CXMSL                 29     32I 0
     D* Exit user area
     D  CXUA                  33     48
     D* Exit data
     D  CXDAT                 49     80
     D* Number of times the message has been retried
     D  CXMRC                 81     84I 0
     D* Minimum interval in milliseconds after which the put operation
     D* should be retried
     D  CXMRI                 85     88I 0
     D* Reason code from previous attempt to put the message
     D  CXMRR                 89     92I 0
     D* Length of header information
     D  CXHDL                 93     96I 0
     D* Partner Name
     D  CXPNM                 97    144
     D* Negotiated Formats and Protocols level
     D  CXFAP                145    148I 0
     D* Capability flags
     D  CXCAP                149    152I 0
     D* Exit number
     D  CXEXN                153    156I 0
     D* Number of bytes in transmission buffer reserved for exit to use
     D  CXHDL                157    160I 0
     D* User identifier associated with remote SSL certificate
     D  CXSSLCU              161    172
     D* Length of distinguished name of issuer of remote SSL certificate
     D  CXSRCINL             173    176I 0
     D* Address of distinguished name of issuer of remote SSL certificate
     D  CXSRCINP             177    192*
     D* Security parameters
     D  CXSECP               193    208*
     D* Header data compression used for current message
     D  CXCHC                209    212I 0
     D* Message data compression used for current message
     D  CXCMC                213    216I 0
     D* Connection handle
     D  CXHCONN               217    220I   0
     D* Multiple conversations possible on channel instance?
     D  CXSHARECONV           221    224I   0
     D* Source of the provided MCA user ID
     D  MCAUSERSOURCE         225    228I   0
```

### *System/390 assembler declaration*

This declaration is the System/390 assembler declaration for the MQCXP structure.

```
MQCXP                   DSECT
MQCXP_STRUCID           DS   CL4   Structure identifier
MQCXP_VERSION           DS   F     Structure version number
MQCXP_EXITID            DS   F     Type of exit
MQCXP_EXITREASON        DS   F     Reason for invoking exit
MQCXP_EXITRESPONSE      DS   F     Response from exit
MQCXP_EXITRESPONSE2     DS   F     Secondary response from exit
MQCXP_FEEDBACK          DS   F     Feedback code
MQCXP_MAXSEGMENTLENGTH  DS   F     Maximum segment length
MQCXP_EXITUSERAREA      DS   XL16  Exit user area
MQCXP_EXITDATA          DS   CL32  Exit data
MQCXP_MSGRETRYCOUNT     DS   F     Number of times the message has been
*                                  retried
MQCXP_MSGRETRYINTERVAL  DS   F     Minimum interval in milliseconds
*                                  after which the put operation should
*                                  be retried
MQCXP_MSGRETRYREASON    DS   F     Reason code from previous attempt to
*                                  put the message
MQCXP_HEADERLENGTH      DS   F     Length of header information
MQCXP_PARTNERNAME       DS   CL48  Partner Name
MQCXP_FAPLEVEL          DS   F     Negotiated Formats and Protocols
*                                  level
MQCXP_CAPABILITYFLAGS   DS   F     Capability flags
MQCXP_EXITNUMBER        DS   F     Exit number
MQCXP_EXITSPACE         DS   F     Number of bytes in transmission
*                                  buffer reserved for exit to use
MQCXP_SSLCERTUSERID     DS   CL12  User identifier associated with
*                                  remote SSL certificate
MQCXP_SSLREMCERTISSNAMELENGTH   DS   F     Length of distinguished name
*                                  of issuer of remote SSL certificate
MQCXP_SSLREMCERTISSNAMEPTR      DS   F     Address of distinguished name
```

```
*                                    of issuer of remote SSL certificate
MQCXP_SECURITYPARMS     DS   F    Address of security parameters
MQCXP_CURHDRCOMPRESSION         DS   F     Header data compression used for
*                                   current message
MQCXP_CURMSGCOMPRESSION         DS   F      Message data compression used for
*                                   current message
MQCXP_HCONN             DS   F Connection handle
MQCXP_SHARINGCONVERSATIONS      DS   F Multiple conversations possible on
*                                   channel inst?
MQCXP_MCAUSERSOURCE     DS   F    Source of the provided MCA user ID

MQCXP_LENGTH            EQU  *-MQCXP
                        ORG  MQCXP
MQCXP_AREA              DS   CL(MQCXP_LENGTH)
```

## MQXWD - Exit wait descriptor

The MQXWD structure is an input/output parameter on the MQXWAIT call.

This structure is supported only on z/OS.

**Related reference**

"Fields" on page 1554
This topic lists all the fields in the MQXWD structure and describes each field.

"C declaration" on page 1555
This declaration is the C declaration for the MQXWD structure.

"System/390 assembler declaration" on page 1555
This declaration is the System/390 assembler declaration for the MQXWD structure.

### *Fields*

This topic lists all the fields in the MQXWD structure and describes each field.

*StrucId (MQCHAR4)*
This field specifies the structure identifier.

The value must be:

**MQXWD_STRUC_ID**
Identifier for exit wait descriptor structure.

For the C programming language, the constant MQXWD_STRUC_ID_ARRAY is also defined; this constant has the same value as MQXWD_STRUC_ID, but is an array of characters instead of a string.

The initial value of this field is MQXWD_STRUC_ID.

*Version (MQLONG)*
This field specifies the structure version number.

The value must be:

**MQXWD_VERSION_1**
Version number for exit wait descriptor structure.

The initial value of this field is MQXWD_VERSION_1.

*Reserved1 (MQLONG)*
This field is reserved. Its value must be zero.

This is an input field.

*Reserved2 (MQLONG)*
This field is reserved. Its value must be zero.

This is an input field.

*Reserved3 (MQLONG)*
This field is reserved. Its value must be zero.

This is an input field.

*ECB (MQLONG)*
This field specifies the event control block to wait on.

This field is the event control block (ECB) to wait on. It must be set to zero before the MQXWAIT call is issued; on successful completion it contains the post code.

This field is an input/output field.

### *C declaration*
This declaration is the C declaration for the MQXWD structure.

```
typedef struct tagMQXWD MQXWD;
struct tagMQXWD {
  MQCHAR4  StrucId;    /* Structure identifier */
  MQLONG   Version;    /* Structure version number */
  MQLONG   Reserved1;  /* Reserved */
  MQLONG   Reserved2;  /* Reserved */
  MQLONG   Reserved3;  /* Reserved */
  MQLONG   ECB;        /* Event control block to wait on */
};
```

### *System/390 assembler declaration*
This declaration is the System/390 assembler declaration for the MQXWD structure.

```
MQXWD            DSECT
MQXWD_STRUCID    DS   CL4  Structure identifier
MQXWD_VERSION    DS   F    Structure version number
MQXWD_RESERVED1  DS   F    Reserved
MQXWD_RESERVED2  DS   F    Reserved
MQXWD_RESERVED3  DS   F    Reserved
MQXWD_ECB        DS   F    Event control block to wait on
*
MQXWD_LENGTH     EQU  *-MQXWD
                 ORG  MQXWD
MQXWD_AREA       DS   CL(MQXWD_LENGTH)
```

## Cluster workload exit call and data structures

This section provides reference information for the cluster workload exit and the data structures. This is general-use programming interface information.

You can write cluster workload exits in the following programming languages:

- C
- System/390 assembler ( IBM MQ for z/OS )

The call is described in:

- “MQ_CLUSTER_WORKLOAD_EXIT - Call description” on page 1556

The structure data types used by the exit are described in:

- “MQXCLWLN - Navigate Cluster workload records” on page 1558
- “MQWXP - Cluster workload exit parameter structure” on page 1561
- “MQWDR - Cluster workload destination record structure” on page 1569
- “MQWQR - Cluster workload queue record structure” on page 1573
- “MQWCR - Cluster workload cluster record structure” on page 1578
- z/OS Asynchronous behavior of CLUSTER commands on z/OS

Throughout this section, queue-manager attributes and queue attributes are shown in full. The equivalent names that are used in the MQSC commands are shown below. For details of MQSC commands, see MQSC commands.

*Table 644. Queue-manager attributes*

| Full name | Name used in MQSC |
|---|---|
| *ClusterWorkloadData* | CLWLDATA |
| *ClusterWorkloadExit* | CLWLEXIT |
| *ClusterWorkloadLength* | CLWLLEN |

*Table 645. Queue attributes*

| Full name | Name used in MQSC |
|---|---|
| *DefBind* | DEFBIND |
| *DefPersistence* | DEFPSIST |
| *DefPriority* | DEFPRTY |
| *InhibitPut* | PUT |
| *QDesc* | DESCR |

**Related tasks**

Writing and compiling cluster workload exits

## MQ_CLUSTER_WORKLOAD_EXIT - Call description

The cluster workload exit is called by the queue manager to route a message to an available queue manager.

**Note:** No entry point called MQ_CLUSTER_WORKLOAD_EXIT is provided by the queue manager. Instead, the name of the cluster workload exit is defined by the ClusterWorkloadExit queue-manager attribute.

The MQ_CLUSTER_WORKLOAD_EXIT exit is supported on all platforms.

### Syntax

```
MQ_CLUSTER_WORKLOAD_EXIT (ExitParms)
```

**Related reference**

MQXCLWLN - Navigate Cluster workload records
The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

MQWXP - Cluster workload exit parameter structure
The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

MQWDR - Cluster workload destination record structure
The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

MQWQR - Cluster workload queue record structure
The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

MQWCR - Cluster workload cluster record structure

The following table summarizes the fields in the MQWCR cluster workload record structure.

## *Parameters for MQ_CLUSTER_WORKLOAD_EXIT*

Description of the parameters in the MQ_CLUSTER_WORKLOAD_EXIT call.

***ExitParms* ( MQWXP ) - input/output**
Exit parameter block.

- The exit sets information in MQWXP to indicate how to manage the workload.

**Related reference**

Usage notes
The function performed by the cluster workload exit is defined by the provider of the exit. The exit, however, must conform to the rules defined in the associated control block MQWXP.

Language invocations for MQ_CLUSTER_WORKLOAD_EXIT
The MQ_CLUSTER_WORKLOAD_EXIT supports two languages, C and High Level Assembler.

## *Usage notes*

The function performed by the cluster workload exit is defined by the provider of the exit. The exit, however, must conform to the rules defined in the associated control block MQWXP.

No entry point called MQ_CLUSTER_WORKLOAD_EXIT is provided by the queue manager. However, a `typedef` is provided for the name MQ_CLUSTER_WORKLOAD_EXIT in the C programming language. Use the typedef to declare the user-written exit, to ensure that the parameters are correct.

**Related reference**

Parameters for MQ_CLUSTER_WORKLOAD_EXIT
Description of the parameters in the MQ_CLUSTER_WORKLOAD_EXIT call.

Language invocations for MQ_CLUSTER_WORKLOAD_EXIT
The MQ_CLUSTER_WORKLOAD_EXIT supports two languages, C and High Level Assembler.

## *Language invocations for MQ_CLUSTER_WORKLOAD_EXIT*

The MQ_CLUSTER_WORKLOAD_EXIT supports two languages, C and High Level Assembler.

### C invocation

```
MQ_CLUSTER_WORKLOAD_EXIT (&ExitParms);
```

Replace *MQ_CLUSTER_WORKLOAD_EXIT* with the name of your cluster workload exit function.

Declare the *MQ_CLUSTER_WORKLOAD_EXIT* parameters as follows:

```
MQWXP ExitParms; /* Exit parameter block */
```

### High Level Assembler invocation

```
CALL EXITNAME,(EXITPARMS)
```

Declare the parameters as follows:

```
EXITPARMS      CMQWXPA       Exit parameter block
```

**Related reference**

Parameters for MQ_CLUSTER_WORKLOAD_EXIT
Description of the parameters in the MQ_CLUSTER_WORKLOAD_EXIT call.

Usage notes

The function performed by the cluster workload exit is defined by the provider of the exit. The exit, however, must conform to the rules defined in the associated control block MQWXP.

## MQXCLWLN - Navigate Cluster workload records

The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

The cluster cache is an area of main storage used to store information relating to the cluster.

If the cluster cache is static, it has a fixed size. If you set it to dynamic, the cluster cache can expand as required.

Set the type of cluster cache to STATIC or DYNAMIC using either a system parameter or macro.

- The system parameter ClusterCacheType on platforms other than z/OS
- The CLCACHE parameter in the CSQ6SYSP macro on z/OS.

### Syntax

```
MQXCLWLN (ExitParms, CurrentRecord, NextOffset, NextRecord, Compcode, Reason)
```

**Related reference**

MQ_CLUSTER_WORKLOAD_EXIT - Call description
The cluster workload exit is called by the queue manager to route a message to an available queue manager.

MQWXP - Cluster workload exit parameter structure
The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

MQWDR - Cluster workload destination record structure
The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

MQWQR - Cluster workload queue record structure
The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

MQWCR - Cluster workload cluster record structure
The following table summarizes the fields in the MQWCR cluster workload record structure.

### *Parameters for MQXCLWLN - Navigate Cluster workload records*

Description of the parameters in the MQXCLWLN call.

***ExitParms* ( MQWXP ) - input/output**
Exit parameter block.

This structure contains information relating to the invocation of the exit. The exit sets information in this structure to indicate how to manage the workload.

***CurrentRecord* ( MQPTR ) - input**
Address of current record.

This structure contains information relating to the address of the record currently being examined by the exit. The record must be one of the following types:

- Cluster workload destination record ( MQWDR )
- Cluster workload queue record ( MQWQR )
- Cluster workload cluster record ( MQWCR )

***NextOffset* ( MQLONG ) - input**
Offset of next record.

This structure contains information relating to the offset of the next record or structure. *NextOffset* is the value of the appropriate offset field in the current record, and must be one of the following fields:

- ChannelDefOffset field in MQWDR
- ClusterRecOffset field in MQWDR
- ClusterRecOffset field in MQWQR
- ClusterRecOffset field in MQWCR

***NextRecord* ( MQPTR ) - output**
Address of next record or structure.

This structure contains information relating to the address of the next record or structure. If *CurrentRecord* is the address of an MQWDR, and *NextOffset* is the value of the ChannelDefOffset field, *NextRecord* is the address of the channel definition structure ( MQCD ).

If there is no next record or structure, the queue manager sets *NextRecord* to the null pointer, and the call returns completion code MQCC_WARNING and reason code MQRC_NO_RECORD_AVAILABLE.

***CompCode* ( MQLONG ) - output**
Completion code.

The completion code has one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason* ( MQLONG ) - output**
Reason code qualifying CompCode

If CompCode is MQCC_OK:

**MQRC_NONE**
**(0, X'0000')**
No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_NO_RECORD_AVAILABLE**
**(2359, X'0937')**
No record available. An MQXCLWLN call was issued from a cluster workload exit to obtain the address of the next record in the chain. The current record is the last record in the chain. Corrective action: None.

If *CompCode* is MQCC_FAILED:

**MQRC_CURRENT_RECORD_ERROR**
**(2357, X'0935')**
*CurrentRecord* parameter not valid. An MQXCLWLN call was issued from a cluster workload exit to obtain the address of the next record in the chain. The address specified by the *CurrentRecord* parameter is not the address of a valid record.

*CurrentRecord* must be the address of a destination record, MQWDR, queue record ( MQWQR ), or cluster record ( MQWCR ) residing within the cluster cache. Corrective action: Ensure that the cluster workload exit passes the address of a valid record residing in the cluster cache.

**MQRC_ENVIRONMENT_ERROR**
**(2012, X'07DC')**
Call not valid in environment. An MQXCLWLN call was issued, but not from a cluster workload exit.

**MQRC_NEXT_OFFSET_ERROR**
**(2358, X'0936')**
*NextOffset* parameter not valid. An MQXCLWLN call was issued from a cluster workload exit to obtain the address of the next record in the chain. The offset specified by the *NextOffset* parameter is not valid. *NextOffset* must be the value of one of the following fields:

- `ChannelDefOffset` field in `MQWDR`
- `ClusterRecOffset` field in `MQWDR`
- `ClusterRecOffset` field in `MQWQR`
- `ClusterRecOffset` field in `MQWCR`

Corrective action: Ensure that the value specified for the *NextOffset* parameter is the value of one of the fields listed previously.

**MQRC_NEXT_RECORD_ERROR**
**(2361, X'0939')**
*NextRecord* parameter not valid.

**MQRC_WXP_ERROR**
**(2356, X'0934')**
Workload exit parameter structure not valid. An `MQXCLWLN` call was issued from a cluster workload exit to obtain the address of the next record in the chain. The workload exit parameter structure *ExitParms* is not valid, for one of the following reasons:

- The parameter pointer is not valid. It is not always possible to detect parameter pointers that are not valid; if not detected, unpredictable results occur.
- The `StrucId` field is not `MQWXP_STRUC_ID`.
- The `Version` field is not `MQWXP_VERSION_2`.
- The `Context` field does not contain the value passed to the exit by the queue manager.

Corrective action: Ensure that the parameter specified for *ExitParms* is the `MQWXP` structure that was passed to the exit when the exit was invoked.

**Related reference**
Usage notes for MQXCLWLN - Navigate Cluster workload records
Use `MQXCLWLN` to navigate through cluster records, even if the cache is static.

Language invocations of MQXCLWLN
`MQXCLWLN` supports two languages, C and High Level Assembler.

### *Usage notes for MQXCLWLN - Navigate Cluster workload records*
Use `MQXCLWLN` to navigate through cluster records, even if the cache is static.

If the cluster cache is dynamic, the `MQXCLWLN` call must be used to navigate through the records. The exit ends abnormally if simple pointer-and-offset arithmetic is used to navigate through the records.

If the cluster cache is static, `MQXCLWLN` need not be used to navigate through the records. Typically use `MQXCLWLN` even when the cache is static. You can then change the cluster cache to being dynamic without needing to change the workload exit.

**Related reference**
Parameters for MQXCLWLN - Navigate Cluster workload records
Description of the parameters in the `MQXCLWLN` call.

Language invocations of MQXCLWLN
`MQXCLWLN` supports two languages, C and High Level Assembler.

### *Language invocations of MQXCLWLN*
`MQXCLWLN` supports two languages, C and High Level Assembler.

## C invocation

```
MQXCLWLN (&ExitParms, CurrentRecord, NextOffset, &NextRecord, &CompCode, &Reason) ;
```

Declare the parameters as follows:

```
Typedef struct tagMQXCLWLN {
MQWXP   ExitParms;      /* Exit parameter block */
MQPTR   CurrentRecord;  /* Address of current record*/
MQLONG  NextOffset;     /* Offset of next record */
MQPTR   NextRecord;     /* Address of next record or structure */
MQLONG  CompCode;       /* Completion code */
MQLONG  Reason;         /* Reason code qualifying CompCode */
```

## High Level Assembler invocation

```
CALL MQXCLWLN,(CLWLEXITPARMS,CURRENTRECORD,NEXTOFFSET,NEXTRECORD,COMPCODE,REASON)
```

Declare the parameters as follows:

```
CLWLEXITPARMS CMQWXPA, Cluster workload exit parameter block
CURRENTRECORD CMQWDRA, Current record
NEXTOFFSET    DS F     Next offset
NEXTRECORD    DS F     Next record
COMPCODE      DS F     Completion code
REASON        DS F     Reason code qualifying COMPCODE
```

**Related reference**

Parameters for MQXCLWLN - Navigate Cluster workload records
Description of the parameters in the MQXCLWLN call.

Usage notes for MQXCLWLN - Navigate Cluster workload records
Use MQXCLWLN to navigate through cluster records, even if the cache is static.

## MQWXP - Cluster workload exit parameter structure

The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

*Table 646. Fields in MQWXP*

| Field | Description | Page |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *ExitId* | Type of exit | ExitId |
| *ExitReason* | Reason for invoking exit | ExitReason |
| *ExitResponse* | Response from exit | ExitResponse |
| *ExitResponse2* | Secondary response from exit | ExitResponse2 |
| *Feedback* | Feedback code | Feedback |
| *Flags* | Flags values. These bit flags are used to indicate information about the message being put | Flags |
| *ExitUserArea* | Exit user area | ExitUserArea |
| *ExitData* | Exit data | ExitData |
| *MsgDescPtr* | Address of message descriptor ( MQMD ) | MsgDescPtr |
| *MsgBufferPtr* | Address of buffer containing some or all the message data | MsgBufferPtr |
| *MsgBufferLength* | Length of buffer containing message data | MsgBufferLength |
| *MsgLength* | Length of complete message | MsgLength |

| Table 646. Fields in MQWXP (continued) | | |
|---|---|---|
| **Field** | **Description** | **Page** |
| *QName* | Name of queue | QName |
| *QMgrName* | Name of local queue manager | QMgrName |
| *DestinationCount* | Number of possible destinations | DestinationCount |
| *DestinationChosen* | Destination chosen | DestinationChosen |
| *DestinationArrayPtr* | Address of an array of pointers to destination records ( MQWDR ) | DestinationArrayPtr |
| *QArrayPtr* | Address of an array of pointers to queue records ( MQWQR ) | QArrayPtr |
| **Note:** The remaining fields are ignored if Version is less than MQWXP_VERSION_2. | | |
| *CacheContext* | Context information | CacheContext |
| *CacheType* | Type of cluster cache | CacheType |
| **Note:** The remaining fields are ignored if Version is less than MQWXP_VERSION_3. | | |
| *CLWLMRUChannels* | Maximum number of allowed active outbound cluster channels | CLWLMRUChannels |
| **Note:** The remaining fields are ignored if Version is less than MQWXP_VERSION_4. | | |
| *pEntryPoints* | Address of the MQIEP structure to allow MQI and DCI calls to be made | pEntryPoints |

The cluster workload exit parameter structure describes the information that is passed to the cluster workload exit.

The cluster workload exit parameter structure is supported on all platforms

Additionally, the MQWXP1, MQWXP2 and MQWXP3 structures are available for backwards compatibility.

**Related reference**

MQ_CLUSTER_WORKLOAD_EXIT - Call description
The cluster workload exit is called by the queue manager to route a message to an available queue manager.

MQXCLWLN - Navigate Cluster workload records
The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

MQWDR - Cluster workload destination record structure
The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

MQWQR - Cluster workload queue record structure
The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

MQWCR - Cluster workload cluster record structure
The following table summarizes the fields in the MQWCR cluster workload record structure.

## *Fields in MQWXP - Cluster workload exit parameter structure*

Description of the fields in the MQWXP - Cluster workload exit parameter structure

**StrucId ( MQCHAR4 ) - input**
The structure identifier for the cluster workload exit parameter structure.

- The StrucId value is MQWXP_STRUC_ID.

- For the C programming language, the constant MQWXP_STRUC_ID_ARRAY is also defined. It has the same value as MQWXP_STRUC_ID. It is an array of characters instead of a string.

**Version ( MQLONG ) - input**
Indicates the structure version number. Version takes one of the following values:

**MQWXP_VERSION_1**
Version-1 cluster workload exit parameter structure.

MQWXP_VERSION_1 is supported in all environments.

**MQWXP_VERSION_2**
Version-2 cluster workload exit parameter structure.

MQWXP_VERSION_2 is supported in the following environments: AIX, HP-UX, Linux, IBM i, Solaris and Windows.

**MQWXP_VERSION_3**
Version-3 cluster workload exit parameter structure.

MQWXP_VERSION_3 is supported in the following environments: AIX, HP-UX, Linux, IBM i, Solaris and Windows.

**MQWXP_VERSION_4**
Version-4 cluster workload exit parameter structure.

MQWXP_VERSION_4 is supported in the following environments: AIX, HP-UX, Linux, IBM i, Solaris and Windows.

**MQWXP_CURRENT_VERSION**
Current version of cluster workload exit parameter structure.

**ExitId ( MQLONG ) - input**
Indicates the type of exit being called. The cluster workload exit is the only supported exit.

- The ExitId value must be MQXT_CLUSTER_WORKLOAD_EXIT

**ExitReason ( MQLONG ) - input**
Indicates the reason for invoking the cluster workload exit. ExitReason takes one of the following values:

**MQXR_INIT**
Indicates that the exit is being invoked for the first time.

Acquire and initialize any resources that the exit might need, such as main storage.

**MQXR_TERM**
Indicates that the exit is about to be terminated.

Free any resources that the exit might have acquired since it was initialized, such as main storage.

**MQXR_CLWL_OPEN**
Called by MQOPEN.

**MQXR_CLWL_PUT**
Called by MQPUT or MQPUT1.

**MQXR_CLWL_MOVE**
Called by MCA when the channel state has changed.

**MQXR_CLWL_REPOS**
Called by MQPUT or MQPUT1 for a repository-manager PCF message.

**MQXR_CLWL_REPOS_MOVE**
Called by MCA for a repository-manager PCF message if the channel state has changed.

**ExitResponse ( MQLONG ) - output**
Set ExitResponse to indicate whether processing of the message continues. It must be one of the following values:

**MQXCC_OK**
Continue processing the message normally.

- DestinationChosen identifies the destination to which the message is to be sent.

**MQXCC_SUPPRESS_FUNCTION**
Discontinue processing the message.

- The actions taken by the queue manager depend on the reason the exit was invoked:

*Table 647. Actions taken by the queue manager.*

There are two columns in this table. The first column lists the exit reasons and the second column describes the action taken for each exit reason.

| ExitReason | Action taken |
|---|---|
| – MQXR_CLWL_OPEN<br>– MQXR_CLWL_REPOS<br>– MQXR_CLWL_PUT | MQOPEN, MQPUT, or MQPUT1 call fail with completion code MQCC_FAILED and reason code MQRC_STOPPED_BY_CLUSTER_EXIT. |
| – MQXR_CLWL_MOVE<br>– MQXR_CLWL_REPOS_MOVE | The message is placed on the dead-letter queue. |

**MQXCC_SUPPRESS_EXIT**
Continue processing the current message normally. Do not invoke the exit again until the queue manager shuts down.

The queue manager processes subsequent messages as if the ClusterWorkloadExit queue-manager attribute is blank. DestinationChosen identifies the destination to which the current message is sent.

***Any other value***
Process the message as if MQXCC_SUPPRESS_FUNCTION is specified.

**ExitResponse2 ( MQLONG ) - input/output**
Set ExitResponse2 to provide the queue manager with more information.

- MQXR2_STATIC_CACHE is the default value, and is set on entry to the exit.
- When ExitReason has the value MQXR_INIT, the exit can set one of the following values in ExitResponse2:

  **MQXR2_STATIC_CACHE**
  The exit requires a static cluster cache.

  – If the cluster cache is static, the exit need not use the MQXCLWLN call to navigate the chains of records in the cluster cache.

  – If the cluster cache is dynamic, the exit cannot navigate correctly through the records in the cache.

  **Note:** The queue manager processes the return from the MQXR_INIT call as though the exit had returned MQXCC_SUPPRESS_EXIT in the ExitResponse field.

  **MQXR2_DYNAMIC_CACHE**
  The exit can operate with either a static or dynamic cache.

  – If the exit returns this value, the exit must use the MQXCLWLN call to navigate the chains of records in the cluster cache.

**Feedback ( MQLONG ) - input**
A reserved field. The value is zero.

**Flags ( MQLONG ) - input**
Indicates information about the message being put.

- The value of Flags is MQWXP_PUT_BY_CLUSTER_CHL. The message originates from a cluster channel, rather than locally or from a non-cluster channel. In other words, the message has come from another cluster queue manager.

**Reserved ( MQLONG ) - input**
A reserved field. The value is zero.

**ExitUserArea ( MQBYTE16 ) - input/output**
Set ExitUserArea to communicate between calls to the exit.

- ExitUserArea is initialized to binary zero before the first invocation of the exit. Any changes made to this field by the exit are preserved across the invocations of the exit that occur between the MQCONN call and the matching MQDISC call. The field is reset to binary zero when the MQDISC call occurs.
- The first invocation of the exit is indicated by the ExitReason field having the value MQXR_INIT.
- The following constants are defined:

  **MQXUA_NONE - string**
  **MQXUA_NONE_ARRAY - character array**
  No user information. Both constants are binary zero for the length of the field.

  **MQ_EXIT_USER_AREA_LENGTH**
  The length of ExitUserArea.

**ExitData ( MQCHAR32 ) - input**
The value of the ClusterWorkloadData queue-manager attribute. If no value has been defined for that attribute, this field is all blanks.

- The length of ExitData is given by MQ_EXIT_DATA_LENGTH.

**MsgDescPtr ( PMQMD ) - input**
The address of a copy of the message descriptor ( MQMD ) for the message being processed.

- Any changes made to the message descriptor by the exit are ignored by the queue manager.
- If ExitReason has one of the following values MsgDescPtr is set to the null pointer, and no message descriptor is passed to the exit:
  - MQXR_INIT
  - MQXR_TERM
  - MQXR_CLWL_OPEN

**MsgBufferPtr ( PMQVOID ) - input**
The address of a buffer containing a copy of the first MsgBufferLength bytes of the message data.

- Any changes made to the message data by the exit are ignored by the queue manager.
- No message data is passed to the exit when:
  - MsgDescPtr is the null pointer.
  - The message has no data.
  - The ClusterWorkloadLength queue-manager attribute is zero.

  In these cases, MsgBufferPtr is the null pointer.

**MsgBufferLength ( MQLONG ) - input**
The length of the buffer containing the message data passed to the exit.

- The length is controlled by the ClusterWorkloadLength queue-manager attribute.
- The length might be less than the length of the complete message, see MsgLength.

**MsgLength ( MQLONG ) - input**
The length of the complete message passed to the exit.

- MsgBufferLength might be less than the length of the complete message.
- MsgLength is zero if ExitReason is MQXR_INIT, MQXR_TERM, or MQXR_CLWL_OPEN.

**QName ( MQCHAR48 ) - input**
The name of the destination queue. The queue is a cluster queue.

- The length of QName is MQ_Q_NAME_LENGTH.

**QMgrName ( MQCHAR48 ) - input**
The name of the local queue manager that has invoked the cluster workload exit.

- The length of QMgrName is MQ_Q_MGR_NAME_LENGTH.

**DestinationCount ( MQLONG ) - input**
The number of possible destinations. Destinations are instances of the destination queue and are described by destination records.

- A destination record is a MQWDR structure. There is one structure for each possible route to each instance of the queue.
- MQWDR structures are addressed by an array of pointers, see DestinationArrayPtr.

**DestinationChosen ( MQLONG ) - input/output**
The chosen destination.

- The number of the MQWDR structure that identifies the route and queue instance where the message is to be sent.
- The value is in the range 1 - DestinationCount.
- On input to the exit, DestinationChosen indicates the route and queue instance that the queue manager has selected. The exit can accept this choice, or choose a different route and queue instance.
- The value set by the exit must be in the range 1 - DestinationCount. If any other value is returned, the queue manager uses the value of DestinationChosen on input to the exit.

**DestinationArrayPtr ( PPMQWDR ) - input**
The address of an array of pointers to destination records ( MQWDR ).

- There are DestinationCount destination records.

**QArrayPtr ( PPMQWQR ) - input**
The address of an array of pointers to queue records ( MQWQR ).

- If queue records are available, there are DestinationCount of them.
- If no queue records are available, QArrayPtr is the null pointer.

  **Note:** QArrayPtr can be the null pointer even when DestinationCount is greater than zero.

**CacheContext ( MQPTR ) : Version 2 - input**
The CacheContext field is reserved for use by the queue manager. The exit must not alter the value of this field.

**CacheType ( MQLONG ) : Version 2 - input**
The cluster cache has one of the following types:

**MQCLCT_STATIC**
The cache is static.

- The size of the cache is fixed, and cannot grow as the queue manager operates.
- You do not need to use the MQXCLWLN call to navigate the records in this type of cache.

**MQCLCT_DYNAMIC**
The cache is dynamic.

- The size of the cache can increase in order to accommodate the varying cluster information.
- You must use the MQXCLWLN call to navigate the records in this type of cache.

**CLWLMRUChannels ( MQLONG ) : Version 3 - input**
Indicates the maximum number of active outbound cluster channels, to be considered for use by the cluster workload choice algorithm.

- CLWLMRUChannels is a value 1 - 999 999 999.

**pEntryPoints ( PMQIEP ) : Version 4**
The address of an MQIEP structure through which MQI and DCI calls can be made.

**Related reference**
Initial values and language declarations for MQWXP
Initial values and C and High Level Assembler Language declarations for MQWXP - Cluster workload exit parameter structure.

## *Initial values and language declarations for MQWXP*

Initial values and C and High Level Assembler Language declarations for MQWXP - Cluster workload exit parameter structure.

*Table 648. Initial values of fields in MQWXP*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQWXP_STRUC_ID | 'WXP¬' |
| *Version* | MQWXP_VERSION_2 | 2 |
| *ExitId* | None | 0 |
| *ExitReason* | MQXCC_OK | 0 |
| *ExitResponse* | None | 0 |
| *ExitResponse2* | None | 0 |
| *Flags* | None | 0 |
| *ExitUserArea* | {MQXUA_NONE_ARRAY} | 0 |
| *ExitData* | None | "" |
| *MsgDescPtr* | None | NULL |
| *MsgBufferPtr* | None | NULL |
| *MsgBufferLength* | None | 0 |
| *MsgBufferPtr* | None | 0 |
| *QName* | None | "" |
| *QMgrName* | None | "" |
| *DestinationCount* | None | 0 |
| *DestinationChosen* | None | 0 |
| *DestinationArrayPtr* | None | NULL |
| *QArrayPtr* | None | NULL |
| *CacheContext* | None | NULL |
| *CacheType* | MQCLCT_DYNAMIC | 1 |
| *CLWLMRUChannels* | None | 0 |
| *pEntryPoints* | None | NULL |

| *Table 648. Initial values of fields in MQWXP (continued)* | | |
|---|---|---|
| **Field name** | **Name of constant** | **Value of constant** |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQWXP_DEFAULT contains the default values. Use it in the following way to provide initial values for the fields in the structure:

```
MQWDR MyWXP = {MQWXP_DEFAULT};
```

## C declaration

```
typedef struct tagMQWXP {
  MQCHAR4   StrucId;              /* Structure identifier */
  MQLONG    Version;              /* Structure version number */
  MQLONG    ExitId;               /* Type of exit */
  MQLONG    ExitReason;           /* Reason for invoking exit */
  MQLONG    ExitResponse;         /* Response from exit */
  MQLONG    ExitResponse2;        /* Reserved */
  MQLONG    Feedback;             /* Reserved */
  MQLONG    Flags;                /* Flags */
  MQBYTE16  ExitUserArea;         /* Exit user area */
  MQCHAR32  ExitData;             /* Exit data */
  PMQMD     MsgDescPtr;           /* Address of message descriptor */
  PMQVOID   MsgBufferPtr;         /* Address of buffer containing some
                                     or all of the message data */
  MQLONG    MsgBufferLength;      /* Length of buffer containing message
                                     data */
  MQLONG    MsgLength;            /* Length of complete message */
  MQCHAR48  QName;                /* Queue name */
  MQCHAR48  QMgrName;             /* Name of local queue manager */
  MQLONG    DestinationCount;     /* Number of possible destinations */
  MQLONG    DestinationChosen;    /* Destination chosen */
  PPMQWDR   DestinationArrayPtr;  /* Address of an array of pointers to
                                     destination records */
  PPMQWQR   QArrayPtr;            /* Address of an array of pointers to
                                     queue records */
  /* version 1 */
  MQPTR     CacheContext;         /* Context information */
  MQLONG    CacheType;            /* Type of cluster cache */
  /* version 2 */
  MQLONG    CLWLMRUChannnels;     /* Maximum number of most recently
                                     used cluster channels */
  /* version 3 */
  PMQIEP    pEntryPoints;         /* Address of the MQIEP structure */
  /* version 4 */
};
```

## High Level Assembler

```
MQWXP                           DSECT
MQWXP_STRUCID                   DS   CL4      Structure identifier
MQWXP_VERSION                   DS   F        Structure version number
MQWXP_EXITID                    DS   F        Type of exit
MQWXP_EXITREASON                DS   F        Reason for invoking exit
MQWXP_EXITRESPONSE              DS   F        Response from exit
MQWXP_EXITRESPONSE2             DS   F        Reserved
MQWXP_FEEDBACK                  DS   F        Reserved
MQWXP_RESERVED                  DS   F        Reserved
MQWXP_EXITUSERAREA              DS   XL16     Exit user area
MQWXP_EXITDATA                  DS   CL32     Exit data
MQWXP_MSGDESCPTR                DS   F        Address of message
*                                             descriptor
MQWXP_MSGBUFFERPTR              DS   F        Address of buffer containing
*                                             some or all of the message
*                                             data
MQWXP_MSGBUFFERLENGTH           DS   F        Length of buffer containing
*                                             message data
```

```
MQWXP_MSGLENGTH                DS   F        Length of complete message
MQWXP_QNAME                    DS   CL48     Queue name
MQWXP_QMGRNAME                 DS   CL48     Name of local queue manager
MQWXP_DESTINATIONCOUNT         DS   F        Number of possible
*                                            destinations
MQWXP_DESTINATIONCHOSEN        DS   F        Destination chosen
MQWXP_DESTINATIONARRAYPTR      DS   F        Address of an array of
*                                            pointers to destination
*                                            records
MQWXP_QARRAYPTR                DS   F        Address of an array of
*                                            pointers to queue records
MQWXP_CACHECONTEXT             DS   F        Context information
MQWXP_CACHETYPE                DS   F        Type of cluster cache
MQWXP_CLWLMRUCHANNELS          DS   F        Number of most recently used
*                                            channels for workload balancing

MQWXP_LENGTH                   EQU  *-MQWXP  Length of structure
                               ORG  MQWXP
MQWXP_AREA                     DS   CL(MQWXP_LENGTH)
```

**Related reference**

Fields in MQWXP - Cluster workload exit parameter structure
Description of the fields in the MQWXP - Cluster workload exit parameter structure

## MQWDR - Cluster workload destination record structure

The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

*Table 649. Fields in MQWDR*

| Field | Description | Page |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQWDR structure | StrucLength |
| *QMgrFlags* | Queue-manager flags | QMgrFlags |
| *QMgrIdentifier* | Queue-manager identifier | QMgrIdentifier |
| *QMgrName* | Queue-manager name | QMgrName |
| *ClusterRecOffset* | Logical offset of first cluster record ( MQWCR ) | ClusterRecOffset |
| *ChannelState* | Channel state | ChannelState |
| *ChannelDefOffset* | Logical offset of channel-definition structure ( MQCD ) | ChannelDefOffset |
| **Note:** The remaining fields are ignored if Version is less than MQWDR_VERSION_2. | | |
| *DestSeqNumber* | Channel destination sequence number | DestSeqNumber |
| *DestSeqFactor* | Channel destination sequence factor for weighting | DestSeqFactor |

The cluster workload destination record structure contains information relating to one of the possible destinations for the message. There is one cluster workload destination record structure for each instance of the destination queue.

The cluster workload destination record structure is supported in all environments.

Additionally, the MQWDR1 and MQWDR2 structures are available for backwards compatibility.

**Related reference**

MQ_CLUSTER_WORKLOAD_EXIT - Call description
The cluster workload exit is called by the queue manager to route a message to an available queue manager.

MQXCLWLN - Navigate Cluster workload records

The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

MQWXP - Cluster workload exit parameter structure
The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

MQWQR - Cluster workload queue record structure
The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

MQWCR - Cluster workload cluster record structure
The following table summarizes the fields in the MQWCR cluster workload record structure.

## *Fields in MQWDR - Cluster workload destination record structure*

Description of the parameters in the MQWDR - Cluster workload destination record structure.

**StrucId ( MQCHAR4 ) - input**
The structure identifier for the cluster workload destination record structure.

- The StrucId value is MQWDR_STRUC_ID.
- For the C programming language, the constant MQWDR_STRUC_ID_ARRAY is also defined. It has the same value as MQWDR_STRUC_ID. It is an array of characters instead of a string.

**Version ( MQLONG ) - input**
The structure version number. Version takes one of the following values:

**MQWDR_VERSION_1**
Version-1 cluster workload destination record.

**MQWDR_VERSION_2**
Version-2 cluster workload destination record.

**MQWDR_CURRENT_VERSION**
Current version of cluster workload destination record.

**StrucLength ( MQLONG ) - input**
The length of MQWDR structure. StrucLength takes one of the following values:

**MQWDR_LENGTH_1**
Length of version-1 cluster workload destination record.

**MQWDR_LENGTH_2**
Length of version-2 cluster workload destination record.

**MQWDR_CURRENT_LENGTH**
Length of current version of cluster workload destination record.

**QMgrFlags ( MQLONG ) - input**
Queue manager flags indicating properties of the queue manager that hosts the instance of the destination queue described by the MQWDR structure. The following flags are defined:

**MQQMF_REPOSITORY_Q_MGR**
Destination is a full repository queue manager.

**MQQMF_CLUSSDR_USER_DEFINED**
Cluster-sender channel was defined manually.

**MQQMF_CLUSSDR_AUTO_DEFINED**
Cluster-sender channel was defined automatically.

**MQQMF_AVAILABLE**
Destination queue manager is available to receive messages.

***Other values***
Other flags in the field might be set by the queue manager for internal purposes.

**QMgrIdentifier ( MQCHAR48 ) - input**
The queue manager identifier is a unique identifier for the queue manager that hosts the instance of the destination queue described by the MQWDR structure.

- The identifier is generated by the queue manager.

- The length of QMgrIdentifier is MQ_Q_MGR_IDENTIFIER_LENGTH.

**QMgrName ( MQCHAR48 ) - input**
The name of the queue manager that hosts the instance of the destination queue described by the MQWDR structure.

- QMgrName can be the name of the local queue manager, as well another queue manager in the cluster.
- The length of QMgrName is MQ_Q_MGR_NAME_LENGTH.

**ClusterRecOffset ( MQLONG ) - input**
The logical offset of the first MQWCR structure that belongs to the MQWDR structure.

- For static caches, ClusterRecOffset is the offset of the first MQWCR structure that belongs to the MQWDR structure.
- The offset is measured in bytes from the start of the MQWDR structure.
- Do not use the logical offset for pointer arithmetic with dynamic caches. To obtain the address of the next record, the MQXCLWLN call must be used.

**ChannelState ( MQLONG ) - input**
The state of the channel that links the local queue manager to the queue manager identified by the MQWDR structure. The following values are possible:

**MQCHS_BINDING**
Channel is negotiating with the partner.

**MQCHS_INACTIVE**
Channel is not active.

**MQCHS_INITIALIZING**
Channel is initializing.

**MQCHS_PAUSED**
Channel has paused.

**MQCHS_REQUESTING**
Requester channel is requesting connection.

**MQCHS_RETRYING**
Channel is reattempting to establish connection.

**MQCHS_RUNNING**
Channel is transferring or waiting for messages.

**MQCHS_STARTING**
Channel is waiting to become active.

**MQCHS_STOPPING**
Channel is stopping.

**MQCHS_STOPPED**
Channel has stopped.

**ChannelDefOffset ( MQLONG ) - input**
The logical offset of the channel definition ( MQCD ) for the channel that links the local queue manager to the queue manager identified by the MQWDR structure.

- ChannelDefOffset is like ClusterRecOffset
- The logical offset cannot be used in pointer arithmetic. To obtain the address of the next record, the MQXCLWLN call must be used.

**DestSeqFactor ( MQLONG ) - input**
The destination sequence factor that allows a choice of the channel based on weight.

- DestSeqFactor is used before the queue manager changes it.
- The workload manager increases DestSeqFactor in a way that ensures messages are distributed down channels according to their weight.

**DestSeqNumber ( MQLONG ) - input**
The cluster channel destination value before the queue manager changes it.

- The workload manager increases DestSeqNumber every time a message is put down that channel.
- Workload exits can use DestSeqNumber to decide which channel to put a message down.

**Related reference**
Initial values and language declarations for MQWDR
Initial values and C and High Level Assembler Language declarations for MQWDR - Cluster workload destination record.

## *Initial values and language declarations for MQWDR*

Initial values and C and High Level Assembler Language declarations for MQWDR - Cluster workload destination record.

*Table 650. Initial values of fields in MQWDR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQWDR_STRUC_ID | 'WDR¬' |
| *Version* | MQWDR_VERSION_1 | 1 |
| *StrucLength* | MQWDR_CURRENT_LENGTH [3] | 136 |
| *QMgrFlags* | MQWDR_NONE | 0 |
| *QMgrIdentifier* | None | "" |
| *QMgrName* | None | "" |
| *ClusterRecOffset* | None | 0 |
| *ChannelState* | None | 0 |
| *ChannelDefOffset* | None | 0 |
| *DestSeqNumber* | None | 0 |
| *DestSeqFactor* | None | 0 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQWDR_DEFAULT contains the default values. Use it in the following way to provide initial values for the fields in the structure:

```
MQWDR MyWDR = {MQWDR_DEFAULT};
```

3. The initial values intentionally set the length of the structure to the length of the current version, and not version 1 of the structure.

## High Level Assembler

```
MQWDR                           DSECT
MQWDR_STRUCID                   DS   CL4      Structure identifier
MQWDR_VERSION                   DS   F        Structure version number
MQWDR_STRUCLENGTH               DS   F        Length of MQWDR structure
MQWDR_QMGRFLAGS                 DS   F        Queue-manager flags
MQWDR_QMGRIDENTIFIER            DS   CL48     Queue-manager identifier
MQWDR_QMGRNAME                  DS   CL48     Queue-manager name
MQWDR_CLUSTERRECOFFSET          DS   F        Offset of first cluster
*                                            record
MQWDR_CHANNELSTATE              DS   F        Channel state
MQWDR_CHANNELDEFOFFSET          DS   F        Offset of channel definition
```

```
*                                       structure
MQWDR_LENGTH                    EQU  *-MQWDR  Length of structure
                                ORG  MQWDR
MQWDR_AREA                      DS   CL(MQWDR_LENGTH)
```

## C declaration

```
typedef struct tagMQWDR {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    StrucLength;       /* Length of MQWDR structure */
  MQLONG    QMgrFlags;         /* Queue-manager flags */
  MQCHAR48  QMgrIdentifier;    /* Queue-manager identifier */
  MQCHAR48  QMgrName;          /* Queue-manager name */
  MQLONG    ClusterRecOffset;  /* Offset of first cluster record */
  MQLONG    ChannelState;      /* Channel state */
  MQLONG    ChannelDefOffset;  /* Offset of channel definition structure */
  /* Ver:1 */
  MQLONG    DestSeqNumber;     /* Cluster channel destination sequence number */
  MQINT64   DestSeqFactor;     /* Cluster channel factor sequence number */
  /* Ver:2 */
};
```

**Related reference**

Fields in MQWDR - Cluster workload destination record structure
Description of the parameters in the MQWDR - Cluster workload destination record structure.

# MQWQR - Cluster workload queue record structure

The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

*Table 651. Fields in MQWQR*

| Field | Description | Page |
|---|---|---|
| *StrucId* | Structure identifier | StrucId |
| *Version* | Structure version number | Version |
| *StrucLength* | Length of MQWQR structure | StrucLength |
| *QFlags* | Queue flags | QFlags |
| *QName* | Queue name | QName |
| *QMgrIdentifier* | Queue-manager identifier | QMgrIdentifier |
| *ClusterRecOffset* | Offset of first cluster record (MQWCR) | ClusterRecOffset |
| *QType* | Queue type | QType |
| *QDesc* | Queue description | QDesc |
| *DefBind* | Default binding | DefBind |
| *DefPersistence* | Default message persistence | DefPersistence |
| *DefPriority* | Default message priority | DefPriority |
| *InhibitPut* | Whether put operations on the queue are allowed | InhibitPut |
| **Note:** The remaining fields are ignored if Version is less than MQWQR_VERSION_2. | | |
| *CWLQueuePriority* | A value 0 - 9 representing the priority of the queue | CLWLQueuePriority |
| *CLWLQueueRank* | A value 0 - 9 representing the rank of the queue | CLWLQueueRank |
| **Note:** The remaining fields are ignored if Version is less than MQWQR_VERSION_3. | | |

| Table 651. Fields in MQWQR (continued) | | |
|---|---|---|
| **Field** | **Description** | **Page** |
| *DefPutResponse* | Default put response | DefPutResponse |

The cluster workload queue record structure contains information relating to one of the possible destinations for the message. There is one cluster workload queue record structure for each instance of the destination queue.

The cluster workload queue record structure is supported in all environments.

Additionally, the MQWQR1 and MQWQR2 structures are available for backwards compatibility.

**Related reference**

MQ_CLUSTER_WORKLOAD_EXIT - Call description
The cluster workload exit is called by the queue manager to route a message to an available queue manager.

MQXCLWLN - Navigate Cluster workload records
The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

MQWXP - Cluster workload exit parameter structure
The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

MQWDR - Cluster workload destination record structure
The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

MQWCR - Cluster workload cluster record structure
The following table summarizes the fields in the MQWCR cluster workload record structure.

## *Fields in MQWQR - Cluster workload queue record structure*

Description of the fields in the MQWQR - Cluster workload queue record structure.

**StrucId ( MQCHAR4 ) - input**
The structure identifier for the cluster workload queue record structure.

- The StrucId value is MQWQR_STRUC_ID.
- For the C programming language, the constant MQWQR_STRUC_ID_ARRAY is also defined. It has the same value as MQWQR_STRUC_ID. It is an array of characters instead of a string.

**Version ( MQLONG ) - input**
The structure version number. Version takes one of the following values:

**MQWQR_VERSION_1**
Version-1 cluster workload queue record.

**MQWQR_VERSION_2**
Version-2 cluster workload queue record.

**MQWQR_VERSION_3**
Version-3 cluster workload queue record.

**MQWQR_CURRENT_VERSION**
Current version of cluster workload queue record.

**StrucLength ( MQLONG ) - input**
The length of MQWQR structure. StrucLength takes one of the following values:

**MQWQR_LENGTH_1**
Length of version-1 cluster workload queue record.

**MQWQR_LENGTH_2**
Length of version-2 cluster workload queue record.

**MQWQR_LENGTH_3**
Length of version-3 cluster workload queue record.

**MQWQR_CURRENT_LENGTH**
Length of current version of cluster workload queue record.

**QFlags ( MQLONG ) - input**
The queue flags indicate properties of the queue. The following flags are defined:

**MQQF_LOCAL_Q**
Destination is a local queue.

**MQQF_CLWL_USEQ_ANY**
Allow use of local and remote queues in puts.

**MQQF_CLWL_USEQ_LOCAL**
Allow only local queue puts.

***Other values***
Other flags in the field might be set by the queue manager for internal purposes.

**QName ( MQCHAR48 ) - input**
The name of the queue that is one of the possible destinations of the message.

- The length of QName is MQ_Q_NAME_LENGTH.

**QMgrIdentifier ( MQCHAR48 ) - input**
The queue manager identifier is a unique identifier for the queue manager that hosts the instance of the queue described by the MQWQR structure.

- The identifier is generated by the queue manager.
- The length of QMgrIdentifier is MQ_Q_MGR_IDENTIFIER_LENGTH.

**ClusterRecOffset ( MQLONG ) - input**
The logical offset of the first MQWCR structure that belongs to the MQWQR structure.

- For static caches, ClusterRecOffset is the offset of the first MQWCR structure that belongs to the MQWQR structure.
- The offset is measured in bytes from the start of the MQWQR structure.
- Do not use the logical offset for pointer arithmetic with dynamic caches. To obtain the address of the next record, the MQXCLWLN call must be used.

**QType ( MQLONG ) - input**
The queue type of the destination queue. The following values are possible:

**MQCQT_LOCAL_Q**
Local queue.

**MQCQT_ALIAS_Q**
Alias queue.

**MQCQT_REMOTE_ Q**
Remote queue.

**MQCQT_Q_MGR_ALIAS**
Queue-manager alias.

**QDesc ( MQCHAR64 ) - input**
The queue description queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure.

- The length of QDesc is MQ_Q_DESC_LENGTH.

**DefBind ( MQLONG ) - input**
The default binding queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure. Either MQBND_BIND_ON_OPEN or MQBND_BIND_ON_GROUP must be specified when using groups with clusters. The following values are possible:

**MQBND_BIND_ON_OPEN**
Binding fixed by MQOPEN call.

**MQBND_BIND_NOT_FIXED**
Binding not fixed.

**MQBND_BIND_ON_GROUP**
Allows an application to request that a group of messages are all allocated to the same destination instance.

**DefPersistence ( MQLONG ) - input**
The default message persistence queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure. The following values are possible:

**MQPER_PERSISTENT**
Message is persistent.

**MQPER_NOT_PERSISTENT**
Message is not persistent.

**DefPriority ( MQLONG ) - input**

The default message priority queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure. The priority range is 0 - MaxPriority.

- 0 is the lowest priority.
- MaxPriority is the queue manager attribute of the queue manager that hosts this instance of the destination queue.

**InhibitPut ( MQLONG ) - input**
The put inhibited queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure. The following values are possible:

**MQQA_PUT_INHIBITED**
Put operations are inhibited.

**MQQA_PUT_ALLOWED**
Put operations are allowed.

**CLWLQueuePriority ( MQLONG ) - input**
The cluster workload queue priority attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure.

**CLWLQueueRank ( MQLONG ) - input**
The cluster workload queue rank defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure.

**DefPutResponse ( MQLONG ) - input**
The default put response queue attribute defined on the queue manager that hosts the instance of the destination queue described by the MQWQR structure. The following values are possible:

**MQPRT_SYNC_RESPONSE**
Synchronous response to MQPUT or MQPUT1 calls.

**MQPRT_ASYNC_RESPONSE**
Asynchronous response to MQPUT or MQPUT1 calls.

**Related reference**
Initial values and language declarations for MQWQR

Initial values and C and High Level Assembler Language declarations for MQWQR - Cluster workload queue record.

### *Initial values and language declarations for MQWQR*

Initial values and C and High Level Assembler Language declarations for MQWQR - Cluster workload queue record.

*Table 652. Initial values of fields in MQWQR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *StrucId* | MQWQR_STRUC_ID_ARRAY | 'WQR¬' |
| *Version* | MQWQR_VERSION_1 | 1 |
| *StrucLength* | MQWQR_CURRENT_LENGTH [3] | 212 |
| *QFlags* | None | 0 |
| *QName* | None | "" |
| *QMgrIdentifier* | None | "" |
| *ClusterRecOffset* | None | 0 |
| *QType* | None | 0 |
| *QDesc* | None | "" |
| *DefBind* | None | 0 |
| *DefPersistence* | None | 0 |
| *DefPriority* | None | 0 |
| *InhibitPut* | None | 0 |
| *CLWLQueuePriority* | None | 0 |
| *CLWLQueueRank* | None | 0 |
| *DefPutResponse* | None | 1 |

**Notes:**

1. The symbol ¬ represents a single blank character.
2. In the C programming language, the macro variable MQWQR_DEFAULT contains the default values. Use it in the following way to provide initial values for the fields in the structure:

   ```
   MQWQR MyWQR = {MQWQR_DEFAULT};
   ```

3. The initial values intentionally set the length of the structure to the length of the current version, and not version 1 of the structure.

## C declaration

```
typedef struct tagMQWQR {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    StrucLength;       /* Length of MQWQR structure */
  MQLONG    QFlags;            /* Queue flags */
  MQCHAR48  QName;             /* Queue name */
  MQCHAR48  QMgrIdentifier;    /* Queue-manager identifier */
  MQLONG    ClusterRecOffset;  /* Offset of first cluster record */
  MQLONG    QType;             /* Queue type */
  MQCHAR64  QDesc;             /* Queue description */
  MQLONG    DefBind;           /* Default binding */
```

```
  MQLONG    DefPersistence;    /* Default message persistence */
  MQLONG    DefPriority;       /* Default message priority */
  MQLONG    InhibitPut;        /* Whether put operations on the queue
                                  are allowed */
  /* version 2 */
  MQLONG    CLWLQueuePriority; /* Queue priority */
  MQLONG    CLWLQueueRank;     /* Queue rank */
  /* version 3 */
  MQLONG    DefPutResponse;    /* Default put response */
};
```

### High Level Assembler

```
MQWQR                          DSECT
MQWQR_STRUCID                  DS   CL4      Structure identifier
MQWQR_VERSION                  DS   F        Structure version number
MQWQR_STRUCLENGTH              DS   F        Length of MQWQR structure
MQWQR_QFLAGS                   DS   F        Queue flags
MQWQR_QNAME                    DS   CL48     Queue name
MQWQR_QMGRIDENTIFIER           DS   CL48     Queue-manager identifier
MQWQR_CLUSTERRECOFFSET         DS   F        Offset of first cluster
*                                           record
MQWQR_QTYPE                    DS   F        Queue type
MQWQR_QDESC                    DS   CL64     Queue description
MQWQR_DEFBIND                  DS   F        Default binding
MQWQR_DEFPERSISTENCE           DS   F        Default message persistence
MQWQR_DEFPRIORITY              DS   F        Default message priority
MQWQR_INHIBITPUT               DS   F        Whether put operations on
*                                           the queue are allowed
MQWQR_DEFPUTRESPONSE           DS   F        Default put response
MQWQR_LENGTH                   EQU  *-MQWQR  Length of structure
                               ORG  MQWQR
MQWQR_AREA                     DS   CL(MQWQR_LENGTH)
```

**Related reference**

Fields in MQWQR - Cluster workload queue record structure
Description of the fields in the MQWQR - Cluster workload queue record structure.

## MQWCR - Cluster workload cluster record structure

The following table summarizes the fields in the MQWCR cluster workload record structure.

*Table 653. Fields in MQWCR.*

There are three columns in this table. The first column lists the field names, the second column provides a description of each field and the third column provides a link to further information about each field.

| Field | Description | Page |
|---|---|---|
| *ClusterName* | Name of cluster | ClusterName |
| *ClusterRecOffset* | Offset of next cluster record ( MQWCR ) | ClusterRecOffset |
| *ClusterFlags* | Cluster flags | ClusterFlags |

The cluster workload cluster record structure contains information about a cluster. For each cluster the destination queue belongs to, there is one cluster workload cluster record structure.

The cluster workload cluster record structure is supported in all environments.

**Related reference**

MQ_CLUSTER_WORKLOAD_EXIT - Call description
The cluster workload exit is called by the queue manager to route a message to an available queue manager.

MQXCLWLN - Navigate Cluster workload records

The MQXCLWLN call is used to navigate through the chains of MQWDR, MQWQR, and MQWCR records stored in the cluster cache.

MQWXP - Cluster workload exit parameter structure
The following table summarizes the fields in the MQWXP - Cluster workload exit parameter structure.

MQWDR - Cluster workload destination record structure
The following table summarizes the fields in the MQWDR - Cluster workload destination record structure.

MQWQR - Cluster workload queue record structure
The following table summarizes the fields in the MQWQR - Cluster workload queue record structure.

## *Fields in the MQWCR - Cluster workload cluster record structure.*

Description of the fields in the MQWCR - Cluster workload cluster record structure.

**ClusterName ( MQCHAR48 ) - input**
The name of a cluster to which the instance of the destination queue that owns the MQWCR structure belongs. The destination queue instance is described by an MQWDR structure.

- The length of ClusterName is MQ_CLUSTER_NAME_LENGTH.

**ClusterRecOffset ( MQLONG ) - input**
The logical offset of the next MQWCR structure.

- If there are no more MQWCR structures, ClusterRecOffset is zero.
- The offset is measured in bytes from the start of the MQWCR structure.

**ClusterFlags ( MQLONG ) - input**
The cluster flags indicate properties of the queue manager identified by the MQWCR structure. The following flags are defined:

**MQQMF_REPOSITORY_Q_MGR**
Destination is a full repository queue manager.

**MQQMF_CLUSSDR_USER_DEFINED**
Cluster-sender channel was defined manually.

**MQQMF_CLUSSDR_AUTO_DEFINED**
Cluster-sender channel was defined automatically.

**MQQMF_AVAILABLE**
Destination queue manager is available to receive messages.

***Other values***
Other flags in the field might be set by the queue manager for internal purposes.

**Related reference**
Initial values and language declarations for MQWCR
Initial values and C and High Level Assembler Language declarations for MQWCR - Cluster workload cluster record structure.

## *Initial values and language declarations for MQWCR*

Initial values and C and High Level Assembler Language declarations for MQWCR - Cluster workload cluster record structure.

*Table 654. Initial values of fields in MQWCR*

| Field name | Name of constant | Value of constant |
|---|---|---|
| *ClusterName* | None | " " |
| *ClusterRecOffset* | None | 0 |
| *ClusterFlags* | None | 0 |

### C declaration

```
typedef struct tagMQWCR {
  MQCHAR48  ClusterName;       /* Cluster name */
  MQLONG    ClusterRecOffset;  /* Offset of next cluster record */
  MQLONG    ClusterFlags;      /* Cluster flags */
};
```

### High Level Assembler

```
MQWCR                           DSECT
MQWCR_CLUSTERNAME               DS   CL48     Cluster name
MQWCR_CLUSTERRECOFFSET          DS   F        Offset of next cluster
*                                            record
MQWCR_CLUSTERFLAGS              DS   F        Cluster flags
MQWCR_LENGTH                    EQU  *-MQWCR  Length of structure
                                ORG  MQWCR
MQWCR_AREA                      DS   CL(MQWCR_LENGTH)
```

**Related reference**

Fields in the MQWCR - Cluster workload cluster record structure.

Description of the fields in the MQWCR - Cluster workload cluster record structure.

## API exit reference

This section provides reference information mainly of interest to a programmer writing API exits.

### General usage notes

**notes:**

1. All exit functions can issue the MQXEP call; this call is designed specifically for use from API exit functions.
2. The MQ_INIT_EXIT function cannot issue any MQ calls other than MQXEP.
3. You cannot issue the MQDISC call for the current connection.
4. If an exit function issues the MQCONN call, or the MQCONNX call with the MQCNO_HANDLE_SHARE_NONE option, the call completes with reason code MQRC_ALREADY_CONNECTED, and the handle returned is the same as the one passed to the exit as a parameter.
5. In general when an API exit function issues an MQI call, API exits are not be called recursively. However, if an exit function issues the MQCONNX call with the MQCNO_HANDLE_SHARE_BLOCK or MQCNO_HANDLE_SHARE_NO_BLOCK options, the call returns a new shared handle. This provides the exit suite with a connection handle of its own, and hence a unit of work that is independent of the application's unit of work. The exit suite can use this handle to put and get messages within its own unit of work, and commit or back out that unit of work; all of this can be done without affecting the application's unit of work in any way.

   Because the exit function is using a connection handle that is different from the handle being used by the application, MQ calls issued by the exit function result in the relevant API exit functions being invoked. Exit functions can therefore be invoked recursively. Note that both the *ExitUserArea* field in MQAXP and the exit chain area have connection-handle scope. Consequently, an exit function cannot use those areas to signal to another instance of itself invoked recursively that it is already active.
6. Exit functions can also put and get messages within the application's unit of work. When the application commits or backs out the unit of work, all messages within the unit of work are committed or backed out together, regardless of who placed them in the unit of work (application or exit function). However, the exit can cause the application to exceed system limits sooner than would

otherwise be the case (for example, by exceeding the maximum number of uncommitted messages in a unit of work).

When an exit function uses the application's unit of work in this way, the exit function should usually avoid issuing the MQCMIT call, as this commits the application's unit of work and might impair the correct functioning of the application. However, the exit function might sometimes need to issue the MQBACK call, if the exit function encounters a serious error that prevents the unit of work being committed (for example, an error putting a message as part of the application's unit of work). When MQBACK is called, take care to ensure that the application unit of work boundaries are not changed. In this situation the exit function must set the appropriate values to ensure that completion code MQCC_WARNING and reason code MQRC_BACKED_OUT are returned to the application, so that the application can detect the fact that the unit of work has been backed out.

If an exit function uses the application's connection handle to issue MQ calls, those calls do not themselves result in further invocations of API exit functions.

7. If an MQXR_BEFORE exit function terminates abnormally, the queue manager might be able to recover from the failure. If it can, the queue manager continues processing as though the exit function had returned MQXCC_FAILED. If the queue manager cannot recover, the application is terminated.
8. If an MQXR_AFTER exit function terminates abnormally, the queue manager might be able to recover from the failure. If it can, the queue manager continues processing as though the exit function had returned MQXCC_FAILED. If the queue manager cannot recover, the application is terminated. Be aware that in the latter case, messages retrieved outside a unit of work are lost (this is the same situation as the application failing immediately after removing a message from the queue).
9. The MCA process performs a two phase commit.

   If an API exit intercepts an MQCMIT from a prepared MCA process and attempts to perform an action within the unit of work, then the action will fail with reason code MQRC_UOW_NOT_AVAILABLE.
10. For a multi-installation environment, the only way to have an exit that works with both Websphere MQ Version 7.0 and Version 7.1 is to write the exit in a way which links at Version 7.0 with mqm.Lib and, for non-primary or relocated exits, to ensure that the application finds the correct mqm.Lib for the installation with which the queue manager is currently associated, prior to the application launch. (For example, run the **setmqenv -m QM** command before launching the application, even if the queue manager is owned by a Version 7.0 installation.)
11. Where multiple installations of IBM MQ are available, use the exits written for an earlier version of IBM MQ, as new functionality added in the later version might not work with earlier versions. For more information about changes between releases, see What's changed in IBM MQ 8.0.

## IBM MQ API exit parameter structure (MQAXP)

The MQAXP structure, an external control block, is used as an input or output parameter to the API exit. This topic also gives information about how queue managers process exit functions.

MQAXP has the following C declaration:

```
typedef struct tagMQAXP {
  MQCHAR4   StrucId;           /* Structure identifier */
  MQLONG    Version;           /* Structure version number */
  MQLONG    ExitId;            /* Exit Identifier */
  MQLONG    ExitReason;        /* Exit invocation reason */
  MQLONG    ExitResponse;      /* Response code from exit */
  MQLONG    ExitResponse2;     /* Secondary response code from exit */
  MQLONG    Feedback;          /* Feedback code from exit */
  MQLONG    APICallerType;     /* MQSeries API caller type */
  MQBYTE16  ExitUserArea;      /* User area for use by exit */
  MQCHAR32  ExitData;          /* Exit data area */
  MQCHAR48  ExitInfoName;      /* Exit information name */
  MQBYTE48  ExitPDArea;        /* Problem determination area */
  MQCHAR48  QMgrName;          /* Name of local queue manager */
  PMQACH    ExitChainAreaPtr;  /* Inter exit communication area */
  MQHCONFIG Hconfig;           /* Configuration handle */
  MQLONG    Function;          /* Function Identifier */
  /* Ver:1 */
```

```
  MQHMSG    ExitMsgHandle      /* Exit message handle
  /* Ver:2 */
};
```

The following parameter list is passed when functions in an API exit are invoked:

**StrucId (MQCHAR4) - input**
The exit parameter structure identifier, with a value of:

```
MQAXP_STRUC_ID.
```

The exit handler sets this field on entry to each exit function.

**Version (MQLONG) - input**
The structure version number, with a value of:

**MQAXP_VERSION_1**
Version 1 API exit parameter structure.

**MQAXP_VERSION_2**
Version 2 API exit parameter structure.

**MQAXP_CURRENT_VERSION**
Current version number for the API exit parameter structure.

The exit handler sets this field on entry to each exit function.

**ExitId (MQLONG) - input**
The exit identifier, set on entry to the exit routine, indicating the type of exit:

**MQXT_API_EXIT**
API exit.

**ExitReason (MQLONG) - input**
The reason for invoking the exit, set on entry to each exit function:

**MQXR_CONNECTION**
The exit is being invoked to initialize itself before an MQCONN or MQCONNX call, or to end itself after an MQDISC call.

**MQXR_BEFORE**
The exit is being invoked before executing an API call, or before converting data on an MQGET.

**MQXR_AFTER**
The exit is being invoked after executing an API call.

**ExitResponse (MQLONG) - output**
The response from the exit, initialized on entry to each exit function to:

**MQXCC_OK**
Continue normally.

This field must be set by the exit function, to communicate to the queue manager the result of executing the exit function. The value must be one of the following:

**MQXCC_OK**
The exit function completed successfully. Continue normally.

This value can be set by all MQXR_* exit functions. ExitResponse2 is used to decide whether to invoke exit functions later in the chain.

**MQXCC_FAILED**
The exit function failed because of an error.

This value can be set by all MQXR_* exit functions. The queue manager sets CompCode to MQCC_FAILED, and Reason to:

- MQRC_API_EXIT_INIT_ERROR if the function is MQ_INIT_EXIT
- MQRC_API_EXIT_TERM_ERROR if the function is MQ_TERM_EXIT

- MQRC_API_EXIT_ERROR for all other exit functions

The values set can be altered by an exit function later in the chain.

ExitResponse2 is ignored; the queue manager continues processing as though MQXR2_SUPPRESS_CHAIN had been returned.

**MQXCC_SUPPRESS_FUNCTION**
Suppress IBM MQ API function.

This value can be set only by an MQXR_BEFORE exit function. It bypasses the API call. If it is returned by the MQ_DATA_CONV_ON_GET_EXIT, data conversion is bypassed. The queue manager sets CompCode to MQCC_FAILED, and Reason to MQRC_SUPPRESSED_BY_EXIT, but the values set can be altered by an exit function later in the chain. Other parameters for the call remain as the exit left them. ExitResponse2 is used to decide whether to invoke exit functions later in the chain.

If this value is set by an MQXR_AFTER or MQXR_CONNECTION exit function, the queue manager continues processing as though MQXCC_FAILED had been returned.

**MQXCC_SKIP_FUNCTION**
Skip IBM MQ API function.

This value can be set only by an MQXR_BEFORE exit function. It bypasses the API call. If it is returned by the MQ_DATA_CONV_ON_GET_EXIT, data conversion is bypassed. The exit function must set CompCode and Reason to the values to be returned to the application, but the values set can be altered by an exit function later in the chain. Other parameters for the call remain as the exit left them. ExitResponse2 is used to decide whether to invoke exit functions later in the chain.

If this value is set by an MQXR_AFTER or MQXR_CONNECTION exit function, the queue manager continues processing as though MQXCC_FAILED had been returned.

**MQXCC_SUPPRESS_EXIT**
Suppress all exit functions belonging to the set of exits.

This value can be set only by the MQXR_BEFORE and MQXR_AFTER exit functions. It bypasses *all* subsequent invocations of exit functions belonging to this set of exits for this logical connection. This bypassing continues until the logical disconnect request occurs, when MQ_TERM_EXIT function is invoked with an ExitReason of MQXR_CONNECTION.

The exit function must set CompCode and Reason to the values to be returned to the application, but the values set can be altered by an exit function later in the chain. Other parameters for the call remain as the exit left them. ExitResponse2 is ignored.

If this value is set by an MQXR_CONNECTION exit function, the queue manager continues processing as though MQXCC_FAILED had been returned.

For information about the interaction between ExitResponse and ExitResponse2, and its effect on exit processing, see "How queue managers process exit functions" on page 1585.

**ExitResponse2 (MQLONG) - output**
This is a secondary exit response code that qualifies the primary exit response code for MQXR_BEFORE exit functions. It is initialized to:

```
MQXR2_DEFAULT_CONTINUATION
```

on entry to an IBM MQ API call exit function. It can then be set to one of the values:

**MQXR2_DEFAULT_CONTINUATION**
Whether to continue with the next exit in the chain, depending on the value of ExitResponse.

If ExitResponse is MQXCC_SUPPRESS_FUNCTION or MQXCC_SKIP_FUNCTION, bypass exit functions later in the MQXR_BEFORE chain and the matching exit functions in the MQXR_AFTER chain. Invoke exit functions in the MQXR_AFTER chain that match exit functions earlier in the MQXR_BEFORE chain.

Otherwise, invoke the next exit in the chain.

**MQXR2_SUPPRESS_CHAIN**
Suppress the chain.

Bypass exit functions later in the MQXR_BEFORE chain and the matching exit functions in the MQXR_AFTER chain for this API call invocation. Invoke exit functions in the MQXR_AFTER chain that match exit functions earlier in the MQXR_BEFORE chain.

**MQXR2_CONTINUE_CHAIN**
Continue with the next exit in the chain.

For information about the interaction between ExitResponse and ExitResponse2, and its effect on exit processing, see "How queue managers process exit functions" on page 1585.

**Feedback (MQLONG) - input/output**
Communicate feedback codes between exit function invocations. This is initialized to:

```
MQFB_NONE (0)
```

before invoking the first function of the first exit in a chain.

Exits can set this field to any value, including any valid MQFB_* or MQRC_* value. Exits can also set this field to a user-defined feedback value in the range MQFB_APPL_FIRST to MQFB_APPL_LAST.

**APICallerType (MQLONG) - input**
The API caller type, indicating whether the IBM MQ API caller is external or internal to the queue manager: MQXACT_EXTERNAL or MQXACT_INTERNAL.

**ExitUserArea (MQBYTE16) - input/output**
A user area, available to all the exits associated with a particular ExitInfoObject. It is initialized to MQXUA_NONE (binary zeros for the length of the ExitUserArea) before invoking the first exit function (MQ_INIT_EXIT) for the hconn. From then on, any changes made to this field by an exit function are preserved across invocations of functions of the same exit.

This field is aligned to a multiple of 4 MQLONGs.

Exits can also anchor any storage that they allocate from this area.

For each hconn, each exit in a chain of exits has a different ExitUserArea. The ExitUserArea cannot be shared by exits in a chain, and the contents of the ExitUserArea for one exit are not available to another exit in a chain.

For C programs, the constant MQXUA_NONE_ARRAY is also defined with the same value as MQXUA_NONE, but as an array of characters instead of a string.

The length of this field is given by MQ_EXIT_USER_AREA_LENGTH.

**ExitData (MQCHAR32) - input**
Exit data, set on input to each exit function to the 32 characters of exit-specific data that is provided in the exit. If you define no value in the exit this field is all blanks.

The length of this field is given by MQ_EXIT_DATA_LENGTH.

**ExitInfoName (MQCHAR48) - input**
The exit information name, set on input to each exit function to the ApiExit_name specified in the exit definitions in the stanzas.

**ExitPDArea (MQBYTE48) - input/output**
A problem determination area, initialized to MQXPDA_NONE (binary zeros for the length of the field) for each invocation of an exit function.

For C programs, the constant MQXPDA_NONE_ARRAY is also defined with the same value as MQXPDA_NONE, but as an array of characters instead of a string.

The exit handler always writes this area to the IBM MQ trace at the end of an exit, even when the function is successful.

The length of this field is given by MQ_EXIT_PD_AREA_LENGTH.

**QMgrName (MQCHAR48) - input**
The name of the queue manager the application is connected to, that has invoked an exit as a result of processing an IBM MQ API call.

If the name of a queue manager supplied on an MQCONN or MQCONNX calls is blank, this field is still set to the name of the queue manager to which the application is connected, whether the application is server or client.

The exit handler sets this field on entry to each exit function.

The length of this field is given by MQ_Q_MGR_NAME_LENGTH.

**ExitChainAreaPtr (PMQACH) - input/output**
This is used to communicate data across invocations of different exits in a chain. It is set to a NULL pointer before invoking the first function (MQ_INIT_EXIT with ExitReason MQXR_CONNECTION) of the first exit in a chain of exits. The value returned by the exit on one invocation is passed on to the next invocation.

Refer to "The exit chain area and exit chain area header (MQACH)" on page 1589 for more details about how to use the exit chain area.

**Hconfig (MQHCONFIG) - input**
The configuration handle, representing the set of functions being initialized. This value is generated by the queue manager on the MQ_INIT_EXIT function, and is later passed to the API exit function. It is set on entry to each exit function.

You can use Hconfig as a pointer to the MQIEP structure to make MQI and DCI calls. You must check that the first 4 bytes of HConfig match the StrucId of the MQIEP structure before using the HConfig parameter as a pointer to the MQIEP structure.

**Function (MQLONG) - input**
The function identifier, valid values for which are the MQXF_* constants described in "External constants" on page 1590.

The exit handler sets this field to the correct value, on entry to each exit function, depending on the IBM MQ API call that resulted in the exit being invoked.

**ExitMsgHandle (MQHMSG) - input/output**
When Function is MQXF_GET and ExitReason is MQXR_AFTER, a valid message handle is returned in this field allowing the API exit access to the message descriptor fields and any other properties matching the ExitProperties string specified in the MQXEPO structure when registering the API exit.

Any non-message descriptor properties that are returned in the ExitMsgHandle will not be available from the MsgHandle in the MQGMO structure if one was specified, or in the message data.

When Function is MQXF_GET and ExitReason is MQXR_BEFORE, if the exit program sets this field to MQHM_NONE then it will suppress the populating of the ExitMsgHandle properties.

This field is not set if Version is less then MQAXP_VERSION_2.

## How queue managers process exit functions

The processing performed by the queue manager on return from an exit function depends on both ExitResponse and ExitResponse2.

Table 655 on page 1586 summarizes the possible combinations and their effects for an MQXR_BEFORE exit function, showing:

- Who sets the CompCode and Reason parameters of the API call
- Whether the remaining exit functions in the MQXR_BEFORE chain and the matching exit functions in the MQXR_AFTER chain are invoked
- Whether the API call is invoked

For an MQXR_AFTER exit function:

- CompCode and Reason are set in the same way as MQXR_BEFORE
- ExitResponse2 is ignored (the remaining exit functions in the MQXR_AFTER chain are always invoked)
- MQXCC_SUPPRESS_FUNCTION and MQXCC_SKIP_FUNCTION are not valid

For an MQXR_CONNECTION exit function:

- CompCode and Reason are set in the same way as MQXR_BEFORE
- ExitResponse2 is ignored
- MQXCC_SUPPRESS_FUNCTION, MQXCC_SKIP_FUNCTION, MQXCC_SUPPRESS_EXIT are not valid

In all cases, where an exit or the queue manager sets CompCode and Reason, the values set can be changed by an exit invoked later, or by the API call (if the API call is invoked later).

*Table 655. MQXR_BEFORE exit processing*

| Value of ExitResponse | CompCode and Reason set by | Value of ExitResponse2 (default continuation) Chain | Value of ExitResponse2 (default continuation) API |
|---|---|---|---|
| MQXCC_OK | exit | Y | Y |
| MQXCC_SUPPRESS_EXIT | exit | Y | Y |
| MQXCC_SUPPRESS_FUNCTION | queue manager | N | N |
| MQXCC_SKIP FUNCTION | exit | N | N |
| MQXCC_FAILED | queue manager | N | N |

### How clients process exit functions

In general, clients process exit functions in the same way that server applications do, and the *QMgrName* attribute in this structure applies whether the function is on a server or a client.

However, the client has no concept of the *mqs.ini* file, so the *ApiExitCommon* and *APIExitTemplate* stanzas do not apply. Only the *ApiExitLocal* stanza applies, and this stanza is configured in the *mqclient.ini* file.

## IBM MQ API exit context structure (MQAXC)

The MQAXC structure, an external control block, is used as an input parameter to an API exit.

MQAXC has the following C declaration:

```
typedef struct tagMQAXC {
   MQCHAR4   StrucId;               /* Structure identifier */
   MQLONG    Version;               /* Structure version number */
   MQLONG    Environment;           /* Environment */
   MQCHAR12  UserId;                /* UserId associated with appl */
   MQBYTE40  SecurityId             /* Extension to UserId running appl */
   MQCHAR264 ConnectionName;        /* Connection name */
   MQLONG    LongMCAUserIdLength;   /* long MCA user identifier length */
   MQLONG    LongRemoteUserIdLength; /* long remote user identifier length */
   MQPTR     LongMCAUserIdPtr;      /* long MCA user identifier address */
   MQPTR     LongRemoteUserIdPtr;   /* long remote user identifier address */
   MQCHAR28  ApplName;              /* Application name */
   MQLONG    ApplType;              /* Application type */
   MQPID     ProcessId;             /* Process identifier */
   MQTID     ThreadId;              /* Thread identifier */

   /* Ver:1 */
   MQCHAR    ChannelName[20]        /* Channel Name */
   MQBYTE4   Reserved1;             /* Reserved */
   PMQCD     pChannelDefinition;    /* Channel Definition pointer */
 };
```

The parameters to MQAXC are:

**StrucId (MQCHAR4) - input**
The exit context structure identifier, with a value of MQAXC_STRUC_ID. For C programs, the constant MQAXC_STRUC_ID_ARRAY is also defined, with the same value as MQAXC_STRUC_ID, but as an array of characters instead of a string.

The exit handler sets this field on entry to each exit function.

**Version (MQLONG) - input**
The structure version number, with a value of:

**MQAXC_VERSION_2**
Version number for the exit context structure.

**MQAXC_CURRENT_VERSION**
Current version number for the exit context structure.

The exit handler sets this field on entry to each exit function.

**Environment (MQLONG) - input**
The environment from which an IBM MQ API call was issued that resulted in an exit function being driven. Valid values for this field are:

**MQXE_OTHER**
This value is consistent with invocations an API exit sees if the exit is called from a server application. This means that an API exit runs unchanged on a client and does not see anything different.

If the exit really needs to determine whether it is running on the client, the exit can do so by looking at the *ChannelName* and *ChannelDefinition* fields.

**MQXE_MCA**
Message channel agent

**MQXE_MCA_SVRCONN**
A message channel agent acting on behalf of a client

**MQXE_COMMAND_SERVER**
The command server

**MQXE_MQSC**
The runmqsc command interpreter

The exit handler sets this field on entry to each exit function.

**UserId (MQCHAR12) - input**
The user ID associated with the application. In particular, in the case of client connections, this field contains the user ID of the adopted user as opposed to the user ID under which the channel code is running. If a blank user ID flows from the client, then no change is made to the user ID already being used. That is, no new user ID is adopted.

The exit handler sets this field on entry to each exit function. The length of this field is given by MQ_USER_ID_LENGTH.

In the case of a client, this is the user ID sent from the client to the server. Note, that this might not be the effective user ID the client is running against in the queue manager, as there could be an MCAUser or CHLAUTH configuration which changes the user ID.

**SecurityId (MQBYTE40) - input**
An extension to the user ID running the application. Its length is given by MQ_SECURITY_ID_LENGTH.

In the case of a client, this is the user ID sent from the client to the server. Note, that this might not be the effective user ID the client is running against in the queue manager, as there could be an MCAUser or CHLAUTH configuration which changes the user ID.

**ConnectionName (MQCHAR264) - input**
The connection name field, set to the address of the client. For example, for TCP/IP, it would be the client IP address.

The length of this field is given by MQ_CONN_NAME_LENGTH.

In the case of a client, this is the partner address of the queue manager.

**LongMCAUserIdLength (MQLONG) - input**
The length of the long MCA user identifier.

When MCA connects to the queue manager this field is set to the length of the long MCA user identifier (or zero if there is no such identifier).

In the case of a client, this is the client long user identifier.

**LongRemoteUserIdLength (MQLONG) - input**
The length of the long remote user identifier.

When MCA connects to the queue manager this field is set to the length of the long remote user identifier. Otherwise this field will be set to zero

In the case of a client, set this field to zero.

**LongMCAUserIdPtr (MQPTR) - input**
Address of long MCA user identifier.

When MCA connects to the queue manager this field is set to the address of the long MCA user identifier (or to a null pointer if there is no such identifier).

In the case of a client, this is the client long user identifier.

**LongRemoteUserIdPtr (MQPTR) - input**
The address of the long remote user identifier.

When MCA connects to the queue manager this field is set to the address of the long remote user identifier (or to a null pointer if there is no such identifier).

In the case of a client, set this field to zero.

**ApplName (MQCHAR28) - input**
The name of the application or component that issued the IBM MQ API call.

The rules for generating the ApplName are the same as for generating the default name for an MQPUT.

The value of this field is found by querying the operating system for the program name. Its length is given by MQ_APPL_NAME_LENGTH.

**ApplType (MQLONG) - input**
The type of application or component that issued the IBM MQ API call.

The value is MQAT_DEFAULT for the platform on which the application is compiled, or it equates to one of the defined MQAT_* values.

The exit handler sets this field on entry to each exit function.

**ProcessId (MQPID) - input**
The operating system process identifier.

Where applicable, the exit handler sets this field on entry to each exit function.

**ThreadId (MQTID) - input**
The MQ thread identifier. This is the same identifier used in MQ trace and FFST dumps, but might be different from the operating system thread identifier.

Where applicable, the exit handler sets this field on entry to each exit function.

**ChannelName (MQCHAR) - input**
The name of the channel, padded with blanks, if applicable and known.

If not applicable, this field is set to NULL characters.

**Reserved1 (MQBYTE4) - input**
This field is reserved.

**ChanneDefinition (PMQCD) - input**
A pointer to the channel definition being used, if applicable and known.

If not applicable, this field is set to NULL characters.

Note that the pointer is only completed if the connection is processing on behalf of an IBM MQ channel and that channel definition has been read.

In particular, the channel definition is not given on the server when the first MQCONN call is made for the channel. Furthermore, if the pointer is filled, the structure (and any sub structures) pointed to by the pointer must be treated as read only; any updating of the structure would lead to unpredictable results and is not supported.

In the case of a client, fields other than those with a value specified for a client, contain values that are appropriate for a client application.

## The exit chain area and exit chain area header (MQACH)

If required, an exit function can acquire storage for an exit chain area and set the ExitChainAreaPtr in MQAXP to point to this storage.

Exits (either the same or different exit functions) can acquire multiple exit chain areas and link them together. Exit chain areas must only be added or removed from this list while called from the exit handler. This ensures that there are no serialization issues caused by different threads adding or removing areas from the list at the same time.

An exit chain area must start with an MQACH header structure, the C declaration for which is:

```
typedef struct tagMQACH {
   MQCHAR4   StrucId;             /* Structure identifier */
   MQLONG    Version;             /* Structure version number */
   MQLONG    StrucLength;         /* Length of the MQACH structure */
   MQLONG    ChainAreaLength;     /* Exit chain area length */
   MQCHAR48  ExitInfoName         /* Exit information name */
   PMQACH    NextChainAreaPtr;    /* Pointer to next exit chain area */
 };
```

The fields in the exit chain area header are:

**StrucId (MQCHAR4) - input**
The exit chain area structure identifier, with an initial value, defined by MQACH_DEFAULT, of MQACH_STRUC_ID.

For C programs, the constant MQACH_STRUC_ID_ARRAY is also defined; this has the same value as MQACH_STRUC_ID, but as an array of characters instead of a string.

**Version (MQLONG) - input**
The structure version number, as follows:

**MQACH_VERSION_1**
The version number for the exit parameter structure.

**MQACH_CURRENT_VERSION**
The current version number for the exit context structure.

The initial value of this field, defined by MQACH_DEFAULT, is MQACH_CURRENT_VERSION.

**Note:** If you introduce a new version of this structure, the layout of the existing part does not change. Exit functions must check that the version number is equal to or greater than the lowest version containing the fields that the exit function needs to use.

**StrucLength (MQLONG) - input**
The length of the MQACH structure. Exits can use this field to determine the start of the exit data, setting it to the length of the structure created by the exit.

The initial value of this field, defined by MQACH_DEFAULT, is MQACH_CURRENT_LENGTH.

**ChainAreaLength (MQLONG) - input**
The exit chain area length, set to the overall length of the current exit chain area, including the MQACH header.

The initial value of this field, defined by MQACH_DEFAULT, is zero.

**ExitInfoName (MQCHAR48) - input**
The exit information name.

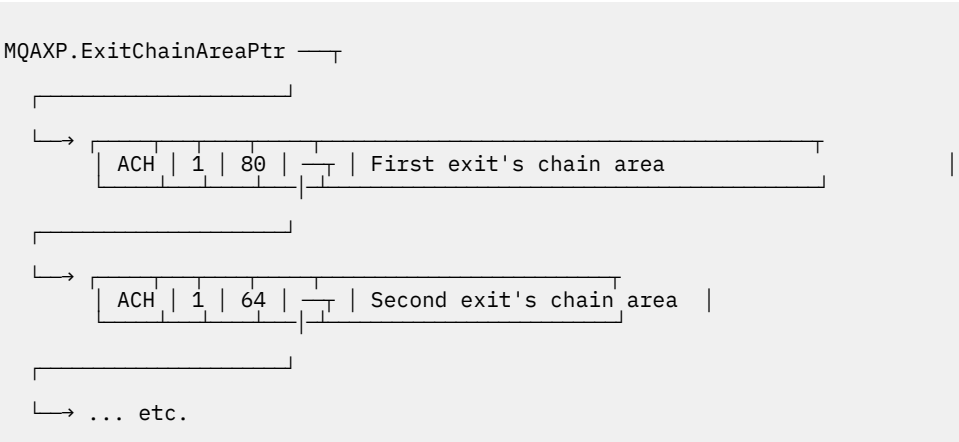
When an exit creates an MQACH structure, it must initialize this field with its own ExitInfoName, so that later this MQACH structure can be found by either another instance of this exit, or by a cooperating exit.

The initial value of this field, defined by MQACH_DEFAULT, is a zero length string ({""}).

**NextChainAreaPtr (PMQACH) - input**
A pointer to the next exit chain area with an initial value, defined by MQACH_DEFAULT, of null pointer (NULL ).

Exit functions must release the storage for any exit chain areas that they acquire, and manipulate the chain pointers to remove their exit chain areas from the list.

An exit chain area can be constructed as follows:




## External constants

Use this topic as reference information for external constants available for API exists.

The following external constants are available for API exits:

**MQXF_* (exit function identifiers)**

```
MQXF_INIT                       1       X'00000001'
MQXF_TERM                       2       X'00000002'
MQXF_CONN                       3       X'00000003'
MQXF_CONNX                      4       X'00000004'
MQXF_DISC                       5       X'00000005'
MQXF_OPEN                       6       X'00000006'
MQXF_CLOSE                      7       X'00000007'
MQXF_PUT1                       8       X'00000008'
MQXF_PUT                        9       X'00000009'
MQXF_GET                        10      X'0000000A'
MQXF_DATA_CONV_ON_GET           11      X'0000000B'
MQXF_INQ                        12      X'0000000C'
MQXF_SET                        13      X'0000000D'
MQXF_BEGIN                      14      X'0000000E'
MQXF_CMIT                       15      X'0000000F'
MQXF_BACK                       16      X'00000010'
MQXF_STAT                       18      X'00000012'
MQXF_CB                         19      X'00000013'
MQXF_CTL                        20      X'00000014'
MQXF_CALLBACK                   21      X'00000015'
MQXF_SUB                        22      X'00000016'
MQXF_SUBRQ                      23      X'00000017'
MQXF_XACLOSE                    24      X'00000018'
MQXF_XACOMMIT                   25      X'00000019'
MQXF_XACOMPLETE                 26      X'0000001A'
MQXF_XAEND                      27      X'0000001B'
MQXF_XAFORGET                   28      X'0000001C'
```

```
MQXF_XAOPEN                     29      X'0000001D'
MQXF_XAPREPARE                  30      X'0000001E'
MQXF_XARECOVER                  31      X'0000001F'
MQXF_XAROLLBACK                 32      X'00000020'
MQXF_XASTART                    33      X'00000021'
MQXF_AXREG                      34      X'00000022'
MQXF_AXUNREG                    35      X'00000023'
```

**MQXR_* (exit reasons)**

```
MQXR_BEFORE                     1       X'00000001'
MQXR_AFTER                      2       X'00000002'
MQXR_CONNECTION                 3       X'00000003'
```

**MQXE_* (environments)**

```
MQXE_OTHER                      0       X'00000000'
MQXE_MCA                        1       X'00000001'
MQXE_MCA_SVRCONN                2       X'00000002'
MQXE_COMMAND_SERVER             3       X'00000003'
MQXE_MQSC                       4       X'00000004'
```

**MQ*_* (additional constants)**

```
MQAXP_VERSION_1                 1
MQAXP_VERSION_2                 2
MQAXC_VERSION_1                 1
MQACH_VERSION_1                 1

MQAXP_CURRENT_VERSION           1
MQAXC_CURRENT_VERSION           1
MQACH_CURRENT_VERSION           1

MQXACT_EXTERNAL                 1
MQXACT_INTERNAL                 2

MQXT_API_EXIT                   2

MQACH_LENGTH_1                  68 (32-bit platforms)
                                72 (64-bit platforms)
                                80 (128-bit platforms)

MQACH_CURRENT_LENGTH            68 (32-bit platforms)
                                72 (64-bit platforms)
                                80 (128-bit platforms)
```

**MQ*_* (null constants)**

```
MQXPDA_NONE                     X'00...00' (48 nulls)
MQXPDA_NONE_ARRAY               '\0','\0',...,'\0','\0'
```

**MQXCC_* (completion codes)**

```
MQXCC_FAILED                   -8
```

**MQRC_* (reason codes)**

**MQRC_API_EXIT_ERROR 2374 X'00000946'**
An exit function invocation has returned an invalid response code, or has failed in some way, and the queue manager cannot determine the next action to take.

Examine both the ExitResponse and ExitResponse2 fields of the MQAXP to determine the bad response code, and change the exit to return a valid response code.

**MQRC_API_EXIT_INIT_ERROR 2375 X'00000947'**
The queue manager encountered an error while initializing the execution environment for an API exit function.

**MQRC_API_EXIT_TERM_ERROR 2376 X'00000948'**
The queue manager encountered an error while closing the execution environment for an API exit function.

**MQRC_EXIT_REASON_ERROR 2377 X'00000949'**
The value of the ExitReason field supplied on an exit entry point registration call (MQXEP) call is in error.

Examine the value of the ExitReason field to determine and correct the bad exit reason value.

**MQRC_RESERVED_VALUE_ERROR 2378 X'0000094A'**
The value of the Reserved field is in error.

Examine the value of the Reserved field to determine and correct the Reserved value.

## C language typedefs

This topic provides information about typedefs associated with API exits available in C language.

Here are the C language typedefs associated with the API exits:

```
typedef PMQLONG  MQPOINTER PPMQLONG;
typedef PMQBYTE  MQPOINTER PPMQBYTE;
typedef PMQHOBJ  MQPOINTER PPMQHOBJ;
typedef PMQOD    MQPOINTER PPMQOD;
typedef PMQMD    MQPOINTER PPMQMD;
typedef PMQPMO   MQPOINTER PPMQPMO;
typedef PMQGMO   MQPOINTER PPMQGMO;
typedef PMQCNO   MQPOINTER PPMQCNO;
typedef PMQBO    MQPOINTER PPMQBO;

typedef MQAXP    MQPOINTER PMQAXP;
typedef MQACH    MQPOINTER PMQACH;
typedef MQAXC    MQPOINTER PMQAXC;

typedef MQCHAR   MQCHAR16[16];
typedef MQCHAR16 MQPOINTER PMQCHAR16;

typedef MQLONG   MQPID;
typedef MQLONG   MQTID;
```

## The exit entry point registration call (MQXEP)

Use this information to learn about MQXEP, MQXEP C language invocation, and MQXEP C function prototype.

Use the MQXEP call to:

1. Register the before and after IBM MQ API exit invocation points at which to invoke exit functions
2. Specify the exit function entry points
3. Deregister the exit function entry points

You would typically code the MQXEP calls in the MQ_INIT_EXIT exit function, but you can specify them in any subsequent exit function.

If you use an MQXEP call to register an already registered exit function, the second MQXEP call completes successfully, replacing the registered exit function.

If you use an MQXEP call to register a NULL exit function, the MQXEP call completes successfully and the exit function is deregistered.

If MQXEP calls are used to register, deregister, and reregister a particular exit function during the life of a connection request, the previously registered exit function is reactivated. Any storage still allocated and associated with this exit function instance is available for use by the exit's functions. (This storage is typically released during the invocation of the termination exit function.)

The interface to MQXEP is:

```
MQXEP (Hconfig, ExitReason, Function, EntryPoint, &ExitOpts, &CompCode, &Reason)
```

where:

**Hconfig (MQHCONFIG) - input**
The configuration handle, representing the API exit that includes the set of functions being initialized. This value is generated by the queue manager immediately before invoking the MQ_INIT_EXIT function, and is passed in the MQAXP to each API exit function.

**ExitReason (MQLONG) - input**
The reason for which the entry point is being registered, from the following reasons:

- Connection level initialization or termination (MQXR_CONNECTION)
- Before an IBM MQ API call (MQXR_BEFORE)
- After an IBM MQ API call (MQXR_AFTER)

**Function (MQLONG) - input**
The function identifier, valid values for which are the MQXF_* constants (see "External constants" on page 1590 ).

**EntryPoint (PMQFUNC) - input**
The address of the entry point for the exit function to be registered. The value NULL indicates either that the exit function has not been provided, or that a previous registration of the exit function is being deregistered.

**ExitOpts(MQXEPO)**
API exits can specify options that control how API exits are registered. If a null pointer is specified for this field, the default values of the MQXEPO structure are assumed.

**CompCode (MQLONG) - output**
The completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
The reason code that qualifies the completion code.

If the completion code is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If the completion code is MQCC_FAILED:

**MQRC_HCONFIG_ERROR**
(2280, X'8E8') The supplied configuration handle is not valid. Use the configuration handle from the MQAXP.

**MQRC_EXIT_REASON_ERROR**
(2377, X'949') The supplied exit function invocation reason is either not valid or is not valid for the supplied exit function identifier.

Either use one of the valid exit function invocation reasons (MQXR_* value), or use a valid function identifier and exit reason combination. (See Table 656 on page 1594.)

**MQRC_FUNCTION_ERROR**
(2281, X'8E9') The supplied function identifier is not valid for API exit reason. The following table shows valid combinations of function identifiers and ExitReasons.

*Table 656. Valid combinations of function identifiers and ExitReasons*

| Function | ExitReason |
|---|---|
| MQXF_INIT<br>MQXF_TERM | MQXR_CONNECTION |
| MQXF_CONN<br>MQXF_CONNX<br>MQXF_DISC<br>MQXF_OPEN<br>MQXF_CLOSE<br>MQXF_PUT1<br>MQXF_PUT<br>MQXF_GET<br>MQXF_INQ<br>MQXF_SET<br>MQXF_BEGIN<br>MQXF_CMIT<br>MQXF_BACK<br>MQXF_STAT<br>MQXF_CB<br>MQXF_CTL<br>MQXF_CALLBACK<br>MQXF_SUB<br>MQXF_SUBRQ | MQXR_BEFORE<br>MQXR_AFTER |
| MQXF_DATA_CONV_ON_GET | MQXR_BEFORE |

**MQRC_RESOURCE_PROBLEM**
(2102, X'836') An attempt to register or deregister an exit function has failed because of a resource problem.

**MQRC_UNEXPECTED_ERROR**
(2195, X'893') An attempt to register or deregister an exit function has failed unexpectedly.

**MQRC_PROPERTY_NAME_ERROR**
(2442, X'098A') Invalid ExitProperties name.

**MQRC_XEPO_ERROR**
(2507, X'09CB') Exit options structure not valid.

## MQXEP C language invocation

```
MQXEP (Hconfig, ExitReason, Function, EntryPoint, &ExitOpts, &CompCode, &Reason);
```

Declaration for parameter list:

```
    MQHCONFIG       Hconfig;        /* Configuration handle */
    MQLONG          ExitReason;     /* Exit reason */
    MQLONG          Function;       /* Function identifier */
    PMQFUNC         EntryPoint;     /* Function entry point */
    MQXEPO          ExitOpts;       /* Options that control the action of MQXEP */
    MQLONG          CompCode;       /* Completion code */
    MQLONG          Reason;         /* Reason code qualifying completion
                                       code */
```

### MQXEP C function prototype

```
void MQXEP (
MQHCONFIG    Hconfig,        /* Configuration handle */
MQLONG       ExitReason,     /* Exit reason */
MQLONG       Function,       /* Function identifier */
PMQFUNC      EntryPoint,     /* Function entry point */
PMQXEPO      pExitOpts;      /* Options that control the action of MQXEP */
PMQLONG      pCompCode,      /* Address of completion code */
PMQLONG      pReason);       /* Address of reason code qualifying completion
                                code */
```

## Exit functions

This section provides some general information to help you when using the function calls and describes how to invoke the individual exit functions.

Use this information to understand the general rules for API exit routines, and setting up and cleaning up the exit execution environment.

### General rules for API exit routines

The following general rules apply when invoking API exit routines:

- In all cases, API exit functions are driven before validating API call parameters, and before any security checks (in the case of MQCONN, MQCONNX, or MQOPEN).
- The values of fields entered into and output from an exit routine are:
  - On input to a *before* IBM MQ API exit function, the value of a field can be set by the application program, or by a previous exit function invocation.
  - On output from a *before* IBM MQ API exit function, the value of a field can be left unchanged, or set to some other value by the exit function.
  - On input to an *after* IBM MQ API exit function, the value of a field can be the value set by the queue manager after processing the IBM MQ API call, or can be set to a value by a previous exit function invocation in the chain of exit functions.
  - On output from an *after* IBM MQ API call exit function, the value of a field can be left unchanged, or set to some other value by the exit function.
- Exit functions must communicate with the queue manager by using the ExitResponse and ExitResponse2 fields.
- The CompCode and Reason code fields communicate back to the application. The queue manager and exit functions can set the CompCode and Reason code fields.
- The MQXEP call returns new reason codes to the exit functions that call MQXEP. However, exit functions can translate these new reason codes to any existing reasons codes that existing and new applications can understand.
- Each exit function prototype has similar parameters to the API function with an extra level of indirection except for the CompCode and Reason.
- API exits can issue MQI calls (except MQDISC), but these MQI calls do not themselves invoke API exits.

Note, that whether the application is on a server or a client, you cannot predict the sequencing of the API exit calls. An API exit BEF0RE call might not be followed immediately by an AFTER call.

The BEF0RE call can be followed by another BEF0RE call. For example:

BEFORE MQCTL
BEFORE Callback
BEFORE MQPUT
AFTER MQPUT
AFTER Callback

AFTER MQCTL

or

BEFORE XAOPEN
BEFORE MQCONNX
AFTER MQCONNX
AFTER XAOPEN

On the client, there is an exit that can modify the behavior of the MQCONN or MQCONNX call, called the `PreConnect` exit. The `PreConnect` exit can modify any of the parameters on the MQCONN or MQCONNX call including the queue manager name. The client calls this exit first and then invokes the MQCONN or MQCONNX call. Note that only the initial MQCONN or MQCONNX call invokes the API exit; any subsequent reconnect calls have no effect.

## The execution environment

In general, all errors from exit functions are communicated back to the exit handler using the ExitResponse and ExitResponse2 fields in MQAXP.

These errors in turn are converted into MQCC_* and MQRC_* values and communicated back to the application in the CompCode and Reason fields. However, any errors encountered in the exit handler logic are communicated back to the application as MQCC_* and MQRC_* values in the CompCode and Reason fields.

If an MQ_TERM_EXIT function returns an error:

- The MQDISC call has already taken place
- There is no other opportunity to drive the *after* MQ_TERM_EXIT exit function (and thus perform exit execution environment cleanup)
- Exit execution environment cleanup is *not* performed

The exit cannot be unloaded as it might still be in use. Also, other registered exits further down in the exit chain for which the *before* exit was successful, will be driven in the reverse order.

## Setting up the exit execution environment

While processing an explicit MQCONN or MQCONNX call, exit handling logic sets up the exit execution environment before invoking the exit initialization function (MQ_INIT_EXIT). Exit execution environment setup involves loading the exit, acquiring storage for, and initializing exit parameter structures. The exit configuration handle is also allocated.

If errors occur during this phase, the MQCONN or MQCONNX call fails with CompCode MQCC_FAILED and one of the following reason codes:

**MQRC_API_EXIT_LOAD_ERROR**
An attempt to load an API exit module has failed.

**MQRC_API_EXIT_NOT_FOUND**
An API exit function could not be found in the API exit module.

**MQRC_STORAGE_NOT_AVAILABLE**
An attempt to initialize the execution environment for an API exit function failed because insufficient storage was available.

**MQRC_API_EXIT_INIT_ERROR**
An error was encountered while initializing the execution environment for an API exit function.

## Cleaning up the exit execution environment

While processing an explicit MQDISC call, or an implicit disconnect request as a result of an application ending, exit handling logic might need to clean up the exit execution environment after invoking the exit termination function (MQ_TERM_EXIT), if registered.

Cleaning up the exit execution environment involves releasing storage for exit parameter structures, possibly deleting any modules previously loaded into memory.

If errors occur during this phase, an explicit MQDISC call fails with CompCode MQCC_FAILED and the following reason code (errors are not highlighted on implicit disconnect requests):

**MQRC_API_EXIT_TERM_ERROR**
An error was encountered while closing the execution environment for an API exit function. The exit should *not* return any failure from the MQDISC before or after the MQ_TERM* API exit function calls.

### *API exits on clients*

A client uses the PreConnect exit to modify the behavior of the MQCONN and MQCONNX calls and does not support API exit properties.

## PreConnect exit

On a client, the PreConnect exit can be used to look up the channel definition from a central repository, such as an LDAP server.

The PreConnect exit can also modify any parameter, or all the parameters, on an MQCONN or MQCONNX call itself, for example, the queue manager name.

In the case of client applications, the PreConnect exit must be called before the API exit because the MQCONN or MQCONNX API exit is called only once the name of the queue manager is known and this name can be changed by the PreConnect exit.

Note that only the initial MQCONN or MQCONNX call invokes the exit.

## API exit properties

On a server, API exits can register an MQXEPO structure at initialization time. The MQXEPO structure contains the ExitProperties field which details the group of properties the exit is interested in. This has the effect of generating a separate message property handle which the exit can manipulate separately from any application message property handle.

On a client, API exit properties are not supported. If an attempt is made to register a property group name on a client, the function fails with a reason code of MQRC_EXIT_PROPS_NOT_SUPPORTED.

### *Backout - MQ_BACK_EXIT*

MQ_BACK_EXIT provides a backout exit function to perform *before* and *after* backout processing. Use function identifier MQXF_BACK with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* backout call exit functions.

The interface to this function is:

```
MQ_BACK_EXIT (&ExitParms, &ExitContext, &Hconn, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;      /* Exit parameter structure */
MQAXC    ExitContext;    /* Exit context structure */
MQHCONN  Hconn;          /* Connection handle */
MQLONG   CompCode;       /* Completion code */
MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_BACK_EXIT (&ExitParms, &ExitContext, &Hconn, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_BACK_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

## *Begin - MQ_BEGIN_EXIT*

MQ_BEGIN_EXIT provides a begin exit function to perform *before* and *after* MQBEGIN call processing. Use function identifier MQXF_BEGIN with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQBEGIN call exit functions.

The interface to this function is:

```
MQ_BEGIN_EXIT (&ExitParms, &ExitContext, &Hconn, &pBeginOptions, &CompCode,
               &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pBeginOptions (PMQBO)- input/output**
Pointer to begin options.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
        MQAXP    ExitParms;      /* Exit parameter structure */
        MQAXC    ExitContext;    /* Exit context structure */
        MQHCONN  Hconn;          /* Connection handle */
        PMQBO    pBeginOptions;  /* Ptr to begin options */
        MQLONG   CompCode;       /* Completion code */
        MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_BEGIN_EXIT (&ExitParms, &ExitContext, &Hconn, &pBeginOptions, &CompCode,
               &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_BEGIN_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PPMQBO    ppBeginOptions,   /* Address of ptr to begin options */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

## *Callback - MQ_CALLBACK_EXIT*

MQ_CALLBACK_EXIT provides an exit function to perform *before* and *after* callback processing. Use function identifier MQXF_CALLBACK with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* callback call exit functions.

The interface to this function is:

```
MQ_CALLBACK_EXIT (&ExitParms, &ExitContext, &Hconn, &pMsgDesc, &pGetMsgOpts,
                  &pBuffer, &pMQCBContext)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure

**ExitContext (MQAXC) - input/output**
Exit context structure

**Hconn (MQHCONN) - input/output**
Connection handle

**pMsgDesc**
Message descriptor

**pGetMsgOpts**
Options that control the action of MQGET

**pBuffer**
Area to contain the message data

**pMQCBContext**
Context data for the callback

## C language invocation

The queue manager logically defines the following variables:

```
        MQAXP    ExitParms;      /* Exit parameter structure */
        MQAXC    ExitContext;    /* Exit context structure */
        MQHCONN  Hconn;          /* Connection handle */
        PMQMD    pMsgDesc;       /* Message descriptor */
        PMQGMO   pGetMsgOpts;    /* Options that define the operation of the consumer */
        PMQVOID  pBuffer;        /* Area to contain the message data */
        PMQCBC   pContext;       /* Context data for the callback */
```

The queue manager then logically calls the exit as follows:

```
MQ_SUBRQ_EXIT (&ExitParms, &ExitContext, &Hconn, &pMsgDesc, &pGetMsgOpts, &pBuffer,
               &pContext);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CALLBACK_EXIT (
PMQAXP    pExitParms;    /* Exit parameter structure */
PMQAXC    pExitContext;  /* Exit context structure */
PMQHCONN  pHconn;        /* Connection handle */
PPMQMD    ppMsgDesc;     /* Message descriptor */
PPMQGMO   ppGetMsgOpts;  /* Options that define the operation of the consumer */
PPMQVOID  ppBuffer;      /* Area to contain the message data */
PPMQCBC   ppContext;)    /* Context data for the callback */
```

## Usage notes

1. The Callback exit is invoked before the consumer is invoked and after the consumer's consumer function has completed. Although the MQMD and MQGMO structures are alterable, changing the values in the before exit does not redrive the retrieval of a message from the queue as the message has already been removed from the queue to be delivered to the consumer function

### *Manage callback functions - MQ_CB_EXIT*

MQ_CB_EXIT provides an exit function to perform *before* and *after* the MQCB call. Use function identifier MQXF_CB with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQCB call exit functions.

The interface to this function is:

```
MQ_CB_EXIT (&ExitParms, &ExitContext, &Hconn, &Operation, &pCallbackDesc,
            &Hobj, &pMsgDesc, &pGetMsgOpts, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure

**ExitContext (MQAXC) - input/output**
Exit context structure

**Hconn (MQHCONN) - input/output**
Connection handle

**Operation (MQLONG) - input/output**
Operation value

**pCallbackDesc (PMQCBD) - input/output**
Callback descriptor

**Hobj (MQHOBJ) - input/output**
Object handle

**pMsgDesc (PMQMD) - input/output**
Message descriptor

**pGetMsgOpts (PMQGMO) - input/output**
Options that control the action of MQCB

**CompCode (MQLONG) - input/output**
Completion code

**Reason (MQLONG) - input/output**
Reason code qualifying CompCode

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;      /* Exit parameter structure */
MQAXC    ExitContext;    /* Exit context structure */
MQHCONN  Hconn;          /* Connection handle */
MQLONG   Operation;      /* Operation value. */
MQCBD    pMsgDesc;       /* Callback descriptor. */
MQHOBJ   Hobj;           /* Object handle. */
PMQMD    pMsgDesc;       /* Message descriptor */
PMQGMO   pGetMsgOpts;    /* Options that define the operation of the consumer */
PMQLONG  CompCode;       /* Completion code. */
PMQLONG  Reason;         /* Reason code qualifying CompCode. */
```

The queue manager then logically calls the exit as follows:

```
MQ_CB_EXIT (&ExitParms, &ExitContext, &Hconn, &Operation, &Hobj, &pMsgDesc,
            &pGetMsgOpts, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CB_EXIT (
PMQAXP     pExitParms;     /* Exit parameter structure */
PMQAXC     pExitContext;   /* Exit context structure */
PMQHCONN   pHconn;         /* Connection handle */
PMQLONG    pOperation;     /* Callback operation */
PMQHOBJ    pHobj;          /* Object handle */
PPMQMD     ppMsgDesc;      /* Message descriptor */
PPMQGMO    ppGetMsgOpts;   /* Options that control the action of MQCB */
PMQLONG    pCompCode;      /* Completion code */
PMQLONG    pReason;        /* Reason code qualifying CompCode */
```

### *Close - MQ_CLOSE_EXIT*

MQ_CLOSE_EXIT provides a close exit function to perform *before* and *after* MQCLOSE call processing. Use function identifier MQXF_CLOSE with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQCLOSE call exit functions.

The interface to this function is:

```
MQ_CLOSE_EXIT (&ExitParms, &ExitContext, &Hconn, &pHobj,
               &Options, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pHobj (PMQHOBJ) - input**
Pointer to object handle.

**Options (MQLONG)- input/output**
Close options.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
        MQAXP           ExitParms;      /* Exit parameter structure */
        MQAXC           ExitContext;    /* Exit context structure */
        MQHCONN         Hconn;          /* Connection handle */
        PMQHOBJ         pHobj;          /* Ptr to object handle */
        MQLONG          Options;        /* Close options */
        MQLONG          CompCode;       /* Completion code */
        MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_CLOSE_EXIT (&ExitParms, &ExitContext,&Hconn, &pHobj, &Options,
               &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CLOSE_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQHCONN        pHconn,         /* Address of connection handle */
PPMQHOBJ        ppHobj,         /* Address of ptr to object handle */
PMQLONG         pOptions,       /* Address of close options */
PMQLONG         pCompCode,      /* Address of completion code */
```

```
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

### *Commit - MQ_CMIT_EXIT*

MQ_CMIT_EXIT provides a commit exit function to perform *before* and *after* commit processing. Use function identifier MQXF_CMIT with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* commit call exit functions.

If a commit operation fails, and the transaction is backed out, the MQCMIT call fails with MQCC_WARNING and MQRC_BACKED_OUT. These return and reason codes are passed into any *after* MQCMIT exit functions to give the exit functions an indication that the unit of work has been backed out.

The interface to this function is:

```
MQ_CMIT_EXIT (&ExitParms, &ExitContext, &Hconn, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;      /* Exit parameter structure */
MQAXC    ExitContext;    /* Exit context structure */
MQHCONN  Hconn;          /* Connection handle */
MQLONG   CompCode;       /* Completion code */
MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_CMIT_EXIT (&ExitParms, &ExitContext,&Hconn, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CMIT_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

## Usage notes

1. The MQ_GET_EXIT function interface described here is used for both the MQXF_GET exit function and the "MQXF_DATA_CONV_ON_GET" on page 1610 exit function.

   Separate entry points are defined for these two exit functions, so to intercept *both* the MQXEP call must be used twice; for this call use function identifier MQXF_GET.

   Because the MQ_GET_EXIT interface is the same for MQXF_GET and MQXF_DATA_CONV_ON_GET, a single exit function can be used for both; the *Function* field in the MQAXP structure indicates which exit function has been invoked. Alternatively, the MQXEP call can be used to register different exit functions for the two cases.

### *Connect and connect extension - MQ_CONNX_EXIT*

MQ_CONNX_EXIT provides:

- Connection exit function to perform *before* and *after* MQCONN processing
- Connection extension exit function to perform *before* and *after* MQCONNX processing

The same interface, described here, is invoked for both MQCONN and MQCONNX call exit functions.

When the message channel agent (MCA) responds to an inbound client connection, the MCA can connect and make a number of IBM MQ API calls before the client state is fully known. These API calls call the API exit functions with the MQAXC based on the MCA program itself (for example in the UserId and ConnectionName fields of the MQAXC).

When the MCA responds to subsequent inbound client API calls, the MQAXC structure is based on the inbound client, setting the UserId and ConnectionName fields appropriately.

The queue manager name set by the application on an MQCONN or MQCONNX call is passed to the underlying connect call. Any attempt by a *before* MQ_CONNX_EXIT to change the name of the queue manager has no effect.

Use function identifiers MQXF_CONN and MQXF_CONNX with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQCONN and MQCONNX call exit functions.

An MQ_CONNX_EXIT exit called for reason MQXR_BEFORE *must not* issue any IBM MQ API calls, as the correct environment has not been set up at this time.

An MQ_CONNX_EXIT cannot call MQDISC from an API exit call for the connection for which it is being called. This restriction is applicable to both client and server API exits.

The interface to MQCONN and MQCONNX is identical:

```
MQ_CONNX_EXIT (&ExitParms, &ExitContext, &pQMgrName, &pConnectOpts,
&pHconn, &CompCode, &Reason);
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**pQMgrName (PMQCHAR) - input**
Pointer to the queue manager name supplied on the MQCONNX call. The exit must not change this name on the MQCONN or MQCONNX call.

**pConnectOpts (PMQCNO) - input/output**
Pointer to the options that control the action of the MQCONNX call.

See "MQCNO - Connect options" on page 310 for details.

For exit function MQXF_CONN, pConnectOpts points to the default connect options structure (MQCNO_DEFAULT).

**pHconn (PMQHCONN) - input**
Pointer to the connection handle.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion)

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
PMQCHAR         pQMgrName;      /* Ptr to Queue manager name */
PMQCNO          pConnectOpts;   /* Ptr to Connection options */
PMQHCONN        pHconn;         /* Ptr to Connection handle */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_CONNX_EXIT (&ExitParms, &ExitContext, &pQMgrName, &pConnectOps,
               &pHconn, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CONNX_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PPMQCHAR        ppQMgrName,     /* Address of ptr to queue manager name */
PPMQCNO         ppConnectOpts,  /* Address of ptr to connection options */
PPMQHCONN       ppHconn,        /* Address of ptr to connection handle */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

## Usage notes

1. The MQ_CONNX_EXIT function interface described here is used for both the MQCONN call and the MQCONNX call. However, separate entry points are defined for these two calls. To intercept *both* calls, the MQXEP call must be used at least twice - once with function identifier MQXF_CONN, and again with MQXF_CONNX.

   Because the MQ_CONNX_EXIT interface is the same for MQCONN and MQCONNX, a single exit function can be used for both calls; the *Function* field in the MQAXP structure indicates which call is in progress. Alternatively, the MQXEP call can be used to register different exit functions for the two calls.
2. When a message channel agent (MCA) responds to an inbound client connection, the MCA can issue a number of MQ calls before the client state is fully known. These MQ calls result in the API exit functions being invoked with the MQAXC structure containing data relating to the MCA, and not to the client (for example, user identifier and connection name). However, once the client state is fully known, subsequent MQ calls result in the API exit functions being invoked with the appropriate client data in the MQAXC structure.
3. All MQXR_BEFORE exit functions are invoked before any parameter validation is performed by the queue manager. The parameters might therefore be invalid (including invalid pointers for the addresses of parameters).

   The MQ_CONNX_EXIT function is invoked before any authorization checks are performed by the queue manager.
4. The exit function must not change the name of the queue manager specified on the MQCONN or MQCONNX call. If the name is changed by the exit function, the results are undefined.
5. An MQXR_BEFORE exit function for the MQ_CONNX_EXIT cannot issue MQ calls other than MQXEP.

### *Control callback - MQ_CTL_EXIT*

MQ_CTL_EXIT provides a subscription request exit function to perform *before* and *after* control callback processing. Use function identifier MQXF_CTL with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* control callback call exit functions.

The interface to this function is:

```
MQ_CTL_EXIT (&Hconn, &Operation, &ControlOpts, &CompCode, &Reason)
```

where the parameters are:

**Hconn (MQHCONN) - input/output**
Connection handle.

**Operation (MQLONG) input/output**
The operation being processed on the callback defined for the specified object handle

**ControlOpts (MQCTLO) input/output**
Options that control the action of MQCTL

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQHCONN  Hconn;          /* Connection handle */
MQLONG   Operation;      /* Operation being processed */
MQCTLO   ControlOpts;    /* Options that control the action of MQCTL  */
MQLONG   CompCode;       /* Completion code */
MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_CTL_EXIT (&Hconn, &Operation, &ControlOpts, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_CTL_EXIT (
PMQHCONN  pHconn;          /* Address of connection handle */
PMQLONG   pOperation;      /* Address of operation being processed */
PMQCTLO   pControlOpts;    /* Address of options that control the action of MQCTL  */
PMQLONG   pCompCode;       /* Address of completion code */
PMQLONG   pReason;)        /* Address of reason code qualifying completion code */
```

## *Disconnect - MQ_DISC_EXIT*

MQ_DISC_EXIT provides a disconnect exit function to perform *before* and *after* MQDISC exit processing. Use function identifier MQXF_DISC with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQDISC call exit functions.

The interface to this function is

```
MQ_DISC_EXIT (&ExitParms, &ExitContext, &pHconn,
&CompCode, &Reason);
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**pHconn (PMQHCONN) - input**
Pointer to the connection handle.

*For the before MQDISC call*, the value of this field is one of:

- The connection handle returned on the MQCONN or MQCONNX call
- Zero, for environments where an environment-specific adapter has connected to the queue manager
- A value set by a previous exit function invocation

*For the after MQDISC call*, the value of this field is zero or a value set by a previous exit function invocation.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
PMQHCONN        pHconn;         /* Ptr to Connection handle */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_DISC_EXIT (&ExitParms, &ExitContext, &pHconn,
              &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_DISC_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PPMQHCONN       ppHconn,        /* Address of ptr to connection handle */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

### *Get - MQ_GET_EXIT*

MQ_GET_EXIT provides a get exit function to perform *before* and *after* MQGET call processing.

There are two function identifiers:

1. Use MQXF_GET with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQGET call exit functions.
2. See “MQXF_DATA_CONV_ON_GET” on page 1610 for information on using the MQXF_DATA_CONV_ON_GET function identifier.

The interface to this function is:

```
MQ_GET_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &pMsgDesc,
             &pGetMsgOpts, &BufferLength, &pBuffer, &pDataLength,
             &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**Hobj (MQHOBJ) - input/output**
Object handle.

**pMsgDesc (PMQMD) - input/output**
Pointer to message descriptor.

**pGetMsgOpts (PMQGMO) - input/output**
Pointer to get message options.

**BufferLength (MQLONG) - input/output**
Message buffer length.

**pBuffer (PMQBYTE) - input/output**
Pointer to message buffer.

**pDataLength (PMQLONG) - input/output**
Pointer to data length field.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
MQHCONN         Hconn;          /* Connection handle */
MQHOBJ          Hobj;           /* Object handle */
PMQMD           pMsgDesc;       /* Ptr to message descriptor */
PMQPMO          pGetMsgOpts;    /* Ptr to get message options */
MQLONG          BufferLength;   /* Message buffer length */
PMQBYTE         pBuffer;        /* Ptr to message buffer */
PMQLONG         pDataLength;    /* Ptr to data length field */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_GET_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &pMsgDesc,
             &pGetMsgOpts, &BufferLength, &pBuffer, &pDataLength,
             &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_GET_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQHCONN        pHconn,         /* Address of connection handle */
PMQHOBJ         pHobj,          /* Address of object handle */
PPMQMD          ppMsgDesc,      /* Address of ptr to message descriptor */
PPMQGMO         ppGetMsgOpts,   /* Address of ptr to get message options */
PMQLONG         pBufferLength,  /* Address of message buffer length */
PPMQBYTE        ppBuffer,       /* Address of ptr to message buffer */
PPMQLONG        ppDataLength,   /* Address of ptr to data length field */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

## Usage notes

1. The MQ_GET_EXIT function interface described here is used for both the MQXF_GET exit function and the “MQXF_DATA_CONV_ON_GET” on page 1610 exit function.

   Separate entry points are defined for these two exit functions, so to intercept *both* the MQXEP call must be used twice; for this call use function identifier MQXF_GET.

   Because the MQ_GET_EXIT interface is the same for MQXF_GET and MQXF_DATA_CONV_ON_GET, a single exit function can be used for both; the *Function* field in the MQAXP structure indicates which exit function has been invoked. Alternatively, the MQXEP call can be used to register different exit functions for the two cases.

### *MQXF_DATA_CONV_ON_GET*

See MQ_GET_EXIT for information about the interface to this call, and a sample C language declaration.

## Usage notes

If registered, this entry point is called when messages arrive at the application but before any data conversion has occurred. This can be useful if the API exit needs to perform processing, such as decryption or decompression, before the message is passed to data conversion. The exit can, if necessary, cause data conversion to be bypassed by returning MQXCC_SUPPRESS_FUNCTION; for more information, see MQAXP structure.

Registering for this entry point on a client has the effect of causing the data conversion to be performed locally on the client machine. For correct operation it might, therefore, be necessary to install the application conversion exits on the client. Note that MQXF_DATA_CONV_ON_GET is also used for asynchronous consume.

When using the MQ_GET_EXIT call, use MQXF_DATA_CONV_ON_GET, with exit reason MQXR_BEFORE, to register a *before* MQGET data conversion exit function.

There is no MQXR_AFTER exit function for MQXF_DATA_CONV_ON_GET; the MQXR_AFTER exit function for MQXF_GET provides the required capability for exit processing after data conversion.

Separate entry points are defined for the MQ_GET_EXIT call, so to intercept *both* exit functions, the MQXEP call must be used twice; for this call use function identifier MQXF_DATA_CONV_ON_GET.

Because the MQ_GET_EXIT interface is the same for MQXF_GET and MQXF_DATA_CONV_ON_GET, a single exit function can be used for both; the *Function* field in the MQAXP structure indicates which exit function has been invoked. Alternatively, the MQXEP call can be used to register different exit functions for the two cases.

### *Initialization - MQ_INIT_EXIT*

MQ_INIT_EXIT provides connection level initialization, indicated by setting ExitReason in MQAXP to MQXR_CONNECTION.

During the initialization, note the following:

- The MQ_INIT_EXIT function calls MQXEP to register the IBM MQ API verbs and the ENTRY and EXIT points in which it is interested.
- Exits do not need to intercept all the IBM MQ API verbs. Exit functions are invoked only if an interest has been registered.
- Storage that is to be used by the exit can be acquired while initializing it.
- If a call to this function fails, the MQCONN or MQCONNX call that invoked it also fails with a CompCode and Reason that depend on the value of the ExitResponse field in MQAXP.
- An MQ_INIT_EXIT exit must not issue IBM MQ API calls, because the correct environment has not been set up at this time.
- If an MQ_INIT_EXIT fails with MQXCC_FAILED, the queue manager returns from the MQCONN or MQCONNX call that called it with MQCC_FAILED and MQRC_API_EXIT_ERROR.
- If the queue manager encounters an error while initializing the API exit function execution environment before invoking the first MQ_INIT_EXIT, the queue manager returns from the MQCONN or MQCONNX call that invoked MQ_INIT_EXIT with MQCC_FAILED and MQRC_API_EXIT_INIT_ERROR.

The interface to MQ_INIT_EXIT is:

```
MQ_INIT_EXIT (&ExitParms, &ExitContext, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**CompCode (MQLONG) - input/output**
Pointer to completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Pointer to reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

The CompCode and Reason returned to the application depend on the value of the ExitResponse field in MQAXP.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_INIT_EXIT (&ExitParms, &ExitContext, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_INIT_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

## Usage notes

1. The MQ_INIT_EXIT function can issue the MQXEP call to register the addresses of the exit functions for the particular MQ calls to be intercepted. It is not necessary to intercept all MQ calls, or to intercept both MQXR_BEFORE and MQXR_AFTER calls. For example, an exit suite could choose to intercept only the MQXR_BEFORE call of MQPUT.
2. Storage that is to be used by exit functions in the exit suite can be acquired by the MQ_INIT_EXIT function. Alternatively, exit functions can acquire storage when they are invoked, as and when needed. However, all storage should be freed before the exit suite is terminated; the MQ_TERM_EXIT function can free the storage, or an exit function invoked earlier.
3. If MQ_INIT_EXIT returns MQXCC_FAILED in the *ExitResponse* field of MQAXP, or fails in some other way, the MQCONN or MQCONNX call that caused MQ_INIT_EXIT to be invoked also fails, with the *CompCode* and *Reason* parameters set to appropriate values.
4. An MQ_INIT_EXIT function cannot issue MQ calls other than MQXEP.

### *Inquire - MQ_INQ_EXIT*

MQ_INQ_EXIT provides an inquire exit function to perform *before* and *after* MQINQ call processing. Use function identifier MQXF_INQ with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQINQ call exit functions.

The interface to this function is:

```
MQ_INQ_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &SelectorCount,
             &pSelectors, &IntAttrCount, &pIntAttrs, &CharAttrLength,
             &pCharAttrs, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**Hobj (MQHOBJ) - input**
Object handle.

**SelectorCount (MQLONG) - input**
Count of selectors

**pSelectors (PMQLONG) - input/output**
Pointer to array of selector values.

**IntAttrCount (MQLONG) - input**
Count of integer attributes.

**pIntAttrs (PMQLONG) - input/output**
Pointer to array of integer attribute values.

**CharAttrLength (MQLONG) - input/output**
Character attributes array length.

**pCharAttrs (PMQCHAR) - input/output**
Pointer to character attributes array.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;       /* Exit parameter structure */
MQAXC    ExitContext;     /* Exit context structure */
MQHCONN  Hconn;           /* Connection handle */
MQHOBJ   Hobj;            /* Object handle */
MQLONG   SelectorCount;   /* Count of selectors */
PMQLONG  pSelectors;      /* Ptr to array of attribute selectors */
MQLONG   IntAttrCount;    /* Count of integer attributes */
PMQLONG  pIntAttrs;       /* Ptr to array of integer attributes */
MQLONG   CharAttrLength;  /* Length of char attributes array */
PMQCHAR  pCharAttrs;      /* Ptr to character attributes */
MQLONG   CompCode;        /* Completion code */
MQLONG   Reason;          /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_INQ_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &SelectorCount,
             &pSelectors, &IntAttrCount, &pIntAttrs, &CharAttrLength,
             &pCharAttrs, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_INQ_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PMQHOBJ   pHobj,            /* Address of object handle */
PMQLONG   pSelectorCount,   /* Address of selector count */
PPMQLONG  ppSelectors,      /* Address of ptr to array of selectors */
PMQLONG   pIntAttrCount;    /* Address of count of integer attributes */
PPMQLONG  ppIntAttrs,       /* Address of ptr to array of integer attributes */
PMQLONG   pCharAttrLength,  /* Address of character attribute length */
PPMQCHAR  ppCharAttrs,      /* Address of ptr to character attributes array */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

### *Open - MQ_OPEN_EXIT*

MQ_OPEN_EXIT provides an open exit function to perform *before* and *after* MQOPEN call processing. Use function identifier MQXF_OPEN with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQOPEN call exit functions.

The interface to this function is

```
MQ_OPEN_EXIT (&ExitParms, &ExitContext, &Hconn, &pObjDesc, &Options,
&pHobj, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pObjDesc (PMQOD) - input/output**
Pointer to object descriptor.

**Options (MQLONG) - input/output**
Open options.

**pHobj (PMQHOBJ) - input**
Pointer to object handle.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
MQHCONN         Hconn;          /* Connection handle */
PMQOD           pObjDesc;       /* Ptr to object descriptor */
MQLONG          Options;        /* Open options */
PMQHOBJ         pHobj;          /* Ptr to object handle */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_OPEN_EXIT (&ExitParms, &ExitContext, &Hconn, &pObjDesc, &Options,
              &pHobj, &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_OPEN_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQHCONN        pHconn,         /* Address of connection handle */
PPMQOD          ppObjDesc,      /* Address of ptr to object descriptor */
PMQLONG         pOptions,       /* Address of open options */
PPMQHOBJ        ppHobj,         /* Address of ptr to object handle */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

### *Put - MQ_PUT_EXIT*

MQ_PUT_EXIT provides a put exit function to perform *before* and *after* MQPUT call processing. Use function identifier MQXF_PUT with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQPUT call exit functions.

The interface to this function is:

```
MQ_PUT_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &pMsgDesc,
             &pPutMsgOpts, &BufferLength, &pBuffer, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**Hobj (MQHOBJ) - input/output**
Object handle.

**pMsgDesc (PMQMD) - input/output**
Pointer to message descriptor.

**pPutMsgOpts (PMQPMO) - input/output**
Pointer to put message options.

**BufferLength (MQLONG) - input/output**
Message buffer length.

**pBuffer (PMQBYTE) - input/output**
Pointer to message buffer.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
MQHCONN         Hconn;          /* Connection handle */
MQHOBJ          Hobj;           /* Object handle */
PMQMD           pMsgDesc;       /* Ptr to message descriptor */
PMQPMO          pPutMsgOpts;    /* Ptr to put message options */
MQLONG          BufferLength;   /* Message buffer length */
PMQBYTE         pBuffer;        /* Ptr to message data */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_PUT_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &pMsgDesc,
             &pPutMsgOpts, &BufferLength, &pBuffer, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_PUT_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQHCONN        pHconn,         /* Address of connection handle */
PMQHOBJ         pHobj,          /* Address of object handle */
PPMQMD          ppMsgDesc,      /* Address of ptr to message descriptor */
PPMQPMO         ppPutMsgOpts,   /* Address of ptr to put message options */
PMQLONG         pBufferLength,  /* Address of message buffer length */
PPMQBYTE        ppBuffer,       /* Address of ptr to message buffer */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

## Usage notes

- Report messages generated by the queue manager skip the normal call processing. As a result, such messages cannot be intercepted by the MQ_PUT_EXIT function or the MQPUT1 function. However, report messages generated by the message channel agent are processed normally, and hence can be intercepted by the MQ_PUT_EXIT function or the MQ_PUT1_EXIT function. To be sure to intercepting all of the report messages generated by the MCA, both MQ_PUT_EXIT and MQ_PUT1_EXIT should be used.

## *Put1 - MQ_PUT1_EXIT*

MQ_PUT1_EXIT provides a *put one message only* exit function to perform *before* and *after* MQPUT1 call processing. Use function identifier MQXF_PUT1 with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQPUT1 call exit functions.

The interface to this function is:

```
MQ_PUT1_EXIT (&ExitParms, &ExitContext, &Hconn, &pObjDesc, &pMsgDesc,
&pPutMsgOpts, &BufferLength, &pBuffer, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pObjDesc (PMQOD) - input/output**
Pointer to object descriptor.

**pMsgDesc (PMQMD) - input/output**
Pointer to message descriptor.

**pPutMsgOpts (PMQPMO) - input/output**
Pointer to put message options.

**BufferLength (MQLONG) - input/output**
Message buffer length.

**pBuffer (PMQBYTE) - input/output**
Pointer to message buffer.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
        MQAXP           ExitParms;      /* Exit parameter structure */
        MQAXC           ExitContext;    /* Exit context structure */
        MQHCONN         Hconn;          /* Connection handle */
        PMQOD           pObjDesc;       /* Ptr to object descriptor */
        PMQMD           pMsgDesc;       /* Ptr to message descriptor */
        PMQPMO          pPutMsgOpts;    /* Ptr to put message options */
        MQLONG          BufferLength;   /* Message buffer length */
        PMQBYTE         pBuffer;        /* Ptr to message data */
        MQLONG          CompCode;       /* Completion code */
        MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_PUT1_EXIT (&ExitParms, &ExitContext, &Hconn, &pObjDesc, &pMsgDesc,
              &pPutMsgOpts, &BufferLength, &pBuffer, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_PUT1_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
```

```
PMQHCONN        pHconn,         /* Address of connection handle */
PPMQOD          ppObjDesc,      /* Address of ptr to object descriptor */
PPMQMD          ppMsgDesc,      /* Address of ptr to message descriptor */
PPMQPMO         ppPutMsgOpts,   /* Address of ptr to put message options */
PMQLONG         pBufferLength,  /* Address of message buffer length */
PPMQBYTE        ppBuffer,       /* Address of ptr to message buffer */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

### *Set - MQ_SET_EXIT*

MQ_SET_EXIT provides a set exit function to perform *before* and *after* MQSET call processing. Use function identifier MQXF_SET with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQSET call exit functions.

The interface to this function is:

```
MQ_SET_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &SelectorCount,
             &pSelectors, &IntAttrCount, &pIntAttrs, &CharAttrLength,
             &pCharAttr, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**Hobj (MQHOBJ) - input**
Object handle.

**SelectorCount (MQLONG) - input**
Count of selectors

**pSelectors (PMQLONG) - input/output**
Pointer to array of selector values.

**IntAttrCount (MQLONG) - input**
Count of integer attributes.

**pIntAttrs (PMQLONG) - input/output**
Pointer to array of integer attribute values.

**CharAttrLength (MQLONG) - input/output**
Character attributes array length.

**pCharAttrs (PMQCHAR) - input/output**
Pointer to character attribute values.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;       /* Exit parameter structure */
MQAXC    ExitContext;     /* Exit context structure */
MQHCONN  Hconn;           /* Connection handle */
MQHOBJ   Hobj;            /* Object handle */
MQLONG   SelectorCount;   /* Count of selectors */
PMQLONG  pSelectors;      /* Ptr to array of attribute selectors */
MQLONG   IntAttrCount;    /* Count of integer attributes */
PMQLONG  pIntAttrs;       /* Ptr to array of integer attributes */
MQLONG   CharAttrLength;  /* Length of char attributes array */
PMQCHAR  pCharAttrs;      /* Ptr to character attributes */
MQLONG   CompCode;        /* Completion code */
MQLONG   Reason;          /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_SET_EXIT (&ExitParms, &ExitContext, &Hconn, &Hobj, &SelectorCount,
             &pSelectors, &IntAttrCount, &pIntAttrs, &CharAttrLength,
             &pCharAttrs, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_SET_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PMQHOBJ   pHobj,            /* Address of object handle */
PMQLONG   pSelectorCount,   /* Address of selector count */
PPMQLONG  ppSelectors,      /* Address of ptr to array of selectors */
PMQLONG   pIntAttrCount;    /* Address of count of integer attributes */
PPMQLONG  ppIntAttrs,       /* Address of ptr to array of integer attributes */
PMQLONG   pCharAttrLength,  /* Address of character attribute length */
PPMQCHAR  ppCharAttrs,      /* Address of ptr to character attributes array */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

## *Status - MQ_STAT_EXIT*

MQ_STAT_EXIT provides a status exit function to perform *before* and *after* MQSTAT call processing. Use function identifier MQXF_STAT with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* MQSTAT call exit functions.

The interface to this function is:

```
MQ_STAT_EXIT (&ExitParms, &ExitContext, &Hconn, &Type, &pStatus
              &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**Type (MQLONG) - input**
Type of status information to retrieve.

**pStatus (PMQSTS) - output**
Pointer to status buffer.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

Your exit must match the following C function prototype:

```
void MQENTRY MQ_STAT_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PMQLONG   pType             /* Address of status type */
PPMQSTS   ppStatus          /* Address of status buffer */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

### *Termination - MQ_TERM_EXIT*

MQ_TERM_EXIT provides connection level termination, registered with a function identifier of MQXF_TERM and ExitReason MQXR_CONNECTION. If registered, MQ_TERM_EXIT is called once for every disconnect request.

As part of the termination, storage no longer required by the exit can be released, and any clean up required can be performed.

If an MQ_TERM_EXIT fails with MQXCC_FAILED, the queue manager returns from the MQDISC that called it with MQCC_FAILED and MQRC_API_EXIT_ERROR.

If the queue manager encounters an error while terminating the API exit function execution environment after invoking the last MQ_TERM_EXIT, the queue manager returns from the MQDISC call that invoked MQ_TERM_EXIT with MQCC_FAILED and MQRC_API_EXIT_TERM_ERROR

The interface to this function is:

```
MQ_TERM_EXIT (&ExitParms, &ExitContext, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED, the exit function can set the reason code field to any valid MQRC_* value.

The CompCode and Reason returned to the application depend on the value of the ExitResponse field in MQAXP.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP           ExitParms;      /* Exit parameter structure */
MQAXC           ExitContext;    /* Exit context structure */
MQLONG          CompCode;       /* Completion code */
MQLONG          Reason;         /* Reason code */
```

The queue manager then logically calls the exit as follows:

```
MQ_TERM_EXIT (&ExitParms, &ExitContext, &CompCode, &Reason)
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_TERM_EXIT (
PMQAXP          pExitParms,     /* Address of exit parameter structure */
PMQAXC          pExitContext,   /* Address of exit context structure */
PMQLONG         pCompCode,      /* Address of completion code */
PMQLONG         pReason);       /* Address of reason code qualifying
                                   completion code */
```

## Usage notes

1. The MQ_TERM_EXIT function is optional. It is not necessary for an exit suite to register a termination exit if there is no termination processing to be done.

   If functions belonging to the exit suite acquire resources during the connection, an MQ_TERM_EXIT function is a convenient point at which to free those resources, for example, freeing storage obtained dynamically.
2. If an MQ_TERM_EXIT function is registered when the MQDISC call is issued, the exit function is invoked after all of the MQDISC exit functions have been invoked.
3. If MQ_TERM_EXIT returns MQXCC_FAILED in the *ExitResponse* field of MQAXP, or fails in some other way, the MQDISC call that caused MQ_TERM_EXIT to be invoked also fails, with the *CompCode* and *Reason* parameters set to appropriate values.

### *Register subscription - MQ_SUB_EXIT*

MQ_SUB_EXIT provides an exit function to perform *before* and *after* subscription reregistration processing. Use function identifier MQXF_SUB with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* subscription registrationcall exit functions.

The interface to this function is:

```
MQ_SUB_EXIT (&ExitParms, &ExitContext, &Hconn, &pSubDesc, &pHobj, &pHsub, &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input/output**
Connection handle.

**pSubDesc - input/output**
Array of attribute selectors.

**pHobj - input/output**
Object handle

**pHsub (MQHOBJ) input/output**
Subscription handle

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP    ExitParms;      /* Exit parameter structure */
MQAXC    ExitContext;    /* Exit context structure */
MQHCONN  Hconn;          /* Connection handle */
PMQSD    pSubDesc;       /* Subscription descriptor */
PMQHOBJ  pHobj;          /* Object Handle */
PMQHOBJ  pHsub;          /* Subscription handle */
MQLONG   CompCode;       /* Completion code */
MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_SUB_EXIT (&ExitParms, &ExitContext, &Hconn, &pSubDesc, &pHobj, &pHsub,
             &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
        PMQAXP    pExitParms;      /* Exit parameter structure */
        PMQAXC    pExitContext;    /* Exit context structure */
        PMQHCONN  pHconn;          /* Connection handle */
        PPMQSD    ppSubDesc;       /* Subscription descriptor */
        PPMQHOBJ  ppHobj;          /* Object Handle */
        PPMQHOBJ  ppHsub;          /* Subscription handle */
        PMQLONG   pCompCode;       /* Completion code */
        PMQLONG   pReason;         /* Reason code qualifying completion code */
```

### *Subscription request - MQ_SUBRQ_EXIT*

MQ_SUBRQ_EXIT provides a subscription request exit function to perform *before* and *after* subscription request processing. Use function identifier MQXF_SUBRQ with exit reasons MQXR_BEFORE and MQXR_AFTER to register *before* and *after* subscription request call exit functions.

The interface to this function is:

```
MQ_SUBRQ_EXIT (&ExitParms, &ExitContext, &Hconn, &pHsub, &Action, &pSubRqOpts,
               &CompCode, &Reason)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input/output**
Connection handle.

**pHsub (MQHOBJ) input/output**
Subscription handle

**Action (MQLONG) input/output**
Action

**pSubRqOpts (MQSRO) input/output**

**CompCode (MQLONG) - input/output**
Completion code, valid values for which are:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed

**Reason (MQLONG) - input/output**
Reason code qualifying the completion code.

If the completion code is MQCC_OK, the only valid value is:

**MQRC_NONE**
(0, x'000') No reason to report.

If the completion code is MQCC_FAILED or MQCC_WARNING, the exit function can set the reason code field to any valid MQRC_* value.

## C language invocation

The queue manager logically defines the following variables:

```
        MQAXP    ExitParms;      /* Exit parameter structure */
        MQAXC    ExitContext;    /* Exit context structure */
        MQHCONN  Hconn;          /* Connection handle */
        PMQLONG  pHsub;          /* Subscription handle */
        MQLONG   Action;         /* Action */
        PMQSRO   pSubRqOpts;     /* Subscription Request Options */
        MQLONG   CompCode;       /* Completion code */
        MQLONG   Reason;         /* Reason code qualifying completion code */
```

The queue manager then logically calls the exit as follows:

```
MQ_SUBRQ_EXIT (&ExitParms, &ExitContext, &Hconn, &pHsub, &Action, &pSubRqOpts,
               &CompCode, &Reason);
```

Your exit must match the following C function prototype:

```
void MQENTRY MQ_SUBRQ_EXIT (
PMQAXP    pExitParms,       /* Address of exit parameter structure */
PMQAXC    pExitContext,     /* Address of exit context structure */
PMQHCONN  pHconn,           /* Address of connection handle */
PPMQHOBJ  ppHsub;           /* Address of Subscription handle */
PMQLONG   pAction;          /* Address of Action */
PPMQSRO   ppSubRqOpts;      /* Address of Subscription Request Options */
PMQLONG   pCompCode,        /* Address of completion code */
PMQLONG   pReason);         /* Address of reason code qualifying completion
                               code */
```

### *xa_close - XA_CLOSE_EXIT*

XA_CLOSE_EXIT provides an xa_close exit function to perform before and after xa_close processing. Use function identifier MQXF_XACLOSE with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_close call exit functions.

The interface to this function is:

```
XA_CLOSE_EXIT (&ExitParms, &ExitContext, &Hconn, &pXa_info, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXa_info (PMQCHAR) - input/output**
Instance-specific resource manager information.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP    ExitParms;    /* Exit parameter structure */
     MQAXC    ExitContext;  /* Exit context structure */
     MQHCONN  Hconn;        /* Connection handle */
     PMQCHAR  pXa_info;     /* Instance-specific RM info */
     MQLONG   Rmid;         /* Resource manager identifier */
     MQLONG   Flags;        /* Resource manager options*/
     MQLONG   XARetCode;    /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_CLOSE_EXIT (&ExitParms, &ExitContext, &Hconn, &pXa_info, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_CLOSE_EXIT (
     PMQAXP    pExitParms,    /* Address of exit parameter structure */
     PMQAXC    pExitContext,  /* Address of exit context structure */
     PMQHCONN  pHconn,        /* Address of connection handle */
     PPMQCHAR  ppXa_info,     /* Address of instance-specific RM info */
     PMQLONG   pRmid,         /* Address of resource manager identifier */
     PMQLONG   pFlags,        /* Address of resource manager options*/
     PMQLONG   pXARetCode);   /* Address of response from XA call */
```

### *xa_commit - XA_COMMIT_EXIT*

XA_COMMIT_EXIT provides an xa_commit exit function to perform before and after xa_commit processing. Use function identifier MQXF_XACOMMIT with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_commit call exit functions.

The interface to this function is:

```
XA_COMMIT_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP    ExitParms;   /* Exit parameter structure */
     MQAXC    ExitContext; /* Exit context structure */
     MQHCONN  Hconn;       /* Connection handle */
     MQPTR    pXID;        /* Transaction branch ID */
     MQLONG   Rmid;        /* Resource manager identifier */
```

```
     MQLONG   Flags;       /* Resource manager options*/
     MQLONG   XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_COMMIT_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_COMMIT_EXIT (
     PMQAXP    pExitParms,   /* Address of exit parameter structure */
     PMQAXC    pExitContext, /* Address of exit context structure */
     PMQHCONN  pHconn,       /* Address of connection handle */
     PMQPTR    ppXID,        /* Address of transaction branch ID */
     PMQLONG   pRmid,        /* Address of resource manager identifier */
     PMQLONG   pFlags,       /* Address of resource manager options*/
     PMQLONG   pXARetCode);  /* Address of response from XA call */
```

### *xa_complete - XA_COMPLETE_EXIT*

XA_COMPLETE_EXIT provides an xa_complete exit function to perform before and after xa_complete processing. Use function identifier MQXF_XACOMPLETE with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_complete call exit functions.

The interface to this function is:

```
XA_COMPLETE_EXIT (&ExitParms, &ExitContext, &Hconn, &pHandle, &pRetval, &Rmid, &Flags,
&XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pHandle (PMQLONG) - input/output**
Pointer to asynchronous operation.

**pRetVal (PMQLONG) - input/output**
Return value of asynchronous operation.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     PMQLONG pHandle;     /* Ptr to asynchronous op */
     PMQLONG pRetval;     /* Return value of async op */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_COMPLETE_EXIT (&ExitParms, &ExitContext, &Hconn, &pHandle, &pRetval, &Rmid, &Flags,
&XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_COMPLETE_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PPMQLONG ppHandle,     /* Address of ptr to asynchronous op */
     PPMQLONG ppRetval,     /* Address of return value of async op */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_end - XA_END_EXIT*

XA_END_EXIT provides an xa_end exit function to perform before and after xa_end processing. Use function identifier MQXF_XAEND with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_end call exit functions.

The interface to this function is:

```
XA_END_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_END_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_END_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_forget - XA_FORGET_EXIT*

XA_FORGET_EXIT provides an xa_forget exit function to perform before and after xa_forget processing. Use function identifier MQXF_XAFORGET with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_forget call exit functions.

The interface to this function is:

```
XA_FORGET_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_FORGET_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_FORGET_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
```

```
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_open - XA_OPEN_EXIT*

XA_OPEN_EXIT provides an xa_open exit function to perform before and after xa_open processing. Use function identifier MQXF_XAOPEN with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_open call exit functions.

The interface to this function is:

```
XA_OPEN_EXIT (&ExitParms, &ExitContext, &Hconn, &pXa_info, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXa_info (PMQCHAR) - input/output**
Instance-specific resource manager information.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     PMQCHAR pXa_info;    /* Instance-specific RM info */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_OPEN_EXIT (&ExitParms, &ExitContext, &Hconn, &pXa_info, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_OPEN_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PPMQCHAR ppXa_info,    /* Address of instance-specific RM info */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_prepare - XA_PREPARE_EXIT*

XA_PREPARE_EXIT provides an xa_prepare exit function to perform before and after xa_prepare processing. Use function identifier MQXF_XAPREPARE with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_prepare call exit functions.

The interface to this function is:

```
XA_PREPARE_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
MQAXP  ExitParms;  /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_PREPARE_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_PREPARE_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_recover - XA_RECOVER_EXIT*

XA_RECOVER_EXIT provides an xa_recover exit function to perform before and after xa_recover processing. Use function identifier MQXF_XARECOVER with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_recover call exit functions.

The interface to this function is:

```
XA_RECOVER_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Count, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Count (MQLONG) - input/output**
Maximum XIDs in XID array

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Count;       /* Max XIDs in XID array */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_RECOVER_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Count, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_RECOVER_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
     PMQLONG  pCount,       /* Address of max XIDs in XID array */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_rollback - XA_ROLLBACK_EXIT*

XA_ROLLBACK_EXIT provides an xa_rollback exit function to perform before and after xa_rollback processing. Use function identifier MQXF_XAROLLBACK with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_rollback call exit functions.

The interface to this function is:

```
XA_ROLLBACK_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_ROLLBACK_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_ROLLBACK_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

### *xa_start - XA_START_EXIT*

XA_START_EXIT provides an xa_start exit function to perform before and after xa_start processing. Use function identifier MQXF_XASTART with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after xa_start call exit functions.

The interface to this function is:

```
XA_START_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP   ExitParms;   /* Exit parameter structure */
     MQAXC   ExitContext; /* Exit context structure */
     MQHCONN Hconn;       /* Connection handle */
     MQPTR   pXID;        /* Transaction branch ID */
     MQLONG  Rmid;        /* Resource manager identifier */
     MQLONG  Flags;       /* Resource manager options*/
     MQLONG  XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
XA_START_EXIT (&ExitParms, &ExitContext, &Hconn, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY XA_START_EXIT (
     PMQAXP   pExitParms,   /* Address of exit parameter structure */
     PMQAXC   pExitContext, /* Address of exit context structure */
     PMQHCONN pHconn,       /* Address of connection handle */
     PMQPTR   ppXID,        /* Address of transaction branch ID */
     PMQLONG  pRmid,        /* Address of resource manager identifier */
     PMQLONG  pFlags,       /* Address of resource manager options*/
     PMQLONG  pXARetCode);  /* Address of response from XA call */
```

## *ax_reg - AX_REG_EXIT*

AX_REG_EXIT provides an ax_reg exit function to perform before and after ax_reg processing. Use function identifier MQXF_AXREG with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after ax_reg call exit functions.

The interface to this function is:

```
AX_REG_EXIT (&ExitParms, &ExitContext, &pXID, &Rmid, &Flags, &XARetCode)
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Hconn (MQHCONN) - input**
Connection handle.

**pXID (MQPTR) - input/output**
Transaction branch ID.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP  ExitParms;   /* Exit parameter structure */
     MQAXC  ExitContext; /* Exit context structure */
     MQPTR  pXID;        /* Transaction branch ID */
     MQLONG Rmid;        /* Resource manager identifier */
     MQLONG Flags;       /* Resource manager options*/
     MQLONG XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
AX_REG_EXIT (&ExitParms, &ExitContext, &pXID, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY AX_REG_EXIT (
     PMQAXP  pExitParms,   /* Address of exit parameter structure */
     PMQAXC  pExitContext, /* Address of exit context structure */
     PMQPTR  ppXID,        /* Address of transaction branch ID */
     PMQLONG pRmid,        /* Address of resource manager identifier */
     PMQLONG pFlags,       /* Address of resource manager options*/
     PMQLONG pXARetCode);  /* Address of response from XA call */
```

## *ax_unreg - AX_UNREG_EXIT*

AX_UNREG_EXIT provides an ax_unreg exit function to perform before and after ax_unreg processing. Use function identifier MQXF_AXUNREG with exit reasons MQXR_BEFORE and MQXR_AFTER to register the before and after ax_unreg call exit functions.

The interface to this function is:

```
AX_UNREG_EXIT (&ExitParms, &ExitContext, &Rmid, &Flags, &XARetCode);
```

where the parameters are:

**ExitParms (MQAXP) - input/output**
Exit parameter structure.

**ExitContext (MQAXC) - input/output**
Exit context structure.

**Rmid (MQLONG) - input/output**
Resource manager identifier.

**Flags (MQLONG) - input/output**
Resource manager options.

**XARetCode (MQLONG) - input/output**
Response from XA call.

## C language invocation

The queue manager logically defines the following variables:

```
     MQAXP  ExitParms;   /* Exit parameter structure */
     MQAXC  ExitContext; /* Exit context structure */
     MQLONG Rmid;        /* Resource manager identifier */
     MQLONG Flags;       /* Resource manager options*/
     MQLONG XARetCode;   /* Response from XA call */
```

The queue manager then logically calls the exit as follows:

```
AX_UNREG_EXIT (&ExitParms, &ExitContext, &Rmid, &Flags, &XARetCode);
```

Your exit must match the following C function prototype:

```
typedef void MQENTRY AX_UNREG_EXIT (
     PMQAXP  pExitParms,   /* Address of exit parameter structure */
     PMQAXC  pExitContext, /* Address of exit context structure */
     PMQLONG pRmid,        /* Address of resource manager identifier */
     PMQLONG pFlags,       /* Address of resource manager options*/
     PMQLONG pXARetCode);  /* Address of response from XA call */
```

## General information on invoking exit functions

This topic provides some general guidance to help you to plan your exits, particularly related to handling errors and unexpected events.

### *Exit failure*

If an exit function abnormally terminates after a destructive, out of syncpoint, MQGET call but before the message has been passed to the application, the exit handler can recover from the failure, and pass control to the application.

In this case, the message might be lost. This is like what happens when an application fails immediately after receiving a message from a queue.

The MQGET call might complete with MQCC_FAILED and MQRC_API_EXIT_ERROR.

If a *before* API call exit function terminates abnormally, the exit handler can recover from the failure and pass control to the application without processing the API call. In this event, the exit function must recover any resources that it owns.

If chained exits are in use, the *after* API call exits for any *before* API call exits that had successfully been driven can themselves be driven. The API call might fail with MQCC_FAILED and MQRC_API_EXIT_ERROR.

*Example error handling for exit functions*

The following diagram shows the points (e *N* ) at which errors can occur. It is only an example to show how exits behave and should be read together with the following table. In this example, two exit functions are invoked both before and after each API call to show the behavior with chained exits.

```
Application ErrPt     Exit function            API call
----------- -----     -------------            --------

Start

MQCONN  -->
            e1
                         MQ_INIT_EXIT
            e2
                  before MQ_CONNX_EXIT  1
            e3
                  before MQ_CONNX_EXIT  2
            e4
                                          -->  MQCONN
            e5
                  after  MQ_CONNX_EXIT  2
            e6
                  after  MQ_CONNX_EXIT  1
```

```
            e7
        <--
MQOPEN  -->
                  before MQ_OPEN_EXIT  1
            e8
                  before MQ_OPEN_EXIT  2
            e9
                                          -->  MQOPEN
            e10
                  after  MQ_OPEN_EXIT  2
            e11
                  after  MQ_OPEN_EXIT  1
            e12
        <--
MQPUT   -->
                  before MQ_PUT_EXIT   1
            e13
                  before MQ_PUT_EXIT   2
            e14
                                          -->  MQPUT
            e15
                  after  MQ_PUT_EXIT   2
            e16
                  after  MQ_PUT_EXIT   1
            e17
        <--
MQCLOSE -->
                  before MQ_CLOSE_EXIT 1
            e18
                  before MQ_CLOSE_EXIT 2
            e19
                                          -->  MQCLOSE
            e20
                  after  MQ_CLOSE_EXIT 2
            e21
                  after  MQ_CLOSE_EXIT 1
            e22
        <--
MQDISC  -->
                  before MQ_DISC_EXIT  1
            e23
                  before MQ_DISC_EXIT  2
            e24
                                          -->  MQDISC
            e25
                  after  MQ_DISC_EXIT  2
            e26
                  after  MQ_DISC_EXIT  1
            e27

        <--

end
```

The following table lists the actions to be taken at each error point. Only a subset of the error points have been covered, as the rules shown here can apply to all others. It is the actions that specify the intended behavior in each case.

*Table 657. API exit errors and appropriate actions to take*

| Err Pt | Description | Actions |
|---|---|---|
| e1 | Error while setting up environment setup. | 1. Undo environment setup as required<br>2. Drive no exit functions<br>3. Fail MQCONN with MQCC_FAILED, MQRC_API_EXIT_LOAD_ERROR |

*Table 657. API exit errors and appropriate actions to take (continued)*

| Err Pt | Description | Actions |
|---|---|---|
| e2 | MQ_INIT_EXIT function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Clean up environment<br>2. Fail MQCONN with MQCC_FAILED, MQRC_API_EXIT_INIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Clean up environment |
| e3 | *Before* MQ_CONNX_EXIT 1 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive MQ_TERM_EXIT function<br>2. Clean up environment<br>3. Fail MQCONN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Drive MQ_TERM_EXIT function if required<br>3. Clean up environment if required |
| e4 | *Before* MQ_CONNX_EXIT 2 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive *after* MQ_CONNX_EXIT 1 function<br>2. Drive MQ_TERM_EXIT function<br>3. Clean up environment<br>4. Fail MQCONN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Drive *after* MQ_CONNX_EXIT 1 function if exit not suppressed<br>3. Drive MQ_TERM_EXIT function if required<br>4. Clean up environment if required |
| e5 | MQCONN call fails. | 1. Pass MQCONN CompCode and Reason<br>2. Drive *after* MQ_CONNX_EXIT 2 function if the *before* MQ_CONNX_EXIT 2 succeeded and the exit is not suppressed<br>3. Drive *after* MQ_CONNX_EXIT 1 function if the *before* MQ_CONNX_EXIT 1 succeeded and the exit is not suppressed<br>4. Drive MQ_TERM_EXIT function<br>5. Clean up environment |

*Table 657. API exit errors and appropriate actions to take (continued)*

| Err Pt | Description | Actions |
|---|---|---|
| e6 | *After* MQ_CONNX_EXIT 2 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive *after* MQ_CONNX_EXIT 1 function<br>2. Complete MQCONN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Drive *after* MQ_CONNX_EXIT 1 function if required |
| e7 | *After* MQ_CONNX_EXIT 1 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED, complete MQCONN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*, act as for the values of MQXCC_* and MQXR2_* [1] |
| e8 | *Before* MQ_OPEN_EXIT 1 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED, complete MQOPEN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*, act as for the values of MQXCC_* and MQXR2_* [1] |
| e9 | *Before* MQ_OPEN_EXIT 2 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive *after* MQ_OPEN_EXIT 1 function<br>2. Complete MQOPEN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*, act as for the values of MQXCC_* and MQXR2_* [1] |
| e10 | MQOPEN call fails | 1. Pass MQOPEN CompCode and Reason<br>2. Drive *after* MQ_OPEN_EXIT 2 function if exit not suppressed<br>3. Drive *after* MQ_OPEN_EXIT 1 function if exit not suppressed and if chained exits not suppressed |
| e11 | *After* MQ_OPEN_EXIT 2 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive *after* MQ_OPEN_EXIT 1 function<br>2. Complete MQOPEN call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Drive *after* MQ_OPEN_EXIT 1 function if exit not suppressed |

| Table 657. API exit errors and appropriate actions to take (continued) | | |
|---|---|---|
| **Err Pt** | **Description** | **Actions** |
| e25 | *After* MQ_DISC_EXIT 2 function completes with:<br>• MQXCC_FAILED<br>• MQXCC_* | • For MQXCC_FAILED:<br>1. Drive *after* MQ_DISC_EXIT 1 function<br>2. Drive MQ_TERM_EXIT function<br>3. Clean up exit execution environment<br>4. Complete MQDISC call with MQCC_FAILED, MQRC_API_EXIT_ERROR<br>• For MQXCC_*<br>1. Act as for the values of MQXCC_* and MQXR2_* [1]<br>2. Drive MQ_TERM_EXIT function<br>3. Clean up exit execution environment |

**Note:**

1. The values of MQXCC_* and MQXR2_* and their corresponding actions are defined in How queue managers process exit functions.

### *ExitResponse fields set incorrectly*

This topic gives information about what would happen when the ExitResponse field is set to anything but the supported values.

If the ExitResponse field is set to a value other than one of the supported values, the following actions apply:

- For a *before* MQCONN or MQDISC API exit function:
  - The ExitResponse2 value is ignored.
  - No further *before* exit functions in the exit chain (if any) are invoked; the API call itself is not issued.
  - For any *before* exits that were successfully called, the *after* exits are called in reverse order.
  - If registered, the termination exit functions for those *before* MQCONN or MQDISC exit functions in the chain that were successfully invoked are driven to clean up after these exit functions.
  - The MQCONN or MQDISC call fails with MQRC_API_EXIT_ERROR.
- For a *before* IBM MQ API exit function other than MQCONN or MQDISC:
  - The ExitResponse2 value is ignored.
  - No further *before* or *after* data conversion functions in the exit chain (if any) are invoked.
  - For any *before* exits that were successfully called, the *after* exits are called in reverse order.
  - The IBM MQ API call itself is not issued.
  - The IBM MQ API call fails with MQRC_API_EXIT_ERROR.
- For an *after* MQCONN or MQDISC API exit function:
  - The ExitResponse2 value is ignored.
  - The remaining exit functions that were successfully called before the API call are called in reverse order.
  - If registered, the termination exit functions for those *before* or *after* MQCONN or MQDISC exit functions in the chain that were successfully invoked are driven to clean up after the exit.
  - A CompCode of the more severe of MQCC_WARNING and the CompCode returned by the exit is returned to the application.
  - A Reason of MQRC_API_EXIT_ERROR is returned to the application.

  - The IBM MQ API call is successfully issued.
- For an *after* IBM MQ API call exit function other than MQCONN or MQDISC:
  - The ExitResponse2 value is ignored.
  - The remaining exit functions that were successfully called before the API call are called in reverse order.
  - A CompCode of the more severe of MQCC_WARNING and the CompCode returned by the exit is returned to the application.
  - A Reason of MQRC_API_EXIT_ERROR is returned to the application.
  - The IBM MQ API call is successfully issued.
- For the *before* data conversion on get exit function:
  - The ExitResponse2 value is ignored.
  - The remaining exit functions that were successfully called before the API call are called in reverse order.
  - The message is not converted, and the unconverted message is returned to the application.
  - A CompCode of the more severe of MQCC_WARNING and the CompCode returned by the exit is returned to the application.
  - A Reason of MQRC_API_EXIT_ERROR is returned to the application.
  - The IBM MQ API call is successfully issued.

  **Note:** As the error is with the exit, it is better to return MQRC_API_EXIT_ERROR than to return MQRC_NOT_CONVERTED.

If an exit function sets the ExitResponse2 field to a value other than one of the supported values, a value of MQXR2_DEFAULT_CONTINUATION is assumed instead.

# Installable services interface reference information

This collection of topics provides reference information for the installable services.

The functions and data types are listed in alphabetical order within the group for each service type.

## How the functions are shown

How the installable services functions are documented.

For each function there is a description, including the function identifier (for MQZEP).

The *parameters* are shown listed in the order they must occur. They must all be present.

Each parameter name is followed by its data type. These are the elementary data types described in the “Elementary data types” on page 232.

The C language invocation is also given, after the description of the parameters.

## MQZ_AUTHENTICATE_USER - Authenticate user

This function is provided by an MQZAS_VERSION_5 authorization service component, and is invoked by the queue manager to authenticate a user, or to set identity context fields. It is invoked when the IBM MQ user application context is established.

The application context is established during connect calls at the point where the application's user context is initialized, and at each point where the application's user context is changed. Each time a connect call is made, the application's user context information is reacquired in the *IdentityContext* field.

The function identifier for this function (for MQZEP) is MQZID_AUTHENTICATE_USER.

## Syntax

MQZ_AUTHENTICATE_USER ( *QMgrName* , *SecurityParms* , *ApplicationContext* , *IdentityContext* , *CorrelationPtr* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

## Parameters

***QMgrName***

Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***SecurityParms***

Type: MQCSP - input

Security parameters. Data relating to the user ID, password, and authentication type. If the AuthenticationType attribute of the MQCSP structure is specified as MQCSP_AUTH_USER_ID_AND_PWD, both the user ID and password are compared against the equivalent fields in the IdentityContext (MQZIC) parameter to determine whether they match. For more information, see "MQCSP - Security parameters" on page 325.

During an MQCONN MQI call this parameter contains null, or default values.

***ApplicationContext***

Type: MQZAC - input

Application context. Data relating to the calling application. See MQZAC - Application context for details.

During every MQCONN or MQCONNX MQI call, the user context information in the MQZAC structure is reacquired.

***IdentityContext***

Type: MQZIC - input/output

Identity context. On input to the authenticate user function, this identifies the current identity context. The authenticate user function can change this, at which point the queue manager adopts the new identity context. See MQZIC - Identity context for more details on the MQZIC structure.

***CorrelationPtr***

Type: MQPTR - output

Correlation pointer. Specifies the address of any correlation data. This pointer is subsequently passed on to other OAM calls.

***ComponentData***

Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***

Type: MQLONG - output

Continuation flag. You can specify the following values:

**MQZCI_DEFAULT**
Continuation dependent on other components.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information about these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_AUTHENTICATE_USER (QMgrName, SecurityParms, ApplicationContext,
                   IdentityContext, &CorrelationPtr, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

Declare the parameters passed to the service as follows:

```
MQCHAR48  QMgrName;           /* Queue manager name */
MQCSP     SecurityParms;      /* Security parameters */
MQZAC     ApplicationContext; /* Application context */
MQZIC     IdentityContext;    /* Identity context */
MQPTR     CorrelationPtr;     /* Correlation pointer */
MQBYTE    ComponentData[n];   /* Component data */
MQLONG    Continuation;       /* Continuation indicator set by
                                 component */
MQLONG    CompCode;           /* Completion code */
MQLONG    Reason;             /* Reason code qualifying CompCode */
```

## MQZ_CHECK_AUTHORITY - Check authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is started by the queue manager to check whether an entity has authority to perform a particular action, or actions, on a specified object.

The function identifier for this function (for MQZEP) is MQZID_CHECK_AUTHORITY.

### Syntax

MQZ_CHECK_AUTHORITY( *QMgrName* , *EntityName* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityName***
Type: MQCHAR12 - input

Entity name. The name of the entity whose authorization to the object is to be checked. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

It is not essential for this entity to be known to the underlying security service. If it is not known, the authorizations of the special **nobody** group (to which all entities are assumed to belong) are used for the check. An all-blank name is valid and can be used in this way.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by EntityName. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object to which access is required. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

***Authority***
Type: MQLONG - input

Authority to be checked. If one authorization is being checked, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authorization is being checked, it is the bitwise OR of the corresponding MQZAO_* constants.

The following authorizations apply to use of the MQI calls:

**MQZAO_CONNECT**
Ability to use the MQCONN call.

**MQZAO_BROWSE**
Ability to use the MQGET call with a browse option.

This allows the MQGMO_BROWSE_FIRST, MQGMO_BROWSE_MSG_UNDER_CURSOR, or MQGMO_BROWSE_NEXT option to be specified on the MQGET call.

**MQZAO_INPUT**
Principal. Ability to use the MQGET call with an input option.

This allows the MQOO_INPUT_SHARED, MQOO_INPUT_EXCLUSIVE, or MQOO_INPUT_AS_Q_DEF option to be specified on the MQOPEN call.

**MQZAO_OUTPUT**
Ability to use the MQPUT call.

This allows the MQOO_OUTPUT option to be specified on the MQOPEN call.

**MQZAO_INQUIRE**
Ability to use the MQINQ call.

This allows the MQOO_INQUIRE option to be specified on the MQOPEN call.

**MQZAO_SET**
Ability to use the MQSET call.

This allows the MQOO_SET option to be specified on the MQOPEN call.

**MQZAO_PASS_IDENTITY_CONTEXT**
Ability to pass identity context.

This allows the MQOO_PASS_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_PASS_ALL_CONTEXT**
Ability to pass all context.

This allows the MQOO_PASS_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_IDENTITY_CONTEXT**
Ability to set identity context.

This allows the MQOO_SET_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_ALL_CONTEXT**
Ability to set all context.

This allows the MQOO_SET_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_ALTERNATE_USER_AUTHORITY**
Ability to use alternate user authority.

This allows the MQOO_ALTERNATE_USER_AUTHORITY option to be specified on the MQOPEN call, and the MQPMO_ALTERNATE_USER_AUTHORITY option to be specified on the MQPUT1 call.

**MQZAO_ALL_MQI**
All of the MQI authorizations.

This enables all of the authorizations.

The following authorizations apply to administration of a queue manager:

**MQZAO_CREATE**
Ability to create objects of a specified type.

**MQZAO_DELETE**
Ability to delete a specified object.

**MQZAO_DISPLAY**
Ability to display the attributes of a specified object.

**MQZAO_CHANGE**
Ability to change the attributes of a specified object.

**MQZAO_CLEAR**
Ability to delete all messages from a specified queue.

**MQZAO_AUTHORIZE**
Ability to authorize other users for a specified object.

**MQZAO_CONTROL**
Ability to start or stop a listener, service, or non-client channel object, and the ability to ping a non-client channel object.

**MQZAO_CONTROL_EXTENDED**
Ability to reset a sequence number, or resolve an indoubt message on a non-client channel object.

**MQZAO_ALL_ADMIN**
Ability to set identity context.

All of the administration authorizations, other than MQZAO_CREATE.

The following authorizations apply to both use of the MQI and to administration of a queue manager:

**MQZAO_ALL**
All authorizations, other than MQZAO_CREATE.

**MQZAO_NONE**
No authorizations.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

If the call to a component fails (that is, *CompCode* returns MQCC_FAILED), and the *Continuation* parameter is MQZCI_DEFAULT or MQZCI_CONTINUE, the queue manager continues to call other components if there are any.

If the call succeeds (that is, *CompCode* returns MQCC_OK) no other components are called no matter what the setting of *Continuation* is.

If the call fails and the *Continuation* parameter is MQZCI_STOP then no other components are called and the error is returned to the queue manager. Components have no knowledge of previous calls, so the *Continuation* parameter is always set to MQZCI_DEFAULT before the call.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_CHECK_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                     ObjectType, Authority, ComponentData,
                     &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_CHECK_AUTHORITY_2 - Check authority (extended)

This function is provided by a MQZAS_VERSION_2 authorization service component, and is started by the queue manager to check whether an entity has authority to perform a particular action, or actions, on a specified object.

The function identifier for this function (for MQZEP) is MQZID_CHECK_AUTHORITY.

MQZ_CHECK_AUTHORITY_2 is like MQZ_CHECK_AUTHORITY, but with the *EntityName* parameter replaced by the *EntityData* parameter.

## Syntax

MQZ_CHECK_AUTHORITY_2( *QMgrName* , *EntityData* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

## Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity with authorization to the object that is to be checked. See "MQZED - Entity descriptor" on page 1698 for details.

It is not essential for this entity to be known to the underlying security service. If it is not known, the authorizations of the special **nobody** group (to which all entities are assumed to belong) are used for the check. An all-blank name is valid and can be used in this way.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityData*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object to which access is required. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority to be checked. If one authorization is being checked, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authorization is being checked, it is the bitwise OR of the corresponding MQZAO_* constants.

The following authorizations apply to use of the MQI calls:

**MQZAO_CONNECT**
Ability to use the MQCONN call.

**MQZAO_BROWSE**
Ability to use the MQGET call with a browse option.

This allows the MQGMO_BROWSE_FIRST, MQGMO_BROWSE_MSG_UNDER_CURSOR, or MQGMO_BROWSE_NEXT option to be specified on the MQGET call.

**MQZAO_INPUT**
Principal. Ability to use the MQGET call with an input option.

This allows the MQOO_INPUT_SHARED, MQOO_INPUT_EXCLUSIVE, or MQOO_INPUT_AS_Q_DEF option to be specified on the MQOPEN call.

**MQZAO_OUTPUT**
Ability to use the MQPUT call.

This allows the MQOO_OUTPUT option to be specified on the MQOPEN call.

**MQZAO_INQUIRE**
Ability to use the MQINQ call.

This allows the MQOO_INQUIRE option to be specified on the MQOPEN call.

**MQZAO_SET**
Ability to use the MQSET call.

This allows the MQOO_SET option to be specified on the MQOPEN call.

**MQZAO_PASS_IDENTITY_CONTEXT**
Ability to pass identity context.

This allows the MQOO_PASS_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_PASS_ALL_CONTEXT**
Ability to pass all context.

This allows the MQOO_PASS_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_IDENTITY_CONTEXT**
Ability to set identity context.

This allows the MQOO_SET_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_ALL_CONTEXT**
Ability to set all context.

This allows the MQOO_SET_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_ALTERNATE_USER_AUTHORITY**
Ability to use alternate user authority.

This allows the MQOO_ALTERNATE_USER_AUTHORITY option to be specified on the MQOPEN call, and the MQPMO_ALTERNATE_USER_AUTHORITY option to be specified on the MQPUT1 call.

**MQZAO_ALL_MQI**
All of the MQI authorizations.

This enables all of the authorizations.

The following authorizations apply to administration of a queue manager:

**MQZAO_CREATE**
Ability to create objects of a specified type.

**MQZAO_DELETE**
Ability to delete a specified object.

**MQZAO_DISPLAY**
Ability to display the attributes of a specified object.

**MQZAO_CHANGE**
Ability to change the attributes of a specified object.

**MQZAO_CLEAR**
Ability to delete all messages from a specified queue.

**MQZAO_AUTHORIZE**
Ability to authorize other users for a specified object.

**MQZAO_CONTROL**
Ability to start or stop a listener, service, or non-client channel object, and the ability to ping a non-client channel object.

**MQZAO_CONTROL_EXTENDED**
Ability to reset a sequence number, or resolve an indoubt message on a non-client channel object.

**MQZAO_ALL_ADMIN**
Ability to set identity context.

All of the administration authorizations, other than MQZAO_CREATE.

The following authorizations apply to both use of the MQI and to administration of a queue manager:

**MQZAO_ALL**
All authorizations, other than MQZAO_CREATE.

**MQZAO_NONE**
No authorizations.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_CHECK_AUTHORITY_2 (QMgrName, &EntityData, EntityType,
                       ObjectName, ObjectType, Authority, ComponentData,
                       &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity data */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_CHECK_PRIVILEGED - Check if user is privileged

This function is provided by an MQZAS_VERSION_6 authorization service component, and is invoked by the queue manager to determine whether a specified user is a privileged user.

The function identifier for this function (for MQZEP) is MQZID_CHECK_PRIVILEGED.

### Syntax

MQZ_CHECK_PRIVILEGED( *QMgrName* , *EntityData* , *EntityType* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity that is to be checked. For more information, see "MQZED - Entity descriptor" on page 1698.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by EntityData. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

If the call to a component fails (that is, *CompCode* returns MQCC_FAILED), and the *Continuation* parameter is MQZCI_DEFAULT or MQZCI_CONTINUE, the queue manager continues to call other components if there are any.

If the call succeeds (that is, *CompCode* returns MQCC_OK) no other components are called no matter what the setting of *Continuation* is.

If the call fails and the *Continuation* parameter is MQZCI_STOP then no other components are called and the error is returned to the queue manager. Components have no knowledge of previous calls, so the *Continuation* parameter is always set to MQZCI_DEFAULT before the call.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_PRIVILEGED**
(2584, X'A18') This user is not a privileged user ID.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_CHECK_PRIVILEGED (QMgrName, &EntityData, EntityType,
                      ComponentData, &Continuation,
                      &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_COPY_ALL_AUTHORITY - Copy all authority

This function is provided by an authorization service component. It is started by the queue manager to copy all of the authorizations that are currently in force for a reference object to another object.

The function identifier for this function (for MQZEP) is MQZID_COPY_ALL_AUTHORITY.

### Syntax

MQZ_COPY_ALL_AUTHORITY( *QMgrName* , *RefObjectName* , *ObjectName* , *ObjectType* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***

Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***RefObjectName***

Type: MQCHAR48 - input

Reference object name. The name of the reference object, the authorizations for which are to be copied. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

***ObjectName***

Type: MQCHAR48 - input

Object name. The name of the object for which accesses are to be set. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

***ObjectType***

Type: MQLONG - input

Object type. The type of entity specified by *RefObjectName* and *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_REF_OBJECT**
(2294, X'8F6') Reference object unknown.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_COPY_ALL_AUTHORITY (QMgrName, RefObjectName, ObjectName, ObjectType,
                        ComponentData, &Continuation, &CompCode,
                        &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  RefObjectName;     /* Reference object name */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_DELETE_AUTHORITY - Delete authority

This function is provided by an authorization service component, and is started by the queue manager to delete all of the authorizations associated with the specified object.

The function identifier for this function (for MQZEP) is MQZID_DELETE_AUTHORITY.

### Syntax

MQZ_DELETE_AUTHORITY( *QMgrName* , *ObjectName* , *ObjectType* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object for which accesses are to be deleted. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_DELETE_AUTHORITY (QMgrName, ObjectName, ObjectType, ComponentData,
                      &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_ENUMERATE_AUTHORITY_DATA - Enumerate authority data

This function is provided by an MQZAS_VERSION_4 authorization service component, and is started repeatedly by the queue manager to retrieve all of the authority data that matches the selection criteria specified on the first invocation.

The function identifier for this function (for MQZEP) is MQZID_ENUMERATE_AUTHORITY_DATA.

### Syntax

MQZ_ENUMERATE_AUTHORITY_DATA( *QMgrName* , *StartEnumeration* , *Filter* , *AuthorityBufferLength* , *AuthorityBuffer* , *AuthorityDataLength* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***

Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***StartEnumeration***

Type: MQLONG - input

Flag indicating whether call can start enumeration. This indicates whether the call can start the enumeration of authority data, or continue the enumeration of authority data started by a previous call to MQZ_ENUMERATE_AUTHORITY_DATA. The value is one of the following values:

**MQZSE_START**
Start enumeration. The call is started with this value to start the enumeration of authority data. The *Filter* parameter specifies the selection criteria to be used to select the authority data returned by this and successive calls.

**MQZSE_CONTINUE**
Continue enumeration. The call is started with this value to continue the enumeration of authority data. The *Filter* parameter is ignored in this case, and can be specified as the null pointer (the selection criteria are determined by the *Filter* parameter specified by the call that had *StartEnumeration* set to MQZSE_START).

***Filter***

Type: MQZAD - input

Filter. If *StartEnumeration* is MQZSE_START, *Filter* specifies the selection criteria to be used to select the authority data to return. If *Filter* is the null pointer, no selection criteria are used, that is,

all authority data is returned. See “MQZAD - Authority data” on page 1695 for details of the selection criteria that can be used.

If *StartEnumeration* is MQZSE_CONTINUE, *Filter* is ignored, and can be specified as the null pointer.

***AuthorityBufferLength***
Type: MQLONG - input

Length of *AuthorityBuffer*. This is the length in bytes of the *AuthorityBuffer* parameter. The authority buffer must be large enough to accommodate the data to be returned.

***AuthorityBuffer***
Type: MQZAD - output

Authority data. This is the buffer in which the authority data is returned. The buffer must be large enough to accommodate an MQZAD structure, an MQZED structure, plus the longest entity name and longest domain name defined.

**Note:** Note: This parameter is defined as an MQZAD, as the MQZAD always occurs at the start of the buffer. However, if the buffer is declared as an MQZAD, the buffer will be too small - it must be bigger than an MQZAD so that it can accommodate the MQZAD, MQZED, plus entity and domain names.

***AuthorityDataLength***
Type: MQLONG - output

Length of data returned in *AuthorityBuffer*. If the authority buffer is too small, *AuthorityDataLength* is set to the length of the buffer required, and the call returns completion code MQCC_FAILED and reason code MQRC_BUFFER_LENGTH_ERROR.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_ENUMERATE_AUTHORITY_DATA, this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_NO_DATA_AVAILABLE**
(2379, X'94B') No data available.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_ENUMERATE_AUTHORITY_DATA (QMgrName, StartEnumeration, &Filter,
                              AuthorityBufferLength,
                              &AuthorityBuffer,
                              &AuthorityDataLength, ComponentData,
                              &Continuation, &CompCode,
                              &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;               /* Queue manager name */
MQLONG    StartEnumeration;       /* Flag indicating whether call should
                                     start enumeration */
MQZAD     Filter;                 /* Filter */
MQLONG    AuthorityBufferLength;  /* Length of AuthorityBuffer */
MQZAD     AuthorityBuffer;        /* Authority data */
MQLONG    AuthorityDataLength;    /* Length of data returned in
                                     AuthorityBuffer */
MQBYTE    ComponentData[n];       /* Component data */
MQLONG    Continuation;           /* Continuation indicator set by
                                     component */
MQLONG    CompCode;               /* Completion code */
MQLONG    Reason;                 /* Reason code qualifying CompCode */
```

## MQZ_FREE_USER - Free user

This function is provided by a MQZAS_VERSION_5 authorization service component, and is started by the queue manager to free associated allocated resource.

It is started when an application has finished running under all user contexts, for example during an MQDISC MQI call.

The function identifier for this function (for MQZEP) is MQZID_FREE_USER.

### Syntax

MQZ_FREE_USER( *QMgrName* , *FreeParms* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***FreeParms***
Type: MQZFP - input

Free parameters. A structure containing data relating to the resource to be freed. See “MQZFP - Free parameters” on page 1700 for details.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation flag. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on other components.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_AUTHENTICATE_USER (QMgrName, SecurityParms, ApplicationContext,
                   IdentityContext, CorrelationPtr, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;           /* Queue manager name */
MQZFP     FreeParms;          /* Resource to be freed */
```

```
MQBYTE    ComponentData[n];   /* Component data */
MQLONG    Continuation;       /* Continuation indicator set by
                                 component */
MQLONG    CompCode;           /* Completion code */
MQLONG    Reason;             /* Reason code qualifying CompCode */
```

## MQZ_GET_AUTHORITY - Get authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is started by the queue manager to retrieve the authority that an entity has to access the specified object, including (if the entity is a principal) authorities possessed by the groups in which the principal is a member. Authorities from generic profiles are included in the returned authority set.

The function identifier for this function (for MQZEP) is MQZID_GET_AUTHORITY.

### Syntax

MQZ_GET_AUTHORITY( *QMgrName* , *EntityName* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityName***
Type: MQCHAR12 - input

Entity name. The name of the entity whose access to the object is to be retrieved. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityName*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object to which access is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_GET_AUTHORITY, this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_GET_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                   ObjectType, &Authority, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_GET_AUTHORITY_2 - Get authority (extended)

This function is provided by a MQZAS_VERSION_2 authorization service component, and is started by the queue manager to retrieve the authority that an entity has to access the specified object.

The function identifier for this function (for MQZEP) is MQZID_GET_AUTHORITY.

MQZ_GET_AUTHORITY_2 is like MQZ_GET_AUTHORITY, but with the *EntityName* parameter replaced by the *EntityData* parameter.

### Syntax

MQZ_GET_AUTHORITY_2( *QMgrName* , *EntityData* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity for which authorization to the object is to be retrieved. See "MQZED - Entity descriptor" on page 1698 for details.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityData*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object for which the entity authority is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

## Syntax

```
MQZ_GET_AUTHORITY_2 (QMgrName, EntityData, EntityType, ObjectName, ObjectType,
Authority, ComponentData, Continuation, CompCode, Reason)
```

### C invocation

```
MQZ_GET_AUTHORITY_2 (QMgrName, &EntityData, EntityType, ObjectName,
                     ObjectType, &Authority, ComponentData,
                     &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity data */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_GET_EXPLICIT_AUTHORITY - Get explicit authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is started by the queue manager to retrieve the authority that an entity has to access the specified object, including (if the entity is a principal) authorities possessed by the groups in which the principal is a member. Authorities from generic profiles are included in the returned authority set.

On UNIX platforms, for the built-in IBM MQ object authority manager (OAM), the returned authority is that possessed only by the principal's primary group.

The function identifier for this function (for MQZEP) is MQZID_GET_EXPLICIT_AUTHORITY.

### Syntax

MQZ_GET_EXPLICIT_AUTHORITY( *QMgrName* , *EntityName* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***

Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityName***

Type: MQCHAR12 - input

Entity name. The name of the entity for which access to the object is to be retrieved. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

***EntityType***

Type: MQLONG - input

Entity type. The type of entity specified by *EntityName*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object for which the entity authority is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_GET_AUTHORITY, this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_GET_EXPLICIT_AUTHORITY (QMgrName, EntityName, EntityType,
                            ObjectName, ObjectType, &Authority,
                            ComponentData, &Continuation,
                            &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

# MQZ_GET_EXPLICIT_AUTHORITY_2 - Get explicit authority (extended)

This function is provided by a MQZAS_VERSION_2 authorization service component, and is started by the queue manager to retrieve the authority that a named group has to access a specified object (but

without the additional authority of the **nobody** group), or the authority that the primary group of the named principal has to access a specified object.

The function identifier for this function (for MQZEP) is MQZID_GET_EXPLICIT_AUTHORITY.

MQZ_GET_EXPLICIT_AUTHORITY_2 is like MQZ_GET_EXPLICIT_AUTHORITY, but with the *EntityName* parameter replaced by the *EntityData* parameter.

## Syntax

MQZ_GET_EXPLICIT_AUTHORITY_2( *QMgrName* , *EntityData* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

## Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity whose authorization to the object is to be retrieved. See "MQZED - Entity descriptor" on page 1698 for details.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityData*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object for which the entity authority is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_GET_EXPLICIT_AUTHORITY_2 (QMgrName, &EntityData, EntityType,
                              ObjectName, ObjectType, &Authority,
                              ComponentData, &Continuation,
                              &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity data */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_INIT_AUTHORITY - Initialize authorization service

This function is provided by an authorization service component, and is started by the queue manager during configuration of the component. It is expected to call MQZEP in order to provide information to the queue manager.

The function identifier for this function (for MQZEP) is MQZID_INIT_AUTHORITY.

### Syntax

MQZ_INIT_AUTHORITY( *Hconfig* , *Options* , *QMgrName* , *ComponentDataLength* , *ComponentData* , *Version* , *CompCode* , *Reason* )

### Parameters

***Hconfig***
Type: MQHCONFIG - input

Configuration handle. This handle represents the particular component being initialized. It is to be used by the component when calling the queue manager with the MQZEP function.

***Options***
Type: MQLONG - input

Initialization options. It must be one of the following values:

**MQZIO_PRIMARY**
Primary initialization.

**MQZIO_SECONDARY**
Secondary initialization.

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ComponentDataLength***
Type: MQLONG - input

Length of component data. Length in bytes of the *ComponentData* area. This length is defined in the component configuration data.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This is initialized to all zeros before calling the component primary initialization function. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Version***
Type: MQLONG - input/output

Version number. On input to the initialization function, this identifies the highest version number that the queue manager supports. The initialization function must change this, if necessary, to the version of the interface which it supports. If on return the queue manager does not support the version returned by the component, it calls the component MQZ_TERM_AUTHORITY function and makes no further use of this component.

The following values are supported:

**MQZAS_VERSION_1**
Version 1.

**MQZAS_VERSION_2**
Version 2.

**MQZAS_VERSION_3**
Version 3.

**MQZAS_VERSION_4**
Version 4.

**MQZAS_VERSION_5**
Version 5.

**MQZAS_VERSION_6**
Version 6.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_INITIALIZATION_FAILED**
(2286, X'8EE') Initialization failed for an undefined reason.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_INIT_AUTHORITY (Hconfig, Options, QMgrName, ComponentDataLength,
                    ComponentData, &Version, &CompCode,
                    &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;              /* Configuration handle */
MQLONG     Options;              /* Initialization options */
MQCHAR48   QMgrName;             /* Queue manager name */
MQLONG     ComponentDataLength;  /* Length of component data */
MQBYTE     ComponentData[n];     /* Component data */
MQLONG     Version;              /* Version number */
MQLONG     CompCode;             /* Completion code */
MQLONG     Reason;               /* Reason code qualifying CompCode */
```

## MQZ_INQUIRE - Inquire authorization service

This function is provided by a MQZAS_VERSION_5 authorization service component, and is started by the queue manager to query the supported functionality.

Where multiple service components are used, service components are called in reverse order to the order they were installed in.

The function identifier for this function (for MQZEP) is MQZID_INQUIRE.

### Syntax

MQZ_INQUIRE( *QMgrName* , *SelectorCount* , *Selectors* , *IntAttrCount* , *IntAttrs* , *CharAttrLength* , *CharAttrs* , *SelectorReturned* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***SelectorCount***
Type: MQLONG - input

Number of selectors. The number of selectors supplied in the *Selectors* parameter.

The value must be in the range 0 through 256.

***Selectors***
Type: MQLONGxSelectorCount - input

Array of selectors. Each selector identifies a required attribute and must be one of the following:

- MQIACF_INTERFACE_VERSION (integer)
- MQIACF_USER_ID_SUPPORT (integer)
- MQCACF_SERVICE_COMPONENT (character)

Selectors can be specified in any order. The number of selectors in the array is indicated by the *SelectorCount* parameter.

Integer attributes identified by selectors are returned in the *IntAttrs* parameter in the same order as they appear in *Selectors*.

Character attributes identified by selectors are returned in the *CharAttrs* parameter in the same order as they in appear *Selectors*.

***IntAttrCount***
Type: MQLONG - input

Number of integer attributes supplied in the IntAttrs parameter.

The value must be in the range 0 through 256.

***IntAttrs***
Type: MQLONG x IntAttrCount - output

Integer attributes. Array of integer attributes. The integer attributes are returned in the same order as the corresponding integer selectors in the *Selectors* array.

***CharAttrCount***
Type: MQLONG - input

Length of the character attributes buffer. The length in bytes of the *CharAttrs* parameter.

The value must be at least the sum of the lengths of the requested character attributes. If no character attributes are requested, zero is a valid value.

***CharAttrs***
Type: MQLONG x CharAttrCount - output

Character attributes buffer. Buffer containing character attributes, concatenated together. The character attributes are returned in the same order as the corresponding character selectors in the *Selectors* array.

The length of the buffer is given by the CharAttrCount parameter.

***SelectorReturned***
Type: MQLONG x SelectorCount - input

Selector returned. Array of values identifying which attributes have been returned from the set requested for by the selectors in the Selectors parameter. The number of values in this array is indicated by the *SelectorCount* parameter. Each value in the array relates to the selector from the corresponding position in the Selectors array. Each value is one of the following:

**MQZSL_RETURNED**
The attribute requested by the corresponding selector in the *Selectors* parameter has been returned.

**MQZSL_NOT_RETURNED**
The attribute requested by the corresponding selector in the *Selectors* parameter has not been returned.

The array is initialized with all values as *MQZSL_NOT_RETURNED*. When an authorization service component returns an attribute, it sets the appropriate value in the array to *MQZSL_NOT_RETURNED*. This allows any other authorization service components, to which the inquire call is made, to identify which attributes have already been returned.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_CHAR_ATTRS_TOO_SHORT**
Not enough space for character attributes.

**MQRC_INT_COUNT_TOO_SMALL**
Not enough space for integer attributes.

If *CompCode* is MQCC_FAILED:

**MQRC_SELECTOR_COUNT_ERROR**
Number of selectors is not valid.

**MQRC_SELECTOR_ERROR**
Attribute selector not valid.

**MQRC_SELECTOR_LIMIT_EXCEEDED**
Too many selectors specified.

**MQRC_INT_ATTR_COUNT_ERROR**
Number of integer attributes is not valid.

**MQRC_INT_ATTRS_ARRAY_ERROR**
Integer attributes array not valid.

**MQRC_CHAR_ATTR_LENGTH_ERROR**
Number of character attributes is not valid.

**MQRC_CHAR_ATTRS_ERROR**
Character attributes string is not valid.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_INQUIRE (QMgrName, SelectorCount, Selectors, IntAttrCount,
                  &IntAttrs, CharAttrLength, &CharAttrs,
                  SelectorReturned, ComponentData, &Continuation,
                  &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48   QMgrName;              /* Queue manager name */
MQLONG     SelectorCount;         /* Selector count */
MQLONG     Selectors[n];          /* Selectors */
MQLONG     IntAttrCount;          /* IntAttrs count */
MQLONG     IntAttrs[n];           /* Integer attributes */
MQLONG     CharAttrCount;         /* CharAttrs count */
MQLONG     CharAttrs[n];          /* Chatacter attributes */
MQLONG     SelectorReturned[n];   /* Selector returned */
MQBYTE     ComponentData[n];      /* Component data */
MQLONG     Continuation;          /* Continuation indicator set by
                                     component */
MQLONG     CompCode;              /* Completion code */
MQLONG     Reason;                /* Reason code qualifying CompCode */
```

## MQZ_REFRESH_CACHE - Refresh all authorizations

This function is provided by an MQZAS_VERSION_3 authorization service component, and is invoked by the queue manager to refresh the list of authorizations held internally by the component.

The function identifier for this function (for MQZEP) is MQZID_REFRESH_CACHE (8L).

### Syntax

MQZ_REFRESH_CACHE( *QMgrName* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

## C invocation

```
MQZ_REFRESH_CACHE (QMgrName, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

# MQZ_SET_AUTHORITY - Set authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is started by the queue manager to set the authority that an entity has to access the specified object.

The function identifier for this function (for MQZEP) is MQZID_SET_AUTHORITY.

**Note:** This function overrides any existing authorities. To preserve any existing authorities you must set them again with this function.

## Syntax

MQZ_SET_AUTHORITY( *QMgrName* , *EntityName* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

## Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityName***
Type: MQCHAR12 - input

Entity name. The name of the entity for which access to the object is to be retrieved. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityName*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object to which access is required. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If one authority is being set, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authority is being set, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_GET_AUTHORITY, this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_SET_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                   ObjectType, Authority, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_SET_AUTHORITY_2 - Set authority (extended)

This function is provided by a MQZAS_VERSION_2 authorization service component, and is started by the queue manager to set the authority that an entity has to access the specified object.

The function identifier for this function (for MQZEP) is MQZID_SET_AUTHORITY.

**Note:** This function overrides any existing authorities. To preserve any existing authorities you must set them again with this function.

MQZ_SET_AUTHORITY_2 is like MQZ_SET_AUTHORITY, but with the *EntityName* parameter replaced by the *EntityData* parameter.

### Syntax

MQZ_SET_AUTHORITY_2( *QMgrName* , *EntityData* , *EntityType* , *ObjectName* , *ObjectType* , *Authority* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity whose authorization to the object is to be set. See “MQZED - Entity descriptor” on page 1698 for details.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by *EntityData*. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ObjectName***
Type: MQCHAR48 - input

Object name. The name of the object to which the entity authority is to be set. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

***ObjectType***
Type: MQLONG - input

Object type. The type of entity specified by *ObjectName*. It must be one of the following values:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**MQOT_TOPIC**
Topic.

***Authority***
Type: MQLONG - input

Authority of entity. If one authority is being set, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authority is being set, this field is the bitwise OR of the corresponding MQZAO_* constants.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_SET_AUTHORITY_2 (QMgrName, &EntityData, EntityType, ObjectName,
                     ObjectType, Authority, ComponentData,
                     &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity data */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_TERM_AUTHORITY - Terminate authorization service

This function is provided by an authorization service component, and is started by the queue manager when it no longer requires the services of this component. The function must perform any cleanup required by the component.

The function identifier for this function (for MQZEP) is MQZID_TERM_AUTHORITY.

### Syntax

MQZ_TERM_AUTHORITY( *Hconfig* , *Options* , *QMgrName* , *ComponentData* , *CompCode* , *Reason* )

### Parameters

***Hconfig***
Type: MQHCONFIG - input

Configuration handle. This handle represents the particular component being terminated. It is to be used by the component when calling the queue manager with the MQZEP function.

***Options***
Type: MQLONG - input

Termination options. It must be one of the following values:

**MQZTO_PRIMARY**
Primary termination.

**MQZTO_SECONDARY**
Secondary termination.

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter on the MQZ_INIT_AUTHORITY call.

When the MQZ_TERM_AUTHORITY call has completed, the queue manager discards this data.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_TERMINATION_FAILED**
(2287, X'8FF') Termination failed for an undefined reason.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_TERM_AUTHORITY (Hconfig, Options, QMgrName, ComponentData,
                    &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;           /* Configuration handle */
MQLONG     Options;           /* Termination options */
MQCHAR48   QMgrName;          /* Queue manager name */
MQBYTE     ComponentData[n];  /* Component data */
MQLONG     CompCode;          /* Completion code */
MQLONG     Reason;            /* Reason code qualifying CompCode */
```

## MQZ_DELETE_NAME - Delete name

This function is provided by a name service component, and is started by the queue manager to delete an entry for the specified queue.

The function identifier for this function (for MQZEP) is MQZID_DELETE_NAME.

### Syntax

MQZ_DELETE_NAME( *QMgrName* , *QName* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***QName***
Type: MQCHAR48 - input

Queue name. The name of the queue for which an entry is to be deleted. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the ComponentDataLength parameter on the MQZ_INIT_NAME call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. It must be one of the following values:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

**MQZCI_STOP**
Do not continue with next component.

For the **MQZ_DELETE_NAME** command, the queue manager does not attempt to start another component, no matter what is returned in the **Continuation** parameter.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Warning (partial completion).

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_UNKNOWN_NAME**
(2288, X'8F0') Queue name not found.

**Note:** It might not be possible to return this code if the underlying service responds with success for this case.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZ_DELETE_NAME (QMgrName, QName, ComponentData, &Continuation,
                 &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  QName;             /* Queue name */
MQBYTE    ComponentData[n];  /* Component data */
```

```
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_INIT_NAME - Initialize name service

This function is provided by a name service component, and is started by the queue manager during configuration of the component. It is expected to call MQZEP in order to provide information to the queue manager.

The function identifier for this function (for MQZEP) is MQZID_INIT_NAME.

### Syntax

MQZ_INIT_NAME( *Hconfig* , *Options* , *QMgrName* , *ComponentDataLength* , *ComponentData* , *Version* , *CompCode* , *Reason* )

### Parameters

***Hconfig***

Type: MQHCONFIG - input

Configuration handle. This handle represents the particular component being initialized. It is to be used by the component when calling the queue manager with the MQZEP function.

***Options***

Type: MQLONG - input

Initialization options. It must be one of the following values:

**MQZIO_PRIMARY**
Primary initialization.

**MQZIO_SECONDARY**
Secondary initialization.

***QMgrName***

Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ComponentDataLength***

Type: MQLONG - input

Length of component data. Length in bytes of the *ComponentData* area. This length is defined in the component configuration data.

***ComponentData***

Type: MQBYTE x ComponentDataLength - input/output

Component data. This is initialized to all zeros before calling the component primary initialization function. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Version***

Type: MQLONG - input/output

Version number. On input to the initialization function, this identifies the highest version number that the queue manager supports. The initialization function must change this, if necessary, to the version of the interface which it supports. If on return the queue manager does not support the version returned by the component, it calls the component MQZ_TERM_NAME function and makes no further use of this component.

The following values are supported:

**MQZAS_VERSION_1**
Version 1.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_INITIALIZATION_FAILED**
(2286, X'8EE') Initialization failed for an undefined reason.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_INIT_NAME (Hconfig, Options, QMgrName, ComponentDataLength,
               ComponentData, &Version, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;              /* Configuration handle */
MQLONG     Options;              /* Initialization options */
MQCHAR48   QMgrName;             /* Queue manager name */
MQLONG     ComponentDataLength;  /* Length of component data */
MQBYTE     ComponentData[n];     /* Component data */
MQLONG     Version;              /* Version number */
MQLONG     CompCode;             /* Completion code */
MQLONG     Reason;               /* Reason code qualifying CompCode */
```

## MQZ_INSERT_NAME - Insert name

This function is provided by a name service component, and is started by the queue manager to insert an entry for the specified queue, containing the name of the queue manager that owns the queue. If the queue is already defined in the service, the call fails.

The function identifier for this function (for MQZEP) is MQZID_INSERT_NAME.

## Syntax

MQZ_INSERT_NAME( *QMgrName* , *QName* , *ResolvedQMgrName* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

## Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***QName***
Type: MQCHAR48 - input

Queue name. The name of the queue for which an entry is to be inserted. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

***ResolvedQMgrName***
Type: MQCHAR48 - input

Resolved queue manager name. The name of the queue manager to which the queue resolves. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_NAME call.

***Continuation***
Type: MQLONG - input/output

Continuation indicator set by component. For MQZ_INSERT_NAME, the queue manager does not attempt to start another component, whatever is returned in the *Continuation* parameter.

The following values are supported:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_Q_ALREADY_EXISTS**
(2290, X'8F2') Queue object already exists.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_INSERT_NAME (QMgrName, QName, ResolvedQMgrName, ComponentData,
                 &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  QName;             /* Queue name */
MQCHAR48  ResolvedQMgrName;  /* Resolved queue manager name */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_LOOKUP_NAME - Lookup name

This function is provided by a name service component, and is started by the queue manager to retrieve the name of the owning queue manager, for a specified queue.

The function identifier for this function (for MQZEP) is MQZID_LOOKUP_NAME.

### Syntax

MQZ_LOOKUP_NAME( *QMgrName* , *QName* , *ResolvedQMgrName* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***QName***
Type: MQCHAR48 - input

Queue name. The name of the queue for which an entry is to be resolved. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

***ResolvedQMgrName***
Type: MQCHAR48 - output

Resolved queue manager name. If the function completes successfully, this is the name of the queue manager that owns the queue.

The name returned by the service component must be padded on the right with blanks to the full length of the parameter; the name must not be terminated by a null character, or contain leading or embedded blanks.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_NAME call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. For MQZ_LOOKUP_NAME, the queue manager specifies whether to start another name service component, as follows:

- If *CompCode* is MQCC_OK, no further components are started, whatever value is returned in *Continuation*.
- If *CompCode* is not MQCC_OK, a further component is started, unless *Continuation* is MQZCI_STOP.

The following values are supported:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_Q_NAME**
(2288, X'8F0') Queue name not found.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_LOOKUP_NAME (QMgrName, QName, ResolvedQMgrName, ComponentData,
                 &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  QName;             /* Queue name */
MQCHAR48  ResolvedQMgrName;  /* Resolved queue manager name */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_TERM_NAME - Terminate name service

This function is provided by a name service component, and is started by the queue manager when it no longer requires the services of this component. The function must perform any cleanup required by the component.

The function identifier for this function (for MQZEP) is MQZID_TERM_NAME.

### Syntax

MQZ_TERM_NAME( *Hconfig* , *Options* , *QMgrName* , *ComponentData* , *CompCode* , *Reason* )

### Parameters

***Hconfig***
Type: MQHCONFIG - input

Configuration handle. This handle represents the particular component being terminated. It is used by the component when calling the queue manager with the MQZEP function.

***Options***
Type: MQLONG - input

Termination options. It must be one of the following values:

**MQZTO_PRIMARY**
Primary termination.

**MQZTO_SECONDARY**
Secondary termination.

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ComponentData***
Type: MQBYTE x ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of these component functions is called.

Component data is in shared memory accessible to all processes.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_NAME call.

When the MQZ_TERM_NAME call has completed, the queue manager discards this data.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_TERMINATION_FAILED**
(2287, X'8FF') Termination failed for an undefined reason.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_TERM_NAME (Hconfig, Options, QMgrName, ComponentData, &CompCode,
               &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;           /* Configuration handle */
MQLONG     Options;           /* Termination options */
MQCHAR48   QMgrName;          /* Queue manager name */
MQBYTE     ComponentData[n];  /* Component data */
MQLONG     CompCode;          /* Completion code */
MQLONG     Reason;            /* Reason code qualifying CompCode */
```

## MQZAC - Application context

The MQZAC structure is used on the MQZ_AUTHENTICATE_USER call for the *ApplicationContext* parameter. This parameter specifies data related to the calling application.

*Table 1* summarizes the fields in the structure.

*Table 658. Fields in MQZAC*

| Field | Description |
|---|---|
| StrucId | Structure identifier |
| Version | Structure version number |
| ProcessId | Process identifier |

| Table 658. Fields in MQZAC (continued) | |
|---|---|
| **Field** | **Description** |
| ThreadId | Thread identifier |
| ApplName | Application name |
| UserID | User identifier |
| EffectiveUserID | Effective user identifier |
| Environment | Environment |
| CallerType | Caller type |
| AuthenticationType | Authentication type |
| BindType | Bind type |

## Fields

***StrucId***
Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQZAC_STRUC_ID**
Identifier for application context structure.

For the C programming language, the constant MQZAC_STRUC_ID_ARRAY is also defined; this has the same value as MQZAC_STRUC_ID, but is an array of characters instead of a string.

***Version***
Type: MQLONG - input

Structure version number. The value is as follows:

**MQZAC_VERSION_1**
Version-1 application context structure. The constant MQZAC_CURRENT_VERSION specifies the version number of the current version.

***ProcessId***
Type: MQPID - input

Process identifier of the application.

***ThreadId***
Type: MQTID - input

Thread identifier of the application.

***ApplName***
Type: MQCHAR28 - input

Application name.

***UserID***
Type: MQCHAR12 - input

User identifier. On UNIX systems this field specifies the application's real user ID. On Windows this field specifies the application's user ID.

***EffectiveUserID***
Type: MQCHAR12 - input

Effective user identifier. On UNIX systems this field specifies the application's effective user ID. On Windows this field is blank.

***Environment***
Type: MQLONG - input

Environment. This field specifies the environment from which the call was made. The field is one of the following values:

**MQXE_COMMAND_SERVER**
Command server

**MQXE_MQSC**
**runmqsc** command interpreter

**MQXE_MCA**
Message channel agent MQXE_OTHER

**MQXE_OTHER**
Undefined environment

***CallerType***
Type: MQLONG - input

Caller Type. This field specifies the type of program that made the call. The field is one of the following values:

**MQXACT_EXTERNAL**
The call is external to the queue manager.

**MQXACT_INTERNAL**
The call is internal to the queue manager.

***AuthenticationType***
Type: MQLONG - input

Authentication Type. This field specifies the type of authentication being performed. The field is one of the following values:

**MQZAT_INITIAL_CONTEXT**
The authentication call is due to user context being initialized. This value is used during an MQCONN or MQCONNX call.

**MQZAT_CHANGE_CONTEXT**
The authentication call is due to the user context being changed. This value is used when the MCA changes the user context. Parent topic: MQZAC -

***BindType***
Type: MQLONG - input

Bind Type. This field specifies the type of binding in use. The field is one of the following values:

**MQCNO_FASTPATH_BINDING**
Fastpath binding.

**MQCNO_SHARED_BINDING**
Shared binding.

**MQCNO_ISOLATED_BINDING**
Isolated binding.

## C declaration
Declare the fields of the structure as follows:

```
typedef struct tagMQZAC MQZAC;
struct tagMQZAC {
  MQCHAR4   StrucId;            /* Structure identifier */
  MQLONG    Version;            /* Structure version number */
  MQPID     ProcessId;          /* Process identifier */
  MQTID     ThreadId;           /* Thread identifier */
  MQCHAR28  ApplName;           /* Application name */
  MQCHAR12  UserID;             /* User identifier */
  MQCHAR12  EffectiveUserID;    /* Effective user identifier */
```

```
  MQLONG    Environment;        /* Environment */
  MQLONG    CallerType;         /* Caller type */
  MQLONG    AuthenticationType; /* Authentication type */
  MQLONG    BindType;           /* Bind type */
};
```

## MQZAD - Authority data

The MQZAD structure is used on the MQZ_ENUMERATE_AUTHORITY_DATA call for two parameters, one input and one output.

- MQZAD is used for the **Filter** parameter which is input to the call. This parameter specifies the selection criteria that are to be used to select the authority data returned by the call.
- MQZAD is also used for the **AuthorityBuffer** parameter which is output from the call. This parameter specifies the authorizations for one combination of profile name, object type, and entity.

*Table 1.* summarizes the fields in the structure.

*Table 659. Fields in MQZAD*

| Field | Description |
|---|---|
| StrucId | Structure identifier |
| Version | Structure version number |
| ProfileName | Profile name |
| ObjectType | Object type |
| Authority | Authority |
| EntityDataPtr | Pointer to entity data |
| EntityType | Entity type |
| Options | Options |

### Fields

**StrucId**
Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQZAD_STRUC_ID**
Identifier for authority data structure.

For the C programming language, the constant MQZAD_STRUC_ID_ARRAY is also defined; this has the same value as MQZAD_STRUC_ID, but is an array of characters instead of a string.

**Version**
Type: MQLONG - input

Structure version number. The value is as follows:

**MQZAD_VERSION_1**
Version-1 application context structure. The constant MQZAD_CURRENT_VERSION specifies the version number of the current version.

The following constant specifies the version number of the current version:

**MQZAD_CURRENT_VERSION**
Current version of authority data structure.

**ProfileName**
Type: MQCHAR48 - input

Profile name.

For the **Filter** parameter, this field is the profile name for which authority data is required. If the name is entirely blank up to the end of the field or the first null character, authority data for all profile names is returned.

For the **AuthorityBuffer** parameter, this field is the name of a profile that matches the specified selection criteria.

**ObjectType**
Type: MQLONG - input

Object type.

For the **Filter** parameter, this field is the object type for which authority data is required. If the value is MQOT_ALL, authority data for all object types is returned.

For the **AuthorityBuffer** parameter, this field is the object type to which the profile identified by the **ProfileName** parameter applies.

The value is one of the following; for the **Filter** parameter, the value MQOT_ALL is also valid:

**MQOT_AUTH_INFO**
Authentication information

**MQOT_CHANNEL**
Channel

**MQOT_CLNTCONN_CHANNEL**
Client connection channel

**MQOT_LISTENER**
Listener

**MQOT_NAMELIST**
Namelist

**MQOT_PROCESS**
Process definition

**MQOT_Q**
Queue

**MQOT_Q_MGR**
Queue manager

**MQOT_SERVICE**
Service

**Authority**
Type: MQLONG - input

Authority.

For the **Filter** parameter, this field is ignored.

For the **AuthorityBuffer** parameter, this field represents the authorizations that the entity has to the objects identified by **ProfileName** and **ObjectType**. If the entity has only one authority, the field is equal to the appropriate authorization value (MQZAO_* constant). If the entity has more than one authority, the field is the bitwise OR of the corresponding MQZAO_* constants.

**EntityDataPtr**
Type: PMQZED - input

Address of MQZED structure identifying an entity.

For the **Filter** parameter, this field points to an MQZED structure that identifies the entity for which authority data is required. If **EntityDataPtr** is the null pointer, authority data for all entities is returned.

For the **AuthorityBuffer** parameter, this field points to an MQZED structure that identifies the entity for which authority data has been returned.

**EntityType**
Type: MQLONG - input

Entity type.

For the **Filter** parameter, this field specifies the entity type for which authority data is required. If the value is MQZAET_NONE, authority data for all entity types is returned.

For the **AuthorityBuffer** parameter, this field specifies the type of the entity identified by the MQZED structure pointed to by the **EntityDataPtr** parameter.

The value is one of the following; for the **Filter** parameter, the value MQZAET_NONE is also valid:

**MQZAET_PRINCIPAL**
Principal

**MQZAET_GROUP**
Group

**Options**
Type: MQAUTHOPT - input

Options. This field specifies options that give control over the profiles that are displayed. One of the following values must be specified:

**MQAUTHOPT_NAME_ALL_MATCHING**
Displays all profiles

**MQAUTHOPT_NAME_EXPLICIT**
Displays profiles that have exactly the same name as specified in the **ProfileName** field.

In addition, one of the following must also be specified:

**MQAUTHOPT_ENTITY_SET**
Display all profiles that are used to calculate the cumulative authority that the entity has to the object specified by the **ProfileName** parameter. The **ProfileName** parameter must not contain any wildcard characters.

- If the specified entity is a principal, for each member of the set {entity, groups} the most applicable profile that applies to the object is displayed.
- If the specified entity is a group, the most applicable profile from the group that applies to the object is displayed.
- If this value is specified, then the values of **ProfileName**, **ObjectType**, **EntityType**, and the entity name specified in the **EntityDataPtr** MQZED structure, must all be non-blank.

If you have specified MQAUTHOPT_NAME_ALL_MATCHING, you can also specify the following value:

**MQAUTHOPT_ENTITY_EXPLICIT**
Displays profiles that have exactly the same entity name as the entity name specified in the **EntityDataPtr** MQZED structure.

## C declaration

```
typedef struct tagMQZAD MQZAD;
struct tagMQZAD {
  MQCHAR4   StrucId;        /* Structure identifier */
  MQLONG    Version;        /* Structure version number */
  MQCHAR48  ProfileName;    /* Profile name */
  MQLONG    ObjectType;     /* Object type */
  MQLONG    Authority;      /* Authority */
  PMQZED    EntityDataPtr;  /* Address of MQZED structure identifying an
                               entity */
  MQLONG    EntityType;     /* Entity type */
  MQAUTHOPT Options;        /* Options */
};
```

## MQZED - Entity descriptor

The MQZED structure is used in a number of authorization service calls to specify the entity for which authorization is to be checked.

*Table 1.* summarizes the fields in the structure.

*Table 660. Fields in MQZED*

| Field | Description |
|---|---|
| StrucId | Structure identifier |
| Version | Version |
| EntityName Ptr | Entity name |
| EntityDomainPtr | Entity domain pointer |
| SecurityId | Security identifier |
| CorrelationPtr | Correlation pointer |

## Fields

***StrucId***

Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQZED_STRUC_ID**
Identifier for entity descriptor structure.

For the C programming language, the constant MQZED_STRUC_ID_ARRAY is also defined; this has the same value as MQZED_STRUC_ID, but is an array of characters instead of a string.

***Version***

Type: MQLONG - input

Structure version number. The value is as follows:

**MQZED_VERSION_1**
Version-1 entity descriptor structure.

The following constant specifies the version number of the current version:

**MQZED_CURRENT_VERSION**
Current version of entity descriptor structure.

***EntityNamePtr***

Type: PMQCHAR - input

Profile name.

Address of entity name. This is a pointer to the name of the entity whose authorization is to be checked.

***EntityDomainPtr***

Type: PMQCHAR - input

Address of entity domain name. This is a pointer to the name of the domain containing the definition of the entity whose authorization is to be checked.

***SecurityId***

Type: MQBYTE40 - input

Authority.

Security identifier. This is the security identifier whose authorization is to be checked.

***CorrelationPtr***
Type: MQPTR - input

Correlation pointer. This facilitates the passing of correlational data between the authenticate user function and other appropriate OAM functions.

## C declaration

```
typedef struct tagMQZED MQZED;
struct tagMQZED {
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  PMQCHAR   EntityNamePtr;    /* Address of entity name */
  PMQCHAR   EntityDomainPtr;  /* Address of entity domain name */
  MQBYTE40  SecurityId;       /* Security identifier */
  MQPTR     CorrelationPtr;   /* Address of correlation data */
```

## Fields

# MQZEP - Add component entry point

A service component starts this function, during initialization, to add an entry point to the entry point vector for that service component.

## Syntax

MQZEP ( *Hconfig* , *Function* , *EntryPoint* , *CompCode* , *Reason* )

## Parameters

***Hconfig***
Type: MQHCONFIG - input

Configuration handle. This handle represents the component that is being configured for this particular installable service. It must be the same as the component passed to the component configuration function by the queue manager on the component initialization call.

***Function***
Type: MQLONG - input

Function identifier. Valid values for this are defined for each installable service.

If MQZEP is called more than once for the same function, the last call made provides the entry point that is used.

***EntryPoint***
Type: PMQFUNC - input

Function entry point. This is the address of the entry point provided by the component to perform the function.

The value NULL is valid, and indicates that the function is not provided by this component. NULL is assumed for entry points that are not defined using MQZEP.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_FUNCTION_ERROR**
(2281, X'8E9') Function identifier not valid.

**MQRC_HCONFIG_ERROR**
(2280, X'8E8') Configuration handle not valid.

For more information about these reason codes, see API completion and reason codes.

## C invocation

```
MQZEP (Hconfig, Function, EntryPoint, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONFIG  Hconfig;     /* Configuration handle */
MQLONG     Function;    /* Function identifier */
PMQFUNC    EntryPoint;  /* Function entry point */
MQLONG     CompCode;    /* Completion code */
MQLONG     Reason;      /* Reason code qualifying CompCode */
```

# MQZFP - Free parameters

The MQZFP structure is used on the MQZ_FREE_USER call for the *FreeParms* parameter. This parameter specifies data related to resource to be freed.

*Table 1.* summarizes the fields in the structure.

*Table 661. Fields in MQZFP*

| Field | Description |
|---|---|
| StrucId | Structure identifier |
| Version | Version |
| Reserved | Reserved field |
| CorrelationPtr | Correlation pointer |

## Fields

***StrucId***
Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQZIC_STRUC_ID**
Identifier for identity context structure. For the C programming language, the constant MQZIC_STRUC_ID_ARRAY is also defined; this has the same value as MQZIC_STRUC_ID, but is an array of characters instead of a string.

***Version***
Type: MQLONG - input

Structure version number. The value is as follows:

**MQZFP_VERSION_1**
Version-1 free parameters structure.

The following constant specifies the version number of the current version:

**MQZFP_CURRENT_VERSION**
Current version of free parameters structure.

***Reserved***
Type: MQBYTE8 - input

Reserved field. The initial value is null.

***CorrelationPtr***
Type: MQPTR - input

Correlation pointer. Address of correlation data relating to the resource to be freed.

## C declaration

```
typedef struct tagMQZFP MQZFP;
struct tagMQZFP {
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  MQBYTE8   Reserved;         /* Reserved field */
  MQPTR     CorrelationPtr;   /* Address of correlation data */
};
```

## Fields

# MQZIC - Identity context

The MQZIC structure is used on the MQZ_AUTHENTICATE_USER call for the *IdentityContext* parameter.

The MQZIC structure contains identity context information, which identifies the user of the application that first put the message on a queue:

- The queue manager fills the *UserIdentifier* field with a name that identifies the user, the way that the queue manager can do this depends on the environment in which the application is running.
- The queue manager fills the *AccountingToken* field with a token or number that it determined from the application that put the message.
- Applications can use the *ApplIdentityData* field for any extra information that they want to include about the user (for example, an encrypted password).

Suitably authorized applications can set the identity context using the MQZ_AUTHENTICATE_USER function.

A Windows systems security identifier (SID) is stored in the *AccountingToken* field when a message is created under IBM MQ for Windows. The SID can be used to supplement the *UserIdentifier* field and to establish the credentials of a user.

*Table 1.* summarizes the fields in the structure.

*Table 662. Fields in MQZIC*

| Field | Description |
|---|---|
| StrucId | Structure identifier |
| Version | Version |
| UserIdentifier | User identifier |

| Table 662. Fields in MQZIC (continued) | |
|---|---|
| **Field** | **Description** |
| AccountingToken | Accounting token |
| ApplIdentityData | Application identity data |

## Fields

***StrucId***
Type: MQCHAR4 - input

Structure identifier. The value is as follows:

**MQZIC_STRUC_ID**
Identifier for identity context structure. For the C programming language, the constant MQZIC_STRUC_ID_ARRAY is also defined; this has the same value as MQZIC_STRUC_ID, but is an array of characters instead of a string.

***Version***
Type: MQLONG - input

Structure version number. The value is as follows:

**MQZIC_VERSION_1**
Version-1 identity context structure.

The following constant specifies the version number of the current version:

**MQZIC_CURRENT_VERSION**
Current version of identity context structure.

***UserIdentifier***
Type: MQCHAR12 - input

User identifier. This is part of the identity context of the message. *UserIdentifier* specifies the user identifier of the application that originated the message. The queue manager treats this information as character data, but does not define the format of it. For more information on the *UserIdentifier* field, see "UserIdentifier (MQCHAR12)" on page 446.

***AccountingToken***
Type: MQBYTE32 - input

Accounting token. This is part of the identity context of the message. *AccountingToken* allows an application to cause work done as a result of the message to be appropriately charged. The queue manager treats this information as a string of bits and does not check its content. For more information on the *AccountingToken* field, see "AccountingToken (MQBYTE32)" on page 405.

***ApplIdentityData***
Type: MQCHAR32 - input

Application data relating to identity. This is part of the identity context of the message. ApplIdentityData is information that is defined by the application suite that can be used to provide additional information about the origin of the message. For example, it could be set by applications running with suitable user authority to indicate whether the identity data is trusted. For more information on the ApplIdentityData field, see "ApplIdentityData (MQCHAR32)" on page 406.

## C declaration

```
typedef struct tagMQZED MQZED;
struct tagMQZED {
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  MQCHAR12  UserIdentifier;   /* User identifier */
  MQBYTE32  AccountingToken;  /* Accounting token */
```

```
  MQCHAR32  ApplIdentityData; /* Application data relating to identity */
};
```

### Fields

# Installable services interface reference information

Use this information to understand the reference information for the installable services.

For each function there is a description, including the function identifier (for MQZEP).

The *parameters* are shown listed in the order they must occur. They must all be present.

Each parameter name is followed by its data type in parentheses. These are the elementary data types described in “Elementary data types” on page 968.

The C language invocation is also given, after the description of the parameters.

## MQZEP - Add component entry point

This function is invoked by a service component, during initialization, to add an entry point to the entry point vector for that service component.

### Syntax

```
MQZEP (Hconfig, Function, EntryPoint, CompCode, Reason)
```

### Parameters

The MQZEP call has the following parameters.

**Hconfig (MQHCONFIG) - input**
Configuration handle.

This handle represents the component which is being configured for this particular installable service. It must be the same as the one passed to the component configuration function by the queue manager on the component initialization call.

**Function (MQLONG) - input**
Function identifier.

Valid values for this are defined for each installable service. If MQZEP is called more than once for the same function, the last call made provides the entry point which is used.

**EntryPoint (PMQFUNC) - input**
Function entry point.

This is the address of the entry point provided by the component to perform the function. The value NULL is valid, and indicates that the function is not provided by this component. NULL is assumed for entry points which are not defined using MQZEP.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_FUNCTION_ERROR**
(2281, X'8E9') Function identifier not valid.

**MQRC_HCONFIG_ERROR**
(2280, X'8E8') Configuration handle not valid.

For more information on these reason codes, see Messages and reason codes.

### C invocation

```
MQZEP (Hconfig, Function, EntryPoint, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQHCONFIG  Hconfig;     /* Configuration handle */
MQLONG     Function;    /* Function identifier */
PMQFUNC    EntryPoint;  /* Function entry point */
MQLONG     CompCode;    /* Completion code */
MQLONG     Reason;      /* Reason code qualifying CompCode */
```

## MQHCONFIG - Configuration handle

The MQHCONFIG data type represents a configuration handle, that is, the component that is being configured for a particular installable service. A configuration handle must be aligned on its natural boundary.

Applications must test variables of this type for equality only.

### C declaration

```
typedef void MQPOINTER MQHCONFIG;
```

## PMQFUNC - Pointer to function

Pointer to a function.

### C declaration

```
typedef void MQPOINTER PMQFUNC;
```

## MQZ_AUTHENTICATE_USER - Authenticate user

This function is provided by a MQZAS_VERSION_5 authorization service component. It is invoked by the queue manager to authenticate a user, or to set identity context fields.

It is invoked when an IBM MQ user application context is established. This happens during connect calls at the point where the application's user context is initialized, and at each point where the application's user context is changed. Each time a connect call is made, the application's user context information is reacquired in the *IdentityContext* field.

The function identifier for this function (for MQZEP) is MQZID_AUTHENTICATE_USER.

## Syntax

**MQZ_AUTHENTICATE_USER** *(QMgrName, SecurityParms, ApplicationContext, IdentityContext, CorrelationPtr, ComponentData, Continuation, CompCode, Reason)*

## Parameters

The MQZ_AUTHENTICATE_USER call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character. The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

**SecurityParms (MQCSP) - input**
Security parameters.

Data relating to the user ID, password, and authentication type.

During an MQCONN MQI call this parameter contains null, or default values.

**ApplicationContext (MQZAC) - input**
Application context.

Data relating to the calling application. See "MQZAC - Application context" on page 1734 for details. During every MQCONN or MQCONNX MQI call, the user context information in the MQZAC structure is reacquired.

**IdentityContext (MQZIC) - input/output**
Identity context.

On input to the authenticate user function, this identifies the current identity context. The authenticate user function can change this, at which point the queue manager adopts the new identity context. See "MQZIC - Identity context" on page 1741 for more details on the MQZIC structure.

**CorrelationPtr (MQPTR) - output**
Correlation pointer.

Specifies the address of any correlation data. This pointer is then passed on to other OAM calls.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this components functions is called. The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation flag.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on other components.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information about these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_AUTHENTICATE_USER (QMgrName, SecurityParms, ApplicationContext,
                   IdentityContext, &CorrelationPtr, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;           /* Queue manager name */
MQCSP     SecurityParms;      /* Security parameters */
MQZAC     ApplicationContext; /* Application context */
MQZIC     IdentityContext;    /* Identity context */
MQPTR     CorrelationPtr;     /* Correlation pointer */
MQBYTE    ComponentData[n];   /* Component data */
MQLONG    Continuation;       /* Continuation indicator set by
                                 component */
MQLONG    CompCode;           /* Completion code */
MQLONG    Reason;             /* Reason code qualifying CompCode */
```

## MQZ_CHECK_AUTHORITY - Check authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is invoked by the queue manager to check whether an entity has authority to perform a particular action, or actions, on a specified object.

The function identifier for this function (for MQZEP) is MQZID_CHECK_AUTHORITY.

### Syntax

**MQZ_CHECK_AUTHORITY** ***(QMgrName, EntityName, EntityType,***
*ObjectName, ObjectType, Authority, ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_CHECK_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character. The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**EntityName (MQCHAR12) - input**
Entity name.

The name of the entity whose authorization to the object is to be checked. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

It is not essential for this entity to be known to the underlying security service. If it is not known, then the authorizations of the special **nobody** group (to which all entities are assumed to belong) are used for the check. An all-blank name is valid and can be used in this way.

**EntityType (MQLONG) - input**
Entity type.

The type of entity specified by *EntityName*. It is one of the following:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object to which access is required. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

**ObjectType (MQLONG) - input**
Object type.

The type of entity specified by *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**Authority (MQLONG) - input**
Authority to be checked.

If one authorization is being checked, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authorization is being checked, it is the bitwise OR of the corresponding MQZAO_* constants.

The following authorizations apply to use of the MQI calls:

**MQZAO_CONNECT**
Ability to use the MQCONN call.

**MQZAO_BROWSE**
Ability to use the MQGET call with a browse option.

This allows the MQGMO_BROWSE_FIRST, MQGMO_BROWSE_MSG_UNDER_CURSOR, or MQGMO_BROWSE_NEXT option to be specified on the MQGET call.

**MQZAO_INPUT**
Ability to use the MQGET call with an input option.

This allows the MQOO_INPUT_SHARED, MQOO_INPUT_EXCLUSIVE, or MQOO_INPUT_AS_Q_DEF option to be specified on the MQOPEN call.

**MQZAO_OUTPUT**
Ability to use the MQPUT call.

This allows the MQOO_OUTPUT option to be specified on the MQOPEN call.

**MQZAO_INQUIRE**
Ability to use the MQINQ call.

This allows the MQOO_INQUIRE option to be specified on the MQOPEN call.

**MQZAO_SET**
Ability to use the MQSET call.

This allows the MQOO_SET option to be specified on the MQOPEN call.

**MQZAO_PASS_IDENTITY_CONTEXT**
Ability to pass identity context.

This allows the MQOO_PASS_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_PASS_ALL_CONTEXT**
Ability to pass all context.

This allows the MQOO_PASS_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_PASS_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_IDENTITY_CONTEXT**
Ability to set identity context.

This allows the MQOO_SET_IDENTITY_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_IDENTITY_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_SET_ALL_CONTEXT**
Ability to set all context.

This allows the MQOO_SET_ALL_CONTEXT option to be specified on the MQOPEN call, and the MQPMO_SET_ALL_CONTEXT option to be specified on the MQPUT and MQPUT1 calls.

**MQZAO_ALTERNATE_USER_AUTHORITY**
Ability to use alternate user authority.

This allows the MQOO_ALTERNATE_USER_AUTHORITY option to be specified on the MQOPEN call, and the MQPMO_ALTERNATE_USER_AUTHORITY option to be specified on the MQPUT1 call.

**MQZAO_ALL_MQI**
All of the MQI authorizations.

This enables all of the authorizations described previously.

The following authorizations apply to administration of a queue manager:

**MQZAO_CREATE**
Ability to create objects of a specified type.

**MQZAO_DELETE**
Ability to delete a specified object.

**MQZAO_DISPLAY**
Ability to display the attributes of a specified object.

**MQZAO_CHANGE**
Ability to change the attributes of a specified object.

**MQZAO_CLEAR**
Ability to delete all messages from a specified queue.

**MQZAO_AUTHORIZE**
Ability to authorize other users for a specified object.

**MQZAO_CONTROL**
Ability to start, stop, or ping a non-client channel object.

**MQZAO_CONTROL_EXTENDED**
Ability to reset a sequence number, or resolve an indoubt message on a non-client channel object.

**MQZAO_ALL_ADMIN**
All of the administration authorizations, other than MQZAO_CREATE.

The following authorizations apply to both use of the MQI and to administration of a queue manager:

**MQZAO_ALL**
All authorizations, other than MQZAO_CREATE.

**MQZAO_NONE**
No authorizations.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information on these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_CHECK_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                     ObjectType, Authority, ComponentData,
                     &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_CHECK_PRIVILEGED - Check if user is privileged

This function is provided by an MQZAS_VERSION_6 authorization service component, and is invoked by the queue manager to determine whether a specified user is a privileged user.

The function identifier for this function (for MQZEP) is MQZID_CHECK_PRIVILEGED.

### Syntax

MQZ_CHECK_PRIVILEGED( *QMgrName* , *EntityData* , *EntityType* , *ComponentData* , *Continuation* , *CompCode* , *Reason* )

### Parameters

***QMgrName***
Type: MQCHAR48 - input

Queue manager name. The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***EntityData***
Type: MQZED - input

Entity data. Data relating to the entity that is to be checked. For more information, see “MQZED - Entity descriptor” on page 1698.

***EntityType***
Type: MQLONG - input

Entity type. The type of entity specified by EntityData. It must be one of the following values:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

***ComponentData***
Type: MQBYTE×ComponentDataLength - input/output

Component data. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of these component functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation***
Type: MQLONG - output

Continuation indicator set by component. The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_CHECK_AUTHORITY, this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

If the call to a component fails (that is, *CompCode* returns MQCC_FAILED), and the *Continuation* parameter is MQZCI_DEFAULT or MQZCI_CONTINUE, the queue manager continues to call other components if there are any.

If the call succeeds (that is, *CompCode* returns MQCC_OK) no other components are called no matter what the setting of *Continuation* is.

If the call fails and the *Continuation* parameter is MQZCI_STOP then no other components are called and the error is returned to the queue manager. Components have no knowledge of previous calls, so the *Continuation* parameter is always set to MQZCI_DEFAULT before the call.

***CompCode***
Type: MQLONG - output

Completion code. It must be one of the following values:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason***
Type: MQLONG - output

Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_PRIVILEGED**
(2584, X'A18') This user is not a privileged user ID.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information about these reason codes, see API completion and reason codes.

### C invocation

```
MQZ_CHECK_PRIVILEGED (QMgrName, &EntityData, EntityType,
                      ComponentData, &Continuation,
                      &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQZED     EntityData;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_COPY_ALL_AUTHORITY - Copy all authority

This function is provided by an authorization service component. It is invoked by the queue manager to copy all of the authorizations that are currently in force for a reference object to another object.

The function identifier for this function (for MQZEP) is MQZID_COPY_ALL_AUTHORITY.

### Syntax

**MQZ_COPY_ALL_AUTHORITY** ***(QMgrName, RefObjectName, ObjectName,***
*ObjectType, ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_COPY_ALL_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**RefObjectName (MQCHAR48) - input**
Reference object name.

The name of the reference object, the authorizations for which are to be copied. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object for which accesses are to be set. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

**ObjectType (MQLONG) - input**
Object type.

The type of object specified by *RefObjectName* and *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_COPY_ALL_AUTHORITY this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_REF_OBJECT**
(2294, X'8F6') Reference object unknown.

For more information on these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_COPY_ALL_AUTHORITY (QMgrName, RefObjectName, ObjectName, ObjectType,
                        ComponentData, &Continuation, &CompCode,
                        &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  RefObjectName;     /* Reference object name */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_DELETE_AUTHORITY - Delete authority

This function is provided by an authorization service component, and is invoked by the queue manager to delete all of the authorizations associated with the specified object.

The function identifier for this function (for MQZEP) is MQZID_DELETE_AUTHORITY.

### Syntax

**MQZ_DELETE_AUTHORITY** ***(QMgrName, ObjectName, ObjectType,***
*ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_DELETE_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object for which accesses are to be deleted. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

**ObjectType (MQLONG) - input**
Object type.

The type of entity specified by *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_DELETE_AUTHORITY this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information on these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_DELETE_AUTHORITY (QMgrName, ObjectName, ObjectType, ComponentData,
                      &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_ENUMERATE_AUTHORITY_DATA - Enumerate authority data

This function is provided by an MQZAS_VERSION_4 authorization service component, and is invoked repeatedly by the queue manager to retrieve all of the authority data that matches the selection criteria specified on the first invocation.

The function identifier for this function (for MQZEP) is MQZID_ENUMERATE_AUTHORITY_DATA.

### Syntax

**MQZ_ENUMERATE_AUTHORITY_DATA** ***(QMgrName, StartEnumeration,***
*Filter, AuthorityBufferLength, AuthorityBuffer, AuthorityDataLength,*
*ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_ENUMERATE_AUTHORITY_DATA call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**StartEnumeration (MQLONG) - input**
Flag indicating whether call should start enumeration.

This indicates whether the call should start the enumeration of authority data, or continue the enumeration of authority data started by a previous call to MQZ_ENUMERATE_AUTHORITY_DATA. The value is one of the following:

**MQZSE_START**
Start enumeration.

The call is invoked with this value to start the enumeration of authority data. The *Filter* parameter specifies the selection criteria to be used to select the authority data returned by this and successive calls.

**MQZSE_CONTINUE**
Continue enumeration.

The call is invoked with this value to continue the enumeration of authority data. The *Filter* parameter is ignored in this case, and can be specified as the null pointer (the selection criteria are determined by the *Filter* parameter specified by the call that had *StartEnumeration* set to MQZSE_START).

**Filter (MQZAD) - input**
Filter.

If *StartEnumeration* is MQZSE_START, *Filter* specifies the selection criteria to be used to select the authority data to return. If *Filter* is the null pointer, no selection criteria are used, that is, all authority data is returned. See "MQZAD (Authority data) on IBM i" on page 1736 for details of the selection criteria that can be used.

If *StartEnumeration* is MQZSE_CONTINUE, *Filter* is ignored, and can be specified as the null pointer.

**AuthorityBufferLength (MQLONG) - input**
Length of *AuthorityBuffer*.

This is the length in bytes of the *AuthorityBuffer* parameter. The authority buffer must be big enough to accommodate the data to be returned.

**AuthorityBuffer (MQZAD) - output**
Authority data.

This is the buffer in which the authority data is returned. The buffer must be big enough to accommodate an MQZAD structure, an MQZED structure, plus the longest entity name and longest domain name defined.

**Note:** This parameter is defined as an MQZAD, as the MQZAD always occurs at the start of the buffer. However, if the buffer is actually declared as an MQZAD, the buffer will be too small - it needs to be bigger than an MQZAD so that it can accommodate the MQZAD, MQZED, plus entity and domain names.

**AuthorityDataLength (MQLONG) - output**
Length of data returned in *AuthorityBuffer*.

This is the length of the data returned in *AuthorityBuffer*. If the authority buffer is too small, *AuthorityDataLength* is set to the length of the buffer required, and the call returns completion code MQCC_FAILED and reason code MQRC_BUFFER_LENGTH_ERROR.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_ENUMERATE_AUTHORITY_DATA this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_BUFFER_LENGTH_ERROR**
(2005, X'7D5') Buffer length parameter not valid.

**MQRC_NO_DATA_AVAILABLE**
(2379, X'94B') No data available.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

For more information on these reason codes, see Messages and reason codes.

## C invocation

```
MQZ_ENUMERATE_AUTHORITY_DATA (QMgrName, StartEnumeration, &Filter,
                              AuthorityBufferLength,
                              &AuthorityBuffer,
                              &AuthorityDataLength, ComponentData,
                              &Continuation, &CompCode,
                              &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;               /* Queue manager name */
MQLONG    StartEnumeration;       /* Flag indicating whether call should
                                     start enumeration */
MQZAD     Filter;                 /* Filter */
MQLONG    AuthorityBufferLength;  /* Length of AuthorityBuffer */
MQZAD     AuthorityBuffer;        /* Authority data */
MQLONG    AuthorityDataLength;    /* Length of data returned in
                                     AuthorityBuffer */
```

```
MQBYTE    ComponentData[n];       /* Component data */
MQLONG    Continuation;           /* Continuation indicator set by
                                     component */
MQLONG    CompCode;               /* Completion code */
MQLONG    Reason;                 /* Reason code qualifying CompCode */
```

## MQZ_FREE_USER - Free user

This function is provided by a MQZAS_VERSION_5 authorization service component, and is invoked by the queue manager to free associated allocated resource. It is invoked when an application has finished running under all user contexts, for example during an MQDISC MQI call.

The function identifier for this function (for MQZEP) is MQZID_FREE_USER.

## MQZ_GET_AUTHORITY - Get authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is invoked by the queue manager to retrieve the authority that an entity has to access the specified object.

The function identifier for this function (for MQZEP) is MQZID_GET_AUTHORITY.

### Syntax

**MQZ_GET_AUTHORITY** ***(QMgrName, EntityName, EntityType, ObjectName,***
*ObjectType, Authority, ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_GET_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**EntityName (MQCHAR12) - input**
Entity name.

The name of the entity whose access to the object is to be retrieved. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

**EntityType (MQLONG) - input**
Entity type.

The type of entity specified by *EntityName*. The following value can be specified:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object for which the entity's authority is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

**ObjectType (MQLONG) - input**
Object type.

The type of entity specified by *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**Authority (MQLONG) - output**
Authority of entity.

If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_GET_AUTHORITY this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information on these reason codes, see Messages and reason codes.

### C invocation

```
MQZ_GET_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                   ObjectType, &Authority, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_GET_EXPLICIT_AUTHORITY - Get explicit authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is invoked by the queue manager to retrieve the authority that a named group has to access a specified object (but without the additional authority of the **nobody** group), or the authority that the primary group of the named principal has to access a specified object.

The function identifier for this function (for MQZEP) is MQZID_GET_EXPLICIT_AUTHORITY.

### Syntax

**MQZ_GET_EXPLICIT_AUTHORITY** ***(QMgrName, EntityName, EntityType,***
*ObjectName, ObjectType, Authority, ComponentData, Continuation, CompCode, Reason)*

## Parameters

The MQZ_GET_EXPLICIT_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**EntityName (MQCHAR12) - input**
Entity name.

The name of the entity from which access to the object is to be retrieved. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

**EntityType (MQLONG) - input**
Entity type.

The type of entity specified by *EntityName*. The following value can be specified:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object for which the entity's authority is to be retrieved. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

**ObjectType (MQLONG) - input**
Object type.

The type of entity specified by *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**Authority (MQLONG) - output**
Authority of entity.

If the entity has one authority, this field is equal to the appropriate authorization operation (MQZAO_* constant). If it has more than one authority, this field is the bitwise OR of the corresponding MQZAO_* constants.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_GET_EXPLICIT_AUTHORITY this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

For more information on these reason codes, see Messages and reason codes.

## C invocation

```
MQZ_GET_EXPLICIT_AUTHORITY (QMgrName, EntityName, EntityType,
                            ObjectName, ObjectType, &Authority,
                            ComponentData, &Continuation,
                            &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority of entity */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_INIT_AUTHORITY - Initialize authorization service

This function is provided by an authorization service component, and is invoked by the queue manager during configuration of the component. It is expected to call MQZEP in order to provide information to the queue manager.

The function identifier for this function (for MQZEP) is MQZID_INIT_AUTHORITY.

### Syntax

**MQZ_INIT_AUTHORITY** ***(Hconfig, Options, QMgrName, ComponentDataLength,***
*ComponentData, Version, CompCode, Reason)*

### Parameters

The MQZ_INIT_AUTHORITY call has the following parameters.

**Hconfig (MQHCONFIG) - input**
Configuration handle.

This handle represents the particular component being initialized. It is to be used by the component when calling the queue manager with the MQZEP function.

**Options (MQLONG) - input**
Initialization options.

It is one of the following:

**MQZIO_PRIMARY**
Primary initialization.

**MQZIO_SECONDARY**
Secondary initialization.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**ComponentDataLength (MQLONG) - input**
Length of component data.

Length in bytes of the *ComponentData* area. This length is defined in the component configuration data.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This is initialized to all zeros before calling the component's primary initialization function. This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions (including the initialization function) provided by this component are preserved, and presented the next time one of this component's functions is called.

**Version (MQLONG) - input/output**
Version number.

On input to the initialization function, this identifies the *highest* version number that the queue manager supports. The initialization function must change this, if necessary, to the version of the interface which *it* supports. If on return the queue manager does not support the version returned by the component, it calls the component's MQZ_TERM_AUTHORITY function and makes no further use of this component.

The following values are supported:

**MQZAS_VERSION_1**
Version 1.

**MQZAS_VERSION_2**
Version 2.

**MQZAS_VERSION_3**
Version 3.

**MQZAS_VERSION_4**
Version 4.

**MQZAS_VERSION_5**
Version 5.

**MQZAS_VERSION_6**
Version 6.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_INITIALIZATION_FAILED**
(2286, X'8EE') Initialization failed for an undefined reason.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

For more information on these reason codes, see Messages and reason codes.

## C invocation

```
MQZ_INIT_AUTHORITY (Hconfig, Options, QMgrName, ComponentDataLength,
                    ComponentData, &Version, &CompCode,
                    &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;              /* Configuration handle */
MQLONG     Options;              /* Initialization options */
MQCHAR48   QMgrName;             /* Queue manager name */
MQLONG     ComponentDataLength;  /* Length of component data */
MQBYTE     ComponentData[n];     /* Component data */
MQLONG     Version;              /* Version number */
MQLONG     CompCode;             /* Completion code */
MQLONG     Reason;               /* Reason code qualifying CompCode */
```

## MQZ_INQUIRE - Inquire authorization service

This function is provided by a MQZAS_VERSION_5 authorization service component, and is invoked by the queue manager to query the supported functionality. Where multiple service components are used, service components are called in reverse order to the order they were installed in.

The function identifier for this function (for MQZEP) is MQZID_INQUIRE.

### Syntax

**MQZ_INQUIRE**
*(QMgrName, SelectorCount, Selectors, IntAttrCount, IntAttrs, CharAttrLength, CharAttrs, SelectorReturned, ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_INQUIRE call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**SelectorCount (MQLONG) - input**
Number of selectors.

The number of selectors supplied in the Selectors parameter.

The value must be between zero and 256.

**Selectors (MQLONG x SelectorCount) - input**
Selectors.

Array of selectors. Each selector identifies a required attribute and must be of one of the following types:

- MQIACF_* (integer)
- MQCACF_* (character)

Selectors can be specified in any order. The number of selectors in the array is indicated by the SelectorCount parameter.

Integer attributes identified by selectors are returned in the IntAttrs parameter in the same order as they appear in Selectors.

Character attributes identified by selectors are returned in the CharAttrs parameter in the same order as they in appear Selectors.

**IntAttrCount (MQLONG) - input**
Number of integer attributes.

The number of integer attributes supplied in the IntAttrs parameter.

The value must be in the range 0 through 256.

**IntAttrs (MQLONG x IntAttrCount) - output**
Integer attributes.

Array of integer attributes. The integer attributes are returned in the same order as the corresponding integer selectors in the Selectors array.

**CharAttrCount (MQLONG) - input**
Length of the character attributes buffer.

The length in bytes of the CharAttrs parameter.

The value must at least sum of the lengths of the requested character attributes. If no character attributes are requested, zero is a valid value.

**CharAttrs (MQLONG x CharAttrCount) - output**
Character attributes buffer.

Buffer containing character attributes, concatenated together. The character attributes are returned in the same order as the corresponding character selectors in the Selectors array.

The length of the buffer is given by the CharAttrCount parameter.

**SelectorReturned (MQLONGxSelectorCount) - input**
Selector returned.

Array of values identifying which attributes have been returned from the set requested for by the selectors in the Selectors parameter. The number of values in this array is indicated by the SelectorCount parameter. Each value in the array relates to the selector from the corresponding position in the Selectors array. Each value is one of the following:

**MQZSL_RETURNED**
The attribute requested by the corresponding selector in the Selectors parameter has been returned.

**MQZSL_NOT_RETURNED**
The attribute requested by the corresponding selector in the Selectors parameter has not been returned.

The array is initialized with all values as *MQZSL_NOT_RETURNED*. When an authorization service component returns an attribute, it sets the appropriate value in the array to *MQZSL_RETURNED*. This allows any other authorization service components, to which the inquire call is made, to identify which attributes have already been returned.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation flag.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on other components.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_WARNING**
Partial completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_WARNING:

**MQRC_CHAR_ATTRS_TOO_SHORT**
Not enough space for character attributes.

**MQRC_INT_COUNT_TOO_SMALL**
Not enough space for integer attributes.

If *CompCode* is MQCC_FAILED:

**MQRC_SELECTOR_COUNT_ERROR**
Number of selectors is not valid.

**MQRC_SELECTOR_ERROR**
Attribute selector not valid.

**MQRC_SELECTOR_LIMIT_EXCEEDED**
Too many selectors specified.

**MQRC_INT_ATTR_COUNT_ERROR**
Number of integer attributes is not valid.

**MQRC_INT_ATTRS_ARRAY_ERROR**
Integer attributes array not valid.

**MQRC_CHAR_ATTR_LENGTH_ERROR**
Number of character attributes is not valid.

**MQRC_CHAR_ATTRS_ERROR**
Character attributes string is not valid.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

## C invocation

```
MQZ_INQUIRE (QMgrName, SelectorCount, Selectors, IntAttrCount,
                   &IntAttrs, CharAttrLength, &CharAttrs,
                   SelectorReturned, ComponentData, &Continuation,
                   &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48   QMgrName;              /* Queue manager name */
MQLONG     SelectorCount;         /* Selector count */
MQLONG     Selectors[n];          /* Selectors */
MQLONG     IntAttrCount;          /* IntAttrs count */
MQLONG     IntAttrs[n];           /* Integer attributes */
MQLONG     CharAttrCount;         /* CharAttrs count */
MQLONG     CharAttrs[n];          /* Chatacter attributes */
MQLONG     SelectorReturned[n];   /* Selector returned */
MQBYTE     ComponentData[n];      /* Component data */
MQLONG     Continuation;          /* Continuation indicator set by
                                     component */
MQLONG     CompCode;              /* Completion code */
MQLONG     Reason;                /* Reason code qualifying CompCode */
```

## MQZ_REFRESH_CACHE - Refresh all authorizations

This function is provided by an MQZAS_VERSION_3 authorization service component. It is invoked by the queue manager to refresh the list of authorizations held internally by the component.

The function identifier for this function (for MQZEP) is MQZID_REFRESH_CACHE (8L).

### Syntax

**MQZ_REFRESH_CACHE**
*(QMgrName, ComponentData, Continuation, CompCode, Reason)*

### Parameters

***QMgrName* (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to use it in any defined manner.

***ComponentData* (MQBYTE x *ComponentDataLength* ) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component. Any changes made to it by any of the functions provided by this component are preserved, and presented the next time a function of the component is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

***Continuation* (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_REFRESH_CACHE, this has the same effect as MQZCI_CONTINUE.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

***CompCode* (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

***Reason* (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

### C invocation

```
MQZ_REFRESH_CACHE (QMgrName, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

Declare the parameters as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_SET_AUTHORITY - Set authority

This function is provided by a MQZAS_VERSION_1 authorization service component, and is invoked by the queue manager to set the authority that an entity has to access the specified object.

The function identifier for this function (for MQZEP) is MQZID_SET_AUTHORITY.

**Note:** This function overrides any existing authorities. To preserve any existing authorities you must set them again with this function.

### Syntax

**MQZ_SET_AUTHORITY** ***(QMgrName, EntityName, EntityType, ObjectName,***
*ObjectType, Authority, ComponentData, Continuation, CompCode, Reason)*

### Parameters

The MQZ_SET_AUTHORITY call has the following parameters.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**EntityName (MQCHAR12) - input**
Entity name.

The name of the entity for which access to the object is to be set. The maximum length of the string is 12 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

**EntityType (MQLONG) - input**
Entity type.

The type of entity specified by *EntityName*. The following value can be specified:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

**ObjectName (MQCHAR48) - input**
Object name.

The name of the object to which access is required. The maximum length of the string is 48 characters; if it is shorter than that it is padded to the right with blanks. The name is not terminated by a null character.

If *ObjectType* is MQOT_Q_MGR, this name is the same as *QMgrName*.

**ObjectType (MQLONG) - input**
Object type.

The type of entity specified by *ObjectName*. It is one of the following:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**Authority (MQLONG) - input**
Authority to be checked.

If one authorization is being set, this field is equal to the appropriate authorization operation (MQZAO_* constant). If more than one authorization is being set, it is the bitwise OR of the corresponding MQZAO_* constants.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter of the MQZ_INIT_AUTHORITY call.

**Continuation (MQLONG) - output**
Continuation indicator set by component.

The following values can be specified:

**MQZCI_DEFAULT**
Continuation dependent on queue manager.

For MQZ_SET_AUTHORITY this has the same effect as MQZCI_STOP.

**MQZCI_CONTINUE**
Continue with next component.

**MQZCI_STOP**
Do not continue with next component.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_NOT_AUTHORIZED**
(2035, X'7F3') Not authorized for access.

**MQRC_SERVICE_ERROR**
(2289, X'8F1') Unexpected error occurred accessing service.

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_UNKNOWN_ENTITY**
(2292, X'8F4') Entity unknown to service.

## C invocation

```
MQZ_SET_AUTHORITY (QMgrName, EntityName, EntityType, ObjectName,
                   ObjectType, Authority, ComponentData,
                   &Continuation, &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQCHAR48  QMgrName;          /* Queue manager name */
MQCHAR12  EntityName;        /* Entity name */
MQLONG    EntityType;        /* Entity type */
MQCHAR48  ObjectName;        /* Object name */
MQLONG    ObjectType;        /* Object type */
MQLONG    Authority;         /* Authority to be checked */
MQBYTE    ComponentData[n];  /* Component data */
MQLONG    Continuation;      /* Continuation indicator set by
                                component */
```

```
MQLONG    CompCode;          /* Completion code */
MQLONG    Reason;            /* Reason code qualifying CompCode */
```

## MQZ_TERM_AUTHORITY - Terminate authorization service

This function is provided by an authorization service component, and is invoked by the queue manager when it no longer requires the services of this component. The function must perform any cleanup required by the component.

The function identifier for this function (for MQZEP) is MQZID_TERM_AUTHORITY.

### Syntax

**MQZ_TERM_AUTHORITY** ***(Hconfig, Options, QMgrName, ComponentData,***
*CompCode, Reason)*

### Parameters

The MQZ_TERM_AUTHORITY call has the following parameters.

**Hconfig (MQHCONFIG) - input**
Configuration handle.

This handle represents the particular component being terminated.

**Options (MQLONG) - input**
Termination options.

It is one of the following:

**MQZTO_PRIMARY**
Primary termination.

**MQZTO_SECONDARY**
Secondary termination.

**QMgrName (MQCHAR48) - input**
Queue manager name.

The name of the queue manager calling the component. This name is padded with blanks to the full length of the parameter; the name is not terminated by a null character.

The queue-manager name is passed to the component for information; the authorization service interface does not require the component to make use of it in any defined manner.

**ComponentData (MQBYTE x ComponentDataLength) - input/output**
Component data.

This data is kept by the queue manager on behalf of this particular component; any changes made to it by any of the functions provided by this component are preserved, and presented the next time one of this component's functions is called.

The length of this data area is passed by the queue manager in the *ComponentDataLength* parameter on the MQZ_INIT_AUTHORITY call.

When the MQZ_TERM_AUTHORITY call has completed, the queue manager discards this data.

**CompCode (MQLONG) - output**
Completion code.

It is one of the following:

**MQCC_OK**
Successful completion.

**MQCC_FAILED**
Call failed.

**Reason (MQLONG) - output**
Reason code qualifying *CompCode*.

If *CompCode* is MQCC_OK:

**MQRC_NONE**
(0, X'000') No reason to report.

If *CompCode* is MQCC_FAILED:

**MQRC_SERVICE_NOT_AVAILABLE**
(2285, X'8ED') Underlying service not available.

**MQRC_TERMINATION_FAILED**
(2287, X'8FF') Termination failed for an undefined reason.

For more information on these reason codes, see Messages and reason codes.

## C invocation

```
MQZ_TERM_AUTHORITY (Hconfig, Options, QMgrName, ComponentData,
                    &CompCode, &Reason);
```

The parameters passed to the service are declared as follows:

```
MQHCONFIG  Hconfig;           /* Configuration handle */
MQLONG     Options;           /* Termination options */
MQCHAR48   QMgrName;          /* Queue manager name */
MQBYTE     ComponentData[n];  /* Component data */
MQLONG     CompCode;          /* Completion code */
MQLONG     Reason;            /* Reason code qualifying CompCode */
```

# MQZAC - Application context

This parameter specifies data related to the calling application.

The MQZAC structure is used on the MQZ_AUTHENTICATE_USER call for the *ApplicationContext* parameter.

## Fields

**StrucId (MQCHAR4)**
Structure identifier.

The value is:

**MQZAC_STRUC_ID**
Identifier for application context structure.

For the C programming language, the constant MQZAC_STRUC_ID_ARRAY is also defined; this has the same value as MQZAC_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the service.

**Version (MQLONG**
Structure version number.

The value is:

**MQZAC_VERSION_1**
Version-1 application context structure.

The following constant specifies the version number of the current version:

**MQZAC_CURRENT_VERSION**
Current version of application context structure.

This is an input field to the service.

**ProcessId (MQPID)**
Process identifier.

The process identifier of the application.

**ThreadId (MQTID)**
Thread identifier.

The thread identifier of the application.

**ApplName (MQCHAR28)**
Application name.

The application name.

**UserID (MQCHAR12)**
User identifier.

For IBM i systems the user profile that the application job was created under. ( IBM i: when a profile swap is done with the QWTSETP API in the application job the current user profile is returned).

**EffectiveUserID (MQCHAR12)**
Effective user identifier.

For IBM i systems the application job's current user profile.

**Environment (MQLONG)**
Environment.

This field specifies the environment from which the call was made.

This can have one of the following values:

**MQXE_COMMAND_SERVER**
Command server.

**MQXE_MQSC**
`runmqsc` command interpreter.

**MQXE_MCA**
Message channel agent

**MQXE_OTHER**
Undefined environment

**CallerType (MQLONG)**
Caller Type.

This field specifies the type of program that made the call.

This can have one of the following values:

**MQXACT_EXTERNAL**
The call is external to the queue manager.

**MQXACT_INTERNAL**
The call is internal to the queue manager.

**AuthenticationType (MQLONG)**
Authentication Type.

This field specifies the type of authentication being performed.

This can have one of the following values:

**MQZAT_INITIAL_CONTEXT**
The authentication call is due to user context being initialized. This value is used during an `MQCONN` or `MQCONNX` call.

**MQZAT_CHANGE_CONTEXT**
The authentication call is due to the user context being changed. This value is used when the MCA changes the user context.

v

**BindType (MQLONG**
Bind Type.

This field specifies the type of binding in use.

This can have one of the following values:

**MQCNO_FASTPATH_BINDING**
Fastpath binding.

**MQCNO_SHARED_BINDING**
Shared binding.

**MQCNO_ISOLATED_BINDING**
Isolated binding.

## C declaration

```
typedef struct tagMQZAC MQZAC;
struct tagMQZAC {
  MQCHAR4   StrucId;            /* Structure identifier */
  MQLONG    Version;            /* Structure version number */
  MQPID     ProcessId;          /* Process identifier */
  MQTID     ThreadId;           /* Thread identifier */
  MQCHAR28  ApplName;           /* Application name */
  MQCHAR12  UserID;             /* User identifier */
  MQCHAR12  EffectiveUserID;    /* Effective user identifier */
  MQLONG    Environment;        /* Environment */
  MQLONG    CallerType;         /* Caller type */
  MQLONG    AuthenticationType; /* Authentication type */
  MQLONG    BindType;           /* Bind type */
};
```

# IBM i MQZAD (Authority data) on IBM i

The MQZAD structure is used on the MQZ_ENUMERATE_AUTHORITY_DATA call for two parameters.

The two parameters are:

- MQZAD is used for the **Filter** parameter which is input to the call. This parameter specifies the selection criteria that are to be used to select the authority data returned by the call.
- MQZAD is also used for the **AuthorityBuffer** parameter which is output from the call. This parameter specifies the authorizations for one combination of profile name, object type, and entity.

## Fields

**StrucId (MQCHAR4)**
Structure identifier.

The value is:

**MQZAD_STRUC_ID**
Identifier for authority data structure.

For the C programming language, the constant MQZAD_STRUC_ID_ARRAY is also defined; this has the same value as MQZAD_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the service.

**Version (MQLONG)**
Structure version number.

The value is:

**MQZAD_VERSION_1**
Version-1 authority data structure.

The following constant specifies the version number of the current version:

**MQZAD_CURRENT_VERSION**
Current version of authority data structure.

This is an input field to the service.

**ProfileName (MQCHAR48)**
Profile name.

For the **Filter** parameter, this field is the profile name from which authority data is required. If the name is entirely blank up to the end of the field or the first null character, authority data for all profile names is returned.

For the **AuthorityBuffer** parameter, this field is the name of a profile that matches the specified selection criteria.

**ObjectType (MQLONG)**
Object type.

For the **Filter** parameter, this field is the object type for which authority data is required. If the value is MQOT_ALL, authority data for all object types is returned.

For the **AuthorityBuffer** parameter, this field is the object type to which the profile identified by **ProfileName** applies.

The value is one of the following; for the **Filter** parameter, the value MQOT_ALL is also valid:

**MQOT_AUTH_INFO**
Authentication information.

**MQOT_CHANNEL**
Channel.

**MQOT_CLNTCONN_CHANNEL**
Client connection channel.

**MQOT_LISTENER**
Listener.

**MQOT_NAMELIST**
Namelist.

**MQOT_PROCESS**
Process definition.

**MQOT_Q**
Queue.

**MQOT_Q_MGR**
Queue manager.

**MQOT_SERVICE**
Service.

**Authority (MQLONG)**
Authority.

For the **Filter** parameter, this field is ignored.

For the **AuthorityBuffer** parameter, this field represents the authorizations that the entity has to the objects identified by **ProfileName** and **ObjectType**. If the entity has only one authority, the field is equal to the appropriate authorization value (MQZAO_* constant). If the entity has more than one authority, the field is the bitwise OR of the corresponding MQZAO_* constants.

**EntityDataPtr (PMQZED)**
Address of MQZED structure identifying an entity.

For the **Filter** parameter, this field points to an MQZED structure that identifies the entity from which authority data is required. If **EntityDataPtr** is the null pointer, authority data for all entities is returned.

For the **AuthorityBuffer** parameter, this field points to an MQZED structure that identifies the entity that the returned authority data came from.

**EntityType (MQLONG)**
Entity type.

For the **Filter** parameter, this field specifies the entity type for which authority data is required. If the value is MQZAET_NONE, authority data for all entity types is returned.

For the **AuthorityBuffer** parameter, this field specifies the type of the entity identified by the MQZED structure pointed to by **EntityDataPtr**.

The value is one of the following; for the **Filter** parameter, the value MQZAET_NONE is also valid:

**MQZAET_PRINCIPAL**
Principal.

**MQZAET_GROUP**
Group.

**Options (MQAUTHOPT)**
Options.

This field specifies options that give control over the profiles that are displayed.

One of the following must be specified:

**MQAUTHOPT_NAME_ALL_MATCHING**
Displays all profiles

**MQAUTHOPT_NAME_EXPLICIT**
Displays profiles that have exactly the same name as specified in the **ProfileName** field.

In addition, one of the following must also be specified:

**MQAUTHOPT_ENTITY_SET**
Display all profiles used to calculate the cumulative authority that the entity has to the object specified by **ProfileName**. The **ProfileName** field must not contain any wildcard characters.

- If the specified entity is a principal, for each member of the set {entity, groups} the most applicable profile that applies to the object is displayed.
- If the specified entity is a group, the most applicable profile from the group that applies to the object is displayed.
- If this value is specified, then the values of **ProfileName**, **ObjectType**, **EntityType**, and the entity name specified in the **EntityDataPtr** MQZED structure, must all be non-blank.

If you have specified *MQAUTHOPT_NAME_ALL_MATCHING*, you can also specify the following:

**MQAUTHOPT_ENTITY_EXPLICIT**
Displays profiles that have exactly the same entity name as the entity name specified in the **EntityDataPtr** MQZED structure.

## C declaration

```
typedef struct tagMQZAD MQZAD;
struct tagMQZAD {
  MQCHAR4   StrucId;        /* Structure identifier */
  MQLONG    Version;        /* Structure version number */
  MQCHAR48  ProfileName;    /* Profile name */
  MQLONG    ObjectType;     /* Object type */
```

```
  MQLONG    Authority;      /* Authority */
  PMQZED    EntityDataPtr;  /* Address of MQZED structure identifying an
                               entity */
  MQLONG    EntityType;     /* Entity type */
  MQAUTHOPT Options;        /* Options */
};
```

## MQZED - Entity descriptor

The MQZED structure is used in a number of authorization service calls to specify the entity for which authorization is to be checked.

### Fields

**StrucId (MQCHAR4)**
Structure identifier.

The value is:

**MQZED_STRUC_ID**
Identifier for entity descriptor structure.

For the C programming language, the constant MQZED_STRUC_ID_ARRAY is also defined; this has the same value as MQZED_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the service.

**Version (MQLONG)**
Structure version number.

The value is:

**MQZED_VERSION_1**
Version-1 entity descriptor structure.

The following constant specifies the version number of the current version:

**MQZED_CURRENT_VERSION**
Current version of entity descriptor structure.

This is an input field to the service.

**EntityNamePtr (PMQCHAR)**
Address of entity name.

This is a pointer to the name of the entity whose authorization is to be checked.

**EntityDomainPtr (PMQCHAR)**
Address of entity domain name.

This is a pointer to the name of the domain containing the definition of the entity whose authorization is to be checked.

**SecurityId (MQBYTE40)**
Security identifier.

This is the security identifier whose authorization is to be checked.

**CorrelationPtr (MQPTR)**
Correlation pointer.

This facilitates the passing of correlational data between the authenticate user function and other appropriate OAM functions.

### C declaration

```
typedef struct tagMQZED MQZED;
struct tagMQZED {
```

```
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  PMQCHAR   EntityNamePtr;    /* Address of entity name */
  PMQCHAR   EntityDomainPtr;  /* Address of entity domain name */
  MQBYTE40  SecurityId;       /* Security identifier */
  MQPTR     CorrelationPtr;   /* Address of correlation data */
```

## MQZFP - Free parameters

This parameter specifies data related to resource to be freed.

The MQZFP structure is used on the MQZ_FREE_USER call for the *FreeParms* parameter.

### Fields

**StrucId (MQCHAR4)**
Structure identifier.

The value is:

**MQZFP_STRUC_ID**
Identifier for free parameters structure.

For the C programming language, the constant MQZFP_STRUC_ID_ARRAY is also defined; this has the same value as MQZFP_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the service.

**Version (MQLONG)**
Structure version number.

The value is:

**MQZFP_VERSION_1**
Version-1 free parameters structure.

The following constant specifies the version number of the current version:

**MQZFP_CURRENT_VERSION**
Current version of free parameters structure.

This is an input field to the service.

**Reserved (MQBYTE8)**
Reserved field.

The initial value is null.

**CorrelationPtr (MQPTR)**
Correlation pointer.

Address of correlation data relating to the resource to be freed.

### C declaration

```
typedef struct tagMQZFP MQZFP;
struct tagMQZFP {
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  MQBYTE8   Reserved;         /* Reserved field */
  MQPTR     CorrelationPtr;   /* Address of correlation data */
};
```

## MQZIC - Identity context

The MQZIC structure is used on the MQZ_AUTHENTICATE_USER call for the *IdentityContext* parameter.

The MQZIC structure contains identity context information, that identifies the user of the application that first put the message on a queue:

- The queue manager fills the UserIdentifier field with a name that identifies the user, the way that the queue manager can do this depends on the environment in which the application is running.
- The queue manager fills the AccountingToken field with a token or number that it determined from the application that put the message.
- Applications can use the ApplIdentityData field for any extra information that they want to include about the user (for example, an encrypted password).

Suitably authorized applications may set the identity context using the MQZ_AUTHENTICATE_USER function.

A Windows systems security identifier (SID) is stored in the AccountingToken field when a message is created under IBM MQ for Windows. The SID can be used to supplement the UserIdentifier field and to establish the credentials of a user.

### Fields

**StrucId (MQCHAR4)**
Structure identifier.

The value is:

**MQZIC_STRUC_ID**
Identifier for identity context structure.

For the C programming language, the constant MQZIC_STRUC_ID_ARRAY is also defined; this has the same value as MQZIC_STRUC_ID, but is an array of characters instead of a string.

This is an input field to the service.

**Version (MQLONG)**
Structure version number.

The value is:

**MQZIC_VERSION_1**
Version-1 identity context structure.

The following constant specifies the version number of the current version:

**MQZIC_CURRENT_VERSION**
Current version of identity context structure.

This is an input field to the service.

**UserIdentifier (MQCHAR12)**
User identifier.

This is part of the **identity context** of the message.

*UserIdentifier* specifies the user identifier of the application that originated the message. The queue manager treats this information as character data, but does not define the format of it. For more information on the *UserIdentifier* field, see “UserIdentifier (MQCHAR12)” on page 446.

**AccountingToken (MQBYTE32)**
Accounting token.

This is part of the **identity context** of the message.

*AccountingToken* allows an application to cause work done as a result of the message to be appropriately charged. The queue manager treats this information as a string of bits and does not

check its content. For more information on the *AccountingToken* field, see "AccountingToken (MQBYTE32)" on page 405.

**ApplIdentityData (MQCHAR32)**
Application data relating to identity.

This is part of the **identity context** of the message.

*ApplIdentityData* is information that is defined by the application suite that can be used to provide additional information about the origin of the message. For example, it could be set by applications running with suitable user authority to indicate whether the identity data is trusted. For more information on the *ApplIdentityData* field, see "ApplIdentityData (MQCHAR32)" on page 406.

### C declaration

```
typedef struct tagMQZED MQZED;
struct tagMQZED {
  MQCHAR4   StrucId;          /* Structure identifier */
  MQLONG    Version;          /* Structure version number */
  MQCHAR12  UserIdentifier;   /* User identifier */
  MQBYTE32  AccountingToken;  /* Accounting token */
  MQCHAR32  ApplIdentityData; /* Application data relating to identity */
};
```

# Reference material for IBM MQ bridge for HTTP

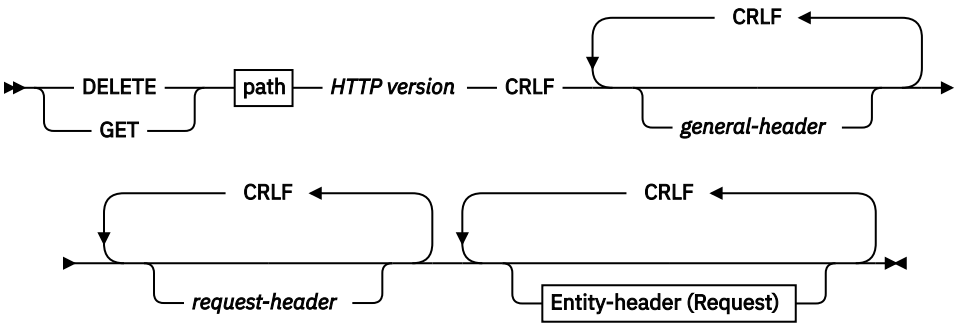
Reference topics for IBM MQ bridge for HTTP, arranged alphabetically

## HTTP DELETE: IBM MQ bridge for HTTP command

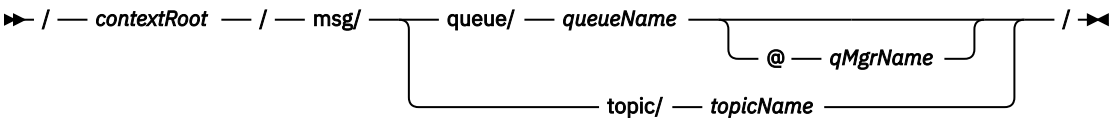
The HTTP **DELETE** operation gets a message from an IBM MQ queue, or retrieves a publication from a topic. The message is removed from the queue. If the publication is retained, it is not removed. A response message is sent back to the client including information about the message.

### Syntax

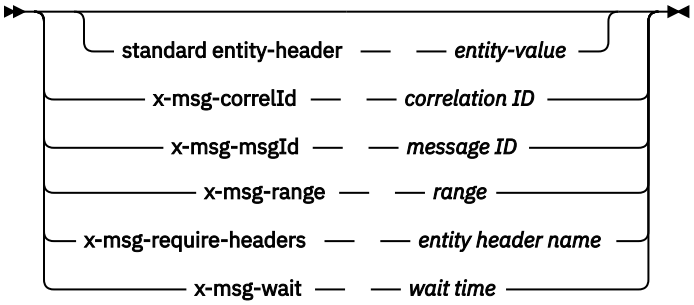
**Request**




**Path**



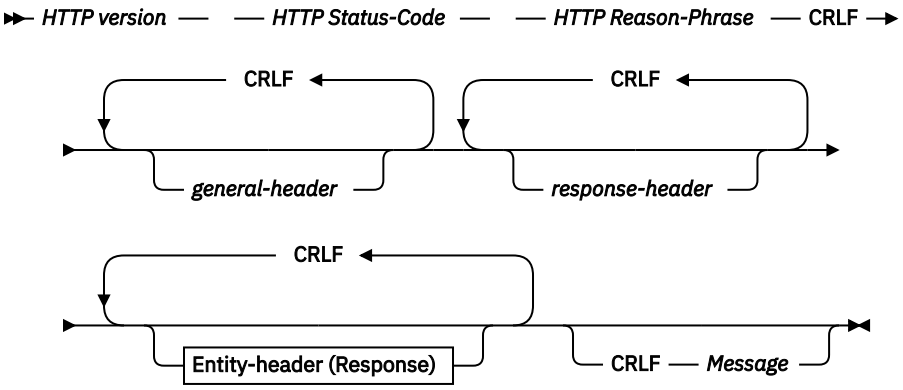

**entity-header (Request)**



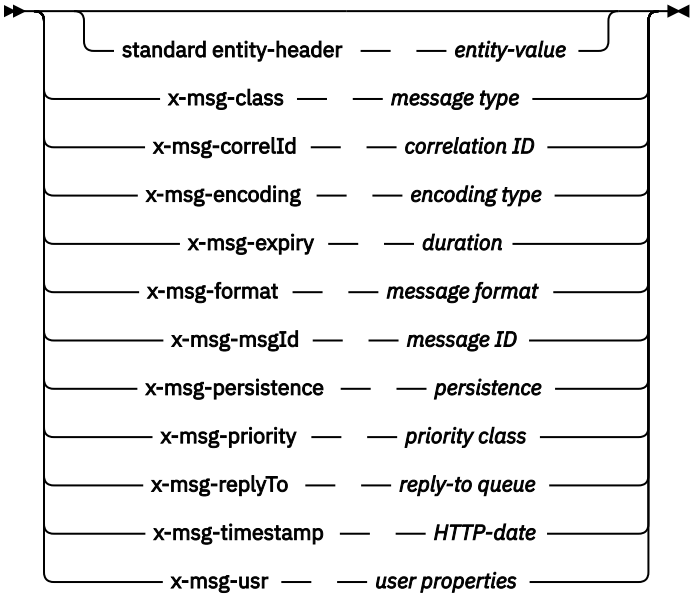

**Note:**

1. If a question mark (?) is used it must be substituted with `%3f`. For example, `orange?topic` should be specified as `orange%3ftopic`.
2. @ *qMgrName* is only valid on an HTTP **POST**

**Response**




**entity-header (Response)**




## Request parameters

### Path

See “URI Format” on page 1777.

***HTTP version***
HTTP version; for example, `HTTP/1.1`

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***request-header***
See HTTP/1.1 - 5.3 Request Header Fields. The Host field is mandatory on an HTTP/1.1 request. It is often automatically inserted by the tool you use to create a client request.

***entity-header (Request)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity headers listed in the Request syntax diagram.

## Response parameters

**Path**
See "URI Format" on page 1777.

***HTTP version***
HTTP version; for example, `HTTP/1.1`

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***response-header***
See HTTP/1.1 - 6.2 Response Header Fields.

***entity-header (Response)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity or response headers listed in the Response syntax diagram. The `Content-Length` is always present in a response. It is set to zero if there is no message body.

***Message***
Message body.

## Description

If the HTTP **DELETE** request is successful, the response message contains the data retrieved from the IBM MQ queue. The number of bytes in the body of the message is returned in the HTTP `Content-Length` header. The status code for the HTTP response is set to `200 OK`. If `x-msg-range` is specified as `0`, or `0-0`, then the status code of the HTTP response is `204 No Content`.

If the HTTP **DELETE** request is unsuccessful, the response includes an IBM MQ bridge for HTTP error message and an HTTP status code.

### HTTP DELETE example

HTTP **DELETE** gets a message from a queue and deletes the message, or retrieves and deletes a publication. The **HTTPDELETE** Java sample is an example an HTTP **DELETE** request reading a message from a queue. Instead of using Java, you could create an HTTP **DELETE** request using a browser form, or an AJAX toolkit instead.

The following figure shows an HTTP request to delete the next message on queue called `myQueue`. In response, the message body is returned to the client. In IBM MQ terms, HTTP **DELETE** is a destructive get.

The request contains the HTTP request header `x-msg-wait`, which instructs IBM MQ bridge for HTTP how long to wait for a message to arrive on the queue. The request also contains the `x-msg-require-headers` request header, which specifies that the client is to receive the message correlation ID in the response.

```
DELETE /msg/queue/myQueue/ HTTP/1.1
Host: www.example.org
x-msg-wait: 10
x-msg-require-headers: correlID
```

*Figure 37. Example of an HTTP **DELETE** request*

The following figure shows the response returned to the client. The correlation ID is returned to the client, as requested in `x-msg-require-headers` of the request.

```
HTTP/1.1 200 OK
Date: Wed, 2 Jan 2007 22:38:34 GMT
Server: Apache-Coyote/1.1 WMQ-HTTP/1.1 JEE-Bridge/1.1
Content-Length: 50
Content-Type: text/plain; charset=utf-8
x-msg-correlId: 1234567890

Here is my message body that is retrieved from the queue.
```

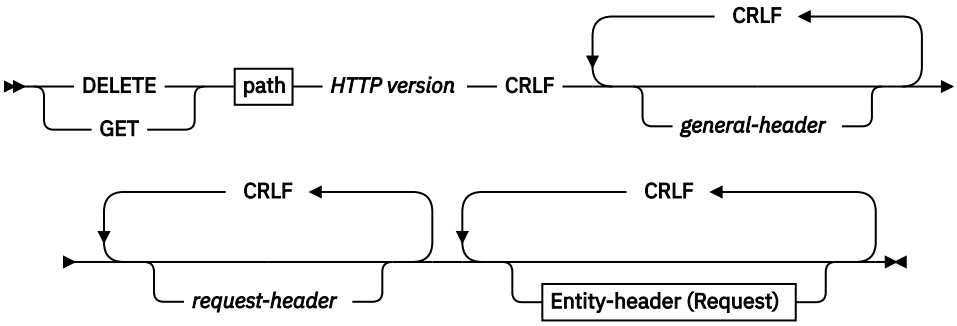
*Figure 38. Example of an HTTP **DELETE** response*

# HTTP GET: IBM MQ bridge for HTTP command

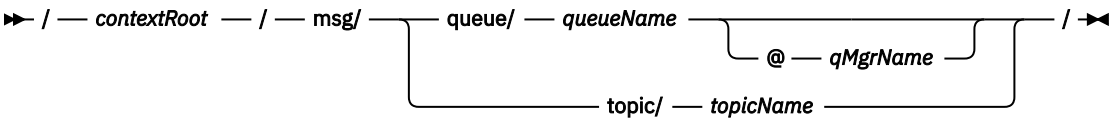
The HTTP **GET** operation gets a message from an IBM MQ queue. The message remains on the queue. The HTTP **GET** operation is equivalent to browsing an IBM MQ queue.

## Syntax

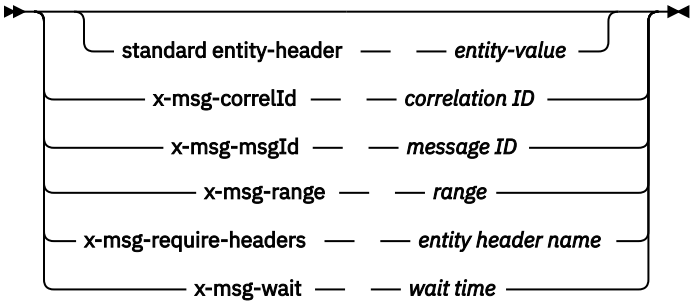
### Request




### Path



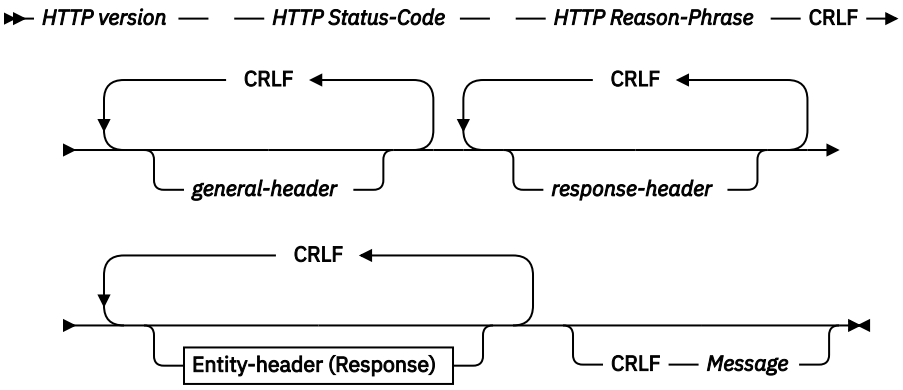

### entity-header (Request)



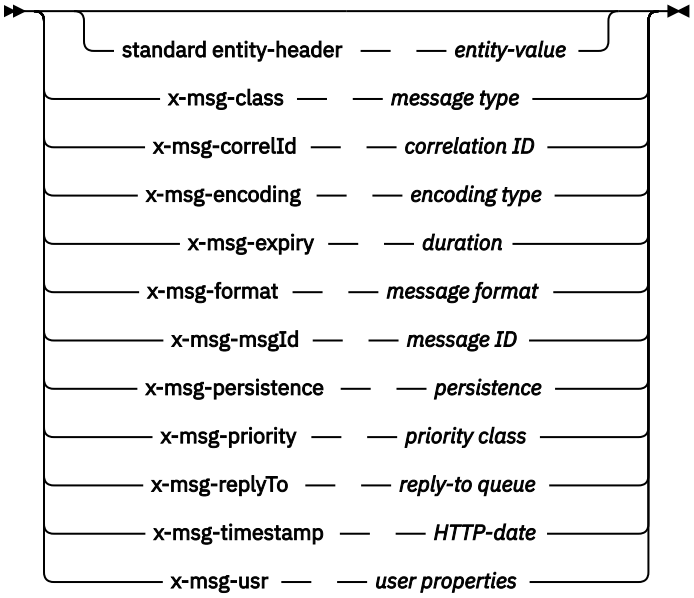

**Note:**

1. If a question mark (?) is used it must be substituted with `%3f`. For example, `orange?topic` should be specified as `orange%3ftopic`.
2. @ *qMgrName* is only valid on an HTTP **POST**

**Response**




**entity-header (Response)**




## Request parameters

### Path

See “URI Format” on page 1777.

***HTTP version***
HTTP version; for example, `HTTP/1.1`

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***request-header***
See HTTP/1.1 - 5.3 Request Header Fields. The Host field is mandatory on an HTTP/1.1 request. It is often automatically inserted by the tool you use to create a client request.

***entity-header (Request)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity headers listed in the Request syntax diagram.

## Response parameters

**Path**
See "URI Format" on page 1777.

***HTTP version***
HTTP version; for example, `HTTP/1.1`

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***response-header***
See HTTP/1.1 - 6.2 Response Header Fields.

***entity-header (Response)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity or response headers listed in the Response syntax diagram. The `Content-Length` is always present in a response. It is set to zero if there is no message body.

***Message***
Message body.

## Description

If the HTTP **GET** request is successful, the response message contains the data retrieved from the IBM MQ queue. The number of bytes in the body of the message is returned in the HTTP `Content-Length` header. The status code for the HTTP response is set to `200 OK`. If `x-msg-range` is specified as `0`, or `0-0`, then the status code of the HTTP response is `204 No Content`.

If the HTTP **GET** request is unsuccessful, the response includes an IBM MQ bridge for HTTP error message and an HTTP status code.

### HTTP GET example

HTTP **GET** gets a message from a queue. The message remains on the queue. In IBM MQ terms, HTTP **GET** is a browse request. You could create an HTTP **GET** request using a Java client, a browser form, or an AJAX toolkit.

The following figure shows an HTTP request to browse the next message on queue called `myQueue`.

The request contains the HTTP request header `x-msg-wait`, which instructs IBM MQ bridge for HTTP how long to wait for a message to arrive on the queue. The request also contains the `x-msg-require-headers` request header, which specifies that the client is to receive the message correlation ID in the response.

```
GET /msg/queue/myQueue/ HTTP/1.1
Host: www.example.org
x-msg-wait: 10
x-msg-require-headers: correlID
```

*Figure 39. Example of an HTTP **GET** request*

The following figure shows the response returned to the client. The correlation ID is returned to the client, as requested in `x-msg-require-headers` of the request.

```
HTTP/1.1 200 OK
Date: Wed, 2 Jan 2007 22:38:34 GMT
Server: Apache-Coyote/1.1 WMQ-HTTP/1.1 JEE-Bridge/1.1
Content-Length: 50
Content-Type: text/plain; charset=utf-8
x-msg-correlId: 1234567890

Here is my message body that appears on the queue.
```

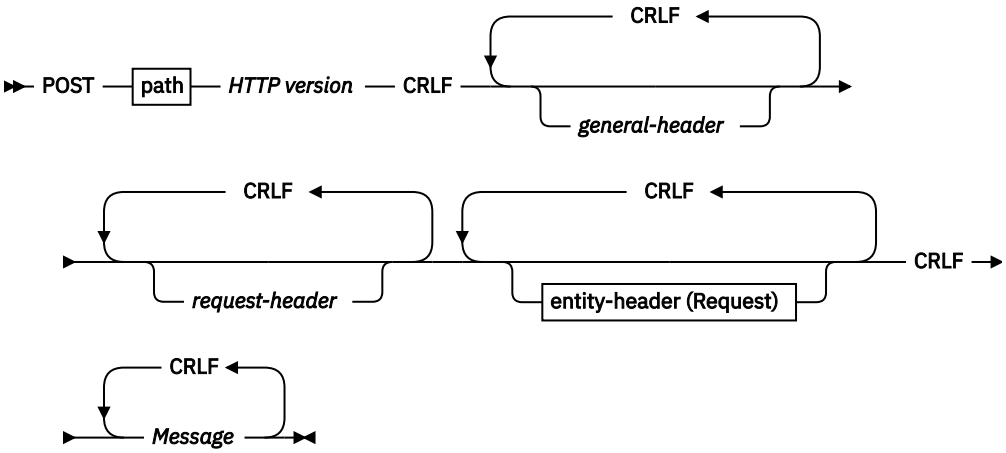
*Figure 40. Example of an HTTP **GET** response*

# HTTP POST: IBM MQ bridge for HTTP command

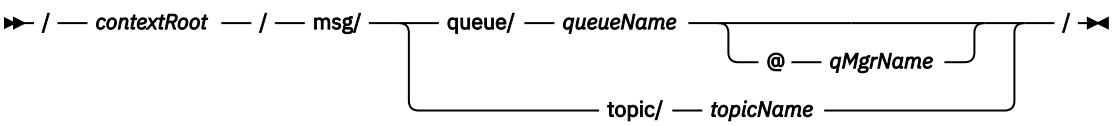
The HTTP **POST** operation puts a message on an IBM MQ queue, or publishes a message to a topic.

## Syntax

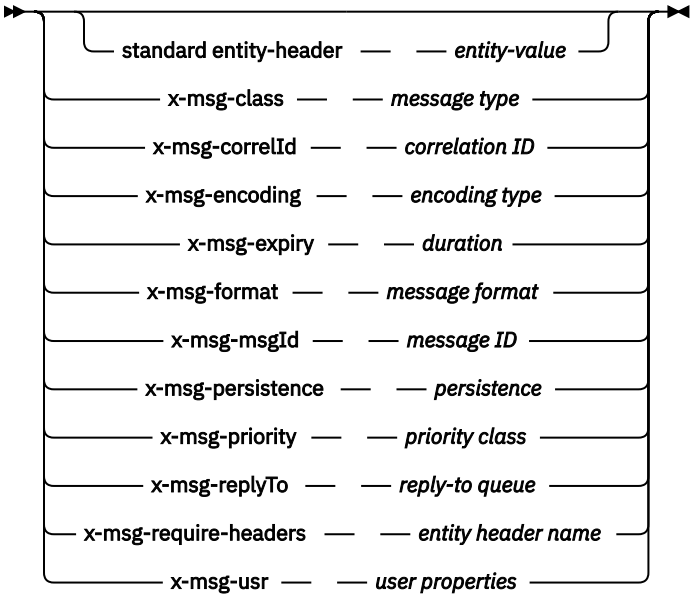
### Request




### Path



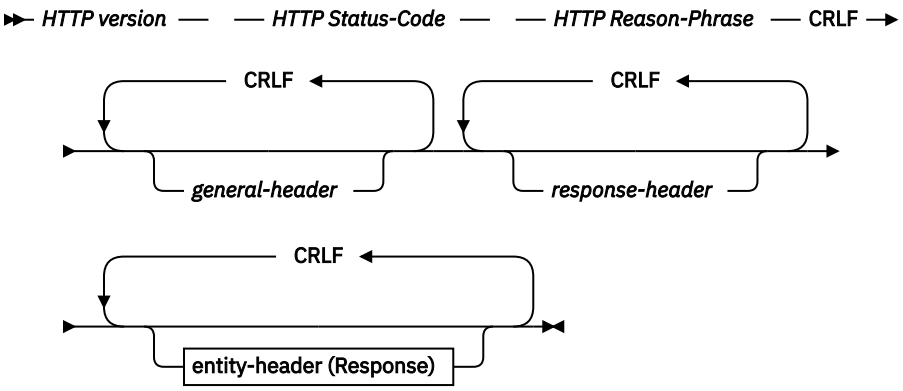

### entity-header (Request)



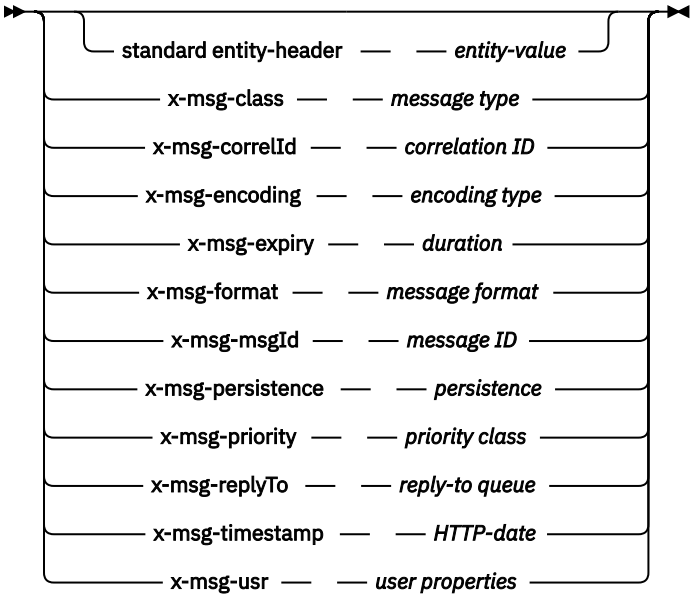

**Note:**

1. If a question mark (?) is used it must be substituted with `%3f`. For example, `orange?topic` should be specified as `orange%3ftopic`.
2. @ *qMgrName* is only valid on an HTTP **POST**

**Response**




**entity-header (Response)**




## Request parameters

**Path**
See “URI Format” on page 1777.

***HTTP version***
HTTP version; for example, HTTP/1.1

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***request-header***
See HTTP/1.1 - 5.3 Request Header Fields. The Host field is mandatory on an HTTP/1.1 request. It is often automatically inserted by the tool you use to create a client request.

***entity-header (Request)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity headers listed in the Request syntax diagram. The `Content-Length` and `Content-Type` should be inserted in a request, and are often inserted automatically by the tool you use to create a client request. The `Content-Type` must match the type defined in the `x-msg-class` custom entity-header, if it is specified.

***Message***
Message to put onto the queue, or publication to post to a topic.

## Response parameters

**Path**
See “URI Format” on page 1777.

***HTTP version***
HTTP version; for example, HTTP/1.1

***general-header***
See HTTP/1.1 - 4.5 General Header Fields.

***response-header***
See HTTP/1.1 - 6.2 Response Header Fields.

***entity-header (Response)***
See HTTP/1.1 - 7.1 Entity Header Fields. One of the entity or response headers listed in the Response syntax diagram. The `Content-Length` is always present in a response. It is set to zero if there is no message body.

### Description

If no `x-msg-usr` header is included, and message class is BYTES or TEXT, the message put on the queue does not have an `MQRFH2`.

Use HTTP entity and request headers in the HTTP **POST** request to set the properties of the message that is put onto the queue. You can also use `x-msg-require-headers` to request which headers are returned in the response message.

If the HTTP **POST** request is successful, the entity of the response message is empty and its Content-Length is zero. The HTTP status code is `200 OK`.

If the HTTP **POST** request is unsuccessful, the response includes an IBM MQ bridge for HTTP error message and an HTTP status code. The IBM MQ message is not put on the queue or topic.

#### HTTP POST example

HTTP **POST** puts a message to a queue, or a publication to a topic. The **HTTPPOST** Java sample is an example an HTTP **POST** request of a message to a queue. Instead of using Java, you could create an HTTP **POST** request using a browser form, or an AJAX toolkit instead.

The following figure shows an HTTP request to put a message on a queue called `myQueue`. This request contains the HTTP header `x-msg-correlId` to set the correlation ID of the IBM MQ message.

```
POST /msg/queue/myQueue/ HTTP/1.1
Host: www.example.org
Content-Type: text/plain
x-msg-correlID: 1234567890
Content-Length: 50

Here is my message body that is posted on the queue.
```

*Figure 41. Example of an HTTP **POST** request to a queue*

The following figure shows the response sent back to the client. There is no response content.

```
HTTP/1.1 200 OK
Date: Wed, 2 Jan 2007 22:38:34 GMT
Server: Apache-Coyote/1.1 WMQ-HTTP/1.1 JEE-Bridge/1.1
Content-Length: 0
```

*Figure 42. Example of an HTTP POST response*

## HTTP headers

The IBM MQ bridge for HTTP supports custom request HTTP headers, custom entity HTTP headers, and a subset of standard HTTP headers.

HTTP practice is to prefix all custom headers with `x-`, so the IBM MQ Bridge for HTTP headers are prefixed with `x-msg-`. For example, to set the priority header use `x-msg-priority`.

**Note:**

- Most header values are case sensitive. For example, when using the `msgId` header, `NONE` is a keyword, whereas `none` is a `msgID`.
- Misspelled headers are ignored.

## Custom entity HTTP headers

The custom entity HTTP headers contain information about IBM MQ messages. Using entity headers, you can set values in the message descriptor ( MQMD), or query values in the MQMD. An additional entity header, x-msg-usr, sets and returns any user property information you want to associate with a request.

You can use entity headers in different HTTP request contexts:

**DELETE**
: You can only use the x-msg-correlId, or x-msg-msgId, or both, entity headers with a **DELETE** HTTP request. The effect of the headers is to select a particular message by MsgId and CorrelId in an MQGET, and to delete the message from its queue.

**GET**
: You can only use the x-msg-correlId, or x-msg-msgId, or both, entity headers with a **GET** HTTP request. The effect of the headers is to select a particular message by MsgId and CorrelId in an MQGET for browse.

**POST**
: You can use any entity header in a **POST** HTTP request, except x-msg-timestamp.

**x-msg-require-headers**
: On any **GET**, **POST** or **DELETE** HTTP request, you can add multiple entity headers inside the x-msg-require-headers request header, separated by commas. The effect is to return the specified entity headers in the HTTP response message, containing the value of the associated message property.

The description of each header lists in which contexts the header is processed by IBM MQ bridge for HTTP. For example, in the header **POST**, x-msg-require-headers, the header is processed by IBM MQ bridge for HTTP in an HTTP **POST** request, or in the x-msg-require-headers request header in either an HTTP **POST**, **GET**, or **DELETE** request. If the header is included in a context it is not allowed in, the header is ignored. No error is reported.

You can put any standard HTTP headers into requests to be processed by the Web server, or other request handlers. Similarly, the response might contain other standard HTTP headers inserted by the Web server or other response handlers.

## Custom request HTTP headers

The three custom request HTTP headers, x-msg-range, x-msg-require-headers, and x-msg-wait, pass additional information about the HTTP request to the server. They act as request modifiers. With x-msg-range, you can restrict the amount of message data returned in a response. With x-msg-require-headers, you can request the response to contain information about the result of the request. With x-msg-wait, you can modify the time the client waits for an HTTP response.

## Standard HTTP headers

The Host standard HTTP request-header must be specified in an HTTP/1.1 request.

The Content-Length and Content-Type standard HTTP entity headers can be specified in a request.

The Content-Length, Content-Location, Content-Range, Content-Type, and Server standard HTTP entity headers can be returned in response to a request. Specify one or more of the standard HTTP headers in the x-msg-request-header header in the request message.

## Alphabetic list of HTTP headers

# class: HTTP x-msg-class entity-header

Set or return the message type.

| Type | Description |
|---|---|
| HTTP header name | x-msg-class |

| Type | Description |
|---|---|
| HTTP header type | Entity-header |
| Valid in HTTP request message | POST, `x-msg-require-headers` |
| Allowed values | **BYTES**<br>**MAP**<br>**STREAM**<br>**TEXT** |
| Default value | BYTES |

### Description

- In an HTTP **POST** request, sets the type of the message created.
- Specifying the class header on a **GET** or **DELETE** returns a `400 Bad Request` with entity body of `MQHTTP40007`.
- Specified in `x-msg-require-headers`, sets `x-msg-class` in the HTTP response message to the type of a message.
- If an invalid value is specified for this header a `MQHTTP40005` message is returned.
- If the `x-msg-class` header is not specified and the content-type of the message is `application/x-www-form-urlencoded`, the data is assumed to be a JMS map object.

## `Content-Length`: HTTP entity-header

Set or return the length, in bytes, of the body of the message.

| Type | Description |
|---|---|
| HTTP header name | `Content-Length` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | `x-msg-require-headers` |
| Allowed and returned value | ***Integer value***<br>Length in bytes of the message body. |

### Description

- The `Content-Length` is optional in an HTTP request. For a **GET** or **DELETE** the length must be zero. For **POST**, if `Content-Length` is specified and it does not match the length of the message-line, the message is either truncated, or padded with nulls to the specified length.
- The `Content-Length` is always returned in the HTTP response even when there is no content, in which case the value is zero.

## `Content-Location`: HTTP entity-header

Returns the queue or topic referenced in the request, in the standard `Content-Location` header in the HTTP response message.

| Type | Description |
|---|---|
| HTTP header name | `Content-Location` |
| HTTP header type | Entity-header |

| Type | Description |
|---|---|
| Valid in HTTP request message | `x-msg-require-headers` |
| Returned value | URI in the format,<br>`/msg/queue/queuename`<br>or<br>`/msg/topic/topicname` |

### Description

- When requested in `x-msg-require-headers`, the `Content-Location` entity-header returns the queue or topic referenced in the HTTP request.

## `Content-Range`: HTTP entity-header

Return the range of bytes selected from an IBM MQ message in the `Content-Range` header in an HTTP response.

| Type | Description |
|---|---|
| HTTP header name | `Content-Range` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | `x-msg-require-headers` |
| Returned value | ***`String`***<br>Returns the lower limit, *`m`* and upper limit, *`n`* of the returned substring, and *`length`* of the whole message. For example,<br>`m - n/length` |

### Description

-
- The `Content-Range` is only returned in the HTTP response when `Content-Range` is specified in a **GET** or **DELETE** request that contains an `x-msg-range` request header.
- If `x-msg-range` is specified on a **GET** or **DELETE** request, the range of bytes specified in the Content-Range header are returned in the response. For example, if `x-msg-range: 0-60` is used in a request for a message containing `100` bytes, the content-range header holds the string `0-60/100`
- An `x-msg-range` request also returns the content range in the `x-msg-range` header in the HTTP response.

## `Content-Type`: HTTP entity-header

Set or return the class of the JMS message in an IBM MQ message according the to HTTP content-type.

| Type | Description |
|---|---|
| HTTP header name | `Content-Type` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |

| Type | Description |
|---|---|
| Allowed or returned value | ***media-type***<br>For media-types that are supported see Table 663 on page 1755. |

*Table 663. Mapping between `x-msg-class` and HTTP `Content-Type`*

| x-msg-class | HTTP Content-Type |
|---|---|
| BYTES | `application/octet-stream`<br>`application/xml` |
| TEXT | `text/*` |
| MAP | `application/x-www-form-urlencoded`<br>`application/xml` (optional) |
| STREAM | `application/xml` (optional) |

## Description

- On an HTTP **POST** request, specify either the `Content-Type` or the `x-msg-class`. If you specify both, they must be consistent or an HTTP `Bad Request` exception, `Status code 400` is returned. If you omit both, the `Content-Type` and the `x-msg-class`, a `Content-Type` of `text/*` is assumed.
- The `Content-Type` is always set in the response to an HTTP **GET** or **DELETE** that has a message body. The `Content-Type` is set according to the rules in Table 664 on page 1755.

*Table 664. Mapping message types to `x-msg-class` and `Content-Type`*

| Message format | JMS Message type | x-msg-class | Content-Type |
|---|---|---|---|
| Anything except MQFMT_STRING | None | BYTES | application/octet-stream |
| MQFMT_STRING | None | TEXT | text/plain |
| MQFMT_NONE | jms_bytes | BYTES | application/octet-stream |
| MQFMT_NONE | jms_text | TEXT | text/plain |
| MQFMT_NONE | jms_map | MAP | application/xml |
| MQFMT_NONE | jms_stream | STREAM | application/xml |

## `correlId`: HTTP `x-msg-correlId` entity-header

Set or return the correlation identifier.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-correlId` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **DELETE**, **GET**, **POST**, `x-msg-require-headers` |

| Type | Description |
|---|---|
| Allowed values | ***String value***<br>For example:<br>`x-msg-correlId: mycorrelationid`<br>Strings enclosed in quotation marks are permitted; for example:<br>`x-msg-correlId: "my id"`<br>***Hex value***<br>A hex value prefixed with `0x:` ; for example:<br>`x-msg-correlId: 0x:43c1d23a`<br>The hex value following 0x: is limited to 48 characters representing 24 bytes. Additional data is ignored. |
| Default value | Not applicable |

## Description

- On an HTTP **POST** request, sets the correlation ID of the message created.
- On an HTTP **GET** or **DELETE** request, selects the message from the queue or topic. If no message exists with the specified correlation ID, an `HTTP 504 Gateway Timeout` response is returned. `x-msg-correlId` can be used with `x-msg-msgID` to select a message from a queue or topic that matches both selectors.
- Specified in `x-msg-require-headers`, sets `x-msg-corelId` in the HTTP response message to the correlation ID of a message.
- Horizontal white space is allowed after the `0x:` prefix.

**Note:**

- Specifying `x-msg-correlId` without a value on an HTTP **GET** or **DELETE** request; for example, `"x-msg-correlId:"`, returns the next message on the queue or topic regardless of its correlation ID.
- If you specify a selector of 24 characters or fewer, or 0x: followed by 48 characters or fewer, IBM MQ bridge for HTTP uses an optimized selector for improved performance.
- A JMS message selector containing JMSCorrelationID is used when selecting messages from the queue. This selector behaves as described in Selection behavior.

## encoding: HTTP `x-msg-encoding` entity-header

Set or return the message encoding.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-encoding` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | A comma-separated list of the following values:<br>**DECIMAL_NORMAL**<br>**DECIMAL_REVERSED** |

| Type | Description |
|---|---|
| | **FLOAT_IEEE_NORMAL**<br>**FLOAT_IEEE_REVERSED**<br>**FLOAT_S390**<br>**INTEGER_NORMAL**<br>**INTEGER_REVERSED**<br>For example,<br>`x-msg-encoding: INTEGER_NORMAL,DECIMAL_NORMAL,FLOAT_IEEE_NORMAL`<br>**Note:** The value is case-sensitive |
| Default value | `DECIMAL_NORMAL, FLOAT_IEEE_NORMAL, INTEGER_NORMAL` |

### Description

- On an HTTP **POST** request, specifies the encoding of the message created.
- On an HTTP **GET** or **DELETE** request, the `x-msg-encoding` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-encoding` in the HTTP response message to the encoding property of a message.

## `expiry`: HTTP `x-msg-expiry` entity-header

Set or return the message expiry duration.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-expiry` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | **UNLIMITED**<br>For example;<br>`x-msg-expiry: UNLIMITED`<br>***Integer value***<br>Milliseconds before expiry.<br>For example;<br>`x-msg-expiry: 10000` |
| Default value | `UNLIMITED` |

### Description

- When set on an HTTP **POST** request, the request message expires in the time specified.
- On an HTTP **GET** or **DELETE** request, the `x-msg-expiry` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-expiry` in the HTTP response message to the expiry time of a message.

- UNLIMITED specifies that the message never expires.
- The expiry of a message starts from the time the message arrives on the queue, as a result network latency is ignored.
- The maximum value is limited by IBM MQ to 214748364700 milliseconds. If a value greater than this is specified then the maximum possible expiry time is assumed.

## format: HTTP x-msg-format entity-header

Set or return the IBM MQ message format.

| Type | Description |
|---|---|
| HTTP header name | x-msg-format |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, x-msg-require-headers |
| Allowed values | **NONE**<br>For example,<br>`x-msg-format: NONE`<br>***String value***<br>Any user-defined value of up to eight characters. For example,<br>`x-msg-format: myformat` |
| Default value | None |

### Description

- When set on an HTTP **POST** request, set the request message format.
- On an HTTP **GET** or **DELETE** request, the x-msg-format header is ignored.
- Specified in x-msg-require-headers, sets x-msg-format in the HTTP response message to the format of a message.
- NONE is case sensitive, and indicates that the message format is blank.
- The value of x-msg-format is used, even if it contradicts the media-type of the HTTP request. See Table 665 on page 1758.

*Table 665. Mapping content-type and x-msg-class to message format*

| x-msg-class | Content-type | Message format on queue/topic |
|---|---|---|
| BYTES | • application/octet-stream<br>• application/xml | IBM MQ message: MQFMT set to MQC.MQFMT_NONE |
| TEXT | • text/* | IBM MQ message: MQFMT set to MQC.MQFMT_STRING |
| MAP | • application/x-www-form-urlencoded<br>• application/xml (optional) | JMSMap |
| STREAM | • application/xml (optional) | JMSStream |

## msgId: HTTP x-msg-msgId entity-header

Set or return the message identifier.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-msgId` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **DELETE**, **GET**, **POST**, `x-msg-require-headers` |
| Allowed values | ***String value***<br>For example,<br>`x-msg-msgId: mymsgid`<br>Strings enclosed in quotation marks for example, `x-msg-msgId: "my id"`<br>***Hex value***<br>A hex value prefixed with `0x:` ; for example,<br>`x-msg-msgId: 0x:43c1d23a` |
| Default value | Not applicable |

### Description

- On an HTTP **POST** request, sets the message ID of the message created.
- On an HTTP **GET** or **DELETE** request, selects the message from the queue or topic. If no message exists with the specified message ID, an `HTTP 504 Gateway Timeout` response is returned. `x-msg-msgId` can be used with `x-msg-correlID` to select a message from a queue or topic that matches both selectors.
- Specified in `x-msg-require-headers`, returns `x-msg-msgId` in the HTTP response to the message ID of a message.
- Horizontal white space is allowed after the `0x:` prefix.

**Note:** Specifying `x-msg-msgId` without a value on an HTTP **GET** or **DELETE** request; for example, `"x-msg-msgId:"`, returns the next message on the queue or topic regardless of its message ID.

A JMS message selector containing JMSMessageID is used when selecting messages from the queue. This selector behaves as described in Selection behavior.

## persistence: HTTP x-msg-persistence entity-header

Set or return the message persistence.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-persistence` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | **NON_PERSISTENT**<br>The message does not survive system failures or queue manager restarts. |

| Type | Description |
|---|---|
| | For example,<br>`x-msg-persistence: NON_PERSISTENT`<br>**PERSISTENT**<br>The message survives system failures and restarts of the queue manager.<br>For example,<br>`x-msg-persistence: PERSISTENT`<br>**AS_DESTINATION**<br>Applies to **POST** only.<br>Use the default persistence of the destination as determined by the message provider.<br>**Note:** Case sensitive |
| Default value | NON_PERSISTENT |

### Description

- When set on an HTTP **POST** request, set the request message persistence.
- On an HTTP **GET** or **DELETE** request, the `x-msg-persistence` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-persistence` in the HTTP response message to the persistence of a message.

## `priority`: HTTP `x-msg-priority` entity-header

Set or return the message priority.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-priority` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | **LOW**<br>For example,<br>`x-msg-priority: LOW`<br>**MEDIUM**<br>This priority is equal to an IBM MQ priority level of 4. For example,<br>`x-msg-priority: MEDIUM`<br>**HIGH**<br>For example,<br>`x-msg-priority: HIGH` |

| Type | Description |
|---|---|
| | ***Integer value***<br>A string representation of an integer in the range 0 through 9; for example,<br>`x-msg-priority: 3`<br>**AS_DESTINATION**<br>Applies to **POST** only.<br>Use the default priority of the destination as determined by the message provider.<br>**Note:** Case sensitive |
| Default value | MEDIUM |

### Description

- When set on an HTTP **POST** request, set the request message priority.
- On an HTTP **GET** or **DELETE** request, the `x-msg-priority` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-priority` in the HTTP response message to the priority of a message.

## `priority`: HTTP `x-msg-priority` entity-header

Set or return the message priority.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-priority` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | **LOW**<br>For example,<br>`x-msg-priority: LOW`<br>**MEDIUM**<br>This priority is equal to an IBM MQ priority level of 4. For example,<br>`x-msg-priority: MEDIUM`<br>**HIGH**<br>For example,<br>`x-msg-priority: HIGH`<br>***Integer value***<br>A string representation of an integer in the range 0 through 9; for example,<br>`x-msg-priority: 3` |

| Type | Description |
|---|---|
| | **AS_DESTINATION**<br>Applies to **POST** only.<br>Use the default priority of the destination as determined by the message provider.<br>**Note:** Case sensitive |
| Default value | MEDIUM |

### Description

- When set on an HTTP **POST** request, set the request message priority.
- On an HTTP **GET** or **DELETE** request, the `x-msg-priority` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-priority` in the HTTP response message to the priority of a message.

## `replyTo`: HTTP `x-msg-replyTo` entity-header

Set or return the message reply-to queue and queue manager name.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-replyTo` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | ***URI***<br>A point-to-point URI; for example,<br>`x-msg-replyTo: /msg/queue/myReplyQueue`<br>`x-msg-replyTo: /msg/queue/myReplyQueue@myReplyQueueManager`<br>**Note:** Case sensitive |
| Default value | MEDIUM |

### Description

- When set on an HTTP **POST** request, set the request message replyTo destination.
- On an HTTP **GET** or **DELETE** request, the `x-msg-replyTo` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-replyTo` in the HTTP response message to the reply-to queue and queue manager name of a message.

**Note:** The URI in the HTTP response can include the name of the queue manager to which the IBM MQ bridge for HTTP is connected.

## `Server`: HTTP response-header

Returns information about the server and protocol the client is connected to.

| Type | Description |
|---|---|
| HTTP header name | `Server` |
| HTTP header type | Response-header |

| Type | Description |
|---|---|
| Valid in HTTP request message | `x-msg-require-headers` |
| Returned value | `WMQ-HTTP/1.1 JEE-Bridge/1.1`<br>or<br>`Server: Product-token WMQ-HTTP/1.1 JEE-Bridge/1.1` |

### Description

- If IBM MQ Bridge for HTTP is deployed to an application server, the IBM MQ bridge for HTTP details is appended to the server response header. For example, the IBM MQ bridge for HTTP deployed to WebSphere Application Server Community Edition, called Apache-Coyote, gives the response:

```
Server: Apache-Coyote/1.1 WMQ-HTTP/1.1 JEE-Bridge/1.1
```

## require-headers: HTTP x-msg-require-headers request-header

Set which headers to return in the HTTP response message.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-require-headers` |
| HTTP header type | Request-header |
| Valid in HTTP request message | **POST**, **GET**, **DELETE** |
| Allowed values | A comma-separated list of the entity header names:<br>**ALL**<br>**ALL-USR**<br>**class**<br>**content-location**<br>**correlId**<br>**encoding**<br>**expiry**<br>**format**<br>**msgId**<br>**NO_require-headers**<br>**persistence**<br>**priority**<br>**replyTo**<br>**server**<br>**timestamp**<br>**usr-** ***property name***<br>For example,<br>`x-msg-require-headers: msgId` |

| Type | Description |
|---|---|
| | or,<br>`x-msg-require-headers: expiry,correlId,timestamp`<br>To request a specific property:<br>`x-msg-require-headers: usr-myCustomProperty`<br>To request all properties:<br>`x-msg-require-headers: ALL-USR, ALL` |
| Default value | `NO_require-headers` |

### Description

- The value of `x-msg-require-headers` is not case-sensitive, except in the cases of the `ALL`, `NO_require-headers`, and `ALL-USR` constants, and the *`property-name`* variable.

## `timestamp`: HTTP `x-msg-timestamp` entity-header

Return the message time stamp.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-timestamp` |
| HTTP header type | Entity-header |
| Valid in HTTP request message | `x-msg-require-headers` |
| Returned value | ***`HTTP-date`***<br>A date in the format; day, date month year time time-zone; for example,<br>`Sun, 06 Nov 1994 08:49:37 GMT`<br>Defined by RFC 822, and updated in RFC 1123. |
| Default value | Not applicable |

### Description

- On an HTTP **`POST`**, **`GET`** or **`DELETE`** request, the `x-msg-timestamp` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-timestamp` in the HTTP response message to the timestamp of a message.

## `usr`: HTTP `x-msg-usr` entity-header

Set or return the user properties.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-usr` |
| HTTP header type | Entity-header |

| Type | Description |
|---|---|
| Valid in HTTP request message | **POST**, `x-msg-require-headers` |
| Allowed values | See "Syntax" on page 1765 ; for example,<br>`x-msg-usr: myProp1;5;i1,`<br>`x-msg-usr: myProp2;"My String";string` |
| Default value | Not applicable |

## Description

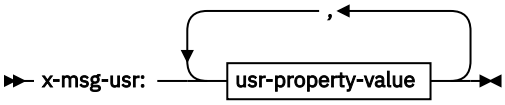
- When set on an HTTP **POST** request, set the request message user properties.
- On an HTTP **GET** or **DELETE** request, the `x-msg-usr` header is ignored.
- Specified in `x-msg-require-headers`, sets `x-msg-usr` in the HTTP response message to user properties of a message.
- Multiple properties can be set on a message. Specify multiple comma-separated properties in a single `x-msg-usr` header, or by using two or more separate instances of the `x-msg-usr` header.
- You can request a specific property to be returned in the response to a **GET** or **DELETE** request. Specify the name of the property in the `x-msg-require-headers` header of the request, using the prefix `usr-`. For example,

```
x-msg-require-headers: usr-myProp1
```

- To request that all user properties are returned in a response, use the `ALL-USR` constant. For example,

```
x-msg-require-headers: ALL-USR
```

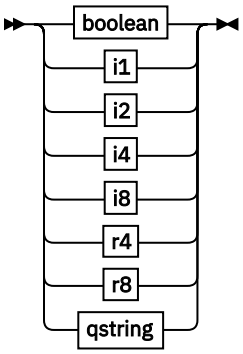
## Syntax



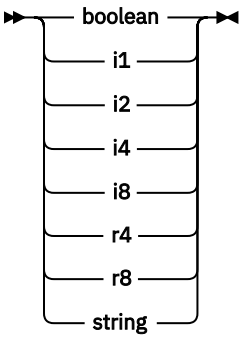

**usr-property-value**

**property-name**

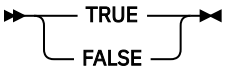
**usr-value**



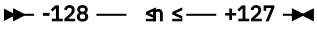

**usr-type**



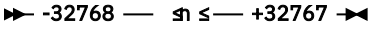

***boolean***



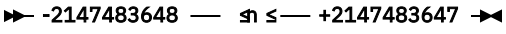

***i1***



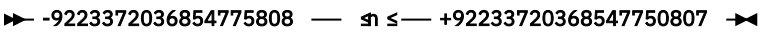

***i2***



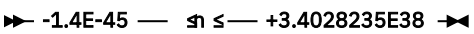

***i4***



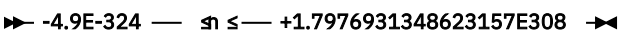

***i8***




***r4***




***r8***




***qstring***

## wait: HTTP x-msg-wait request-header

Set the period of time to wait for a message to arrive, before returning an `HTTP 504 Gateway Timeout` response message.

| Type | Description |
|---|---|
| HTTP header name | `x-msg-wait` |
| HTTP header type | Request-header |
| Valid in HTTP request message | **GET**, **DELETE** |
| Allowed value | **NO_WAIT**<br>For example,<br>`x-msg-wait: NO_WAIT` |

| Type | Description |
|---|---|
| | ***Integer value***<br>The number of milliseconds that the IBM MQ bridge for HTTP waits for a message to arrive; for example,<br>`x-msg-wait: 8` |
| Default value | NO_WAIT |

### Description

- On an HTTP **POST** request, the `x-msg-wait` header is ignored.
- On an HTTP **GET** or **DELETE** request, `x-msg-wait` specifies time to wait for a message to arrive before returning an `HTTP 504 Gateway Timeout` response.
- `NO_WAIT` is case-sensitive.
- The default maximum wait time is 35000. You can change the default by setting the `maximum_wait_time` parameter of the servlet. See the Installing, configuring, and verifying IBM MQ bridge for HTTP section for more information.
- If you set a value greater than `maximum_wait_time`, `maximum_wait_time` is used instead.

## HTTP return codes

List of return codes from the IBM MQ bridge for HTTP

The IBM MQ bridge for HTTP returns four types of error:

**Servlet errors**
MQHTTP0001 and MQHTTP0002 are servlet errors. They are logged, but not returned to the HTTP client.

**Successful operations**
An HTTP status code in the range 200 - 299 indicates a successful operation.

**Client errors**
An HTTP status code in the range 400 - 499 indicates a client error. IBM MQ Bridge for HTTP return codes in the range MQHTTP40001 - MQHTTP49999 correspond to client errors.

**Server errors**

An HTTP status code in the range 500 - 599 indicates a client error. IBM MQ Bridge for HTTP return codes in the range MQHTTP50001 - MQHTTP59999 correspond to server errors.

If a server error occurs, a complete stack trace is output to the application server error log. The stack trace is also returned to the HTTP client in the HTTP response. Handle the stack trace in the client application or refer it to the application server administrator to resolve the problem.

If the stack trace contains resource adapter errors, refer to the documentation for your resource adapter.

### Alphabetic list of return codes

## HTTP 200: OK

This class of status code indicates that the request was successfully received, understood and accepted.

### HTTP status code

`200 OK`

## HTTP 204: No content

Sent following a successful HTTP **GET** or **DELETE** and `x-msg-range: 0` was sent in the request.

### HTTP status code
`204 No Content`

## MQHTTP0001: No connection factory specified in the Servlet context

Servlet error

### Explanation
Servlet error

### HTTP status code
None

### Programmer response
Where these errors are logged is specific to your application server. Refer to the documentation for your application server.

## MQHTTP0002: Could not get connection manager for *queueOrTopic* using the JNDI name of *jndiNameTried*

Servlet error

### Explanation
Servlet error

### HTTP status code
None

### Programmer response
Where these errors are logged is specific to your application server. Refer to the documentation for your application server.

## MQHTTP40001: Reserved

Reserved

### HTTP status code
`400 Bad Request`

## MQHTTP40002: URI is not valid for IBM MQ transport for HTTP

The URI specified in the HTTP request is not valid.

### Explanation
The URI specified in the HTTP request is not valid.

### HTTP status code
`400 Bad Request`

### Programmer response
Confirm that the format and syntax of the specified URI are correct.

## MQHTTP40003: URI is not valid. `@qmgr` is only valid on POST

The `@qmgr` URI option has been specified in a URI for an HTTP request that is not a **POST** request.

### Explanation
The `@qmgr` URI option has been specified in a URI for an HTTP request that is not a **POST** request.

### HTTP status code
`400 Bad Request`

### Programmer response
If you are attempting to put a message by using the **POST** verb, change the HTTP request to a **POST** request. If you are attempting to get a message by using the **DELETE** or **GET** verbs, remove `@qmgr` from the URI.

## MQHTTP40004: Invalid `Content-Type` specified

The `Content-Type` header field specified on a **POST** request is not compatible with the `x-msg-class` header value.

### Explanation
The `Content-Type` header field specified on a **POST** request is not compatible with the `x-msg-class` header value.

### HTTP status code
`400 Bad Request`

### Programmer response
Change the `Content-Type` header field to one that is supported. The `Content-Type` header must be compatible with the specified `x-msg-class` header field.

## MQHTTP40005: Bad message header value

A supported header field has been specified with a value that is not valid for the specified request.

### Explanation
A supported header field has been specified with a value that is not valid for the specified request.

### HTTP status code
`400 Bad Request`

### Programmer response
Change the value specified for the given header field to a value which is valid. Check the case of the value specified, as some header fields have case-sensitive values.

## MQHTTP40006: *Header_name* is not a valid request header

A header that is valid only in an HTTP response message has been specified in an HTTP request message.

### Explanation

A header which is valid only in an HTTP response message has been specified in an HTTP request message.

### HTTP status code

`400 Bad Request`

### Programmer response

Remove any headers from the HTTP request which are only valid in an HTTP response; for example, `x-msg-timestamp`.

## MQHTTP40007: *Header_name* is only valid on ...

A header has been specified in an HTTP request, but the header field is not valid for the given request verb.

### Explanation

A header has been specified in an HTTP request, but the header field is not valid for the given request verb.

### HTTP status code

`400 Bad Request`

### Programmer response

Remove any headers from the HTTP request which are not valid for the given request verb. For example, `x-msg-encoding` is valid for HTTP **POST** requests, but not valid for HTTP **GET** or HTTP **DELETE** requests.

## MQHTTP40008: *Header_name* maximum length is ...

The maximum length for the given header field has been exceeded.

### Explanation

The maximum length for the given header field has been exceeded.

### HTTP status code

`400 Bad Request`

### Programmer response

Change the value of the header field to a value which is within the range permitted for the header field.

## MQHTTP40009: Header field *header_field* is not valid for ...

A header field specified in an HTTP request is not supported by the messaging provider to which the IBM MQ bridge for HTTP is connected.

### Explanation

A header field specified in an HTTP request is not supported by the messaging provider to which the IBM MQ bridge for HTTP is connected. The error occurs if a messaging provider is used that cannot support all the features of the IBM MQ bridge for HTTP.

### HTTP status code
`400 Bad Request`

### Programmer response
Remove the unsupported header from the HTTP request.

## MQHTTP40010: Message with `Content-Type` *`content_type`* could not be parsed

The content of the HTTP request is not compatible with the `Content-Type` of the request.

### Explanation
The content of the HTTP request is not compatible with the `Content-Type` of the request. A common cause is badly formed `application/x-www-form-urlencoded` or `application/xml data`.

### HTTP status code
`400 Bad Request`

### Programmer response
Correct the content of the HTTP request so that it is in the correct format for the `Content-Type` of the request.

## MQHTTP40301: You are forbidden from accessing ...

The IBM MQ bridge for HTTP has been unable to authenticate itself for the specified destination.

### Explanation
The IBM MQ bridge for HTTP has been unable to authenticate itself for the specified destination.

### HTTP status code
`403 Forbidden`

### Programmer response
Change the authentication properties of the destination so that the IBM MQ Bridge for HTTP is authorized to connect to it. Alternatively, specify a destination to which the IBM MQ bridge for HTTP is authorized to connect.

## MQHTTP40302: You are forbidden from ...

The IBM MQ bridge for HTTP has been unable to connect to the queue manager.

### Explanation
The IBM MQ bridge for HTTP has been unable to connect to the queue manager. The IBM MQ bridge for HTTP security configuration is incorrect.

### HTTP status code
`403 Forbidden`

### Programmer response
Change the authentication configuration of the queue manager so that the IBM MQ Bridge for HTTP is authorized to connect to it. Alternatively, configure the IBM MQ bridge for HTTP to connect to a queue manager to which it is authorized to connect.

## MQHTTP40401: The destination *destination_name* could not be found

The destination specified in the HTTP request URI cannot be found by the IBM MQ bridge for HTTP.

### Explanation

The destination specified in the HTTP request URI cannot be found by the IBM MQ bridge for HTTP.

### HTTP status code

`404 Not found`

### Programmer response

Check that the destination specified in the HTTP request URI exists, or specify an alternative destination.

## MQHTTP40501: Method *method_name* not allowed

The method specified in the HTTP request is not supported by the IBM MQ bridge for HTTP.

### Explanation

The method specified in the HTTP request is not supported by the IBM MQ bridge for HTTP.

### HTTP status code

`405 Method not allowed`

### Programmer response

Change the method specified in the HTTP request to one which is supported by the IBM MQ bridge for HTTP.

## MQHTTP41301: The message being posted was too large for the destination

The destination specified in the HTTP POST request URI cannot accept messages that are as long as the message specified in the HTTP request.

### Explanation

The destination specified in the HTTP POST request URI cannot accept messages that are as long as the message specified in the HTTP request.

### HTTP status code

`413 Request entity too large`

### Programmer response

Reduce the size of the message specified in the HTTP request. Alternatively, specify a destination which can support messages of the wanted length.

## MQHTTP41501: The media type character set is unsupported

The character set specified in the `Content-Type` header field is not supported by the IBM MQ bridge for HTTP.

### Explanation

The character set specified in the `Content-Type` header field is not supported by the IBM MQ bridge for HTTP.

### HTTP status code

`415 Unsupported media type`

### Programmer response
Change the character set of the `Content-Type` header field to one that is supported by the IBM MQ bridge for HTTP.

## MQHTTP41502: Media-type *media-type* is not supported ...

The media-type specified in the HTTP request is not supported by the IBM MQ bridge for HTTP for the specified HTTP verb.

### Explanation
The media-type specified in the HTTP request is not supported by the IBM MQ bridge for HTTP for the specified HTTP verb.

### HTTP status code
`415 Unsupported media type`

### Programmer response
Change the media-type specified in the HTTP request to one that is supported by the IBM MQ Bridge for HTTP for the specified HTTP verb.

## MQHTTP41503: Media-type *media-type* is not supported ...

The media-type specified in the HTTP request is not supported by the IBM MQ bridge for HTTP for the specified `x-msg-class` header field.

### Explanation
The media-type specified in the HTTP request is not supported by the IBM MQ bridge for HTTP for the specified `x-msg-class` header field.

### HTTP status code
`415 Unsupported media type`

### Programmer response
Change the media-type specified in the HTTP request to one that is supported by the IBM MQ Bridge for HTTP for the specified `x-msg-class` header field.

## MQHTTP41701: The HTTP header `Expect` is not supported

The IBM MQ bridge for HTTP does not support the `Expect` header field.

### Explanation
The `Expect` header has been specified in an HTTP request. The IBM MQ bridge for HTTP does not support the `Expect` header field.

### HTTP status code
`417 Expectation failed`

### Programmer response
Remove the `Expect` header from the HTTP request.

## MQHTTP50001: There has been an unexpected problem ...

An error has occurred in the IBM MQ bridge for HTTP.

### Explanation

An error has occurred in the IBM MQ bridge for HTTP.

### HTTP status code

`500 Internal server error`

### Programmer response

Contact the system administrator of the IBM MQ Bridge for HTTP.

## MQHTTP50201: An error has occurred between the IBM MQ bridge for HTTP and the queue manager

An error has occurred between the IBM MQ bridge for HTTP and the queue manager

### Explanation

An error has occurred between the IBM MQ bridge for HTTP and the queue manager

### HTTP status code

`502 Bad Gateway`

### Programmer response

Contact the system administrator of the IBM MQ Bridge for HTTP.

## MQHTTP50401: Message retrieval timed out

No message matching the specified request parameters in an HTTP **GET** or HTTP **DELETE** was returned in the timeout period.

### Explanation

No message matching the specified request parameters in an HTTP **GET** or HTTP **DELETE** was returned in the timeout period. The return code indicates that no suitable message was available at any time during the life of the HTTP request.

### HTTP status code

`504 Gateway timeout`

### Programmer response

If a message was expected, check the header fields of the HTTP request such as `x-msg-correlId` and `x-msg-msgid`. Check that the destination specified in the HTTP request URI is correct. Try extending the wait time of the HTTP request using the `x-msg-wait` header field.

## MQHTTP50501: HTTP 1.1 and upwards ...

The HTTP protocol used in the HTTP request is not supported by the IBM MQ bridge for HTTP.

### Explanation

The HTTP protocol used in the HTTP request is not supported by the IBM MQ bridge for HTTP.

### HTTP status code
505 HTTP version not supported

### Programmer response
Change the HTTP request to use HTTP protocol V1.1 or higher.

## Message types and message mappings for WebSphere Bridge for HTTP

IBM MQ bridge for HTTP supports four message classes, TEXT, BYTES, STREAM and MAP. The message classes are mapped to JMS message types and HTTP Content-Type.

### HTTP POST

The message type that arrives at the destination depends on the value of the x-msg-class header or the Content-Type of the HTTP request. Table 666 on page 1775 shows the HTTP Content-Type type that corresponds to each x-msg-class. Either field can be used to set the message type and message format. If both fields are set, and are set inconsistently, then a Bad Request exception is returned (HTTP 400, MQHTTP20004).

*Table 666. Mapping between x-msg-class and HTTP Content-Type*

| **x-msg-class** | **HTTP Content-Type** |
|---|---|
| BYTES | application/octet-stream<br>application/xml |
| TEXT | text/* |
| MAP | application/x-www-form-urlencoded<br>application/xml (optional) |
| STREAM | application/xml (optional) |

If the JMS message type is set in the MQRFH2 header, it is mapped according to Table 667 on page 1775.

*Table 667. Mapping between x-msg-class and JMS message types.*

| **x-msg-class** | **JMS message type** |
|---|---|
| BYTES | jms_bytes |
| TEXT | jms_text |
| MAP | jms_map |
| STREAM | jms_stream |

The JMS message type is always set for a message class of MAP or STREAM. It is not always set for a message class of BYTES or TEXT. If a MQRFH2 is to be created for the request, the JMS message type is always set. Otherwise, if no MQRFH2 is created, no JMS message type is set. An MQRFH2 is created if user properties are set in the request, using the x-msg-usr header.

If the JMS message type is set, then the message format is set to MQFMT_NONE, see Table 669 on page 1776:

| *Table 668. Mapping between x-msg-class and IBM MQ message format* | | |
|---|---|---|
| **x-msg-class** | **Message format with MQRFH2 present in message** | **Message format with *no* MQRFH2 present in message** |
| BYTES | MQFMT_NONE | MQFMT_NONE |
| TEXT | MQFMT_NONE | MQFMT_STRING |
| MAP | MQFMT_NONE | Not possible |
| STREAM | MQFMT_NONE | Not possible |

## HTTP GET or DELETE

The message type or format retrieved determines the value of the x-msg-class header and the Content-Type of the HTTP response. The x-msg-class header is returned only if requested in a x-msg-headers request.

Table 669 on page 1776 describes the mappings between x-msg-class and Content-Type, and the message type retrieved from the queue or topic.

| *Table 669. Mapping message types to x-msg-class and Content-Type* | | | |
|---|---|---|---|
| **Message format** | **JMS Message type** | **x-msg-class** | **Content-Type** |
| Anything except MQFMT_STRING | None | BYTES | application/octet-stream |
| MQFMT_STRING | None | TEXT | text/plain |
| MQFMT_NONE | jms_bytes | BYTES | application/octet-stream |
| MQFMT_NONE | jms_text | TEXT | text/plain |
| MQFMT_NONE | jms_map | MAP | application/xml |
| MQFMT_NONE | jms_stream | STREAM | application/xml |

## MAP and STREAM message class serialization

MAP and STREAM message classes are serialized back to the client in the HTTP response in the same way as a message is serialized to a queue.

For MAP, the XML name, type, and value triplets are encoded as:

```
<map>
    <elt name="elementname1" dt="datatype1">value1</elt>
    <elt name="elementname2" dt="datatype2">value2</elt>
    ...
</map>
```

STREAM is like MAP, but it does not have element names:

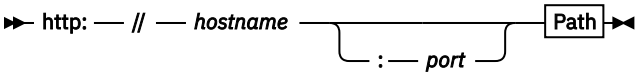
```
<stream>
    <elt dt="datatype1">value1</elt>
    <elt dt="datatype2">value2</elt>
    ...
</stream>
```

**Note:** datatype is one of the data types defined for defining user-defined properties and listed in “usr: HTTP x-msg-usr entity-header” on page 1764. The attribute dt="string" is omitted for string elements because the default data type is string.

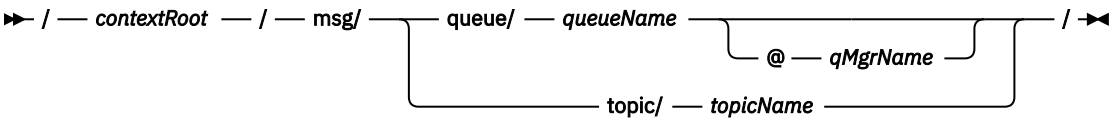
## URI Format

URIs intercepted by IBM MQ bridge for HTTP.

### Syntax




### Path




**Note:**

1. If a question mark (?) is used it must be substituted with `%3f`. For example, `orange?topic` should be specified as `orange%3ftopic`.
2. @ *qMgrName* is only valid on an HTTP **POST**

### Description

Deploy the IBM MQ bridge for HTTP servlet to your JEE application server with a context root of *contextRoot*. Requests to

```
http://hostname: port/context_root/msg/queue/queueName @ qMgrName
```

and

```
http://hostname: port/context_root/msg/topic/topicString
```

are intercepted by IBM MQ bridge for HTTP.

# The IBM MQ .NET classes and interfaces

IBM MQ .NET classes and interfaces are listed alphabetically. The properties, methods and constructors are described.

## MQAsyncStatus.NET class

Use `MQAsyncStatus` to inquire on the status of previous MQI activity; for example inquiring on the success of previous asynchronous put operations. `MQAsyncStatus` encapsulates features of the `MQSTS` data structure.

### Class

```
System.Object
    |
    └─ IBM.WMQ.MQBase
        |
        └─ IBM.WMQ.MQBaseObject
            |
            └─ IBM.WMQ.MQAsyncStatus
```

```
public class IBM.WMQ.MQAsyncStatus extends IBM.WMQ.MQBaseObject;
```

- “Properties” on page 1778

- “Constructors” on page 1778

## Properties

Test for `MQException` being thrown when getting properties.

**public static int CompCode {get;}**

The completion code from the first error or warning.

**public static int Reason {get;}**

The reason code from the first error or warning.

**public static int PutSuccessCount {get;}**

The number of successful asynchronous MQI put calls.

**public static int PutWarningCount {get;}**

The number of asynchronous MQI put calls that succeeded with a warning.

**public static int PutFailureCount {get;}**

The number of failed asynchronous MQI put calls.

**public static int ObjectType {get;}**

The object type for the first error. The following values are possible:

- `MQC.MQOT_ALIAS_Q`
- `MQC.MQOT_LOCAL_Q`
- `MQC.MQOT_MODEL_Q`
- `MQC.MQOT_Q`
- `MQC.MQOT_REMOTE_Q`
- `MQC.MQOT_TOPIC`
- `0`, meaning that no object is returned

**public static string ObjectName {get;}**

The object name.

**public static string ObjectQMgrName {get;}**

The object queue manager name.

**public static string ResolvedObjectName {get;}**

The resolved object name.

**public static string ResolvedObjectQMgrName {get;}**

The resolved object queue manager name.

## Constructors

**public MQAsyncStatus() throws MQException;**

Constructor method, constructs an object with fields initialized to zero or blank as appropriate.

# MQAuthenticationInformationRecord.NET class

Use MQAuthenticationInformationRecord to specify information about an authenticator that is to be used in an IBM MQ SSL client connection. MQAuthenticationInformationRecord encapsulates an authentication information record, MQAIR.

## Class

```
System.Object
    |
    └─ IBM.WMQ.MQAuthenticationInformationRecord
```

```
public class IBM.WMQ.MQAuthenticationInformationRecord extends System.Object;
```


- "Properties" on page 1779
- "Constructors" on page 1779


## Properties

Test for MQException being thrown when getting properties.

**public long Version {get; set;}**

Structure version number.

**public long AuthInfoType {get; set;}**

The type of authentication information. This attribute must be set to one of the following values:

- OCSP - Certificate revocation status checking is done using OCSP.
- CRLLDAP - Certificate revocation status checking is done using Certificate Revocation Lists on LDAP servers.

**public string AuthInfoConnName {get; set;}**

The DNS name or IP address of the host on which the LDAP server is running, with an optional port number. This keyword is required.

**public string LDAPPassword {get; set;}**

The password associated with the distinguished name of the user who is accessing the LDAP server. This property applies only when **AuthInfoType** is set to CRLLDAP.

**public string LDAPUserName {get; set;}**

The distinguished name of the user who is accessing the LDAP server. When you set this property, LDAPUserNameLength and LDAPUserNamePtr are automatically set correctly. This property applies only when AuthInfoType is set to CRLLDAP.

**public string OCSPResponderURL {get; set;}**

The URL at which the OCSP responder can be contacted. This property applies only when AuthInfoType is set to OCSP

This field is case sensitive. It must start with the string http:// in lowercase. The rest of the URL might be case sensitive, depending on the OCSP server implementation.

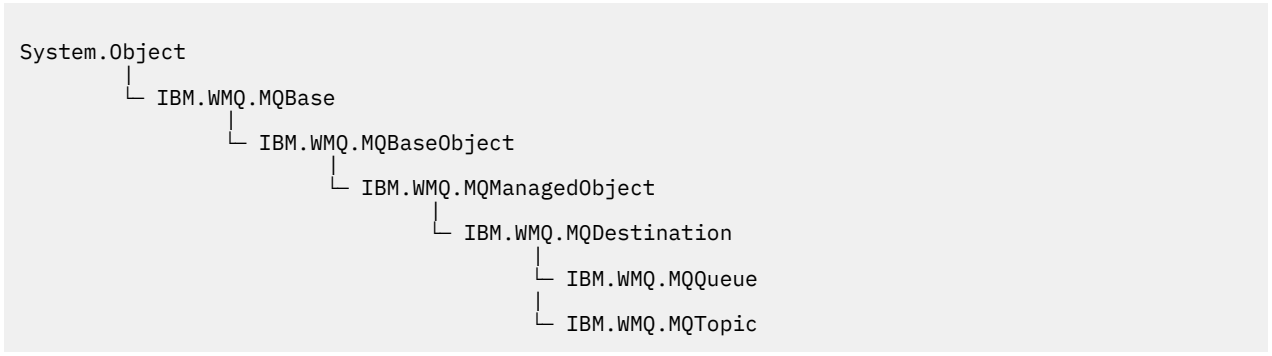
## Constructors

**MQAuthenticationInformationRecord();**

# MQDestination.NET class

Use MQDestination to access methods that are common to MQQueue and MQTopic. MQDestination is an abstract base class and cannot be instantiated.

## Class




```
public class IBM.WMQ.MQDestination extends IBM.WMQ.MQManagedObject;
```

- "Properties" on page 1780
- "Methods" on page 1780
- "Constructors" on page 1782

## Properties

Test for MQException being thrown when getting properties.

**public DateTime CreationDateTime {get;}**

The date and time that the queue or topic was created. Originally contained within MQQueue, this property has been moved into the base MQDestination class.

There is no default value.

**public int DestinationType {get;}**

Integer value describing the type of destination being used. Initialized from the sub classes constructor, MQQueue or MQTopic, this value can take one of these values:

- MQOT_Q
- MQOT_TOPIC

There is no default value.

## Methods

**public void Get(MQMessage *message*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*, int *MaxMsgSize*);**

Throws MQException.

Gets a message from a queue if the destination is an MQQueue object or from a topic if the destination is an MQTopic object, using a default instance of MQGetMessageOptions to do the get.

If the get fails, the MQMessage object is unchanged. If it succeeds, the message descriptor and message data portions of the MQMessage are replaced with the message descriptor and message data from the incoming message.

All calls to IBM MQ from a particular MQQueueManager are synchronous. Therefore, if you perform a get with wait, all other threads using the same MQQueueManager are blocked from making further IBM MQ calls until the Get call is accomplished. If you need multiple threads to access IBM MQ simultaneously, each thread must create its own MQQueueManager object.

***message***
Contains the message descriptor and the returned message data. Some of the fields in the message descriptor are input parameters. It is important to ensure that the MessageId and CorrelationId input parameters are set as required.

A reconnectable client returns the reason code MQRC_BACKED_OUT after successful reconnection, for messages received under MQGM_SYNCPOINT.

***getMessageOptions***
Options controlling the action of the get.

Using option MQC.MQGMO_CONVERT might result in an exception with reason code MQC.MQRC_CONVERTED_STRING_TOO_BIG when converting from single-byte character codes to double byte codes. In this case, the message is copied into the buffer without conversion.

If *getMessageOptions* is not specified, the message option used is MQGMO_NOWAIT.

If you use the MQGMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

***MaxMsgSize***
The largest message this message object is to receive. If the message on the queue is larger than this size, one of two things occurs:

- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is set in the MQGetMessageOptions object, the message is filled with as much of the message data as possible. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_ACCEPTED reason code.
- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is not set, the message remains on the queue. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_FAILED reason code.

If *MaxMsgSize* is not specified, the whole message is retrieved.

**public void Put(MQMessage *message*);**
**public void Put(MQMessage *message*, MQPutMessageOptions *putMessageOptions*);**

Throws MQException.

Puts a message to a queue if the destination is an MQQueue object or publishes a message to a topic if the destination is an MQTopic object.

Modifications to the MQMessage object after the Put call has been accomplished do not affect the actual message on the IBM MQ queue or publication topic.

Put updates the MessageId and CorrelationId properties of the MQMessage object and does not clear message data. Further Put or Get calls refer to the updated information in the MQMessage object. For example, in the following code snippet, the first message contains a and the second ab.

```
msg.WriteString("a");
q.Put(msg,pmo);
msg.WriteString("b");
q.Put(msg,pmo);
```

***message***
An MQMessage object containing the message descriptor data, and message to be sent. The message descriptor can be altered as a consequence of this method. The values in the message descriptor immediately after the completion of this method are the values that were put to the queue or published to the topic.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if the connection is broken while running a Put call on a persistent message and the reconnection is successful.
- MQRC_NONE if the connection is successful while running a Put call on a non-persistent message (see Application Recovery ).

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

**Note:** For simplicity and performance, if you want to put a single message to a queue, use MQQueueManager.Put object. You should have an MQQueue object for this.

### Constructors

MQDestination is an abstract base class and cannot be instantiated. Access destinations using MQQueue and MQTopic constructors, or using MQQueueManager.AccessQueue and MQQueueManager.AccessTopic methods.

## MQEnvironment.NET class

Use MQEnvironment to control how the MQQueueManager constructor is called and to select an IBM MQ MQI client connection. The MQEnvironment class contains properties that control the behavior of the IBM MQ.

### Class

```
System.Object
        |
        └─ IBM.WMQ.MQEnvironment
```

```
public class IBM.WMQ.MQEnvironment extends System.Object;
```

- “Properties - client only” on page 1782
- “Properties” on page 1783
- “Constructors” on page 1784

### Properties - client only

Test for MQException being thrown when getting properties.

**public static int CertificateValPolicy {get; set;}**

Set which SSL/TLS certificate validation policy is used to validate digital certificates received from remote partner systems. Valid values are:

- MQC.CERTIFICATE_VALIDATION_POLICY_ANY
- MQC.CERTIFICATE_VALIDATION_POLICY_RFC5280

**public static ArrayList EncryptionPolicySuiteB {get; set;}**

Set the level of Suite B compliant cryptography. Valid values are:

- MQC.MQ_SUITE_B_NONE - This is the default value.
- MQC.MQ_SUITE_B_128_BIT
- MQC.MQ_SUITE_B_192_BIT

**public static string Channel {get; set;}**
The name of the channel to connect to the target queue manager. You *must* set the channel property before instantiating an `MQQueueManager` instance in client mode.

**public static int FipsRequired {get; set;}**

Specify `MQC.MQSSL_FIPS_YES` to use only FIPS-certified algorithms if cryptography is carried out in IBM MQ. The default is `MQC.MQSSL_FIPS_NO`.

If cryptographic hardware is configured, the cryptographic modules used are those provided by the hardware product. Depending on the hardware in use, these might not be FIPS-certified to a particular level.

**public static string Hostname {get; set;}**
The TCP/IP host name of the computer on which the IBM MQ server resides. If the host name is not set, and no overriding properties are set, server bindings mode is used to connect to the local queue manager.

**public static int Port {get; set;}**
The port to connect to. This is the port on which the IBM MQ server is listening for incoming connection requests. The default value is 1414.

**public static string SSLCipherSpec {get; set;}**
Set `SSLCipherSpec` to the value of the CipherSpec set on the SVRCONN channel to enable SSL for the connection. The default is Null, and SSL is not enabled for the connection.

**public static string sslPeerName {get; set;}**

A distinguished name pattern. If `sslCipherSpec` is set, this variable can be used to ensure that the correct queue manager is used. If set to null (default), the DN of the queue manager is not performed. `sslPeerName` is ignored if `sslCipherSpec` is null.

## Properties

Test for `MQException` being thrown when getting properties.

**public static ArrayList HdrCompList {get; set;}**
Header Data Compression List

**public static int KeyResetCount {get; set;}**
Indicates the number of unencrypted bytes sent and received within an SSL conversation before the secret key is renegotiated.

**public static ArrayList MQAIRArray {get; set;}**
An array of `MQAuthenticationInformationRecord` objects.

**public static ArrayList MsgCompList {get; set;}**
Message Data Compression List

**public static string Password {get; set;}**
The password to be authenticated. The password referenced from the `MQCSP` structure gets populated by setting this Password property.

**public static string ReceiveExit {get; set;}**
A receive exit allows you to examine and alter data received from a queue manager. It is normally used with a corresponding send exit at the queue manager. If ReceiveExit is set to null, no receive exit is called.

**public static string ReceiveUserData {get; set;}**
The user data associated with a receive exit. Limited to 32 characters.

**public static string SecurityExit {get; set;}**
A security exit allows you to customize the security flows that occur when an attempt is made to connect to a queue manager. If `SecurityExit` is set to null, no security exit is called.

**public static string SecurityUserData {get; set;}**
The user data associated with a security exit. Limited to 32 characters.

**public static string SendExit {get; set;}**
A send exit allows you to examine or alter the data sent to a queue manager. It is normally used with a corresponding receive exit at the queue manager. If SendExit is set to null, no send exit is called.

**public static string SendUserData {get; set;}**
The user data associated with a send exit. Limited to 32 characters.

**public static string SharingConversations {get; set;}**

The SharingConversations field is used on connections from .NET applications, when these applications are not using a client channel definition table (CCDT).

SharingConversations determines the maximum number of conversations that can be shared on a socket associated with this connection.

A value of 0 means that the channel operates as it did before IBM WebSphere MQ 7.0, with regard to conversation sharing, read ahead, and heartbeat.

The field is passed in the hash table of properties as a SHARING_CONVERSATIONS_PROPERTY, when instantiating an IBM MQ queue manager.

If you do not specify SharingConversations, a default value of 10 is used.

**public static string SSLCryptoHardware {get; set;}**

Sets the name of the parameter string required to configure the cryptographic hardware present on the system. SSLCryptoHardware is ignored if sslCipherSpec is null.

**public static string SSLKeyRepository {get; set;}**

Set the fully qualified file name of the key repository.

If SSLKeyRepository is set to null (default), the certificate MQSSLKEYR environment variable is used to locate the key repository. SSLCryptoHardware is ignored if sslCipherSpec is null.

**Note:** The .kdb extension is a mandatory part of the file name, but is not included as part of the value of the parameter. The directory you specify must exist. IBM MQ creates the file the first time it accesses the new key repository, unless the file already exists.

**public static string UserId {get; set;}**

The user ID to be authenticated. The user ID referenced from the MQCSP structure gets populated by setting UserId. Authenticate UserId using an API or Security exit.

### Constructors

**public MQEnvironment()**

## MQException.NET class

Use MQException to find out the completion and reason code of a failed IBM MQ function. An MQException is thrown whenever an IBM MQ error occurs.

### Class

```
System.Object
        |
        └─ System.Exception
                |
                └─ System.ApplicationException
                        |
                        └─ IBM.WMQ.MQException
```

public class IBM.WMQ.MQException extends System.ApplicationException;

- "Properties" on page 1785

- “Constructors” on page 1785

### Properties

**public int CompletionCode {get; set;}**
The IBM MQ completion code associated with the error. The possible values are:

- `MQException.MQCC_OK`
- `MQException.MQCC_WARNING`
- `MQException.MQCC_FAILED`

**public int ReasonCode {get; set;}**
IBM MQ reason code describing the error.

### Constructors

**public MQException(int *completionCode*, int *reasonCode*)**

***completionCode***
The IBM MQ completion code.

***reasonCode***
The IBM MQ completion code.

## MQGetMessageOptions.NET class

Use `MQGetMessageOptions` to specify how messages are retrieved. It modifies the behavior of `MQDestination.Get`.

### Class

```
System.Object
        |
        └─ IBM.WMQ.MQBase
                |
                └─ IBM.WMQ.MQBaseObject
                        |
                        └─ IBM.WMQ.MQGetMessageOptions
```

```
public class IBM.WMQ.MQGetMessageOptions extends IBM.WMQ.MQBaseObject;
```

- “Properties” on page 1785
- “Constructors” on page 1788

### Properties

**Note:** The behavior of some of the options available in this class depends on the environment in which they are used. These elements are marked with an asterisk *.

Test for `MQException` being thrown when getting properties.

**public int GroupStatus {get;}***
`GroupStatus` indicates whether the retrieved message is in a group and if it is the last in the group. Possible values are:

**MQC.MQGS_LAST_MSG_IN_GROUP**
Message is the last or only message in the group.

**MQC.MQGS_MSG_IN_GROUP**
Message is in a group, but is not the last in the group.

**MQC.MQGS_NOT_IN_GROUP**
Message is not in a group.

**public int MatchOptions {get; set;}***

`MatchOptions` determines how a message is selected. The following match options can be set:

**MQC.MQMO_MATCH_CORREL_ID**
Correlation ID to be matched.

**MQC.MQMO_MATCH_GROUP_ID**
Group ID to be matched.

**MQC.MQMO_MATCH_MSG_ID**
Message ID to be matched.

**MQC.MQMO_MATCH_MSG_SEQ_NUMBER**
Match message sequence number.

**MQC.MQMO_NONE**
No matching required.

**public int Options {get; set;}**

`Options` control the action of `MQQueue.get`. Any of the following values can be specified. If more than one option is required, the values can be added, or combined using the bitwise OR operator.

**MQC.MQGMO_ACCEPT_TRUNCATED_MSG**
Allow truncation of message data.

**MQC.MQGMO_ALL_MSGS_AVAILABLE***
Retrieve messages from a group only when all the messages in the group are available.

**MQC.MQGMO_ALL_SEGMENTS_AVAILABLE***
Retrieve the segments of a logical message only when all the segments in the group are available.

**MQC.MQGMO_BROWSE_FIRST**
Browse from start of queue.

**MQC.MQGMO_BROWSE_MSG_UNDER_CURSOR***
Browse message under browse cursor.

**MQC.MQGMO_BROWSE_NEXT**
Browse from the current position in the queue.

**MQC.MQGMO_COMPLETE_MSG***
Retrieve only complete logical messages.

**MQC.MQGMO_CONVERT**
Request the application data to be converted, to conform to the `CharacterSet` and `Encoding` attributes of the `MQMessage`, before the data is copied into the message buffer. Because data conversion is also applied when the data is retrieved from the message buffer, applications do not set this option.

Using this option can cause problems when converting from single-byte character sets to double-byte character sets. Instead, do the conversion using the `readString`, `readLine`, and `writeString` methods after the message has been delivered.

**MQC.MQGMO_FAIL_IF_QUIESCING**
Fail if the queue manager is quiescing.

**MQC.MQGMO_LOCK***
Lock the message that is browsed.

**MQC.MQGMO_LOGICAL_ORDER***
Return messages in groups, and segments of logical messages, in logical order.

If you use the `MQGMO_LOGICAL_ORDER` option in a reconnectable client, the `MQRC_RECONNECT_INCOMPATIBLE` reason code is returned to the application.

**MQC.MQGMO_MARK_SKIP_BACKOUT***
Allow a unit of work to be backed out without reinstating the message on the queue.

**MQC.MQGMO_MSG_UNDER_CURSOR**
Get message under browse cursor.

**MQC.MQGMO_NONE**
No other options have been specified; all options assume their default values.

**MQC.MQGMO_NO_PROPERTIES**
No properties of the message, except properties contained in the message descriptor (or extension) are retrieved.

**MQC.MQGMO_NO_SYNCPOINT**
Get message without sync point control.

**MQC.MQGMO_NO_WAIT**
Return immediately if there is no suitable message.

**MQC.MQGMO_PROPERTIES_AS_Q_DEF**
Retrieve message properties as defined by the `PropertyControl` attribute of `MQQueue`. Access to the message properties in the message descriptor, or extension, are not affected by the `PropertyControl` attribute.

**MQC.MQGMO_PROPERTIES_COMPATIBILITY**
Retrieve message properties with a prefix of `mcd`, `jms`, `usr`, or `mqext`, in `MQRFH2` headers. Other properties of the message, except properties contained in the message descriptor, or extension, are discarded.

**MQC.MQGMO_PROPERTIES_FORCE_MQRFH2**
Retrieve message properties, except properties contained in the message descriptor, or extension, in `MQRFH2` headers. Use `MQC.MQGMO_PROPERTIES_FORCE_MQRFH2` in applications that are expecting to retrieve properties but cannot be changed to use message handles.

**MQC.MQGMO_PROPERTIES_IN_HANDLE**
Retrieve message properties using a `MsgHandle`.

**MQC.MQGMO_SYNCPOINT**
Get the message under sync point control. The message is marked as being unavailable to other applications, but it is deleted from the queue only when the unit of work is committed. The message is made available again if the unit of work is backed out.

**MQC.MQGMO_SYNCPOINT_IF_PERSISTENT***
Get message with sync point control if message is persistent.

**MQC.MQGMO_UNLOCK***
Unlock a previously locked message.

**MQC.MQGMO_WAIT**
Wait for a message to arrive.

**public string ResolvedQueueName {get;}**
The queue manager sets `ResolvedQueueName` to the local name of the queue from which the message was retrieved. `ResolvedQueueName` is different from the name used to open the queue if an alias queue or model queue was opened.

**public char Segmentation {get;}***
`Segmentation` indicates whether you can allow segmentation for the retrieved message. Possible values are:

**MQC.MQSEG_INHIBITED**
Do not allow segmentation.

**MQC.MQSEG_ALLOWED**
Allow segmentation

**public byte SegmentStatus {get;}***
`SegmentStatus` is an output field that indicates whether the retrieved message is a segment of a logical message. If the message is a segment, the flag indicates whether it is the last segment. Possible values are:

**MQC.MQSS_LAST_SEGMENT**
Message is the last or only segment of the logical message.

**MQC.MQSS_NOT_A_SEGMENT**
Message is not a segment.

**MQC.MQSS_SEGMENT**
Message is a segment, but is not the last segment of the logical message.

**public int WaitInterval {get; set;}**
`WaitInterval` is the maximum time in milliseconds that an `MQQueue.get` call waits for a suitable message to arrive. Use `WaitInterval` with `MQC.MQGMO_WAIT`. Set a value of `MQC.MQWI_UNLIMITED` to wait an unlimited time for a message.

### Constructors

**public MQGetMessageOptions()**
Construct a new `MQGetMessageOptions` object with `Options` set to `MQC.MQGMO_NO_WAIT`, `WaitInterval` set to zero, and `ResolvedQueueName` set to blank.

## MQManagedObject.NET class

Use `MQManagedObject` to inquire and set attributes of `MQDestination`, `MQProcess`, `MQQueueManager`, and `MQSubscription`. `MQManagedObject` is a superclass of these classes.

### Classes

```
System.Object
        |
        └ IBM.WMQ.MQBase
                |
                └ IBM.WMQ.MQBaseObject
                        |
                        └ IBM.WMQ.MQManagedObject
                                |
                                └ IBM.WMQ.MQProcess
                                |
                                └ IBM.WMQ.MQQueueManager
                                |
                                └ IBM.WMQ.MQSubscription
                                |
                                └ IBM.WMQ.MQDestination
```

`public class IBM.WMQ.MQManagedObject extends IBM.WMQ.MQBaseObject;`


- "Properties" on page 1788
- "Methods" on page 1789
- "Constructors" on page 1790


### Properties

Test for `MQException` being thrown when getting properties.

**public string AlternateUserId {get; set;}**
The alternate user ID, if any, set when the resource was opened. `AlternateUserID.set` is ignored when issued for an object that is opened. `AlternateUserId` is not valid for subscriptions.

**public int CloseOptions {get; set;}**

Set this attribute to control the way the resource is closed. The default value is `MQC.MQCO_NONE`. `MQC.MQCO_NONE` s the only permissible value for all resources other than permanent dynamic queues, temporary dynamic queues, subscriptions, and topics that are being accessed by the objects that created them.

For queues and topics, the following additional values are permissible:

**MQC.MQCO_DELETE**
Delete the queue if there are no messages.

**MQC.MQCO_DELETE_PURGE**
Delete the queue, purging any messages on it.

**MQC.MQCO_QUIESCE**
Request the queue be closed, receiving a warning if any messages remain (allowing them to be retrieved before final closing).

For subscriptions, the following additional values are permissible:

**MQC.MQCO_KEEP_SUB**
The subscription is not deleted. This option is valid only if the original subscription is durable. `MQC.MQCO_KEEP_SUB` is the default value for a durable topic.

**MQC.MQCO_REMOVE_SUB**
The subscription is deleted. `MQC.MQCO_REMOVE_SUB` is the default value for a non-durable, unmanaged topic.

**MQC.MQCO_PURGE_SUB**
The subscription is deleted. `MQC.MQCO_PURGE_SUB` is the default value for a non-durable, managed topic.

**public MQQueueManager ConnectionReference {get;}**
The queue manager to which this resource belongs.

**public string MQDescription {get;}**
The description of the resource as held by the queue manager. `MQDescription` returns an empty string for subscriptions and topics.

**public boolean IsOpen {get;}**
Indicates whether the resource is currently open.

**public string Name {get;}**
The name of the resource. The name is either the supplied on the access method, or the allocated by the queue manager for a dynamic queue.

**public int OpenOptions {get; set;}**
OpenOptions are set when an IBM MQ object is opened. The `OpenOptions.set` method is ignored and does not cause an error. Subscriptions have no `OpenOptions`.

## Methods

**public virtual void Close();**
Throws `MQException`.

Closes the object. No further operations against this resource are permitted after calling `Close`. To change the behavior of the `Close` method, set the `closeOptions` attribute.

**public string GetAttributeString(int *selector*, int *length*);**
Throws `MQException`.

Gets an attribute string.

***selector***
Integer indicating which attribute is being queried.

***length***
Integer indicating the length of the string required.

**public void Inquire(int[] *selectors*, int[] *intAttrs*, byte[] *charAttrs*);**
Throws `MQException`.

Returns an array of integers and a set of character strings containing the attributes of a queue, process, or queue manager. The attributes to be queried are specified in the selectors array.

**Note:** Many of the more common attributes can be queried using the `Get` methods defined in `MQManagedObject`, `MQQueue` and `MQQueueManager`.

***selectors***
Integer array identifying the attributes with values to be inquired on.

***intAttrs***
The array in which the integer attribute values are returned. Integer attribute values are returned in the same order as the integer attribute selectors in the selectors array.

***charAttrs***
The buffer in which the character attributes are returned, concatenated. Character attributes are returned in the same order as the character attribute selectors in the selectors array. The length of each attribute string is fixed for each attribute.

**public void Set(int[] *selectors*, int[] *intAttrs*, byte[] *charAttrs*);**
Throws `MQException`.

Sets the attributes defined in the vector of selectors. The attributes to be set are specified in the selectors array.

***selectors***
Integer array identifying the attributes with values to be set.

***intAttrs***
The array of integer attribute values to be set. These values must be in the same order as the integer attribute selectors in the selectors array.

***charAttrs***
The buffer in which the character attributes to be set are concatenated. These values must be in the same order as the character attribute selectors in the selectors array. The length of each character attribute is fixed.

**public void SetAttributeString(int *selector*, string *value*, int *length*);**
Throws `MQException`.

Sets an attribute string.

***selector***
Integer indicating which attribute is being set.

***value***
The string to set as the attribute value.

***length***
Integer indicating the length of the string required.

### Constructors

**protected MQManagedObject()**
Constructor method. This object is an abstract base class which cannot be instantiated by itself.

## MQMessage.NET class

Use `MQMessage` to access the message descriptor and data for an IBM MQ message. `MQMessage` encapsulates an IBM MQ message.

### Class

```
System.Object
        |
        └─ IBM.WMQ.MQBase
                |
                └─ IBM.WMQ.MQBaseObject
                        |
                        └─ IBM.WMQ.MQMessage
```

```
public class IBM.WMQ.MQMessage extends IBM.WMQ.MQBaseObject;
```

Create an MQMessage object and then use the Read and Write methods to transfer data between the message and other objects in your application. Send and receive MQMessage objects using the Put and Get methods of the MQDestination, MQQueue and MQTopic classes.

Get and set the properties of the message descriptor using the properties of MQMessage. Set and Get extended message properties using the SetProperty and GetProperty methods.


- "Properties" on page 1791
- "Read and Write message methods" on page 1796
- "Buffer methods" on page 1799
- "Property methods" on page 1800
- "Constructors" on page 1802


## Properties

Test for MQException being thrown when getting properties.

**public string AccountingToken {get; set;}**
Part of the identity context of the message; it helps an application to charge for work done as a result of the message. The default value is MQC.MQACT_NONE.

**public string ApplicationIdData {get; set;}**
Part of the identity context of the message. ApplicationIdData is information that is defined by the application suite, and can be used to provide additional information about the message or its originator. The default value is "".

**public string ApplicationOriginData {get; set;}**
Information defined by the application that can be used to provide additional information about the origin of the message. The default value is "".

**public int BackoutCount {get;}**
A count of the number of times the message has previously been returned and backed out by an MQQueue.Get call as part of a unit of work. The default value is zero.

**public int CharacterSet {get; set;}**

The coded character set identifier of character data in the message.

Set CharacterSet to identify the character set of character data in the message. Get CharacterSet to find out in what character set has been used to encode character data in the message.

.NET applications always run in Unicode, whereas in other environments applications run in the same character set as the queue manager is running under.

The ReadString and ReadLine methods convert the character data in the message to Unicode for you.

The WriteString method converts from Unicode to the character set encoded in CharacterSet. If CharacterSet is set to its default value, MQC.MQCCSI_Q_MGR, which is 0, no conversion takes place and CharacterSet is set to 1200. If you set CharacterSet to some other value, WriteString converts from Unicode to the alternate value.

**Note:** Other read and write methods do not use CharacterSet.

- ReadChar and WriteChar read and write a Unicode character to and from the message buffer without conversion.
- ReadUTF and WriteUTF convert between a Unicode string in the application, and a UTF-8 string, prefixed by a 2-byte length field, in the message buffer.
- Byte methods transfer bytes between the application and the message buffer without alteration.

**public byte[] CorrelationId {get; set;}**

- For an MQQueue.Get call, the correlation identifier of the message to be retrieved. The queue manager returns the first message with a message identifier and a correlation identifier that match the message descriptor fields. The default value, MQC.MQCI_NONE, helps any correlation identifier to match.
- For an MQQueue.Put call, the correlation identifier to set.

**public int DataLength {get;}**
The number of bytes of message data remaining to be read.

**public int DataOffset {get; set;}**
The current cursor position within the message data. Reads and writes take effect at the current position.

**public int Encoding {get; set;}**
The representation used for numeric values in the application message data. Encoding applies to binary, packed decimal, and floating point data. The behavior of the read and write methods for these numeric formats is altered accordingly. Construct a value for the encoding field by adding one value from each of these three sections. Alternatively, construct the value combining the values from each of the three sections using the bitwise OR operator.

1. Binary integer

   **MQC.MQENC_INTEGER_NORMAL**
   Big-endian integers.

   **MQC.MQENC_INTEGER_REVERSED**
   Little-endian integers, as used in Intel architecture.

2. Packed-decimal

   **MQC.MQENC_DECIMAL_NORMAL**
   Big-endian packed-decimal, as used by z/OS.

   **MQC.MQENC_DECIMAL_REVERSED**
   Little-endian packed-decimal.

3. Floating-point

   **MQC.MQENC_FLOAT_IEEE_NORMAL**
   Big-endian IEEE floats.

   **MQC.MQENC_FLOAT_IEEE_REVERSED**
   Little-endian IEEE floats, as used Intel architecture.

   **MQC.MQENC_FLOAT_S390**
   z/OS format floating points.

The default value is:

```
MQC.MQENC_INTEGER_REVERSED |
MQC.MQENC_DECIMAL_REVERSED |
MQC.MQENC_FLOAT_IEEE_REVERSED
```

The default setting causes WriteInt to write a little-endian integer, and ReadInt to read a little-endian integer. If you set the flag MQC.MQENC_INTEGER_NORMAL flag instead, WriteInt writes a big-endian integer, and ReadInt reads a big-endian integer.

**Note:** A loss in precision can occur when converting from IEEE format floating points to zSeries format floating points.

**public int Expiry {get; set;}**
An expiry time expressed in tenths of a second, set by the application that puts the message. After the expiry time of a message has elapsed, it is eligible to be discarded by the queue manager. If the message specified one of the MQC.MQRO_EXPIRATION flags, a report is generated when the message is discarded. The default value is MQC.MQEI_UNLIMITED, meaning that the message never expires.

**public int Feedback {get; set;}**

Use Feedback with a message of type MQC.MQMT_REPORT to indicate the nature of the report. The following feedback codes are defined by the system:

- MQC.MQFB_EXPIRATION
- MQC.MQFB_COA
- MQC.MQFB_COD
- MQC.MQFB_QUIT
- MQC.MQFB_PAN
- MQC.MQFB_NAN
- MQC.MQFB_DATA_LENGTH_ZERO
- MQC.MQFB_DATA_LENGTH_NEGATIVE
- MQC.MQFB_DATA_LENGTH_TOO_BIG
- MQC.MQFB_BUFFER_OVERFLOW
- MQC.MQFB_LENGTH_OFF_BY_ONE
- MQC.MQFB_IIH_ERROR

Application-defined feedback values in the range MQC.MQFB_APPL_FIRST to MQC.MQFB_APPL_LAST can also be used. The default value of this field is MQC.MQFB_NONE, indicating that no feedback is provided.

**public string Format {get; set;}**

A format name used by the sender of the message to indicate the nature of the data in the message to the receiver. You can use your own format names, but names beginning with the letters MQ have meanings that are defined by the queue manager. The queue manager built-in formats are:

**MQC.MQFMT_ADMIN**
Command server request/reply message.

**MQC.MQFMT_COMMAND_1**
Type 1 command reply message.

**MQC.MQFMT_COMMAND_2**
Type 2 command reply message.

**MQC.MQFMT_DEAD_LETTER_HEADER**
Dead-letter header.

**MQC.MQFMT_EVENT**
Event message.

**MQC.MQFMT_NONE**
No format name.

**MQC.MQFMT_PCF**
User-defined message in programmable command format.

**MQC.MQFMT_STRING**
Message consisting entirely of characters.

**MQC.MQFMT_TRIGGER**
Trigger message

**MQC.MQFMT_XMIT_Q_HEADER**
Transmission queue header.

The default value is MQC.MQFMT_NONE.

**public byte[] GroupId {get; set;}**

A byte string that identifies the message group to which the physical message belongs. The default value is MQC.MQGI_NONE.

**public int MessageFlags {get; set;}**

Flags controlling the segmentation and status of a message.

**public byte[] MessageId {get; set;}**

For an MQQueue.Get call, this field specifies the message identifier of the message to be retrieved. Normally, the queue manager returns the first message with a message identifier and correlation identifier that match the message descriptor fields. Allow any message identifier to match using the special value MQC.MQMI_NONE.

For an MQQueue.Put call, this field specifies the message identifier to use. If MQC.MQMI_NONE s specified, the queue manager generates a unique message identifier when the message is put. The value of this member variable is updated after the put, to indicate the message identifier that was used. The default value is MQC.MQMI_NONE.

**public int MessageLength {get;}**
The number of bytes of message data in the MQMessage object.

**public int MessageSequenceNumber {get; set;}**
The sequence number of a logical message within a group.

**public int MessageType {get; set;}**
Indicates the type of the message. The following values are currently defined by the system:

- MQC.MQMT_DATAGRAM
- MQC.MQMT_REPLY
- MQC.MQMT_REPORT
- MQC.MQMT_REQUEST

Application-defined values can also be used, in the range MQC.MQMT_APPL_FIRST to MQC.MQMT_APPL_LAST. The default value of this field is MQC.MQMT_DATAGRAM.

**public int Offset {get; set;}**
In a segmented message, the offset of data in a physical message from the start of a logical message.

**public int OriginalLength {get; set;}**
The original length of a segmented message.

**public int Persistence {get; set;}**

Message persistence. The following values are defined:

- MQC.MQPER_NOT_PERSISTENT

  If you set this option in a reconnectable client, the MQRC_NONE reason code is returned to the application when the connection is successful.

- MQC.MQPER_PERSISTENT

  If you set this option in a reconnectable client, the MQRC_CALL_INTERRUPTED reason code is returned to the application after the connection is successful.

- MQC.MQPER_PERSISTENCE_AS_Q_DEF

The default value is MQC.MQPER_PERSISTENCE_AS_Q_DEF, which takes the persistence for the message from the default persistence attribute of the destination queue.

**public int Priority {get; set;}**
The message priority. The special value MQC.MQPRI_PRIORITY_AS_Q_DEF can also be set in outbound message. The priority for the message is then taken from the default priority attribute of the destination queue. The default value is MQC.MQPRI_PRIORITY_AS_Q_DEF.

**public int PropertyValidation {get; set;}**
Specifies whether validation of properties takes place when a property of the message is set. Possible values are:

- MQCMHO_DEFAULT_VALIDATION
- MQCMHO_VALIDATE
- MQCMHO_NO_VALIDATION

The default value is MQCMHO_DEFAULT_VALIDATION.

**public string PutApplicationName {get; set;}**
The name of the application that put the message. The default value is "".

**public int PutApplicationType {get; set;}**
The type of application that put the message. PutApplicationType can be a system-defined or user-defined value. The following values are defined by the system:

- MQC.MQAT_AIX
- MQC.MQAT_CICS
- MQC.MQAT_DOS
- MQC.MQAT_IMS
- MQC.MQAT_MVS
- MQC.MQAT_OS2
- MQC.MQAT_OS400
- MQC.MQAT_QMGR
- MQC.MQAT_UNIX
- MQC.MQAT_WINDOWS
- MQC.MQAT_JAVA

The default value is MQC.MQAT_NO_CONTEXT, which indicates that no context information is present in the message.

**public DateTime PutDateTime {get; set;}**
The time and date that the message was put.

**public string ReplyToQueueManagerName {get; set;}**
The name of the queue manager to send reply or report messages. The default value is "", and the queue manager provides the ReplyToQueueManagerName.

**public string ReplyToQueueName {get; set;}**
The name of the message queue to which the application that issued the get request for the message sends MQC.MQMT_REPLY and MQC.MQMT_REPORT messages. The default ReplyToQueueName is "".

**public int Report {get; set;}**
Use Report to specify options about report and reply messages:

- Whether reports are required.
- Whether the application message data is to be included in the reports.
- How to set the message and correlation identifiers in the report or reply.

Any combination of the four report types can be requested:

- Specify any combination of the four report types. Selecting any of the three options for each report type, depending on whether the application message data is to be included in the report message.

  1. Confirm on arrival
     - MQC.MQRO_COA
     - MQC.MQRO_COA_WITH_DATA
     - MQC.MQRO_COA_WITH_FULL_DATA **
  2. Confirm on delivery
     - MQC.MQRO_COD
     - MQC.MQRO_COD_WITH_DATA
     - MQC.MQRO_COD_WITH_FULL_DATA **
  3. Exception
     - MQC.MQRO_EXCEPTION
     - MQC.MQRO_EXCEPTION_WITH_DATA

- MQC.MQRO_EXCEPTION_WITH_FULL_DATA **

4. Expiration
   - MQC.MQRO_EXPIRATION
   - MQC.MQRO_EXPIRATION_WITH_DATA
   - MQC.MQRO_EXPIRATION_WITH_FULL_DATA **

**Note:** Values marked with ** in the list are not supported by z/OS queue managers. Do not use them if your application is likely to access a z/OS queue manager, regardless of the platform on which the application is running.

- Specify one of the following to control how the message ID is generated for the report or reply message:
  - MQC.MQRO_NEW_MSG_ID
  - MQC.MQRO_PASS_MSG_ID
- Specify one of the following to control how the correlation ID of the report or reply message is to be set:
  - MQC.MQRO_COPY_MSG_ID_TO_CORREL_ID
  - MQC.MQRO_PASS_CORREL_ID
- Specify one of the following to control the disposition of the original message when it cannot be delivered to the destination queue:
  - MQC.MQRO_DEAD_LETTER_Q
  - MQC.MQRO_DISCARD_MSG **
- If no report options are specified, the default is:

```
MQC.MQRO_NEW_MSG_ID |
MQC.MQRO_COPY_MSG_ID_TO_CORREL_ID |
MQC.MQRO_DEAD_LETTER_Q
```

- You can specify one or both of the following to request that the receiving application sends a positive action or negative action report message.
  - MQC.MQRO_PAN
  - MQC.MQRO_NAN

**public int TotalMessageLength {get;}**
The total number of bytes in the message as stored on the message queue from which this message was received.

**public string UserId {get; set;}**
UserId is part of the identity context of the message. The queue manager generally provides the value. You can override the value if you have authority to set the identity context.

**public int Version {get; set;}**
The version of the MQMD structure in use.

## Read and Write message methods

The Read and Write methods perform the same functions as the members of the BinaryReader and BinaryWriter classes in the .NET System.IO namespace. See MSDN for the full language syntax and usage examples. The methods read or write from the current position in the message buffer. They move the current position forward by the number of bytes read or written.

**Note:** If the message data contains an MQRFH or MQRFH2 header, you must use the ReadBytes method to read the data.

- All the methods throw IOException.

- The `ReadFully` methods automatically resize the target `byte` or `sbyte` array to fit the message exactly. A null array is also resized.
- `Read` methods throw `EndOfStreamException`.
- `WriteDecimal` methods throw `MQException`.
- `ReadString`, `ReadLine` and `WriteString` methods convert between Unicode and the character set of the message; see `CharacterSet`.
- The `Decimal` methods read and write packed decimal numbers encoded either in big-endian, `MQC.MQENC_DECIMAL_NORMAL`, or little-endian `MQC.MQENC_DECIMAL_REVERSE` format, according to the value of `Encoding`. Decimal ranges and corresponding .NET types are as follows:

  **Decimal2/short**
  -999 to 999

  **Decimal4/int**
  -9999999 to 9999999

  **Decimal8/long**
  -999999999999999 to 999999999999999
- The `Double` and `Float` methods read and write floating values encoded in IEE big-endian and little-endian formats, `MQC.MQENC_FLOAT_IEEE_NORMAL` and `MQC.MQENC_FLOAT_IEEE_REVERSED`, or in S/390 format, `MQC.MQENC_FLOAT_S390`, according to the value of `Encoding`.
- The `Int` methods read and write integer values encoded in big-endian, `MQC.MQENC_INTEGER_NORMAL`, or little-endian, `MQC.MQENC_INTEGER_REVERSED`, format, according to the value of `Encoding`. The integers are all signed, except for the addition of an unsigned 2-byte integer type. The integer sizes, and .NET and IBM MQ types are as follows:

  **2 byte**
  `short`, `Int2`, `ushort`, `UInt2`

  **4 byte**
  `int`, `Int4`

  **8 byte**
  `long`, `Int8`
- `WriteObject` transfers the class of an object, the values of its non-transient and non-static fields, and the fields of its supertypes, to the message buffer.
- `ReadObject` creates an object from the class of the object, the signature of the class, and the values of its non-transient and non-static fields, and the fields of its supertypes.

*Table 670. Read and Write message methods*

| Target type | Method signatures |
|---|---|
| **Boolean** | `public bool ReadBoolean();`<br><br>`public void WriteBoolean(bool value);` |
| **Byte** | `public byte ReadByte()`<br>`public byte ReadUnsignedByte()`<br><br>`public void Write(int value)`<br>`public void WriteByte(int value)`<br>`public void WriteByte(byte value)`<br>`public void WriteByte(sbyte value)` |

*Table 670. Read and Write message methods (continued)*

| Target type | Method signatures |
|---|---|
| **Bytes** | `public byte[] ReadBytes(int count)`<br>`public void ReadFully(ref byte[] value)`<br>`public void ReadFully(ref sbyte[] value)`<br>`public void ReadFully(ref byte[] value, int offset,int length)`<br>`public void ReadFully(ref sbyte[] value, int offset,int length)`<br><br>`public void Write(byte[] value)`<br>`public void Write(sbyte[] value)`<br>`public void Write(byte[] value, int offset,int length)`<br>`public void Write(sbyte[] value, int offset,int length)`<br>`public void WriteBytes(string value)` |
| **Decimal2** | `public void WriteDecimal2(short value)` |
| **Decimal4** | `public void WriteDecimal4(short value)` |
| **Decimal8** | `public void WriteDecimal8(short value)` |
| **Double** | `public double ReadDouble()`<br><br>`public void WriteDouble(double value)` |
| **Float** | `public float ReadFloat()`<br><br>`public void WriteFloat(float value)` |
| **Int2** | `public void WriteInt2(int value)` |
| **Int4** | `public int readDecimal4()`<br>`public int ReadInt()`<br>`public int ReadInt4()`<br><br>`public void WriteInt(int value)`<br>`public void WriteInt4(int value)` |
| **Int8** | `public void WriteInt8(long value)` |

*Table 670. Read and Write message methods (continued)*

| Target type | Method signatures |
|---|---|
| **Long** | `public long ReadDecimal8()`<br>`public long ReadLong()`<br>`public long ReadInt8()`<br><br>`public void WriteLong(long value)` |
| **Object** | `public Object ReadObject()`<br><br>`public void WriteObject(Object object)` |
| **Short** | `public short ReadShort()`<br>`public short ReadDecimal2()`<br>`public short ReadInt2()`<br><br>`public void WriteShort(int value)` |
| **string** | `public string ReadString(int length)`<br><br>`public void WriteString(string string)` |
| **Unsigned Short** | `public ushort ReadUnsignedShort()`<br>`public ushort ReadUInt2()` |
| **Unicode** | `public string ReadLine()`<br>`public char ReadChar()`<br><br>`public void WriteChar(int value)`<br>`public void WriteChars(string string)` |
| **UTF** | `public string ReadUTF()`<br><br>`public void WriteUTF(string string)` |

## Buffer methods

**`public void ClearMessage();`**

Throws `IOException`.

Discards any data in the message buffer and sets the data offset back to zero.

**public void ResizeBuffer(int *size*)**

Throws IOException.

A hint to the MQMessage object about the size of buffer that might be required for subsequent get operations. If the message currently contains message data, and the new size is less than the current size, the message data is truncated.

**public void Seek(int *pos*)**

Throws IOException, ArgumentOutOfRangeException, ArgumentException.

Moves the cursor to the absolute position in the message buffer given by *pos*. Subsequent reads and writes act at this position in the buffer.

**public int SkipBytes(int *i*)**

Throws IOException, EndOfStreamException.

Moves forward n bytes in the message buffer and returns n, the number of bytes skipped.

SkipBytes method blocks until one of the following events occurs:

- All the bytes are skipped
- The end of message buffer is detected
- An exception is thrown

## Property methods

**public void DeleteProperty(string *name*);**

Throws MQException.

Deletes a property with the specified name from the message.

***name***
The name of the property to delete.

**public System.Collections.IEnumerator GetPropertyNames(string *name*)**

Throws MQException.

Returns an IEnumerator of all the property names matching the specified name. The percent sign '%' can be used at the end of the name as a wildcard character to filter the properties of the message, matching on zero, or more characters, including the period.

***name***
The name of the property to match on.

**SetProperty and GetProperty methods**
All the SetProperty and GetProperty methods throw MQException.

The SetProperty method of MQMessage .NET class adds a new property if a property does not exist already. However, if the property already exists, then the supplied property value is added to the end of the list. When multiple values are set to a property name using SetProperty, calling GetProperty for that name returns those values sequentially in the order that those values were set.

The behavior is same for all the Set*Property and Get*Property typed methods such as GetLongProperty, SetLongProperty, GetBooleanProperty, SetBooleanProperty, GetStringProperty, and SetStringProperty.

*Table 671. SetProperty and GetProperty methods*

| Type | Method signatures |
|---|---|
| **Boolean** | `public boolean GetBooleanProperty(string name);`<br>`public boolean GetBooleanProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetBooleanProperty(string name, boolean value);`<br>`public void SetBooleanProperty(string name, MQPropertyDescriptor pd, boolean value);` |
| **Byte** | `public sbyte GetByteProperty(string name);`<br>`public sbyte GetByteProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetByteProperty(string name, sbyte value);`<br>`public void SetByteProperty(string name, MQPropertyDescriptor pd, sbyte value);` |
| **Bytes** | `public sbyte[] GetBytesProperty(string name);`<br>`public sbyte[] GetBytesProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetBytesProperty(string name, sbyte[] value);`<br>`public void SetBytesProperty(string name, MQPropertyDescriptor pd, sbyte[] value);` |
| **Double** | `public double GetDoubleProperty(string name);`<br>`public double GetDoubleProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetDoubleProperty(string name, double value);`<br>`public void SetDoubleProperty(string name, MQPropertyDescriptor pd, double value);` |
| **Float** | `public float GetFloatProperty(string name);`<br>`public float GetFloatProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetFloatProperty(string name, float value);`<br>`public void SetFloatProperty(string name, MQPropertyDescriptor pd, float value);` |
| **Int2** | `public short GetInt2Property(string name);`<br>`public short GetInt2Property(string name, MQPropertyDescriptor pd);`<br><br>`public void SetInt2Property(string name, short value);`<br>`public void SetInt2Property(string name, MQPropertyDescriptor pd, short value);` |
| **Int4** | `public int GetInt4Property(string name);`<br>`public int GetInt4Property(string name, MQPropertyDescriptor pd);`<br><br>`public void SetInt4Property(string name, int value);`<br>`public void SetInt4Property(string name, MQPropertyDescriptor pd, int value);` |

| Table 671. SetProperty and GetProperty methods (continued) | |
|---|---|
| **Type** | **Method signatures** |
| **Int8** | `public long GetInt8Property(string name);`<br>`public long GetInt8Property(string name, MQPropertyDescriptor pd);`<br><br>`public void SetInt8Property(string name, long value);`<br>`public void SetInt8Property(string name, MQPropertyDescriptor pd, long value);` |
| **Long** | `public long GetLongProperty(string name);`<br>`public long GetLongProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetLongProperty(string name, long value);`<br>`public void SetLongProperty(string name, MQPropertyDescriptor pd, long value);` |
| **Object** | `public Object GetObjectProperty(string name);`<br>`public Object GetObjectProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetObjectProperty(string name, Object value);`<br>`public void SetObjectProperty(string name, MQPropertyDescriptor pd, Object value);` |
| **Short** | `public short GetShortProperty(string name);`<br>`public short GetShortProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetShortProperty(string name, short value);`<br>`public void SetShortProperty(string name, MQPropertyDescriptor pd, short value);` |
| **string** | `public string GetStringProperty(string name);`<br>`public string GetStringProperty(string name, MQPropertyDescriptor pd);`<br><br>`public void SetStringProperty(string name, string value);`<br>`public void SetStringProperty(string name, MQPropertyDescriptor pd, string value);` |

### Constructors

**public MQMessage();**

Creates an MQMessage object with default message descriptor information and an empty message buffer.

## MQProcess.NET class

Use MQProcess to query the attributes of an IBM MQ process. Create an MQProcess object using a constructor, or an MQQueueManager AccessProcess method.

### Class

```
System.Object
        │
        └─ IBM.WMQ.MQBase
                │
                └─ IBM.WMQ.MQBaseObject
                        │
                        └─ IBM.WMQ.MQManagedObject
                                │
                                └─ IBM.WMQ.MQProcess
```

```
public class IBM.WMQ.MQProcess extends IBM.WMQ.MQManagedObject;
```


- "Properties" on page 1803
- "Constructors" on page 1804


## Properties

Test for MQException being thrown when getting properties.

**public string ApplicationId {get;}**

Gets the character string that identifies the application to be started. ApplicationId is used by a trigger monitor application. ApplicationId is sent to the initiation queue as part of the trigger message.

The default value is null.

**public int ApplicationType {get;}**

Identifies the type of the process to be started by a trigger monitor application. Standard types are defined, but others can be used:

- MQAT_AIX
- MQAT_CICS
- MQAT_IMS
- MQAT_MVS
- MQAT_NATIVE
- MQAT_OS400
- MQAT_UNIX
- MQAT_WINDOWS
- MQAT_JAVA
- MQAT_USER_FIRST
- MQAT_USER_LAST

The default value is MQAT_NATIVE.

**public string EnvironmentData {get;}**

Gets information about the environment of the application that is to be started.

The default value is null.

**public string UserData {get;}**

Gets information the user has provided about the application to be started.

The default value is null.

## Constructors

**public MQProcess(MQQueueManager *queueManager*, string *processName*, int *openOptions*);**
**public MQProcess(MQQueueManager *qMgr*, string *processName*, int *openOptions*, string *queueManagerName*, string *alternateUserId*);**

Throws MQException.

Access an IBM MQ process on queue manager *qMgr* to inquire on process attributes.

***qMgr***
Queue manager to access.

***processName***
The name of the process to open.

***openOptions***
Options that control the opening of the process. The valid options that can be added, or combined using a bitwise OR, are:

- MQC.MQOO_FAIL_IF_QUIESCING
- MQC.MQOO_INQUIRE
- MQC.MQOO_SET
- MQC.MQOO_ALTERNATE_USER_AUTHORITY

***queueManagerName***
The name of the queue manager on which the process is defined. You can leave a blank or null queue manager name if the queue manager is the same as the one the process is accessing.

***alternateUserId***

If MQC.MQOO_ALTERNATE_USER_AUTHORITY is specified in the *openOptions* parameter, *alternateUserId* specifies the alternative user ID used to check the authorization for the action. If MQOO_ALTERNATE_USER_AUTHORITY is not specified, *alternateUserId* can be blank or null.

Default user authority is used for connection to the queue manager if MQC.MQOO_ALTERNATE_USER_AUTHORITY is not specified.

**public MQProcess MQQueueManager.AccessProcess(string *processName*, int *openOptions*);**
**public MQProcess MQQueueManager.AccessProcess(string *processName*, int *openOptions*, string *queueManagerName*, string *alternateUserId*);**

Throws MQException.

Access an IBM MQ process on this queue manager to inquire on process attributes.

***processName***
The name of the process to open.

***openOptions***
Options that control the opening of the process. The valid options that can be added, or combined using a bitwise OR, are:

- MQC.MQOO_FAIL_IF_QUIESCING
- MQC.MQOO_INQUIRE
- MQC.MQOO_SET
- MQC.MQOO_ALTERNATE_USER_AUTHORITY

***queueManagerName***
The name of the queue manager on which the process is defined. You can leave a blank or null queue manager name if the queue manager is the same as the one the process is accessing.

***alternateUserId***

If MQC.MQOO_ALTERNATE_USER_AUTHORITY is specified in the *openOptions* parameter, *alternateUserId* specifies the alternative user ID used to check the authorization for the action. If MQOO_ALTERNATE_USER_AUTHORITY is not specified, *alternateUserId* can be blank or null.

Default user authority is used for connection to the queue manager if MQC.MQOO_ALTERNATE_USER_AUTHORITY is not specified.

# MQPropertyDescriptor.NET class

Use MQPropertyDescriptor as a parameter to MQMessage GetProperty and SetProperty methods. MQPropertyDescriptor describes an MQMessage property.

## Class

```
System.Object
        |
        └─ IBM.WMQ.MQPropertyDescriptor
```

```
public class IBM.WMQ.MQPropertyDescriptor extends System.Object;
```

- "Properties" on page 1805
- "Constructors" on page 1806

## Properties

Test for MQException being thrown when getting properties.

**public int Context {get; set;}**

The message context the property belongs to. Possible values are:

**MQC.MQPD_NO_CONTEXT**
The property is not associated with a message context.

**MQC.MQPD_USER_CONTEXT**
The property is associated with the user context.

If the user is authorized, a property associated with the user context is saved when a message is retrieved. A subsequent Put method referencing the saved context, can pass the property into the new message.

**public int CopyOptions {get; set;}**

CopyOptions describes which type of message the property can be copied into.

When a queue manager receives a message containing an IBM MQ defined property that the queue manager recognizes as being incorrect, the queue manager corrects the value of the CopyOptions field.

Any combination of the following options can be specified. Combine the options by adding the values, or using bitwise OR.

**MQC.MQCOPY_ALL**
The property is copied into all types of subsequent messages.

**MQC.MQCOPY_FORWARD**
The property is copied into a message being forwarded.

**MQC.MQCOPY_PUBLISH**
The property is copied into the message received by a subscriber when a message is being published.

**MQC.MQCOPY_REPLY**
The property is copied into a reply message.

**MQC.MQCOPY_REPORT**
The property is copied into a report message.

**MQC.MQCOPY_DEFAULT**
The value indicated no other copy options have been specified. No relationship exists between the property and subsequent messages. MQC.MQCOPY_DEFAULT is always returned for message descriptor properties.

**MQC.MQCOPY_NONE**
The same as MQC.MQCOPY_DEFAULT

**public int Options { set; }**
Options defaults to CMQC.MQPD_NONE. You cannot set any other value.

**public int Support { get; set; }**

Set Support to specify the level of support required for IBM MQ-defined message properties. Support for all other properties is optional. Any or none of the following values can be specified

**MQC.MQPD_SUPPORT_OPTIONAL**
The property is accepted by a queue manager even if it is not supported. The property can be discarded in order for the message to flow to a queue manager that does not support message properties. This value is also assigned to properties that are not IBM MQ defined.

**MQC.MQPD_SUPPORT_REQUIRED**
Support for the property is required. If you put the message to a queue manager that does not support the IBM MQ-defined property, the method fails. It returns completion code MQC.MQCC_FAILED and reason code MQC.MQRC_UNSUPPORTED_PROPERTY.

**MQC.MQPD_SUPPORT_REQUIRED_IF_LOCAL**

Support for the property is required, if the message is destined for a local queue. If you put the message to a local queue on a queue manager that does not support the IBM MQ-defined property, the method fails. It returns completion code MQC.MQCC_FAILED and reason code MQC.MQRC_UNSUPPORTED_PROPERTY.

No check is made if the message is put to a remote queue manager.

### Constructors

**PropertyDescriptor();**
Create a property descriptor.

## MQPutMessageOptions.NET class

Use MQPutMessageOptions to specify how messages are sent. It modifies the behavior of MQDestination.Put.

### Class

```
System.Object
        |
        └─ IBM.WMQ.MQBase
                |
                └─ IBM.WMQ.MQBaseObject
                        |
                        └─ IBM.WMQ.MQPutMessageOptions
```

```
public class IBM.WMQ.MQPutMessageOptions extends IBM.WMQ.MQBaseObject;
```

- “Properties” on page 1807 “Constructors” on page 1809

## Properties

Test for MQException being thrown when getting properties.

**Note:** The behavior of some of the options available in this class depends on the environment in which they are used. These elements are marked with an asterisk, *.

**public MQQueue ContextReference {get; set;}**

If the options field includes MQC.MQPMO_PASS_IDENTITY_CONTEXT or MQC.MQPMO_PASS_ALL_CONTEXT, set this field to refer to the MQQueue from which to take the context information.

The initial value of this field is null.

**public int InvalidDestCount {get;} ***

Generally, used for distribution lists, InvalidDestCount indicates the number of messages that could not be sent to queues in a distribution list. The count includes queues that failed to open and also the queues that were opened successfully, but for which the put operation had failed.

.NET does not support distribution lists, but InvalidDestCount is set when opening a single queue.

**public int KnownDestCount {get;} ***

Generally used for distribution lists, KnownDestCount indicates the number of messages that the current call has sent successfully to queues that resolve to local queues.

.NET does not support distribution lists, but InvalidDestCount is set when opening a single queue.

**public int Options {get; set;}**

Options that control the action of MQDestination.put and MQQueueManager.put. Any or none of the following values can be specified. If more than one option is required, the values can be added or combined using the bitwise OR operator.

**MQC.MQPMO_ASYNC_RESPONSE**
This option causes the MQDestination.put call to be made asynchronously, with some response data.

**MQC.MQPMO_DEFAULT_CONTEXT**
Associate default context with the message.

**MQC.MQPMO_FAIL_IF_QUIESCING**
Fail if the queue manager is quiescing.

**MQC.MQPMO_LOGICAL_ORDER ***
Put logical messages and segments in message groups into their logical order.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned to the application.

**MQC.MQPMO_NEW_CORREL_ID ***
Generate a new correlation ID for each sent message.

**MQC.MQPMO_NEW_MSG_ID ***
Generate a new message ID for each sent message.

**MQC.MQPMO_NONE**
No options specified. Do not use with other options.

**MQC.MQPMO_NO_CONTEXT**
No context is to be associated with the message.

**MQC.MQPMO_NO_SYNCPOINT**
Put a message without sync point control. If the sync point control option is not specified, a default of no sync point is assumed.

**MQC.MQPMO_PASS_ALL_CONTEXT**
Pass all context from an input queue handle.

**MQC.MQPMO_PASS_IDENTITY_CONTEXT**
Pass identity context from an input queue handle.

**MQC.MQPMO_RESPONSE_AS_Q_DEF**

For an `MQDestination.put` call, this option takes the put response type from DEFPRESP attribute of the queue.

For an `MQQueueManager.put` call, this option causes the call to be made synchronously.

**MQC.MQPMO_RESPONSE_AS_TOPIC_DEF**
`MQC.MQPMO_RESPONSE_AS_TOPIC_DEF` is a synonym for `MQC.MQPMO_RESPONSE_AS_Q_DEF` for use with topic objects.

**MQC.MQPMO_RETAIN**

The publication being sent is to be retained by the queue manager. If this option is used and the publication cannot be retained, the message is not published and the call fails with `MQC.MQRC_PUT_NOT_RETAINED`.

Request a copy of this publication after the time it was published, by calling the `MQSubscription.RequestPublicationUpdate` method. The saved publication is sent to applications that create a subscription without setting the `MQC.MQSO_NEW_PUBLICATIONS_ONLY` option. Check the `MQIsRetained` message property of a publication, when it is received, to find out if it was the retained publication.

When retained publications are requested by a subscriber, the subscription used might contain a wildcard in the topic string. If there are multiple retained publications in the topic tree that match the subscription, they are all sent.

**MQC.MQPMO_SET_ALL_CONTEXT**
Set all context from the application.

**MQC.MQPMO_SET_IDENTITY_CONTEXT**
Set identity context from the application.

**MQC.MQPMO_SYNC_RESPONSE**
This option causes the `MQDestination.put` or `MQQueueManager.put` call to be made synchronously, with full response data.

**MQC.MQPMO_SUPPRESS_REPLYTO**
Any information filled into the `ReplyToQueueName` and `ReplyToQueueManagerName` fields of the publication is not passed on to subscribers. If this option is used in combination with a report option that requires a `ReplyToQueueName`, the call fails with `MQC.MQRC_MISSING_REPLY_TO_Q`.

**MQC.MQPMO_SYNCPOINT**
Put a message with sync point control. The message is not visible outside the unit of work until the unit of work is committed. If the unit of work is backed out, the message is deleted.

**public int RecordFields {get; set;}***

Information about distribution lists. Distribution lists are not supporting in .NET.

**public string ResolvedQueueManagerName {get;}**

An output field set by the queue manager to the name of the queue manager that owns the queue specified by the remote queue name. `ResolvedQueueManagerName` might be different from the name of the queue manager from which the queue was accessed if the queue is a remote queue.

A nonblank value is returned only if the object is a single queue. If the object is a distribution list or a topic, the value returned is undefined.

**public string ResolvedQueueName {get;}**

An output field that is set by the queue manager to the name of the queue on which the message is placed. `ResolvedQueueName` might be different from the name used to open the queue if the opened queue was an alias or model queue.

A non-blank value is returned only if the object is a single queue. If the object is a distribution list or a topic, the value returned is undefined.

**public int UnknownDestCount {get;} ***

Generally used for distribution lists, `UnknownDestCount` is an output field set by the queue manager. It reports the number of messages that the current call has sent successfully to queues that resolve to remote queues.

.NET does not support distribution lists, but `InvalidDestCount` is set when opening a single queue.

### Constructors

**public MQPutMessageOptions();**

Construct a new `MQPutMessageOptions` object with no options set, and a blank `ResolvedQueueName` and `ResolvedQueueManagerName`.

## MQQueue.NET class

Use `MQQueue` to send and receive messages, and query attributes of an IBM MQ queue. Create an `MQQueue` object using a constructor, or an `MQQueueManager.AccessProcess` method.

### Class

```
System.Object
        |
        └─ IBM.WMQ.MQBase
                |
                └─ IBM.WMQ.MQBaseObject
                        |
                        └─ IBM.WMQ.MQManagedObject
                                |
                                └─ IBM.WMQ.MQDestination
                                        |
                                        └─ IBM.WMQ.MQQueue
```

`public class IBM.WMQ.MQQueue extends IBM.WMQ.MQDestination;`


- "Properties" on page 1809
- "Methods" on page 1811
- "Constructors" on page 1814


### Properties

Test for `MQException` being thrown when getting properties.

**public int ClusterWorkLoadPriority {get;}**
Specifies the priority of the queue. This parameter is valid only for local, remote, and alias queues.

**public int ClusterWorkLoadRank {get;}**
Specifies the rank of the queue. This parameter is valid only for local, remote, and alias queues.

**public int ClusterWorkLoadUseQ {get;}**
Specifies the behavior of an MQPUT operation when the target queue has a local instance and at least one remote cluster instance. This parameter does not apply if the MQPUT originates from a cluster channel. This parameter is valid only for local queues.

**public DateTime CreationDateTime {get;}**
The date and time that this queue was created.

**public int CurrentDepth {get;}**
Gets the number of messages currently on the queue. This value is incremented during a put call, and during backout of a get call. It is decremented during a non-browse get and during backout of a put call.

**public int DefinitionType {get;}**
How the queue was defined. The possible values are:

- MQC.MQQDT_PREDEFINED
- MQC.MQQDT_PERMANENT_DYNAMIC
- MQC.MQQDT_TEMPORARY_DYNAMIC

**public int InhibitGet {get; set;}**
Controls whether you can get messages on this queue or for this topic. The possible values are:

- MQC.MQQA_GET_INHIBITED
- MQC.MQQA_GET_ALLOWED

**public int InhibitPut {get; set;}**
Controls whether you can put messages on this queue or for this topic. The possible values are:

- MQQA_PUT_INHIBITED
- MQQA_PUT_ALLOWED

**public int MaximumDepth {get;}**
The maximum number of messages that can exist on the queue at any one time. An attempt to put a message to a queue that already contains this many messages fails with reason code MQC.MQRC_Q_FULL.

**public int MaximumMessageLength {get;}**
The maximum length of the application data that can exist in each message on this queue. An attempt to put a message larger than this value fails with reason code MQC.MQRC_MSG_TOO_BIG_FOR_Q.

**public int NonPersistentMessageClass {get;}**
The level of reliability for non-persistent messages put to this queue.

**public int OpenInputCount {get;}**
The number of handles that are currently valid for removing messages from the queue. OpenInputCount is the total number of valid input handles known to the local queue manager, not just handles created by the application.

**public int OpenOutputCount {get;}**
The number of handles that are currently valid for adding messages to the queue. OpenOutputCount is the total number of valid output handles known to the local queue manager, not just handles created by the application.

**public int QueueAccounting {get;}**
Specifies whether you can enable the collection of accounting information for the queue.

**public int QueueMonitoring {get;}**
Specifies whether you can enable the monitoring for the queue.

**public int QueueStatistics {get;}**
Specifies whether you can enable the collection of statistics for the queue.

**public int QueueType {get;}**
The type of this queue with one of the following values:

- MQC.MQQT_ALIAS
- MQC.MQQT_LOCAL
- MQC.MQQT_REMOTE
- MQC.MQQT_CLUSTER

**public int Shareability {get;}**
Whether the queue can be opened for input multiple times. The possible values are:

- MQC.MQQA_SHAREABLE
- MQC.MQQA_NOT_SHAREABLE

**public string TPIPE {get;}**
The TPIPE name used for communication with OTMA using the IBM MQ IMS bridge.

**public int TriggerControl {get; set;}**
Whether trigger messages are written to an initiation queue, to start an application to service the queue. The possible values are:

- MQC.MQTC_OFF
- MQC.MQTC_ON

**public string TriggerData {get; set;}**
The free-format data that the queue manager inserts into the trigger message. It inserts TriggerData when a message arriving on this queue causes a trigger message to be written to the initiation queue. The maximum permissible length of the string is given by MQC.MQ_TRIGGER_DATA_LENGTH.

**public int TriggerDepth {get; set;}**
The number of messages that must be on the queue before a trigger message is written when trigger type is set to MQC.MQTT_DEPTH.

**public int TriggerMessagePriority {get; set;}**
The message priority under which messages do not contribute to the generation of trigger messages. That is, the queue manager ignores these messages when deciding whether to generate a trigger. A value of zero causes all messages to contribute to the generation of trigger messages.

**public int TriggerType {get; set;}**
The conditions under which trigger messages are written as a result of messages arriving on this queue. The possible values are:

- MQC.MQTT_NONE
- MQC.MQTT_FIRST
- MQC.MQTT_EVERY
- MQC.MQTT_DEPTH

## Methods

**public void Get(MQMessage *message*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*, int *MaxMsgSize*);**

Throws MQException.

Gets a message from a queue.

If the get fails, the MQMessage object is unchanged. If it succeeds, the message descriptor and message data portions of the MQMessage are replaced with the message descriptor and message data from the incoming message.

All calls to IBM MQ from a particular MQQueueManager are synchronous. Therefore, if you perform a get with wait, all other threads using the same MQQueueManager are blocked from making further IBM MQ calls until the Get call is accomplished. If you need multiple threads to access IBM MQ simultaneously, each thread must create its own MQQueueManager object.

***message***
Contains the message descriptor and the returned message data. Some of the fields in the message descriptor are input parameters. It is important to ensure that the MessageId and CorrelationId input parameters are set as required.

A reconnectable client returns the reason code MQRC_BACKED_OUT after successful reconnection, for messages received under MQGM_SYNCPOINT.

***getMessageOptions***
Options controlling the action of the get.

Using option MQC.MQGMO_CONVERT might result in an exception with reason code MQC.MQRC_CONVERTED_STRING_TOO_BIG when converting from single-byte character codes to double byte codes. In this case, the message is copied into the buffer without conversion.

If *getMessageOptions* is not specified, the message option used is MQGMO_NOWAIT.

If you use the MQGMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

***MaxMsgSize***
The largest message this message object is to receive. If the message on the queue is larger than this size, one of two things occurs:

- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is set in the MQGetMessageOptions object, the message is filled with as much of the message data as possible. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_ACCEPTED reason code.
- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is not set, the message remains on the queue. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_FAILED reason code.

If *MaxMsgSize* is not specified, the whole message is retrieved.

**public void Put(MQMessage *message*);**
**public void Put(MQMessage *message*, MQPutMessageOptions *putMessageOptions*);**

Throws MQException.

Puts a message to a queue.

Modifications to the MQMessage object after the Put call has been accomplished do not affect the actual message on the IBM MQ queue or publication topic.

Put updates the MessageId and CorrelationId properties of the MQMessage object and does not clear message data. Further Put or Get calls refer to the updated information in the MQMessage object. For example, in the following code snippet, the first message contains a and the second ab.

```
msg.WriteString("a");
q.Put(msg,pmo);
msg.WriteString("b");
q.Put(msg,pmo);
```

***message***
An MQMessage object containing the message descriptor data, and message to be sent. The message descriptor can be altered as a consequence of this method. The values in the message descriptor immediately after the completion of this method are the values that were put to the queue or published to the topic.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if the connection is broken while running a Put call on a persistent message and the reconnection is successful.
- MQRC_NONE if the connection is successful while running a Put call on a non-persistent message (see Application Recovery ).

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

**Note:** For simplicity and performance, if you want to put a single message to a queue, use MQQueueManager.Put object. You should have an MQQueue object for this.

**public void PutForwardMessage(MQMessage *message*);**
**public void PutForwardMessage(MQMessage *message*, MQPutMessageOptions *putMessageOptions*);**

Throws MQException

Put a message being forwarded onto the queue, where *message* is the original message.

***message***
An MQMessage object containing the message descriptor data, and message to be sent. The message descriptor can be altered as a consequence of this method. The values in the message descriptor immediately after the completion of this method are the values that were put to the queue or published to the topic.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if the connection is broken while running a Put call on a persistent message and the reconnection is successful.
- MQRC_NONE if the connection is successful while running a Put call on a non-persistent message (see Application Recovery ).

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

**public void PutReplyMessage(MQMessage *message*)**
**public void PutReplyMessage(MQMessage *message*, MQPutMessageOptions *putMessageOptions*)**

Throws MQException.

Put a reply message onto the queue, where *message* is the original message.

***message***
Contains the message descriptor and the returned message data. Some of the fields in the message descriptor are input parameters. It is important to ensure that the MessageId and CorrelationId input parameters are set as required.

A reconnectable client returns the reason code MQRC_BACKED_OUT after successful reconnection, for messages received under MQGM_SYNCPOINT.

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

**public void PutReportMessage(MQMessage *message*)**
**public void PutReportMessage(MQMessage *message*, MQPutMessageOptions *putMessageOptions*)**

Throws MQException.

Put a report message onto the queue, where *message* is the original message.

***message***
Contains the message descriptor and the returned message data. Some of the fields in the message descriptor are input parameters. It is important to ensure that the MessageId and CorrelationId input parameters are set as required.

A reconnectable client returns the reason code MQRC_BACKED_OUT after successful reconnection, for messages received under MQGM_SYNCPOINT.

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

## Constructors

```
public MQQueue MQQueueManager.AccessQueue(string queueName, int openOptions);
public MQQueue MQQueueManager.AccessQueue(string queueName, int openOptions,
string queueManagerName, string dynamicQueueName, string alternateUserId);
```

Throws MQException.

Accesses a queue on this queue manager.

You can get or browse messages, put messages, inquire about the attributes of the queue or set the attributes of the queue. If the queue named is a model queue, a dynamic local queue is created. Query the name attribute of the resultant MQQueue object to find out the name of the dynamic queue.

***queueName***
Name of queue to open.

***openOptions***
Options that control the opening of the queue.

**MQC.MQOO_ALTERNATE_USER_AUTHORITY**
Validate with the specified user identifier.

**MQC.MQOO_BIND_AS_QDEF**
Use default binding for queue.

**MQC.MQOO_BIND_NOT_FIXED**
Do not bind to a specific destination.

**MQC.MQOO_BIND_ON_OPEN**
Bind handle to destination when queue is opened.

**MQC.MQOO_BROWSE**
Open to browse message.

**MQC.MQOO_FAIL_IF_QUIESCING**
Fail if the queue manager is quiescing.

**MQC.MQOO_INPUT_AS_Q_DEF**
Open to get messages using queue-defined default.

**MQC.MQOO_INPUT_SHARED**
Open to get messages with shared access.

**MQC.MQOO_INPUT_EXCLUSIVE**
Open to get messages with exclusive access.

**MQC.MQOO_INQUIRE**
Open for inquiry - required if you want to query properties.

**MQC.MQOO_OUTPUT**
Open to put messages.

**MQC.MQOO_PASS_ALL_CONTEXT**
Allow all context to be passed.

**MQC.MQOO_PASS_IDENTITY_CONTEXT**
Allow identity context to be passed.

**MQC.MQOO_SAVE_ALL_CONTEXT**
Save context when message retrieved.

**MQC.MQOO_SET**
Open to set attributes - required if you want to set properties.

**MQC.MQOO_SET_ALL_CONTEXT**
Allows all context to be set.

**MQC.MQOO_SET_IDENTITY_CONTEXT**
Allows identity context to be set.

***queueManagerName***
Name of the queue manager on which the queue is defined. A name that is entirely blank or null denotes the queue manager to which the `MQQueueManager` object is connected.

***dynamicQueueName***
*dynamicQueueName* is ignored unless `queueName` specifies the name of a model queue. If it does, *dynamicQueueName* specifies the name of the dynamic queue to be created. A blank or null name is not valid if `queueName` specifies the name of a model queue. If the last nonblank character in the name is an asterisk, `*`, the queue manager replaces the asterisk with a string of characters. The characters guarantee that the name generated for the queue is unique on this queue manager.

***alternateUserId***
If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is specified in the `openOptions` parameter, *alternateUserId* specifies the alternate user identifier that is used to check the authorization for the open. If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is not specified, *alternateUserId* can be left blank, or null.

**public MQQueue(MQQueueManager *queueManager*, string *queueName*, int *openOptions*, string *queueManagerName*, string *dynamicQueueName*, string *alternateUserId*);**

Throws `MQException`.

Accesses a queue on `queueManager`.

You can get or browse messages, put messages, inquire about the attributes of the queue or set the attributes of the queue. If the queue named is a model queue, a dynamic local queue is created. Query the `name` attribute of the resultant `MQQueue` object to find out the name of the dynamic queue.

***queueManager***
Queue manager to access queue on.

***queueName***
Name of queue to open.

***openOptions***
Options that control the opening of the queue.

**MQC.MQOO_ALTERNATE_USER_AUTHORITY**
Validate with the specified user identifier.

**MQC.MQOO_BIND_AS_QDEF**
Use default binding for queue.

**MQC.MQOO_BIND_NOT_FIXED**
Do not bind to a specific destination.

**MQC.MQOO_BIND_ON_OPEN**
Bind handle to destination when queue is opened.

**MQC.MQOO_BROWSE**
Open to browse message.

**MQC.MQOO_FAIL_IF_QUIESCING**
Fail if the queue manager is quiescing.

**MQC.MQOO_INPUT_AS_Q_DEF**
Open to get messages using queue-defined default.

**MQC.MQOO_INPUT_SHARED**
Open to get messages with shared access.

**MQC.MQOO_INPUT_EXCLUSIVE**
Open to get messages with exclusive access.

**MQC.MQOO_INQUIRE**
Open for inquiry - required if you want to query properties.

**MQC.MQOO_OUTPUT**
Open to put messages.

**MQC.MQOO_PASS_ALL_CONTEXT**
Allow all context to be passed.

**MQC.MQOO_PASS_IDENTITY_CONTEXT**
Allow identity context to be passed.

**MQC.MQOO_SAVE_ALL_CONTEXT**
Save context when message retrieved.

**MQC.MQOO_SET**
Open to set attributes - required if you want to set properties.

**MQC.MQOO_SET_ALL_CONTEXT**
Allows all context to be set.

**MQC.MQOO_SET_IDENTITY_CONTEXT**
Allows identity context to be set.

***queueManagerName***
Name of the queue manager on which the queue is defined. A name that is entirely blank or null denotes the queue manager to which the `MQQueueManager` object is connected.

***dynamicQueueName***
*dynamicQueueName* is ignored unless queueName specifies the name of a model queue. If it does, *dynamicQueueName* specifies the name of the dynamic queue to be created. A blank or null name is not valid if queueName specifies the name of a model queue. If the last nonblank character in the name is an asterisk, `*`, the queue manager replaces the asterisk with a string of characters. The characters guarantee that the name generated for the queue is unique on this queue manager.

***alternateUserId***
If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is specified in the `openOptions` parameter, *alternateUserId* specifies the alternate user identifier that is used to check the authorization for the open. If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is not specified, *alternateUserId* can be left blank, or null.

## MQQueueManager.NET class

Use `MQQueueManager` to connect to a queue manager and access queue manager objects. It also controls transactions. The `MQQueueManager` constructor creates either a client or server connection.

### Class

```
System.Object
        │
        └─ IBM.WMQ.MQBase
                │
                └─ IBM.WMQ.MQBaseObject
                        │
                        └─ IBM.WMQ.ManagedObject
                                │
                                └─ IBM.WMQ.MQQueueManager
```

```
public class IBM.WMQ.MQQueueManager extends IBM.WMQ.MQManagedObject;
```

- "Properties" on page 1817
- "Methods" on page 1820

- "Constructors" on page 1825

## Properties

Test for `MQException` being thrown when getting properties.

**public int AccountingConnOverride {get;}**
Whether applications can override the setting of the `MQI` accounting and queue accounting values.

**public int AccountingInterval {get;}**
How long before intermediate accounting records are written (in seconds).

**public int ActivityRecording {get;}**
Controls the generation of activity reports.

**public int AdoptNewMCACheck {get;}**
Specifies which elements are checked to determine whether the MCA is adopted when a new inbound channel is detected. To be adopted, the MCA name must match the name of an active MCA.

**public int AdoptNewMCAInterval {get;}**
The amount of time, in seconds, that the new channel waits for the orphaned channel to end.

**public int AdoptNewMCAType {get;}**
Whether an orphaned MCA instance is to be adopted (restarted) when a new inbound channel request is detected matching the AdoptNewMCACheck value.

**public int BridgeEvent {get;}**
Whether IMS bridge events are generated.

**public int ChannelEvent {get;}**
Whether channel events are generated.

**public int ChannelInitiatorControl {get;}**
Whether the channel initiator starts automatically when the queue manager starts.

**public int ChannelInitiatorAdapters {get;}**
The number of adapter subtasks to process IBM MQ calls.

**public int ChannelInitiatorDispatchers {get;}**
The number of dispatchers to use for the channel initiator.

**public int ChannelInitiatorTraceAutoStart {get;}**
Specifies whether the channel initiator trace starts automatically.

**public int ChannelInitiatorTraceTableSize {get;}**
The size, in megabytes, of the trace data space of a channel initiator.

**public int ChannelMonitoring {get;}**
Whether channel monitoring is used.

**public int ChannelStatistics {get;}**
Controls the collection of statistics data for channels.

**public int CharacterSet {get;}**
Returns the coded character set identifier (CCSID) of the queue manager. `CharacterSet` is used by the queue manager for all character string fields in the application programming interface.

**public int ClusterSenderMonitoring {get;}**
Controls the collection of online monitoring data for automatically defined cluster sender channels.

**public int ClusterSenderStatistics {get;}**
Controls the collection of statistics data for automatically defined cluster sender channels.

**public int ClusterWorkLoadMRU {get;}**
The maximum number of outbound cluster channels.

**public int ClusterWorkLoadUseQ {get;}**
The default value of the `MQQueue` property, `ClusterWorkLoadUseQ`, if it specifies a value of `QMGR`.

**public int CommandEvent {get;}**
Specifies whether command events are generated.

**public string CommandInputQueueName {get;}**
Returns the name of the command input queue defined on the queue manager. Applications can send commands to this queue, if authorized to do so.

**public int CommandLevel {get;}**
Indicates the function level of the queue manager. The set of functions that correspond to a particular function level depends on the platform. On a particular platform, you can rely on every queue manager supporting the functions at the lowest functional level common to all the queue managers.

**public int CommandLevel {get;}**
Whether the command server starts automatically when the queue manager starts.

**public string DNSGroup {get;}**
No longer used.

**public int DNSWLM {get;}**
No longer used.

**public int IPAddressVersion {get;}**
Which IP protocol (IPv4 or IPv6) to use for a channel connection.

**public boolean IsConnected {get;}**
Returns the value of the `isConnected`.

If true, a connection to the queue manager has been made, and is not known to be broken. Any calls to IsConnected do not actively attempt to reach the queue manager, so it is possible that physical connectivity can break, but IsConnected can still return true. The IsConnected state is only updated when activity, for example, putting a message, getting a message, is performed on the queue manager.

If false, a connection to the queue manager has not been made, or has been broken, or has been disconnected.

**public int KeepAlive {get;}**
Specifies whether the TCP KEEPALIVE facility is to be used to check that the other end of the connection is still available. If it is unavailable, the channel is closed.

**public int ListenerTimer {get;}**
The time interval, in seconds, between attempts by IBM MQ to restart the listener after an APPC or TCP/IP failure.

**public int LoggerEvent {get;}**
Whether logger events are generated.

**public string LU62ARMSuffix {get;}**
The suffix of the APPCPM member of SYS1.PARMLIB. This suffix nominates the LUADD for this channel initiator. When automatic restart manager (ARM) restarts the channel initiator, the z/OS command SET APPC=xx is issued.

**public string LUGroupName {get; z/os}**
The generic LU name to be used by the LU 6.2 listener that handles inbound transmissions for the queue-sharing group.

**public string LUName {get;}**
The name of the LU to use for outbound LU 6.2 transmissions.

**public int MaximumActiveChannels {get;}**
The maximum number of channels that can be active at any time.

**public int MaximumCurrentChannels {get;}**
The maximum number of channels that can be current at any time (including server-connection channels with connected clients).

**public int MaximumLU62Channels {get;}**
The maximum number of channels that can be current, or clients that can be connected, that use the LU 6.2 transmission protocol.

**public int MaximumMessageLength {get;}**
Returns the maximum length of a message (in bytes) that can be handled by the queue manager. No queue can be defined with a maximum message length greater than `MaximumMessageLength`.

**public int MaximumPriority {get;}**
Returns the maximum message priority supported by the queue manager. Priorities range from zero (lowest) to this value. Throws `MQException` if you call this method after disconnecting from the queue manager.

**public int MaximumTCPChannels {get;}**
The maximum number of channels that can be current, or clients that can be connected, that use the TCP/IP transmission protocol.

**public int MQIAccounting {get;}**
Controls the collection of accounting information for MQI data.

**public int MQIStatistics {get;}**
Controls the collection of statistics monitoring information for the queue manager.

**public int OutboundPortMax {get;}**
The maximum value in the range of port numbers to be used when binding outgoing channels.

**public int OutboundPortMin {get;}**
The minimum value in the range of port numbers to be used when binding outgoing channels.

**public int QueueAccounting {get;}**
Whether class 3 accounting (thread-level and queue-level accounting) data is to be used for all queues.

**public int QueueMonitoring {get;}**
Controls the collection of online monitoring data for queues.

**public int QueueStatistics {get;}**
Controls the collection of statistics data for queues.

**public int ReceiveTimeout {get;}**
The length of time that a TCP/IP channel waits to receive data, including heartbeats, from its partner before returning to the inactive state.

**public int ReceiveTimeoutMin {get;}**
The minimum length of time that a TCP/IP channel waits to receive data, including heartbeats, from its partner before returning to an inactive state.

**public int ReceiveTimeoutType {get;}**
The qualifier to apply to the value in `ReceiveTimeout`.

**public int SharedQueueQueueManagerName {get;}**
Specifies how to deliver messages to a shared queue. If the put specifies a different queue manager from the same queue sharing group as the target queue manager, the message is delivered in two ways:

**MQC.MQSQQM_USE**
Messages are delivered to the object queue manager before being put on the shared queue.

**MQCMQSQQM_IGNORE**
Messages are put directly on the shared queue.

**public int SSLEvent {get;}**
Whether SSL events are generated.

**public int SSLFips {get;}**
Whether only FIPS-certified algorithms are to be used if cryptography is performed in IBM MQ, rather than cryptographic hardware.

**public int SSLKeyResetCount {get;}**
Indicates the number of unencrypted bytes sent and received within an SSL conversation before the secret key is renegotiated.

**public int ClusterSenderStatistics {get;}**
Specifies the interval, in minutes, between consecutive gatherings of statistics.

**public int SyncpointAvailability {get;}**
Indicates whether the queue manager supports units of work and sync points with the `MQQueue.get` and `MQQueue.put` methods.

**public string TCPName {get;}**
The name of either the only, or default, TCP/IP system to be used, depending on the value of TCPStackType.

**public int TCPStackType {get;}**
Specifies whether the channel initiator uses only the TCP/IP address space specified in TCPName. Alternatively, the channel initiator can bind to any TCP/IP address.

**public int TraceRouteRecording {get;}**
Controls the recording of route tracing information.

## Methods

**public MQProcess AccessProcess(string *processName*, int *openOptions*);**
**public MQProcess AccessProcess(string *processName*, int *openOptions*, string *queueManagerName*, string *alternateUserId*);**

Throws MQException.

Access an IBM MQ process on this queue manager to inquire on process attributes.

***processName***
The name of the process to open.

***openOptions***
Options that control the opening of the process. The valid options that can be added, or combined using a bitwise OR, are:

- MQC.MQOO_FAIL_IF_QUIESCING
- MQC.MQOO_INQUIRE
- MQC.MQOO_SET
- MQC.MQOO_ALTERNATE_USER_AUTHORITY

***queueManagerName***
The name of the queue manager on which the process is defined. You can leave a blank or null queue manager name if the queue manager is the same as the one the process is accessing.

***alternateUserId***

If MQC.MQOO_ALTERNATE_USER_AUTHORITY is specified in the *openOptions* parameter, *alternateUserId* specifies the alternative user ID used to check the authorization for the action. If MQOO_ALTERNATE_USER_AUTHORITY is not specified, *alternateUserId* can be blank or null.

Default user authority is used for connection to the queue manager if MQC.MQOO_ALTERNATE_USER_AUTHORITY is not specified.

**public MQQueue AccessQueue(string *queueName*, int *openOptions*);**
**public MQQueue AccessQueue(string *queueName*, int *openOptions*, string *queueManagerName*, string *dynamicQueueName*, string *alternateUserId*);**

Throws MQException.

Accesses a queue on this queue manager.

You can get or browse messages, put messages, inquire about the attributes of the queue or set the attributes of the queue. If the queue named is a model queue, a dynamic local queue is created. Query the name attribute of the resultant MQQueue object to find out the name of the dynamic queue.

***queueName***
Name of queue to open.

***openOptions***
Options that control the opening of the queue.

**MQC.MQOO_ALTERNATE_USER_AUTHORITY**
Validate with the specified user identifier.

**MQC.MQOO_BIND_AS_QDEF**
Use default binding for queue.

**MQC.MQOO_BIND_NOT_FIXED**
Do not bind to a specific destination.

**MQC.MQOO_BIND_ON_OPEN**
Bind handle to destination when queue is opened.

**MQC.MQOO_BROWSE**
Open to browse message.

**MQC.MQOO_FAIL_IF_QUIESCING**
Fail if the queue manager is quiescing.

**MQC.MQOO_INPUT_AS_Q_DEF**
Open to get messages using queue-defined default.

**MQC.MQOO_INPUT_SHARED**
Open to get messages with shared access.

**MQC.MQOO_INPUT_EXCLUSIVE**
Open to get messages with exclusive access.

**MQC.MQOO_INQUIRE**
Open for inquiry - required if you want to query properties.

**MQC.MQOO_OUTPUT**
Open to put messages.

**MQC.MQOO_PASS_ALL_CONTEXT**
Allow all context to be passed.

**MQC.MQOO_PASS_IDENTITY_CONTEXT**
Allow identity context to be passed.

**MQC.MQOO_SAVE_ALL_CONTEXT**
Save context when message retrieved.

**MQC.MQOO_SET**
Open to set attributes - required if you want to set properties.

**MQC.MQOO_SET_ALL_CONTEXT**
Allows all context to be set.

**MQC.MQOO_SET_IDENTITY_CONTEXT**
Allows identity context to be set.

***queueManagerName***
Name of the queue manager on which the queue is defined. A name that is entirely blank or null denotes the queue manager to which the `MQQueueManager` object is connected.

***dynamicQueueName***
*dynamicQueueName* is ignored unless `queueName` specifies the name of a model queue. If it does, *dynamicQueueName* specifies the name of the dynamic queue to be created. A blank or null name is not valid if `queueName` specifies the name of a model queue. If the last nonblank character in the name is an asterisk, `*`, the queue manager replaces the asterisk with a string of characters. The characters guarantee that the name generated for the queue is unique on this queue manager.

***alternateUserId***
If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is specified in the `openOptions` parameter, *alternateUserId* specifies the alternate user identifier that is used to check the authorization for the open. If `MQC.MQOO_ALTERNATE_USER_AUTHORITY` is not specified, *alternateUserId* can be left blank, or null.

**public MQTopic AccessTopic( MQDestination *destination*, string *topicName*, string *topicObject*, int *options*);**
**public MQTopic AccessTopic( MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*);**
**public MQTopic AccessTopic( MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*);**
**public MQTopic AccessTopic( MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*, System.Collections.Hashtable *properties*);**
**public MQTopic AccessTopic(string *topicName*, string *topicObject*, int *openAs*, int *options*);**
**public MQTopic AccessTopic(string *topicName*, string *topicObject*, int *openAs*, int *options*, string *alternateUserId*);**
**public MQTopic AccessTopic(string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*);**
**public MQTopic AccessTopic(string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*, System.Collections.Hashtable *properties*);**

Access a topic on this queue manager.

`MQTopic` objects are closely related to administrative topic objects, which are sometimes called topic objects. On input, `topicObject` points to an administrative topic object. The `MQTopic` constructor obtains a topic string from the topic object and combines it with `topicName` to create a topic name. Either or both `topicObject` or `topicName` can be null. The topic name is matched to the topic tree, and the name of the closest matching administrative topic object is returned in `topicObject`.

The topics that are associated with the `MQTopic` object are the result of combining two topic strings. The first topic string is defined by the administrative topic object identified by *`topicObject`*. The second topic string is *`topicString`*. The resulting topic string associated with the `MQTopic` object can identify multiple topics by including wild cards.

Depending on whether the topic is opened for publishing or subscribing, you can use the `MQTopic.Put` methods to publish on topics, or `MQTopic.Get` methods to receive publications on topics. If you want to publish and subscribe to the same topic, you must access the topic twice, once for publish and once for subscribe.

If you create an `MQTopic` object for subscription, without providing an `MQDestination` object, a managed subscription is assumed. If you pass a queue as an `MQDestination` object, an unmanaged subscription is assumed. You must ensure the subscription options you set are consistent with the subscription being managed or unmanaged.

***destination***
*`destination`* is an `MQQueue` instance. By providing *`destination`*, `MQTopic` is opened as an unmanaged subscription. Publications on the topic are delivered to the queue accessed as *`destination`*.

***topicName***
A topic string that is the second part of the topic name. *`topicName`* is concatenated with the topic string defined in the *`topicObject`* administrative topic object. You can set *`topicName`* to null, in which case the topic name is defined by the topic string in *`topicObject`*.

***topicObject***
On input, *`topicObject`* is the name of the topic object that contains the topic string that forms the first part of the topic name. The topic string in *`topicObject`* is concatenated with *`topicName`*. The rules for constructing topic strings are defined in Combining topic strings.

On output, *`topicObject`* contains the name of the administrative topic object that is the closest match in the topic tree to the topic identified by the topic string.

***openAs***
Access the topic to publish or subscribe. The parameter can contain only one of these options:

- `MQC.MQTOPIC_OPEN_AS_SUBSCRIPTION`

- MQC.MQTOPIC_OPEN_AS_PUBLICATION

***options***

Combine the options that control the opening of the topic for either publication or subscription. Use MQC.MQSO_* constants to access a topic for subscription and MQC.MQOO_* constants to access a topic for publication.

If more than one option is required, add the values together, or combine the option values using the bitwise OR operator.

***alternateUserId***

Specify the alternate user ID that is used to check for the required authorization to finish the operation. You must specify *alternateUserId*, if either MQC.MQOO_ALTERNATE_USER_AUTHORITY or MQC.MQSO_ALTERNATE_USER_AUTHORITY is set in the options parameter.

***subscriptionName***

*subscriptionName* is required if the options MQC.MQSO_DURABLE or MQC.MQSO_ALTER are provided. In both cases, MQTopic is implicitly opened for subscription. An exception is thrown if the MQC.MQSO_DURABLE is set, and the subscription exists, or if MQC.MQSO_ALTER is set, and the subscription does not exist.

***properties***

Set any of the special subscription properties listed using a hash table. Specified entries in the hash table are updated with output values. Entries are not added to the hash table to report output values.

- MQC.MQSUB_PROP_ALTERNATE_SECURITY_ID
- MQC.MQSUB_PROP_SUBSCRIPTION_EXPIRY
- MQC.MQSUB_PROP_SUBSCRIPTION_USER_DATA
- MQC.MQSUB_PROP_SUBSCRIPTION_CORRELATION_ID
- MQC.MQSUB_PROP_PUBLICATION_PRIORITY
- MQC.MQSUB_PROP_PUBLICATION_ACCOUNTING_TOKEN
- MQC.MQSUB_PROP_PUBLICATION_APPLICATIONID_DATA

**public MQAsyncStatus GetAsyncStatus();**

Throws MQException

Returns an MQAsyncStatus object, which represents the asynchronous activity for the queue manager connection.

**public void Backout();**

Throws MQException.

Backout any messages that were read or written within sync point since the last sync point.

Messages that were written with the MQC.MQPMO_SYNCPOINT flag set are removed from queues. Messages read with the MQC.MQGMO_SYNCPOINT flag are reinstated on the queues they came from. If the messages are persistent, the changes are logged.

For reconnectable clients, the MQRC_NONE reason code is returned to a client after reconnection is successful.

**public void Begin();**

Throws MQException.

Begin is supported only in server bindings mode. It starts a global unit of work.

**public void Commit();**

Throws MQException.

Commit any messages that were read or written within sync point since the last sync point.

Messages written with the MQC.MQPMO_SYNCPOINT flag set are made available to other applications. Messages retrieved with the MQC.MQGMO_SYNCPOINT flag set are deleted. If the messages are persistent, the changes are logged.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if connection is lost while carrying out the commit call.
- MQRC_BACKED_OUT if the commit call is issued after reconnection.

**Disconnect();**

Throws MQException.

Close the connection to the queue manager. All objects accessed on this queue manager are not longer accessible to this application. To reaccess the objects, create a MQQueueManager object.

Generally, any work performed as part of a unit of work is committed. However, if the unit of work is managed by .NET, the unit of work might be rolled back.

```
public void Put(int type, string destinationName, MQMessage message);
public void Put(int type, string destinationName, MQMessage message
MQPutMessageOptions putMessageOptions);
public void Put(int type, string destinationName, string queueManagerName,
string topicString, MQMessage message);
public void Put(string queueName, MQMessage message);
public void Put(string queueName, MQMessage message, MQPutMessageOptions
putMessageOptions);
public void Put(string queueName, string queueManagerName, MQMessage message);
public void Put(string queueName, string queueManagerName, MQMessage message,
MQPutMessageOptions putMessageOptions);
public void Put(string queueName, string queueManagerName, MQMessage message,
MQPutMessageOptions putMessageOptions, string alternateUserId);
```

Throws MQException.

Places a single message onto a queue or topic without creating an MQQueue or MQTopic object first.

***queueName***
The name of the queue onto which to place the message.

***destinationName***
The name of a destination object. It is either a queue or a topic depending on the value of *type*.

***type***
The type of destination object. You must not combine the options.

**MQC.MQOT_Q**
Queue

**MQC.MQOT_TOPIC**
Topic

***queueManagerName***

The name of the queue manager or queue manager alias, on which the queue is defined. If type MQC.MQOT_TOPIC is specified this parameter is ignored.

If the queue is a model queue, and the resolved queue manager name is not this queue manager, an MQException is thrown.

***topicString***

*topicString* is combined with the topic name in the *destinationName* topic object.

*topicString* is ignored if *destinationName* is a queue.

***message***
The message to send. Message is an input/output object.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if the connection is broken while performing a Put call on a persistent message.
- MQRC_NONE if the connection is successful while performing a Put call on a non-persistent message (see Application Recovery ).

***putMessageOptions***

Options controlling the actions of the put.

If you omit *putMessageOptions*, a default instance of *putMessageOptions* is created. *putMessageOptions* is an input/output object.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

***alternateUserId***

Specifies an alternate user identifier used to check authorization when placing the message on a queue.

You can omit *alternateUserId* if you do not set MQC.MQOO_ALTERNATE_USER_AUTHORITY in *putMessageOptions*. If you set MQC.MQOO_ALTERNATE_USER_AUTHORITY, you must also set *alternateUserId*. *alternateUserId* has not effect unless you also set MQC.MQOO_ALTERNATE_USER_AUTHORITY.

## Constructors

```
public MQQueueManager();
public MQQueueManager(string queueManagerName);
public MQQueueManager(string queueManagerName, Int options);
public MQQueueManager(string queueManagerName, Int options, string channel,
string connName);
public MQQueueManager(string queueManagerName, string channel, string
connName);
public MQQueueManager(string queueManagerName, System.Collections.Hashtable
properties);
```

Throws MQException.

Creates a connection to a queue manager. Select between creating a client connection or a server connection.

You must have inquire ( inq) authority on the queue manager when attempting to connect to the queue manager. Without inquire authority, the connection attempt fails.

A client connection is created if one of the following conditions is true:

1. *channel* or *connName* are specified in the constructor.
2. *HostName*, *Port*, or *Channel* are specified in *properties*.
3. *MQEnvironment.HostName*, *MQEnvironment.Port*, or *MQEnvironment.Channel* are specified.

The values of the connection properties are defaulted in the order shown. The *channel* and *connName* in the constructor take precedence over the property values in the constructor. The constructor property values take precedence of the MQEnvironment properties.

The host name, channel name, and port are defined in the MQEnvironment class.

***queueManagerName***
Name of the queue manager, or queue manager group to connect to.

Omit the parameter, or leave it null, or blank to make a default queue manager selection. The default queue manager connection on a server is to the default queue manager on the server. The default queue manager connection on a client connection is to the queue manager the listener is connected to.

***options***
Specify MQCNO connection options. The values must be applicable to the type of connection being made. For example, if you specify the following server connection properties for a client connection an MQException is thrown.

- MQC.MQCNO_FASTPATH_BINDING
- MQC.MQCNO_STANDARD_BINDING

***properties***

The properties parameter takes a series of key/value pairs that override the properties set by MQEnvironment ; see the example, "Override MQEnvironment properties" on page 1828. The following properties can be overridden:

- MQC.CONNECT_OPTIONS_PROPERTY
- MQC.CONNECTION_NAME_PROPERTY
- MQC.ENCRYPTION_POLICY_SUITE_B
- MQC.HOST_NAME_PROPERTY
- MQC.PORT_PROPERTY
- MQC.CHANNEL_PROPERTY
- MQC.SSL_CIPHER_SPEC_PROPERTY
- MQC.SSL_PEER_NAME_PROPERTY
- MQC.SSL_CERT_STORE_PROPERTY
- MQC.SSL_CRYPTO_HARDWARE_PROPERTY
- MQC.SECURITY_EXIT_PROPERTY
- MQC.SECURITY_USERDATA_PROPERTY
- MQC.SEND_EXIT_PROPERTY
- MQC.SEND_USERDATA_PROPERTY
- MQC.RECEIVE_EXIT_PROPERTY
- MQC.RECEIVE_USERDATA_PROPERTY
- MQC.USER_ID_PROPERTY
- MQC.PASSWORD_PROPERTY
- MQC.MQAIR_ARRAY
- MQC.KEY_RESET_COUNT
- MQC.FIPS_REQUIRED
- MQC.HDR_CMP_LIST
- MQC.MSG_CMP_LIST
- MQC.TRANSPORT_PROPERTY

***channel***
Name of a server connection channel

***connName***
Connection name in the format *HostName* ( *Port* ) .

You can supply a list of *hostnames* and *ports* as an argument to the constructor MQQueueManager (String queueManagerName, Hashtable properties) using CONNECTION_NAME_PROPERTY.

For example:

```
ConnectionName = "fred.mq.com(2344),nick.mq.com(3746),tom.mq.com(4288)";

Hashtable Properties-new Hashtable();

properties.Add(MQC.CONNECTION_NAME_PROPERTY,ConnectionName);

MQQueueManager qmgr=new MQQueue Manager("qmgrname",properties);
```

When a connection attempt is made, the connection name list is processed in order. If the connection attempt to the first host name and port fails, then connection to the second pair of attributes is attempted. The client repeats this process until either a successful connection is made or the list is exhausted. If the list is exhausted, an appropriate reason code and completion code is returned to the client application.

When a port number is not provided for the connection name, the default port (configured in `mqclient.ini`) is used.

## Set the Connection List

You can set the connection list by using the following methods when the automatic client reconnection options are set:

**Set the connection list through MQSERVER**

You can set the connection list through the command prompt.

At the command prompt, set the following command:

```
MQSERVER=SYSTEM.DEF.SVRCONN/TCP/Hostname1(Port1),Hostname2(Por2),Hostname3(Port3)
```

For example:

```
MQSERVER=SYSTEM.DEF.SVRCONN/TCP/fred.mq.com(5266),nick.mq.com(6566),jack.mq.com(8413)
```

If you set the connection in the MQSERVER, do not set it in the application.

If you set the connection list in the application, the application overwrites whatever is set in the MQSERVER environment variable.

**Set the connection list through the application**

You can set the connection list in the application by specifying the host name and port properties.

```
String connName = "fred.mq.com(2344), nick.mq.com(3746), chris.mq.com(4288)";
MQQueueManager qm = new MQQueueManager("QM1", "TestChannel", connName);
```

**Set the connection list through `app.config`**

`App.config` is an XML file where you specify the key-value pairs.

In the connection list specify

```
<app.Settings>
<add key="Connection1" value="Hostname1(Port1)"/>
<add key="Connection2" value="Hostname2(Port2)"/>
<app.Settings>
```

For example:

```
<app.Settings>
<add key>="Connection1" value="fred.mq.com(2966)"/>
<add key>="Connection2" value="alex.mq.com(6533)"/>
<app.Settings>
```

You can directly change the connection list in the `app.config` file.

### Set the connection list through `MQEnvironment`

To set the Connection list through the `MQEnvironment`, use the *ConnectionName* property.

```
MQEnvironment.ConnectionName = "fred.mq.com(4288),"alex.mq.com(5211);
```

The *ConnectionName* property overwrites the host name and port properties set in the `MQEnvironment`.

### Create a client connection

The following example shows you how to create a client connection to a queue manager. You can create a client connection by setting the `MQEnvironment` variables before creating a new `MQQueueManager` Object.

```
MQEnvironment.Hostname = "fred.mq.com";  // host to connect to
MQEnvironment.Port     = 1414;           // port to connect to
                                         //If not explicitly set,
                                         // defaults to 1414
                                         // (the default WebSphere MQ port)
MQEnvironment.Channel  = "channel.name"; // the case sensitive
                                         //  name of the
                                         // SVR CONN channel on
                                         // the queue manager
MQQueueManager qMgr    = new MQQueueManager("MYQM");
```

*Figure 43. Client connection*

### Override `MQEnvironment` properties

The following example shows you how to create a queue manager with its user ID and password defined in a hash table.

```
Hashtable properties = new Hashtable();

properties.Add( MQC.USER_ID_PROPERTY, "ExampleUserId" );
properties.Add( MQC.PASSWORD_PROPERTY, "ExamplePassword" );

try
{
    MQQueueManager qMgr = new MQQueueManager("qmgrname", properties);
}
catch (MQException mqe)
{
    System.Console.WriteLine("Connect failed with " + mqe.Message);
    return((int)mqe.Reason);
}
```

*Figure 44. Overriding `MQEnvironment` properties*

### Create a reconnectable connection

The following example shows you how to automatically reconnect a client to a Queue Manager.

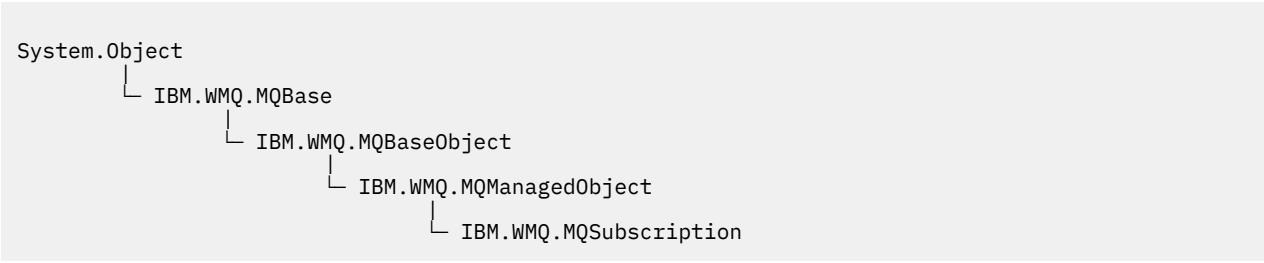
```
Hashtable properties = new Hashtable(); // The queue manager name and the
                                 // properties how it has to be connected

properties.Add(MQC.CONNECT_OPTIONS_PROPERTY, MQC.MQCNO_RECONNECT); // Options
                                 // through which reconnection happens

properties.Add(MQC.CONNECTION_NAME_PROPERTY,"fred.mq.com(4789),nick.mq.com(4790)"); // The list
                                 // of queue managers through which reconnection happens

MQ QueueManager qmgr = new MQQueueManager("qmgrname", properties);
```

*Figure 45. Automatically reconnecting a client to a queue manager*

# MQSubscription.NET class

Use MQSubscription to request that retained publications are sent to the subscriber. MQSubscription is a property of an MQTopic object opened for subscription.

## Class




```
public class IBM.WMQ.MQSubscription extends IBM.WMQ.MQManagedObject;
```


- "Properties" on page 1829
- "Methods" on page 1829
- "Constructors" on page 1829


## Properties

Access subscription properties using the MQManagedObject class; see "Properties" on page 1788.

## Methods

Access subscription Inquire, Set and Get methods using the MQManagedObject class; see "Methods" on page 1789.

**public int RequestPublicationUpdate(int *options*);**

Throws MQException.

Request an updated publication for the current topic. If the queue manager has a retained publications for the topic, they are sent to the subscriber.

Before calling RequestPublicationUpdate, open a topic for subscription to obtain an MQSubscription object.

Typically, open the subscription with the MQC.MQSO_PUBLICATIONS_ON_REQUEST option. If no wildcards are present in the topic string, then only one publication is sent as a result of this call. If the topic string contains wildcards, many publications might be sent. The method returns the number of retained publications that are sent to the subscription queue. There is no guarantee that this many publications are received, especially if they are non-persistent messages.

***options***

**MQC.MQSRO_FAIL_IF_QUIESCING**
The method fails if the queue manager is in a quiescent state. On z/OS, for a CICS or IMS application, MQC.MQSRO_FAIL_IF_QUIESCING also forces the method to fail if the connection is in a quiescent state.

**MQC.MQSRO_NONE**
No options are specified.

## Constructors

No Public constructor.

An MQSubscription object is returned in the SubscriptionReference property of an MQTopic object that is opened for subscription,

Call the RequestPublicationUpdate method. MQSubscription is a subclass of MQManagedObject. Use the reference to access the properties and methods of MQManagedObject.

# MQTopic.NET class

Use MQTopic to publish or subscribe messages on a topic, or to query or set attributes of a topic. Create an MQTopic object for publishing or subscribing by using a constructor or the MQQueueManager.AccessTopic method.

## Class

```
System.Object
        |
        └ IBM.WMQ.MQBase
                |
                └ IBM.WMQ.MQBaseObject
                        |
                        └ IBM.WMQ.MQManagedObject
                                |
                                └ IBM.WMQ.MQDestination
                                        |
                                        └ IBM.WMQ.MQTopic
```

```
public class IBM.WMQ.MQTopic extends IBM.WMQ.MQDestination;
```


- "Properties" on page 1830
- "Methods" on page 1830
- "Constructors" on page 1832


## Properties

Test for MQException being thrown when getting properties.

**public Boolean IsDurable {get;}**
Read only property that returns True if the subscription is durable or False otherwise. If the topic was opened for publication, the property is ignored and would always return False.

**public Boolean IsManaged {get;};**
Read only property that returns True if the subscription is managed by the queue manager, or False otherwise. If the topic was opened for publication, the property is ignored and would always return False.

**public Boolean IsSubscribed {get;};**
Read only property that returns True if the topic was opened for subscription and False if the topic was opened for publication.

**public MQSubscription SubscriptionReference {get;};**
Read only property that returns the MQSubscription object associated with a topic object opened for subscription. The reference is available if you want to modify the close options or start any of the objects methods.

**public MQDestination UnmanagedDestinationReference {get;};**
Read only property that returns the MQQueue associated with an unmanaged subscription. It is the destination specified when the topic object was created. The property returns null for any topic objects opened for publication or with a managed subscription.

## Methods

**public void Put(MQMessage *message*);**
**public void Put(MQMessage *message*, MQPutMessageOptions *putMessageOptions*);**
Throws MQException.

Publishes a message to the topic.

Modifications to the MQMessage object after the Put call has been accomplished do not affect the actual message on the IBM MQ queue or publication topic.

Put updates the MessageId and CorrelationId properties of the MQMessage object and does not clear message data. Further Put or Get calls refer to the updated information in the MQMessage object. For example, in the following code snippet, the first message contains a and the second ab.

```
msg.WriteString("a");
q.Put(msg,pmo);
msg.WriteString("b");
q.Put(msg,pmo);
```

***message***
An MQMessage object containing the message descriptor data, and message to be sent. The message descriptor can be altered as a consequence of this method. The values in the message descriptor immediately after the completion of this method are the values that were put to the queue or published to the topic.

The following reason codes are returned to a reconnectable client:

- MQRC_CALL_INTERRUPTED if the connection is broken while running a Put call on a persistent message and the reconnection is successful.
- MQRC_NONE if the connection is successful while running a Put call on a non-persistent message (see Application Recovery ).

***putMessageOptions***
Options controlling the action of the put.

If *putMessageOptions* is not specified the default instance of MQPutMessageOptons is used.

If you use the MQPMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

**Note:** For simplicity and performance, if you want to put a single message to a queue, use MQQueueManager.Put object. You should have an MQQueue object for this.

**public void Get(MQMessage *message*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*);**
**public void Get(MQMessage *message*, MQGetMessageOptions *getMessageOptions*, int *MaxMsgSize*);**
Throws MQException.

Retrieves a message from the topic.

This method uses a default instance of MQGetMessageOptions to do the get. The message option used is MQGMO_NOWAIT.

If the get fails, the MQMessage object is unchanged. If it succeeds, the message descriptor and message data portions of the MQMessage are replaced with the message descriptor and message data from the incoming message.

All calls to IBM MQ from a particular MQQueueManager are synchronous. Therefore, if you perform a get with wait, all other threads using the same MQQueueManager are blocked from making further IBM MQ calls until the Get call is accomplished. If you need multiple threads to access IBM MQ simultaneously, each thread must create its own MQQueueManager object.

***message***
Contains the message descriptor and the returned message data. Some of the fields in the message descriptor are input parameters. It is important to ensure that the MessageId and CorrelationId input parameters are set as required.

A reconnectable client returns the reason code MQRC_BACKED_OUT after successful reconnection, for messages received under MQGM_SYNCPOINT.

***getMessageOptions***
Options controlling the action of the get.

Using option MQC.MQGMO_CONVERT might result in an exception with reason code MQC.MQRC_CONVERTED_STRING_TOO_BIG when converting from single-byte character codes to double byte codes. In this case, the message is copied into the buffer without conversion.

If *getMessageOptions* is not specified, the message option used is MQGMO_NOWAIT.

If you use the MQGMO_LOGICAL_ORDER option in a reconnectable client, the MQRC_RECONNECT_INCOMPATIBLE reason code is returned.

***MaxMsgSize***
The largest message this message object is to receive. If the message on the queue is larger than this size, one of two things occurs:

- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is set in the MQGetMessageOptions object, the message is filled with as much of the message data as possible. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_ACCEPTED reason code.
- If the MQGMO_ACCEPT_TRUNCATED_MSG flag is not set, the message remains on the queue. An exception is thrown with the MQCC_WARNING completion code and MQRC_TRUNCATED_MSG_FAILED reason code.

If *MaxMsgSize* is not specified, the whole message is retrieved.

## Constructors

```
public MQTopic(MQQueueManager queueManager, MQDestination destination, string
topicName, string topicObject, int options);
public MQTopic(MQQueueManager queueManager, MQDestination destination, string
topicName, string topicObject, int options, string alternateUserId);
public MQTopic(MQQueueManager queueManager, MQDestination destination, string
topicName, string topicObject, int options, string alternateUserId, string
subscriptionName);
public MQTopic(MQQueueManager queueManager, MQDestination destination, string
topicName, string topicObject, int options, string alternateUserId, string
subscriptionName, System.Collections.Hashtable properties);
public MQTopic(MQQueueManager queueManager, string topicName, string
topicObject, int openAs, int options);
public MQTopic(MQQueueManager queueManager, string topicName, string
topicObject, int openAs, int options, string alternateUserId);
public MQTopic(MQQueueManager queueManager, string topicName, string
topicObject, int options, string alternateUserId, string subscriptionName);
public MQTopic(MQQueueManager queueManager, string topicName, string
topicObject, int options, string alternateUserId, string subscriptionName,
System.Collections.Hashtable properties);
```

Access a topic on *queueManager*.

MQTopic objects are closely related to administrative topic objects, which are sometimes called topic objects. On input, topicObject points to an administrative topic object. The MQTopic constructor obtains a topic string from the topic object and combines it with topicName to create a topic name. Either or both topicObject or topicName can be null. The topic name is matched to the topic tree, and the name of the closest matching administrative topic object is returned in topicObject.

The topics that are associated with the MQTopic object are the result of combining two topic strings. The first topic string is defined by the administrative topic object identified by *topicObject*. The second topic string is *topicString*. The resulting topic string associated with the MQTopic object can identify multiple topics by including wild cards.

Depending on whether the topic is opened for publishing or subscribing, you can use the MQTopic.Put methods to publish on topics, or MQTopic.Get methods to receive publications on topics. If you want to publish and subscribe to the same topic, you must access the topic twice, once for publish and once for subscribe.

If you create an MQTopic object for subscription, without providing an MQDestination object, a managed subscription is assumed. If you pass a queue as an MQDestination object, an unmanaged subscription is assumed. You must ensure the subscription options you set are consistent with the subscription being managed or unmanaged.

***queueManager***
Queue manager to access a topic on.

***destination***
*destination* is an MQQueue instance. By providing *destination*, MQTopic is opened as an unmanaged subscription. Publications on the topic are delivered to the queue accessed as *destination*.

***topicName***
A topic string that is the second part of the topic name. *topicName* is concatenated with the topic string defined in the *topicObject* administrative topic object. You can set *topicName* to null, in which case the topic name is defined by the topic string in *topicObject*.

***topicObject***
On input, *topicObject* is the name of the topic object that contains the topic string that forms the first part of the topic name. The topic string in *topicObject* is concatenated with *topicName*. The rules for constructing topic strings are defined in Combining topic strings.

On output, *topicObject* contains the name of the administrative topic object that is the closest match in the topic tree to the topic identified by the topic string.

***openAs***
Access the topic to publish or subscribe. The parameter can contain only one of these options:

- MQC.MQTOPIC_OPEN_AS_SUBSCRIPTION
- MQC.MQTOPIC_OPEN_AS_PUBLICATION

***options***

Combine the options that control the opening of the topic for either publication or subscription. Use MQC.MQSO_* constants to access a topic for subscription and MQC.MQOO_* constants to access a topic for publication.

If more than one option is required, add the values together, or combine the option values using the bitwise OR operator.

***alternateUserId***
Specify the alternate user ID that is used to check for the required authorization to finish the operation. You must specify *alternateUserId*, if either MQC.MQOO_ALTERNATE_USER_AUTHORITY or MQC.MQSO_ALTERNATE_USER_AUTHORITY is set in the options parameter.

***subscriptionName***
*subscriptionName* is required if the options MQC.MQSO_DURABLE or MQC.MQSO_ALTER are provided. In both cases, MQTopic is implicitly opened for subscription. An exception is thrown if the MQC.MQSO_DURABLE is set, and the subscription exists, or if MQC.MQSO_ALTER is set, and the subscription does not exist.

***properties***
Set any of the special subscription properties listed using a hash table. Specified entries in the hash table are updated with output values. Entries are not added to the hash table to report output values.

- MQC.MQSUB_PROP_ALTERNATE_SECURITY_ID
- MQC.MQSUB_PROP_SUBSCRIPTION_EXPIRY
- MQC.MQSUB_PROP_SUBSCRIPTION_USER_DATA
- MQC.MQSUB_PROP_SUBSCRIPTION_CORRELATION_ID
- MQC.MQSUB_PROP_PUBLICATION_PRIORITY
- MQC.MQSUB_PROP_PUBLICATION_ACCOUNTING_TOKEN

- MQC.MQSUB_PROP_PUBLICATION_APPLICATIONID_DATA

**public MQTopic MQQueueManager.AccessTopic(MQDestination *destination*, string *topicName*, string *topicObject*, int *options*);**
**public MQTopic MQQueueManager.AccessTopic(MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*);**
**public MQTopic MQQueueManager.AccessTopic(MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*);**
**public MQTopic MQQueueManager.AccessTopic(MQDestination *destination*, string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*, System.Collections.Hashtable *properties*);**
**public MQTopic MQQueueManager.AccessTopic(string *topicName*, string *topicObject*, int *openAs*, int *options*);**
**public MQTopic MQQueueManager.AccessTopic(string *topicName*, string *topicObject*, int *openAs*, int *options*, string *alternateUserId*);**
**public MQTopic MQQueueManager.AccessTopic(string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*);**
**public MQTopic MQQueueManager.AccessTopic(string *topicName*, string *topicObject*, int *options*, string *alternateUserId*, string *subscriptionName*, System.Collections.Hashtable *properties*);**

Access a topic on this queue manager.

MQTopic objects are closely related to administrative topic objects, which are sometimes called topic objects. On input, topicObject points to an administrative topic object. The MQTopic constructor obtains a topic string from the topic object and combines it with topicName to create a topic name. Either or both topicObject or topicName can be null. The topic name is matched to the topic tree, and the name of the closest matching administrative topic object is returned in topicObject.

The topics that are associated with the MQTopic object are the result of combining two topic strings. The first topic string is defined by the administrative topic object identified by *topicObject*. The second topic string is *topicString*. The resulting topic string associated with the MQTopic object can identify multiple topics by including wild cards.

Depending on whether the topic is opened for publishing or subscribing, you can use the MQTopic.Put methods to publish on topics, or MQTopic.Get methods to receive publications on topics. If you want to publish and subscribe to the same topic, you must access the topic twice, once for publish and once for subscribe.

If you create an MQTopic object for subscription, without providing an MQDestination object, a managed subscription is assumed. If you pass a queue as an MQDestination object, an unmanaged subscription is assumed. You must ensure the subscription options you set are consistent with the subscription being managed or unmanaged.

***destination***
*destination* is an MQQueue instance. By providing *destination*, MQTopic is opened as an unmanaged subscription. Publications on the topic are delivered to the queue accessed as *destination*.

***topicName***
A topic string that is the second part of the topic name. *topicName* is concatenated with the topic string defined in the *topicObject* administrative topic object. You can set *topicName* to null, in which case the topic name is defined by the topic string in *topicObject*.

***topicObject***
On input, *topicObject* is the name of the topic object that contains the topic string that forms the first part of the topic name. The topic string in *topicObject* is concatenated with *topicName*. The rules for constructing topic strings are defined in Combining topic strings.

On output, *topicObject* contains the name of the administrative topic object that is the closest match in the topic tree to the topic identified by the topic string.

***openAs***
Access the topic to publish or subscribe. The parameter can contain only one of these options:

- `MQC.MQTOPIC_OPEN_AS_SUBSCRIPTION`
- `MQC.MQTOPIC_OPEN_AS_PUBLICATION`

***options***

Combine the options that control the opening of the topic for either publication or subscription. Use `MQC.MQSO_*` constants to access a topic for subscription and `MQC.MQOO_*` constants to access a topic for publication.

If more than one option is required, add the values together, or combine the option values using the bitwise OR operator.

***alternateUserId***
Specify the alternate user ID that is used to check for the required authorization to finish the operation. You must specify *alternateUserId*, if either `MQC.MQOO_ALTERNATE_USER_AUTHORITY` or `MQC.MQSO_ALTERNATE_USER_AUTHORITY` is set in the options parameter.

***subscriptionName***
*subscriptionName* is required if the options `MQC.MQSO_DURABLE` or `MQC.MQSO_ALTER` are provided. In both cases, `MQTopic` is implicitly opened for subscription. An exception is thrown if the `MQC.MQSO_DURABLE` is set, and the subscription exists, or if `MQC.MQSO_ALTER` is set, and the subscription does not exist.

***properties***
Set any of the special subscription properties listed using a hash table. Specified entries in the hash table are updated with output values. Entries are not added to the hash table to report output values.

- `MQC.MQSUB_PROP_ALTERNATE_SECURITY_ID`
- `MQC.MQSUB_PROP_SUBSCRIPTION_EXPIRY`
- `MQC.MQSUB_PROP_SUBSCRIPTION_USER_DATA`
- `MQC.MQSUB_PROP_SUBSCRIPTION_CORRELATION_ID`
- `MQC.MQSUB_PROP_PUBLICATION_PRIORITY`
- `MQC.MQSUB_PROP_PUBLICATION_ACCOUNTING_TOKEN`
- `MQC.MQSUB_PROP_PUBLICATION_APPLICATIONID_DATA`

# IMQObjectTrigger.NET interface

Implement `IMQObjectTrigger` to process messages passed by the **runmqdnm**.NET monitor.

## Interface

```
public interface IBM.WMQMonitor.IMQObjectTrigger();
```

Depending on whether sync point control is specified in the **runmqdnm** command the message is removed from the queue before or after the `Execute` method returns.

## Methods

**void Execute (MQQueueManager *queueManager*, MQQueue *queue*, MQMessage *message*, string *param*);**

***queueManager***
Queue manager hosting the queue being monitored.

***queue***
Queue being monitored.

***message***
Message read from the queue.

***param***
Data passed from `UserParameter`.

# MQC.NET interface

Refer to an `MQI` constant by prefixing the constant name with `MQC.`. `MQC` defines all the constants used by the `MQI`.

## Interface

```
System.Object
        |
        └─ IBM.WMQ.MQC
```

```
public interface IBM.WMQ.MQC extends System.Object;
```

### Example

```
MQQueue queue;
queue.closeOptions = MQC.MQCO_DELETE;
```

# Character set identifiers for .NET applications

Descriptions of the character sets you can select to encode .NET IBM MQ messages

| Character set | Description |
|---|---|
| 37 | ibm037 |
| 437 | ibm437 / PC Original |
| 500 | ibm500 |
| 819 | iso-8859-1 / latin1 / ibm819 |
| 1200 | Unicode |
| 1208 | UTF-8 |
| 273 | ibm273 |
| 277 | ibm277 |
| 278 | ibm278 |
| 280 | ibm280 |
| 284 | ibm284 |
| 285 | ibm285 |
| 297 | ibm297 |
| 420 | ibm420 |
| 424 | ibm424 |
| 737 | ibm737 / PC Greek |

| Character set | Description |
|---|---|
| 775 | ibm775 / PC Baltic |
| 813 | iso-8859-7 / greek / ibm813 |
| 838 | ibm838 |
| 850 | ibm850 / PC Latin 1 |
| 852 | ibm852 / PC Latin 2 |
| 855 | ibm855 / PC Cyrillic |
| 856 | ibm856 |
| 857 | ibm857 / PC Turkish |
| 860 | ibm860 / PC Portuguese |
| 861 | ibm861 / PC Icelandic |
| 862 | ibm862 / PC Hebrew |
| 863 | ibm863 / PC Canadian French |
| 864 | ibm864 / PC Arabic |
| 865 | ibm865 / PC Nordic |
| 866 | ibm866 / PC Russian |
| 868 | ibm868 |
| 869 | ibm869 / PC Modern Greek |
| 870 | ibm870 |
| 871 | ibm871 |
| 874 | ibm874 |
| 875 | ibm875 |
| 912 | iso-8859-2 / latin2 / ibm912 |
| 913 | iso-8859-3 / latin3 / ibm913 |
| 914 | iso-8859-4 / latin4 / ibm914 |
| 915 | iso-8859-5 / cyrillic / ibm915 |
| 916 | iso-8859-8 / hebrew / ibm916 |
| 918 | ibm918 |
| 920 | iso-8859-9 / latin5 / ibm920 |
| 921 | ibm921 |
| 922 | ibm922 |
| 930 | ibm930 |
| 932 | PC Japanese |
| 933 | ibm933 |
| 935 | ibm935 |
| 937 | ibm937 |

| Character set | Description |
|---|---|
| 939 | ibm939 |
| 942 | ibm942 |
| 943 | ibm943 |
| 948 | ibm948 |
| 949 | ibm949 |
| 950 | ibm950 / Big 5 Traditional Chinese |
| 954 | EUCJIS |
| 964 | ibm964 / CNS 11643 Traditional Chinese |
| 970 | ibm970 |
| 1006 | ibm1006 |
| 1025 | ibm1025 |
| 1026 | ibm1026 |
| 1089 | iso-8859-6 / arabic / ibm1089 |
| 1097 | ibm1097 |
| 1098 | ibm1098 |
| 1112 | ibm1112 |
| 1122 | ibm1122 |
| 1123 | ibm1123 |
| 1124 | ibm1124 |
| 1250 | Windows Latin 2 |
| 1251 | Windows Cyrillic |
| 1252 | Windows Latin 1 |
| 1253 | Windows Greek |
| 1254 | Windows Turkish |
| 1255 | Windows Hebrew |
| 1256 | Windows Arabic |
| 1257 | Windows Baltic |
| 1258 | Windows Vietnamese |
| 1381 | ibm1381 |
| 1383 | ibm1383 |
| 2022 | JIS |
| 5601 | ksc-5601 Korean |
| 33722 | ibm33722 |

# IBM MQ C++ classes

The IBM MQ C++ classes encapsulate the IBM MQ Message Queue Interface (MQI). There is a single C++ header file, **imqi.hpp**, which covers all of these classes.

For each class, the following information is shown:

**Class hierarchy diagram**
A class diagram showing the class in its inheritance relation to its immediate parent classes, if any.

**Other relevant classes**
Document links to other relevant classes, such as parent classes, and the classes of objects used in method signatures.

**Object attributes**
Attributes of the class. These are in addition to those attributes defined for any parent classes. Many attributes reflect IBM MQ data-structure members (see "C++ and MQI cross-reference" on page 1840 ). For detailed descriptions, see "Attributes of objects" on page 776.

**Constructors**
Signatures of the special methods used to create an object of the class.

**Object methods (public)**
Signatures of methods that require an instance of the class for their operation, and that have no usage restrictions.

Where it applies, the following information is also shown:

**Class methods (public)**
Signatures of methods that do not require an instance of the class for their operation, and that have no usage restrictions.

**Overloaded (parent class) methods**
Signatures of those virtual methods that are defined in parent classes, but exhibit different, polymorphic, behavior for this class.

**Object methods (protected)**
Signatures of methods that require an instance of the class for their operation, and are reserved for use by the implementations of derived classes. This section is of interest only to class writers, as opposed to class users.

**Object data (protected)**
Implementation details for object instance data available to the implementations of derived classes. This section is of interest only to class writers, as opposed to class users.

**Reason codes**
MQRC_* values (see API completion and reason codes ) that can be expected from those methods that fail. For an exhaustive list of reason codes that can occur for an object of a class, consult the parent class documentation. The documented list of reason codes for a class does not include the reason codes for parent classes.

**Note:**

1. Objects of these classes are not thread-safe. This ensures optimal performance, but take care not to access any object from more than one thread.
2. It is recommended that, for a multithreaded program, a separate ImqQueueManager object is used for each thread. Each manager object must have its own independent collection of other objects, ensuring that objects in different threads are isolated from one another.

The classes are:


- "ImqAuthenticationRecord C++ class" on page 1855
- "ImqBinary C++ class" on page 1857
- "ImqCache C++ class" on page 1859
- "ImqChannel C++ class" on page 1862

- “ImqCICSBridgeHeader C++ class” on page 1867
- “ImqDeadLetterHeader C++ class” on page 1873
- “ImqDistributionList C++ class” on page 1876
- “ImqError C++ class” on page 1877
- “ImqGetMessageOptions C++ class” on page 1878
- “ImqHeader C++ class” on page 1882
- “ImqIMSBridgeHeader C++ class” on page 1883
- “ImqItem C++ class” on page 1886
- “ImqMessage C++ class” on page 1888
- “ImqMessageTracker C++ class” on page 1894
- “ImqNamelist C++ class” on page 1897
- “ImqObject C++ class” on page 1898
- “ImqProcess C++ class” on page 1904
- “ImqPutMessageOptions C++ class” on page 1905
- “ImqQueue C++ class” on page 1908
- “ImqQueueManager C++ class” on page 1918
- “ImqReferenceHeader C++ class” on page 1934
- “ImqString C++ class” on page 1937
- “ImqTrigger C++ class” on page 1942
- “ImqWorkHeader C++ class” on page 1945

## C++ and MQI cross-reference

This collection of topics contains information relating C++ to the MQI.

Read this information together with “Data types used in the MQI” on page 232.

This table relates MQI data structures to the C++ classes and include files. The following topics show cross-reference information for each C++ class. These cross-references relate to the use of the underlying IBM MQ procedural interfaces. The classes ImqBinary, ImqDistributionList, and ImqString have no attributes that fall into this category and are excluded.

*Table 672. Data structure, class, and include-file cross reference*

| Data structure | Class | Include file |
|---|---|---|
| MQAIR | ImqAuthenticationRecord | imqair.hpp |
| | ImqBinary | imqbin.hpp |
| | ImqCache | imqcac.hpp |
| MQCD | ImqChannel | imqchl.hpp |
| MQCIH | ImqCICSBridgeHeader | imqcih.hpp |
| MQDLH | ImqDeadLetterHeader | imqdlh.hpp |
| MQOR | ImqDistributionList | imqdst.hpp |
| | ImqError | imqerr.hpp |
| MQGMO | ImqGetMessageOptions | imqgmo.hpp |
| | ImqHeader | imqhdr.hpp |
| MQIIH | ImqIMSBridgeHeader | imqiih.hpp |

| *Table 672. Data structure, class, and include-file cross reference (continued)* | | |
|---|---|---|
| **Data structure** | **Class** | **Include file** |
| | ImqItem | imqitm.hpp |
| MQMD | ImqMessage | imqmsg.hpp |
| | ImqMessageTracker | imqmtr.hpp |
| | ImqNamelist | imqnml.hpp |
| MQOD, MQRR | ImqObject | imqobj.hpp |
| MQPMO, MQPMR, MQRR | ImqPutMessageOptions | imqpmo.hpp |
| | ImqProcess | imqpro.hpp |
| | ImqQueue | imqque.hpp |
| MQBO, MQCNO, MQCSP | ImqQueueManager | imqmgr.hpp |
| MQRMH | ImqReferenceHeader | imqrfh.hpp |
| | ImqString | imqstr.hpp |
| MQTM | ImqTrigger | imqtrg.hpp |
| MQTMC | | |
| MQTMC2 | ImqTrigger | imqtrg.hpp |
| MQXQH | | |
| MQWIH | ImqWorkHeader | imqwih.hpp |

## ImqAuthenticationRecord cross-reference

Cross-reference of attributes, data structures, fields, and calls for the ImqAuthenticationRecord C++ class.

| **Attribute** | **Data structure** | **Field** | **Call** |
|---|---|---|---|
| connection name | MQAIR | AuthInfoConnName | MQCONNX |
| password | MQAIR | LDAPPassword | MQCONNX |
| type | MQAIR | AuthInfoType | MQCONNX |
| user name | MQAIR | LDAPUserNamePtr | MQCONNX |
| | MQAIR | LDAPUserNameOffset | MQCONNX |
| | MQAIR | LDAPUserNameLength | MQCONNX |

## ImqCache cross-reference

Cross-reference of attributes and calls for the ImqCache C++ class.

| **Attribute** | **Call** |
|---|---|
| automatic buffer | MQGET |
| buffer length | MQGET |
| buffer pointer | MQGET, MQPUT |
| data length | MQGET |

| Attribute | Call |
|---|---|
| data offset | MQGET |
| data pointer | MQGET |
| message length | MQGET, MQPUT |

## ImqChannel cross-reference

Cross-reference of attributes, data structures, fields, and calls for the ImqChannel C++ class.

| Attribute | Data structure | Field | Call |
|---|---|---|---|
| batch heart-beat | MQCD | BatchHeartbeat | MQCONNX |
| channel name | MQCD | ChannelName | MQCONNX |
| connection name | MQCD | ConnectionName | MQCONNX |
| | MQCD | ShortConnectionName | MQCONNX |
| header compression | MQCD | HdrCompList | MQCONNX |
| heart-beat interval | MQCD | HeartbeatInterval | MQCONNX |
| keep alive interval | MQCD | KeepAliveInterval | MQCONNX |
| local address | MQCD | LocalAddress | MQCONNX |
| maximum message length | MQCD | MaxMsgLength | MQCONNX |
| message compression | MQCD | MsgCompList | MQCONNX |
| mode name | MQCD | ModeName | MQCONNX |
| password | MQCD | Password | MQCONNX |
| receive exit count | MQCD | | MQCONNX |
| receive exit names | MQCD | ReceiveExit | MQCONNX |
| | MQCD | ReceiveExitsDefined | MQCONNX |
| | MQCD | ReceiveExitPtr | MQCONNX |
| receive user data | MQCD | ReceiveUserData | MQCONNX |
| | MQCD | ReceiveUserDataPtr | MQCONNX |
| security exit name | MQCD | SecurityExit | MQCONNX |
| security user data | MQCD | SecurityUserData | MQCONNX |
| send exit count | MQCD | | MQCONNX |
| send exit names | MQCD | SendExit | MQCONNX |
| | MQCD | SendExitsDefined | MQCONNX |
| | MQCD | SendExitPtr | MQCONNX |
| send user data | MQCD | SendUserData | MQCONNX |
| | MQCD | SendUserDataPtr | MQCONNX |
| SSL CipherSpec | MQCD | sslCipherSpecification | MQCONNX |
| SSL client authentication type | MQCD | sslClientAuthentication | MQCONNX |

| Attribute | Data structure | Field | Call |
|---|---|---|---|
| SSL peer name | MQCD | sslPeerName | MQCONNX |
| transaction program name | MQCD | TpName | MQCONNX |
| transport type | MQCD | TransportType | MQCONNX |
| user id | MQCD | UserIdentifier | MQCONNX |

## ImqCICSBridgeHeader cross-reference

Cross-reference of attributes, data structures, and fields for the ImqCICSBridgeHeader C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| bridge abend code | MQCIH | AbendCode |
| ADS descriptor | MQCIH | AdsDescriptor |
| attention identifier | MQCIH | AttentionId |
| authenticator | MQCIH | Authenticator |
| bridge completion code | MQCIH | BridgeCompletionCode |
| bridge error offset | MQCIH | ErrorOffset |
| bridge reason code | MQCIH | BridgeReason |
| bridge cancel code | MQCIH | CancelCode |
| conversational task | MQCIH | ConversationalTask |
| cursor position | MQCIH | CursorPosition |
| facility token | MQCIH | Facility |
| facility keep time | MQCIH | FacilityKeepTime |
| facility like | MQCIH | FacilityLike |
| function | MQCIH | Function |
| get wait interval | MQCIH | GetWaitInterval |
| link type | MQCIH | LinkType |
| next transaction identifier | MQCIH | NextTransactionId |
| output data length | MQCIH | OutputDataLength |
| reply-to format | MQCIH | ReplyToFormat |
| bridge return code | MQCIH | ReturnCode |
| start code | MQCIH | StartCode |
| task end status | MQCIH | TaskEndStatus |
| transaction identifier | MQCIH | TransactionId |
| uow control | MQCIH | UowControl |
| version | MQCIH | Version |

## ImqDeadLetterHeader cross reference

Cross-reference of attributes, data structures, and fields for the ImqDeadLetterHeader C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| dead-letter reason code | MQDLH | Reason |
| destination queue manager name | MQDLH | DestQMgrName |
| destination queue name | MQDLH | DestQName |
| put application name | MQDLH | PutApplName |
| put application type | MQDLH | PutApplType |
| put date | MQDLH | PutDate |
| put time | MQDLH | PutTime |

## ImqError cross reference

Cross-reference of attributes and calls for the ImqError C++ class.

| Attribute | Call |
|---|---|
| completion code | MQBACK, MQBEGIN, MQCLOSE, MQCMIT, MQCONN, MQCONNX, MQDISC, MQGET, MQINQ, MQOPEN, MQPUT, MQSET |
| reason code | MQBACK, MQBEGIN, MQCLOSE, MQCMIT, MQCONN, MQCONNX, MQDISC, MQGET, MQINQ, MQOPEN, MQPUT, MQSET |

## ImqGetMessageOptions cross reference

Cross-reference of attributes, data structures, and fields for the ImqGetMessageOptions C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| group status | MQGMO | GroupStatus |
| match options | MQGMO | MatchOptions |
| message token | MQGMO | MessageToken |
| options | MQGMO | Options |
| resolved queue name | MQGMO | ResolvedQName |
| returned length | MQGMO | ReturnedLength |
| segmentation | MQGMO | Segmentation |
| segment status | MQGMO | SegmentStatus |
|  | MQGMO | Signal1 |
|  | MQGMO | Signal2 |
| syncpoint participation | MQGMO | Options |
| wait interval | MQGMO | WaitInterval |

## ImqHeader cross reference

Cross-reference of attributes, data structures, and fields for the ImqHeader C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| character set | MQDLH, MQIIH | CodedCharSetId |
| encoding | MQDLH, MQIIH | Encoding |
| format | MQDLH, MQIIH | Format |
| header flags | MQIIH, MQRMH | Flags |

## ImqIMSBridgeHeader cross reference

Cross-reference of attributes, data structures, and fields for the ImqAuthenticationRecord C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| authenticator | MQIIH | Authenticator |
| commit mode | MQIIH | CommitMode |
| logical terminal override | MQIIH | LTermOverride |
| message format services map name | MQIIH | MFSMapName |
| reply-to format | MQIIH | ReplyToFormat |
| security scope | MQIIH | SecurityScope |
| transaction instance id | MQIIH | TranInstanceId |
| transaction state | MQIIH | TranState |

## ImqItem cross reference

Cross-reference of attributes and calls for the ImqItem C++ class.

| Attribute | Call |
|---|---|
| structure id | MQGET |

## ImqMessage cross reference

Cross-reference of attributes, data structures, fields, and calls for the ImqMessage C++ class.

| Attribute | Data structure | Field | Call |
|---|---|---|---|
| application id data | MQMD | ApplIdentityData | |
| application origin data | MQMD | ApplOriginData | |
| backout count | MQMD | BackoutCount | |
| character set | MQMD | CodedCharSetId | |
| encoding | MQMD | Encoding | |
| expiry | MQMD | Expiry | |
| format | MQMD | Format | |
| message flags | MQMD | MsgFlags | |
| message type | MQMD | MsgType | |

| Attribute | Data structure | Field | Call |
|---|---|---|---|
| offset | MQMD | Offset | |
| original length | MQMD | OriginalLength | |
| persistence | MQMD | Persistence | |
| priority | MQMD | Priority | |
| put application name | MQMD | PutApplName | |
| put application type | MQMD | PutApplType | |
| put date | MQMD | PutDate | |
| put time | MQMD | PutTime | |
| reply-to queue manager name | MQMD | ReplyToQMgr | |
| reply-to queue name | MQMD | ReplyToQ | |
| report | MQMD | Report | |
| sequence number | MQMD | MsgSeqNumber | |
| total message length | | DataLength | MQGET |
| user id | MQMD | UserIdentifier | |

## ImqMessageTracker cross reference

Cross-reference of attributes, data structures, and fields for the ImqMessageTracker C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| accounting token | MQMD | AccountingToken |
| correlation id | MQMD | CorrelId |
| feedback | MQMD | Feedback |
| group id | MQMD | GroupId |
| message id | MQMD | MsgId |

## ImqNamelist cross reference

Cross-reference of attributes, inquiries, and calls for the ImqNamelist C++ class.

| Attribute | Inquiry | Call |
|---|---|---|
| name count | MQIA_NAME_COUNT | MQINQ |
| namelist name | MQCA_NAMELIST_NAME | MQINQ |

## ImqObject cross reference

Cross-reference of attributes, data structures, fields, inquiries, and calls for the ImqObject C++ class.

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| alteration date | | | MQCA_ALTERATION_DATE | MQINQ |
| alteration time | | | MQCA_ALTERATION_TIME | MQINQ |

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| alternate user id | MQOD | AlternateUserId | | |
| alternate security id | | | | |
| close options | | | | MQCLOSE |
| description | | | MQCA_Q_DESC, MQCA_Q_MGR_DESC, MQCA_PROCESS_DESC | MQINQ |
| name | MQOD | ObjectName | MQCA_Q_MGR_NAME, MQCQ_Q_NAME, MQCA_PROCESS_NAME | MQINQ |
| open options | | | | MQOPEN |
| open status | | | | MQOPEN, MQCLOSE |
| queue manager identifier | queue manager identifier | | MQCA_Q_MGR_IDENTIFIER | MQINQ |

## ImqProcess cross-reference

Cross-reference of attributes, inquiries, and calls for the ImqAuthenticationRecord C++ class.

| Attribute | Inquiry | Call |
|---|---|---|
| application id | MQCA_APPL_ID | MQINQ |
| application type | MQIA_APPL_TYPE | MQINQ |
| environment data | MQCA_ENV_DATA | MQINQ |
| user data | MQCA_USER_DATA | MQINQ |

## ImqPutMessageOptions cross-reference

Cross-reference of attributes, data structures, and fields for the ImqAuthenticationRecord C++ class.

*Table 673. ImqPutMessageOptions cross reference*

| Attribute | Data structure | Field |
|---|---|---|
| context reference | MQPMO | Context |
| | MQPMO | InvalidDestCount |
| | MQPMO | KnownDestCount |
| options | MQPMO | Options |
| record fields | MQPMO | PutMsgRecFields |
| resolved queue manager name | MQPMO | ResolvedQMgrName |
| resolved queue name | MQPMO | ResolvedQName |
| | MQPMO | Timeout |
| | MQPMO | UnknownDestCount |
| syncpoint participation | MQPMO | Options |

## ImqQueue cross-reference

Cross-reference of attributes, data structures, fields, inquiries, and calls for the ImqQueue C++ class.

*Table 674. ImqQueue cross reference*

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| backout requeue name | | | MQCA_BACKOUT_REQ_Q_NAME | MQINQ |
| backout threshold | | | MQIA_BACKOUT_THRESHOLD | MQINQ |
| base queue name | | | MQCA_BASE_Q_NAME | MQINQ |
| cluster name | | | MQCA_CLUSTER_NAME | MQINQ |
| cluster namelist name | | | MQCA_CLUSTER_NAMELIST | MQINQ |
| cluster workload rank | | | MQIA_CLWL_Q_RANK | MQINQ |
| cluster workload priority | | | MQIA_CLWL_Q_PRIORITY | MQINQ |
| cluster workload use queue | | | MQIA_CLWL_USEQ | MQINQ |
| creation date | | | MQCA_CREATION_DATE | MQINQ |
| creation time | | | MQCA_CREATION_TIME | MQINQ |
| current depth | | | MQIA_CURRENT_Q_DEPTH | MQINQ |
| default bind | | | MQIA_DEF_BIND | MQINQ |
| default input open option | | | MQIA_DEF_INPUT_OPEN_OPTION | MQINQ |
| default persistence | | | MQIA_DEF_PERSISTENCE | MQINQ |
| default priority | | | MQIA_DEF_PRIORITY | MQINQ |
| definition type | | | MQIA_DEFINITION_TYPE | MQINQ |
| depth high event | | | MQIA_Q_DEPTH_HIGH_EVENT | MQINQ |
| depth high limit | | | MQIA_Q_DEPTH_HIGH_LIMIT | MQINQ |
| depth low event | | | MQIA_Q_DEPTH_LOW_EVENT | MQINQ |
| depth low limit | | | MQIA_Q_DEPTH_LOW_LIMIT | MQINQ |
| depth maximum event | | | MQIA_Q_DEPTH_MAX_LIMIT | MQINQ |
| distribution lists | | | MQIA_DIST_LISTS | MQINQ, MQSET |
| dynamic queue name | MQOD | DynamicQName | | |
| harden get backout | | | MQIA_HARDEN_GET_BACKOUT | MQINQ |
| index type | | | MQIA_INDEX_TYPE | MQINQ |
| inhibit get | | | MQIA_INHIBIT_GET | MQINQ, MQSET |

*Table 674. ImqQueue cross reference (continued)*

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| inhibit put | | | MQIA_INHIBIT_PUT | MQINQ, MQSET |
| initiation queue name | | | MQCA_INITIATION_Q_NAME | MQINQ |
| maximum depth | | | MQIA_MAX_Q_DEPTH | MQINQ |
| maximum message length | | | MQIA_MAX_MSG_LENGTH | MQINQ |
| message delivery sequence | | | MQIA_MSG_DELIVERY_SEQUENCE | MQINQ |
| next distributed queue | | | | |
| non persistent message class | | | MQIA_NPM_CLASS | MQINQ |
| open input count | | | MQIA_OPEN_INPUT_COUNT | MQINQ |
| open output count | | | MQIA_OPEN_OUTPUT_COUNT | MQINQ |
| previous distributed queue | | | | |
| process name | | | MQCA_PROCESS_NAME | MQINQ |
| queue accounting | | | MQIA_ACCOUNTING_Q | MQINQ |
| queue manager name | MQOD | ObjectQMgrName | | |
| queue monitoring | | | MQIA_MONITORING_Q | MQINQ |
| queue statistics | | | MQIA_STATISTICS_Q | MQINQ |
| queue type | | | MQIA_Q_TYPE | MQINQ |
| remote queue manager name | | | MQCA_REMOTE_Q_MGR_NAME | MQINQ |
| remote queue name | | | MQCA_REMOTE_Q_NAME | MQINQ |
| resolved queue manager name | MQOD | ResolvedQMgrName | | |
| resolved queue name | MQOD | ResolvedQName | | |
| retention interval | | | MQIA_RETENTION_INTERVAL | MQINQ |
| scope | | | MQIA_SCOPE | MQINQ |
| service interval | | | MQIA_Q_SERVICE_INTERVAL | MQINQ |
| service interval event | | | MQIA_Q_SERVICE_INTERVAL_EVENT | MQINQ |
| shareability | | | MQIA_SHAREABILITY | MQINQ |
| storage class | | | MQCA_STORAGE_CLASS | MQINQ |
| transmission queue name | | | MQCA_XMIT_Q_NAME | MQINQ |

*Table 674. ImqQueue cross reference (continued)*

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| trigger control | | | MQIA_TRIGGER_CONTROL | MQINQ, MQSET |
| trigger data | | | MQCA_TRIGGER_DATA | MQINQ, MQSET |
| trigger depth | | | MQIA_TRIGGER_DEPTH | MQINQ, MQSET |
| trigger message priority | | | MQIA_TRIGGER_MSG_PRIORITY | MQINQ, MQSET |
| trigger type | | | MQIA_TRIGGER_TYPE | MQINQ, MQSET |
| usage | | | MQIA_USAGE | MQINQ |

## ImqQueueManager cross-reference

Cross-reference of attributes, data structures, fields, inquiries, and calls for the ImqQueueManager C++ class.

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| accounting connections override | | | MQIA_ACCOUNTING_CONN_OVERRIDE | MQINQ |
| accounting interval | | | MQIA_ACCOUNTING_INTERVAL | MQINQ |
| activity recording | | | MQIA_ACTIVITY_RECORDING | MQINQ |
| adopt new mca check | | | MQIA_ADOPTNEWMCA_CHECK | MQINQ |
| adopt new mca type | | | MQIA_ADOPTNEWMCA_TYPE | MQINQ |
| authentication type | MQCSP | AuthenticationType | | MQCONNX |
| authority event | | | MQIA_AUTHORITY_EVENT | MQINQ |
| begin options | MQBO | Options | | MQBEGIN |
| bridge event | | | MQIA_BRIDGE_EVENT | MQINQ |
| channel auto definition | | | MQIA_CHANNEL_AUTO_DEF | MQINQ |
| channel auto definition event | | | MQIA_CHANNEL_AUTO_EVENT | MQIA |
| channel auto definition exit | | | MQIA_CHANNEL_AUTO_EXIT | MQIA |
| channel event | | | MQIA_CHANNEL_EVENT | MQINQ |
| channel initiator adapters | | | MQIA_CHINIT_ADAPTERS | MQINQ |

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| channel initiator control | | | MQIA_CHINIT_CONTROL | MQINQ |
| channel initiator dispatchers | | | MQIA_CHINIT_DISPATCHERS | MQINQ |
| channel initiator trace auto start | | | MQIA_CHINIT_TRACE_AUTO_START | MQINQ |
| channel initiator trace table size | | | MQIA_CHINIT_TRACE_TABLE_SIZE | MQINQ |
| channel monitoring | | | MQIA_MONITORING_CHANNEL | MQINQ |
| channel reference | MQCD | ChannelType | | MQCONNX |
| channel statistics | | | MQIA_STATISTICS_CHANNEL | MQINQ |
| character set | | | MQIA_CODED_CHAR_SET_ID | MQINQ |
| cluster sender monitoring | | | MQIA_MONITORING_AUTO_CLUSSDR | MQINQ |
| cluster sender statistics | | | MQIA_STATISTICS_AUTO_CLUSSDR | MQINQ |
| cluster workload data | | | MQCA_CLUSTER_WORKLOAD_DATA | MQINQ |
| cluster workload exit | | | MQCA_CLUSTER_WORKLOAD_EXIT | MQINQ |
| cluster workload length | | | MQIA_CLUSTER_WORKLOAD_LENGTH | MQINQ |
| cluster workload mru | | | MQIA_CLWL_MRU_CHANNELS | MQINQ |
| cluster workload use queue | | | MQIA_CLWL_USEQ | MQINQ |
| command event | | | MQIA_COMMAND_EVENT | MQINQ |
| command input queue name | | | MQCA_COMMAND_INPUT_Q_NAME | MQINQ |
| command level | | | MQIA_COMMAND_LEVEL | MQINQ |
| command server control | | | MQIA_CMD_SERVER_CONTROL | MQINQ |
| connect options | MQCNO | Options | | MQCONN, MQCONNX |
| connection id | MQCNO | ConnectionId | | MQCONNX |
| connection status | | | | MQCONN, MQCONNX, MQDISC |
| connection tag | MQCD | ConnTag | | MQCONNX |

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| cryptographic hardware | MQSCO | CryptoHardware | | MQCONNX |
| dead-letter queue name | | | MQCA_DEAD_LETTER_Q_NAME | MQINQ |
| default transmission queue name | | | MQCA_DEF_XMIT_Q_NAME | MQINQ |
| distribution lists | | | MQIA_DIST_LISTS | MQINQ |
| dns group | | | MQCA_DNS_GROUP | MQINQ |
| dns wlm | | | MQIA_DNS_WLM | MQINQ |
| first authentication record | MQSCO | AuthInfoRecOffset | | MQCONNX |
| | MQSCO | AuthInfoRecPtr | | MQCONNX |
| inhibit event | | | MQIA_INHIBIT_EVENT | MQINQ |
| ip address version | | | MQIA_IP_ADDRESS_VERSION | MQINQ |
| key repository | MQSCO | KeyRepository | | MQCONNX |
| key reset count | MQSCO | KeyResetCount | | MQCONNX |
| listener timer | | | MQIA_LISTENER_TIMER | MQINQ |
| local event | | | MQIA_LOCAL_EVENT | MQINQ |
| logger event | | | MQIA_LOGGER_EVENT | MQINQ |
| lu group name | | | MQCA_LU_GROUP_NAME | MQINQ |
| lu name | | | MQCA_LU_NAME | MQINQ |
| lu62 arm suffix | | | MQCA_LU62_ARM_SUFFIX | MQINQ |
| lu62 channels | | | MQIA_LU62_CHANNELS | MQINQ |
| maximum active channels | | | MQIA_ACTIVE_CHANNELS | MQINQ |
| maximum channels | | | MQIA_MAX_CHANNELS | MQINQ |
| maximum handles | | | MQIA_MAX_HANDLES | MQINQ |
| maximum message length | | | MQIA_MAX_MSG_LENGTH | MQINQ |
| maximum priority | | | MQIA_MAX_PRIORITY | MQINQ |
| maximum uncommitted messages | | | MQIA_MAX_UNCOMMITTED_MSGS | MQINQ |
| mqi accounting | | | MQIA_ACCOUNTING_MQI | MQINQ |
| mqi statistics | | | MQIA_STATISTICS_MQI | MQINQ |

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| outbound port maximum | | | MQIA_OUTBOUND_PORT_MAX | MQINQ |
| outbound port minimum | | | MQIA_OUTBOUND_PORT_MIN | MQINQ |
| password | MQCSP | CSPPasswordPtr | | MQCONNX |
| | MQCSP | CSPPasswordOffset | | MQCONNX |
| | MQCSP | CSPPasswordLength | | MQCONNX |
| performance event | | | MQIA_PERFORMANCE_EVENT | MQINQ |
| platform | | | MQIA_PLATFORM | MQINQ |
| queue accounting | | | MQIA_ACCOUNTING_Q | MQINQ |
| queue monitoring | | | MQIA_MONITORING_Q | MQINQ |
| queue statistics | | | MQIA_STATISTICS_Q | MQINQ |
| receive timeout | | | MQIA_RECEIVE_TIMEOUT | MQINQ |
| receive timeout minimum | | | MQIA_RECEIVE_TIMEOUT_MIN | MQINQ |
| receive timeout type | | | MQIA_RECEIVE_TIMEOUT_TYPE | MQINQ |
| remote event | | | MQIA_REMOTE_EVENT | MQINQ |
| repository name | | | MQCA_REPOSITORY_NAME | MQINQ |
| repository namelist | | | MQCA_REPOSITORY_NAMELIST | MQINQ |
| shared queue queue manager name | | | MQIA_SHARED_Q_Q_MGR_NAME | MQINQ |
| ssl event | | | MQIA_SSL_EVENT | MQINQ |
| ssl fips | | | MQIA_SSL_FIPS_REQUIRED | MQINQ |
| ssl key reset count | | | MQIA_SSL_RESET_COUNT | MQINQ |
| start-stop event | | | MQIA_START_STOP_EVENT | MQINQ |
| statistics interval | | | MQIA_STATISTICS_INTERVAL | MQINQ |
| syncpoint availability | | | MQIA_SYNCPOINT | MQINQ |
| tcp channels | | | MQIA_TCP_CHANNELS | MQINQ |
| tcp keep alive | | | MQIA_TCP_KEEP_ALIVE | MQINQ |
| tcp name | | | MQCA_TCP_NAME | MQINQ |
| tcp stack type | | | MQIA_TCP_STACK_TYPE | MQINQ |
| trace route recording | | | MQIA_TRACE_ROUTE_RECORDING | MQINQ |

| Attribute | Data structure | Field | Inquiry | Call |
|---|---|---|---|---|
| trigger interval | | | MQIA_TRIGGER_INTERVAL | MQINQ |
| user id | MQCSP | CSPUserIdPtr | | MQCONNX |
| | MQCSP | CSPUserIdOffset | | MQCONNX |
| | MQCSP | CSPUserIdLength | | MQCONNX |
| | | | | |

## ImqReferenceHeader cross-reference

Cross-reference of attributes, data structures, and fields for the ImqAuthenticationRecord C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| destination environment | MQRMH | DestEnvLength, DestEnvOffset |
| destination name | MQRMH | DestNameLength, DestNameOffset |
| instance id | MQRMH | ObjectInstanceId |
| logical length | MQRMH | DataLogicalLength |
| logical offset | MQRMH | DataLogicalOffset |
| logical offset 2 | MQRMH | DataLogicalOffset2 |
| reference type | MQRMH | ObjectType |
| source environment | MQRMH | SrcEnvLength, SrcEnvOffset |
| source name | MQRMH | SrcNameLength, SrcNameOffset |

## ImqTrigger cross-reference

Cross-reference of attributes, data structures, and fields for the ImqAuthenticationRecord C++ class.

*Table 675. ImqTrigger cross reference*

| Attribute | Data structure | Field |
|---|---|---|
| application id | MQTM | ApplId |
| application type | MQTM | ApplType |
| environment data | MQTM | EnvData |
| process name | MQTM | ProcessName |
| queue name | MQTM | QName |
| trigger data | MQTM | TriggerData |
| user data | MQTM | UserData |

## ImqWorkHeader cross-reference

Cross-reference of attributes, data structures, and fields for the ImqAuthenticationRecord C++ class.

| Attribute | Data structure | Field |
|---|---|---|
| message token | MQWIH | MessageToken |
| service name | MQWIH | ServiceName |

| Attribute | Data structure | Field |
|---|---|---|
| service step | MQWIH | ServiceStep |

## ImqAuthenticationRecord C++ class

This class encapsulates an authentication information record (MQAIR) for use during execution of the ImqQueueManager::connect method, for custom SSL client connections.

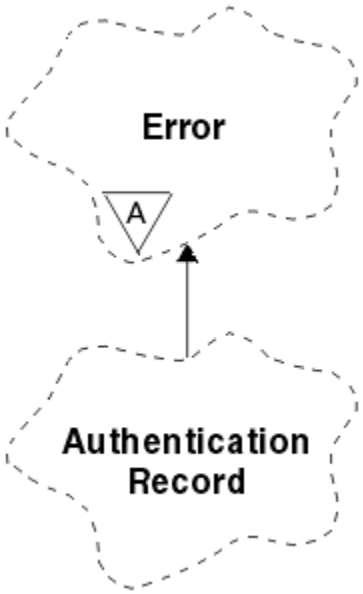



*Figure 46. ImqAuthenticationRecord class*

See the description of the ImqQueueManager::connect method for more details. This class is not available on the z/OS platform.


- "Object attributes" on page 1855
- "Constructors" on page 1856
- "Object methods (public)" on page 1856
- "Object methods (protected)" on page 1857


### Object attributes

**connection name**
The name of the connection to the LDAP CRL server. This is the IP address or DNS name, followed optionally by the port number, in parentheses.

**connection reference**
A reference to an ImqQueueManager object that provides the required connection to a (local) queue manager. The initial value is zero. Do not confuse this with the queue manager name that identifies a queue manager (possibly remote) for a named queue.

**next authentication record**
Next object of this class, in no particular order, having the same **connection reference** as this object. The initial value is zero.

**password**
A password supplied for connection authentication to the LDAP CRL server.

**previous authentication record**
Previous object of this class, in no particular order, having the same **connection reference** as this object. The initial value is zero.

**type**
The type of authentication information contained in the record.

**user name**
A user identifier supplied for authorization to the LDAP CRL server.

## Constructors

**ImqAuthenticationRecord( );**
The default constructor.

## Object methods (public)

**void operator = ( const ImqAuthenticationRecord & *air* );**
Copies instance data from *air*, replacing the existing instance data.

**const ImqString & connectionName ( ) const ;**
Returns the **connection name**.

**void setConnectionName ( const ImqString & *name* );**
Sets the **connection name**.

**void setConnectionName ( const char * *name* = 0 );**
Sets the **connection name**.

**ImqQueueManager * connectionReference ( ) const ;**
Returns the **connection reference**.

**void setConnectionReference ( ImqQueueManager & *manager* );**
Sets the **connection reference**.

**void setConnectionReference ( ImqQueueManager * *manager* = 0 );**
Sets the **connection reference**.

**void copyOut ( MQAIR * *pAir* );**
Copies instance data to *pAir*, replacing the existing instance data. This might involve allocating dependent storage.

**void clear ( MQAIR * *pAir* );**
Clears the structure and releases dependent storage referenced by *pAir*.

**ImqAuthenticationRecord * nextAuthenticationRecord ( ) const ;**
Returns the **next authentication record**.

**const ImqString & password ( ) const ;**
Returns the **password**.

**void setPassword ( const ImqString & *password* );**
Sets the **password**.

**void setPassword ( const char * *password* = 0 );**
Sets the **password**.

**ImqAuthenticationRecord * previousAuthenticationRecord ( ) const ;**
Returns the **previous authentication record**.

**MQLONG type ( ) const ;**
Returns the **type**.

**void setType ( const MQLONG *type* );**
Sets the **type**.

**const ImqString & userName ( ) const ;**
Returns the **user name**.

**void setUserName ( const ImqString & *name* );**
Sets the **user name**.

**void setUserName ( const char * *name* = 0 );**
Sets the **user name**.

### Object methods (protected)

**void setNextAuthenticationRecord ( ImqAuthenticationRecord * *pAir* = 0 );**
Sets the **next authentication record**.

**Attention:** Use this function only if you are sure that it will not break the authentication record list.

**void setPreviousAuthenticationRecord ( ImqAuthenticationRecord * *pAir* = 0 );**
Sets the **previous authentication record**.

**Attention:** Use this function only if you are sure that it will not break the authentication record list.

## ImqBinary C++ class

This class encapsulates a binary byte array that can be used for ImqMessage **accounting token**, **correlation id**, and **message id** values. It allows easy assignment, copying, and comparison.

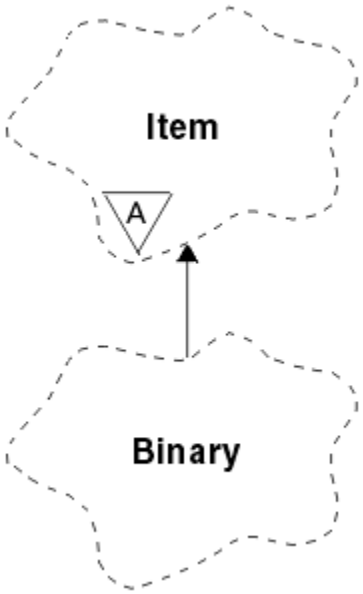



*Figure 47. ImqBinary class*


- "Object attributes" on page 1857
- "Constructors" on page 1857
- "Overloaded ImqItem methods" on page 1858
- "Object methods (public)" on page 1858
- "Object methods (protected)" on page 1858
- "Reason codes" on page 1858


### Object attributes

**data**
An array of bytes of binary data. The initial value is null.

**data length**
The number of bytes. The initial value is zero.

**data pointer**
The address of the first byte of the **data**. The initial value is zero.

### Constructors

**ImqBinary( );**
The default constructor.

**ImqBinary( const ImqBinary & *binary* );**
The copy constructor.

**ImqBinary( const void * *data*, const size_t *length* );**
Copies *length* bytes from *data*.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Copies the **data** to the message buffer, replacing any existing content. Sets the *msg* **format** to MQFMT_NONE.

See the ImqItem class method description for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Sets the **data** by transferring the remaining data from the message buffer, replacing the existing **data**.

To be successful, the ImqMessage **format** must be MQFMT_NONE.

See the ImqItem class method description for further details.

## Object methods (public)

**void operator = ( const ImqBinary & *binary* );**
Copies bytes from *binary*.

**ImqBoolean operator == ( const ImqBinary & *binary* );**
Compares this object with *binary*. It returns FALSE if not equal and TRUE otherwise. The objects are equal if they have the same **data length** and the bytes match.

**ImqBoolean copyOut ( void * *buffer*, const size_t *length*, const char *pad* = 0 );**
Copies up to *length* bytes from the **data pointer** to *buffer*. If the **data length** is insufficient, the remaining space in *buffer* is filled with *pad* bytes. *buffer* can be zero if *length* is also zero. *length* must not be negative. It returns TRUE if successful.

**size_t dataLength ( ) const ;**
Returns the **data length**.

**ImqBoolean setDataLength ( const size_t *length* );**
Sets the **data length**. If the **data length** is changed as a result of this method, the data in the object is uninitialized. It returns TRUE if successful.

**void * dataPointer ( ) const ;**
Returns the **data pointer**.

**ImqBoolean isNull ( ) const ;**
Returns TRUE if the **data length** is zero, or if all the **data** bytes are zero. Otherwise it returns FALSE.

**ImqBoolean set ( const void * *buffer*, const size_t *length* );**
Copies *length* bytes from *buffer*. It returns TRUE if successful.

## Object methods (protected)

**void clear ( );**
Reduces the **data length** to zero.

## Reason codes

- MQRC_NO_BUFFER
- MQRC_STORAGE_NOT_AVAILABLE
- MQRC_INCONSISTENT_FORMAT

# ImqCache C++ class

Use this class to hold or marshal data in memory.

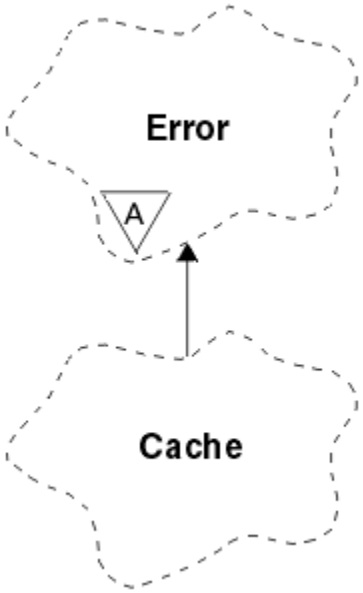



*Figure 48. ImqCache class*

Use this class to hold or marshal data in memory. You can nominate a buffer of memory of fixed size, or the system can provide a flexible amount of memory automatically. This class relates to the MQI calls listed in "ImqCache cross-reference" on page 1841.


- "Object attributes" on page 1859
- "Constructors" on page 1860
- "Object methods (public)" on page 1860
- "Reason codes" on page 1861


## Object attributes

**automatic buffer**
Indicates whether buffer memory is managed automatically by the system (TRUE) or is supplied by the user (FALSE). It is initially set to TRUE.

This attribute is not set directly. It is set indirectly using either the **useEmptyBuffer** or the **useFullBuffer** method.

If user storage is supplied, this attribute is FALSE, buffer memory cannot grow, and buffer overflow errors can occur. The address and length of the buffer remain constant.

If user storage is not supplied, this attribute is TRUE, and buffer memory can grow incrementally to accommodate an arbitrary amount of message data. However, when the buffer grows, the address of the buffer might change, so be careful when using the **buffer pointer** and **data pointer**.

**buffer length**
The number of bytes of memory in the buffer. The initial value is zero.

**buffer pointer**
The address of the buffer memory. The initial value is null.

**data length**
The number of bytes succeeding the **data pointer**. This must be equal to or less than the **message length**. The initial value is zero.

**data offset**
The number of bytes preceding the **data pointer**. This must be equal to or less than the **message length**. The initial value is zero.

**data pointer**
The address of the part of the buffer that is to be written to or read from next. The initial value is null.

**message length**
The number of bytes of significant data in the buffer. The initial value is zero.

## Constructors

**ImqCache( );**
The default constructor.

**ImqCache( const ImqCache &** ***cache*** **);**
The copy constructor.

## Object methods (public)

**void operator = ( const ImqCache &** ***cache*** **);**
Copies up to **message length** bytes of data from the *cache* object to the object. If **automatic buffer** is FALSE, the **buffer length** must already be sufficient to accommodate the copied data.

**ImqBoolean automaticBuffer ( ) const ;**
Returns the **automatic buffer** value.

**size_t bufferLength ( ) const ;**
Returns the **buffer length**.

**char * bufferPointer ( ) const ;**
Returns the **buffer pointer**.

**void clearMessage ( );**
Sets the **message length** and **data offset** to zero.

**size_t dataLength ( ) const ;**
Returns the **data length**.

**size_t dataOffset ( ) const ;**
Returns the **data offset**.

**ImqBoolean setDataOffset ( const size_t** ***offset*** **);**
Sets the **data offset**. The **message length** is increased if necessary to ensure that it is no less than the **data offset**. This method returns TRUE if successful.

**char * dataPointer ( ) const ;**
Returns a copy of the **data pointer**.

**size_t messageLength ( ) const ;**
Returns the **message length**.

**ImqBoolean setMessageLength ( const size_t** ***length*** **);**
Sets the **message length**. Increases the **buffer length** if necessary to ensure that the **message length** is no greater than the **buffer length**. Reduces the **data offset** if necessary to ensure that it is no greater than the **message length**. It returns TRUE if successful.

**ImqBoolean moreBytes ( const size_t** ***bytes-required*** **);**
Assures that *bytes-required* more bytes are available (for writing) between the **data pointer** and the end of the buffer. It returns TRUE if successful.

If **automatic buffer** is TRUE, more memory is acquired as required; otherwise, the **buffer length** must already be adequate.

**ImqBoolean read ( const size_t** ***length*****, char * &** ***external-buffer*** **);**
Copies *length* bytes, from the buffer starting at the **data pointer** position, into the *external-buffer*. After the data has been copied, the **data offset** is increased by *length*. This method returns TRUE if successful.

**ImqBoolean resizeBuffer ( const size_t *length* );**

Varies the **buffer length**, provided that **automatic buffer** is TRUE. This is achieved by reallocating the buffer memory. Up to **message length** bytes of data from the existing buffer are copied to the new one. The maximum number copied is *length* bytes. The **buffer pointer** is changed. The **message length** and **data offset** are preserved as closely as possible within the confines of the new buffer. It returns TRUE if successful, and FALSE if **automatic buffer** is FALSE.

**Note:** This method can fail with MQRC_STORAGE_NOT_AVAILABLE if there is any problem with system resources.

**ImqBoolean useEmptyBuffer ( const char * *external-buffer*, const size_t *length* );**

Identifies an empty user buffer, setting the **buffer pointer** to point to *external-buffer*, the **buffer length** to *length*, and the **message length** to zero. Performs a **clearMessage**. If the buffer is fully primed with data, use the **useFullBuffer** method instead. If the buffer is partially primed with data, use the **setMessageLength** method to indicate the correct amount. This method returns TRUE if successful.

This method can be used to identify a fixed amount of memory, as described previously ( *external-buffer* is not null and *length* is nonzero), in which case **automatic buffer** is set to FALSE, or it can be used to revert to system-managed flexible memory ( *external-buffer* is null and *length* is zero), in which case **automatic buffer** is set to TRUE.

**ImqBoolean useFullBuffer ( const char * *externalBuffer*, const size_t *length* );**

As for **useEmptyBuffer**, except that the **message length** is set to *length*. It returns TRUE if successful.

**ImqBoolean write ( const size_t *length*, const char * *external-buffer* );**

Copies *length* bytes, from the *external-buffer*, into the buffer starting at the **data pointer** position. After the data has been copied, the **data offset** is increased by *length*, and the **message length** is increased if necessary to ensure that it is no less than the new **data offset** value. This method returns TRUE if successful.

If **automatic buffer** is TRUE, an adequate amount of memory is guaranteed; otherwise, the ultimate **data offset** must not exceed the **buffer length**.

## Reason codes

- MQRC_BUFFER_NOT_AUTOMATIC
- MQRC_DATA_TRUNCATED
- MQRC_INSUFFICIENT_BUFFER
- MQRC_INSUFFICIENT_DATA
- MQRC_NULL_POINTER
- MQRC_STORAGE_NOT_AVAILABLE
- MQRC_ZERO_LENGTH

# ImqChannel C++ class

This class encapsulates a channel definition (MQCD) for use during execution of the Manager::connect method, for custom client connections.

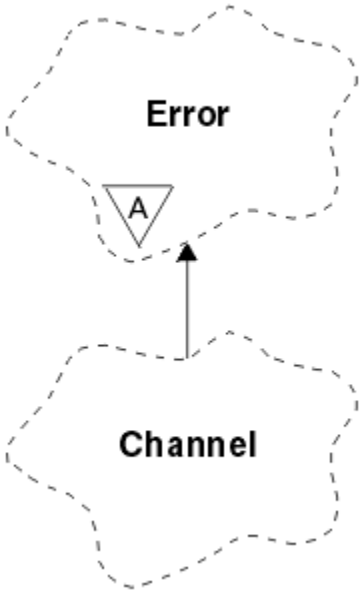



*Figure 49. ImqChannel class*

See the description of the Manager::connect method, and Sample program HELLO WORLD (imqwrld.cpp), for more details.

Not all the listed methods are applicable to all platforms. See the descriptions of the DEFINE CHANNEL and ALTER CHANNEL commands for more information.

The ImqChannel class is not supported on z/OS.


- "Object attributes" on page 1862
- "Constructors" on page 1863
- "Object methods (public)" on page 1864
- "Reason codes" on page 1867


## Object attributes

**batch heart-beat**
The number of milliseconds between checks that a remote channel is active. The initial value is 0.

**channel name**
The name of the channel. The initial value is null.

**connection name**
The name of the connection. For example, the IP address of a host computer. The initial value is null.

**header compression**
The list of header data compression techniques supported by the channel. The initial values are all set to MQCOMPRESS_NOT_AVAILABLE.

**heart-beat interval**
The number of seconds between checks that a connection is still working. The initial value is 300.

**keep alive interval**
The number of seconds passed to the communications stack specifying the keep alive timing for the channel. The initial value is MQKAI_AUTO.

**local address**
The local communications address for the channel.

**maximum message length**
The maximum length of message supported by the channel in a single communication. The initial value is 4 194 304.

**message compression**
The list of message data compression techniques supported by the channel. The initial values are all set to MQCOMPRESS_NOT_AVAILABLE.

**mode name**
The name of the mode. The initial value is null.

**password**
A password supplied for connection authentication. The initial value is null.

**receive exit count**
The number of receive exits. The initial value is zero. This attribute is read-only.

**receive exit names**
The names of receive exits.

**receive user data**
Data associated with receive exits.

**security exit name**
The name of a security exit to be invoked on the server side of the connection. The initial value is null.

**security user data**
Data to be passed to the security exit. The initial value is null.

**send exit count**
The number of send exits. The initial value is zero. This attribute is read-only.

**send exit names**
The names of send exits.

**send user data**
Data associated with send exits.

**SSL CipherSpec**
CipherSpec for use with SSL.

**SSL client authentication type**
Client authentication type for use with SSL.

**SSL peer name**
Peer name for use with SSL.

**transaction program name**
The name of the transaction program. The initial value is null.

**transport type**
The transport type of the connection. The initial value is MQXPT_LU62.

**user id**
A user identifier supplied for authorization. The initial value is null.

## Constructors

**ImqChannel( ) ;**
The default constructor.

**ImqChannel( const ImqChannel &** ***channel*** **);**
The copy constructor.

## Object methods (public)

**void operator = ( const ImqChannel & *channel* );**
Copies instance data from *channel*, replacing any existing instance data.

**MQLONG batchHeartBeat( ) const ;**
Returns the **batch heart-beat**.

**ImqBoolean setBatchHeartBeat( const MQLONG *heartbeat* = 0L );**
Sets the **batch heart-beat**. This method returns TRUE if successful.

**ImqString channelName( ) const ;**
Returns the **channel name**.

**ImqBoolean setChannelName( const char * *name* = 0 );**
Sets the **channel name**. This method returns TRUE if successful.

**ImqString connectionName( ) const ;**
Returns the **connection name**.

**ImqBoolean setConnectionName( const char * *name* = 0 );**
Sets the **connection name**. This method returns TRUE if successful.

**size_t headerCompressionCount( ) const ;**
Returns the supported header data compression techniques count.

**ImqBoolean headerCompression( const size_t count, MQLONG compress [ ] ) const ;**
Returns copies of the supported header data compression techniques in **compress**. This method returns TRUE if successful.

**ImqBoolean setHeaderCompression( const size_t count, const MQLONG compress [ ] );**

Sets the supported header data compression techniques to **compress**.

Sets the supported header data compression techniques count to **count**.

This method returns TRUE if successful.

**MQLONG heartBeatInterval( ) const ;**
Returns the **heart-beat interval**.

**ImqBoolean setHeartBeatInterval( const MQLONG *interval* = 300L );**
Sets the **heart-beat interval**. This method returns TRUE if successful.

**MQLONG keepAliveInterval( ) const ;**
Returns the **keep alive interval**.

**ImqBoolean setKeepAliveInterval( const MQLONG *interval* = MQKAI_AUTO );**
Sets the **keep alive interval**. This method returns TRUE if successful.

**ImqString localAddress() const ;**
Returns the **local address**.

**ImqBoolean setLocalAddress ( const char * *address* = 0 );**
Sets the **local address**. This method returns TRUE if successful.

**MQLONG maximumMessageLength( ) const ;**
Returns the **maximum message length**.

**ImqBoolean setMaximumMessageLength( const MQLONG *length* = 4194304L );**
Sets the **maximum message length**. This method returns TRUE if successful.

**size_t messageCompressionCount( ) const ;**
Returns the supported message data compression techniques count.

**ImqBoolean messageCompression( const size_t count, MQLONG compress [ ]) const ;**
Returns copies of the supported message data compression techniques in **compress**. This method returns TRUE if successful.

**ImqBoolean setMessageCompression( const size_t count, const MQLONG compress [ ] );**

Sets the supported message data compression techniques to compress.

Sets the supported message data compression techniques count to count.

This method returns TRUE if successful.

**ImqString modeName( ) const ;**
Returns the **mode name**.

**ImqBoolean setModeName( const char * *name* = 0 );**
Sets the **mode name**. This method returns TRUE if successful.

**ImqString password( ) const ;**
Returns the **password**.

**ImqBoolean setPassword( const char * *password* = 0 );**
Sets the **password**. This method returns TRUE if successful.

**size_t receiveExitCount( ) const ;**
Returns the **receive exit count**.

**ImqString receiveExitName( );**
Returns the first of the **receive exit names**, if any. If the **receive exit count** is zero, it returns an empty string.

**ImqBoolean receiveExitNames( const size_t *count*, ImqString * *names* [ ] );**
Returns copies of the **receive exit names** in *names*. Sets any *names* in excess of **receive exit count** to null strings. This method returns TRUE if successful.

**ImqBoolean setReceiveExitName( const char * *name* = 0 );**
Sets the **receive exit names** to the single *name*. *name* can be blank or null. Sets the **receive exit count** to either 1 or zero. Clears the **receive user data**. This method returns TRUE if successful.

**ImqBoolean setReceiveExitNames( const size_t *count*, const char * *names* [ ] );**
Sets the **receive exit names** to *names*. Individual *names* values must not be blank or null. Sets the **receive exit count** to *count*. Clears the **receive user data**. This method returns TRUE if successful.

**ImqBoolean setReceiveExitNames( const size_t *count*, const ImqString * *names* [ ] );**
Sets the **receive exit names** to *names*. Individual *names* values must not be blank or null. Sets the **receive exit count** to *count*. Clears the **receive user data**. This method returns TRUE if successful.

**ImqString receiveUserData( );**
Returns the first of the **receive user data** items, if any. If the **receive exit count** is zero, returns an empty string.

**ImqBoolean receiveUserData( const size_t *count*, ImqString * *data* [ ] );**
Returns copies of the **receive user data** items in *data*. Sets any *data* in excess of **receive exit count** to null strings. This method returns TRUE if successful.

**ImqBoolean setReceiveUserData( const char * *data* = 0 );**
Sets the **receive user data** to the single item *data*. If *data* is not null, **receive exit count** must be at least 1. This method returns TRUE if successful.

**ImqBoolean setReceiveUserData( const size_t *count*, const char * *data* [ ] );**
Sets the **receive user data** to *data*. *count* must be no greater than the **receive exit count**. This method returns TRUE if successful.

**ImqBoolean setReceiveUserData( const size_t *count*, const ImqString * *data* [ ] );**
Sets the **receive user data** to *data*. *count* must be no greater than the **receive exit count**. This method returns TRUE if successful.

**ImqString securityExitName( ) const ;**
Returns the **security exit name**.

**ImqBoolean setSecurityExitName( const char * *name* = 0 );**
Sets the **security exit name**. This method returns TRUE if successful.

**ImqString securityUserData( ) const ;**
Returns the **security user data**.

**ImqBoolean setSecurityUserData( const char * *data* = 0 );**
Sets the **security user data**. This method returns TRUE if successful.

**size_t sendExitCount( ) const ;**
Returns the **send exit count**.

**ImqString sendExitName( );**
Returns the first of the **send exit names**, if any. Returns an empty string if the **send exit count** is zero.

**ImqBoolean sendExitNames( const size_t *count*, ImqString * *names* [ ] );**
Returns copies of the **send exit names** in *names*. Sets any *names* in excess of **send exit count** to null strings. This method returns TRUE if successful.

**ImqBoolean setSendExitName( const char * *name* = 0 );**
Sets the **send exit names** to the single *name*. *name* can be blank or null. Sets the **send exit count** to either 1 or zero. Clears the **send user data**. This method returns TRUE if successful

**ImqBoolean setSendExitNames( const size_t *count*, const char * *names* [ ] );**
Sets the **send exit names** to *names*. Individual *names* values must not be blank or null. Sets the **send exit count** to *count*. Clears the **send user data**. This method returns TRUE if successful.

**ImqBoolean setSendExitNames( const size_t *count*, const ImqString * *names* [ ] );**
Sets the **send exit names** to *names*. Individual *names* values must not be blank or null. Sets the **send exit count** to *count*. Clears the **send user data**. This method returns TRUE if successful.

**ImqString sendUserData( );**
Returns the first of the **send user data** items, if any. , Returns an empty string if the **send exit count** is zero.

**ImqBoolean sendUserData( const size_t *count*, ImqString * *data* [ ] );**
Returns copies of the **send user data** items in *data*. Sets any *data* in excess of **send exit count** to null strings. This method returns TRUE if successful.

**ImqBoolean setSendUserData( const char * *data* = 0 );**
Sets the **send user data** to the single item *data*. If *data* is not null, **send exit count** must be at least 1. This method returns TRUE if successful.

**ImqBoolean setSendUserData( const size_t *count*, const char * *data* [ ] );**
Sets the **send user data** to *data*. *count* must be no greater than the **send exit count**. This method returns TRUE if successful.

**ImqBoolean setSendUserData( const size_t *count*, const ImqString * *data* [ ] );**
Sets the **send user data** to *data*. *count* must be no greater than the **send exit count**. This method returns TRUE if successful.

**ImqString sslCipherSpecification( ) const ;**
Returns the SSL cipher specification.

**ImqBoolean setSslCipherSpecification( const char * *name* = 0 );**
Sets the SSL cipher specification. This method returns TRUE if successful.

**MQLONG sslClientAuthentication( ) const ;**
Returns the SSL client authentication type.

**ImqBoolean setSslClientAuthentication( const MQLONG *auth* = MQSCA_REQUIRED);**
Sets the SSL client authentication type. This method returns TRUE if successful.

**ImqString sslPeerName( ) const ;**
Returns the SSL peer name.

**ImqBoolean setSslPeerName( const char * *name* = 0 );**
Sets the SSL peer name. This method returns TRUE if successful.

**ImqString transactionProgramName( ) const ;**
Returns the **transaction program name**.

**ImqBoolean setTransactionProgramName( const char * *name* = 0 );**
Sets the **transaction program name**. This method returns TRUE if successful.

**MQLONG transportType( ) const ;**
Returns the **transport type**.

**ImqBoolean setTransportType( const MQLONG *type* = MQXPT_LU62 );**
Sets the **transport type**. This method returns TRUE if successful.

**ImqString userId( ) const ;**
Returns the **user id**.

**ImqBoolean setUserId( const char * *id* = 0 );**
Sets the **user id**. This method returns TRUE if successful.

### Reason codes

- MQRC_DATA_LENGTH_ERROR
- MQRC_ITEM_COUNT_ERROR
- MQRC_NULL_POINTER
- MQRC_SOURCE_BUFFER_ERROR

## ImqCICSBridgeHeader C++ class

This class encapsulates specific features of the MQCIH data structure.

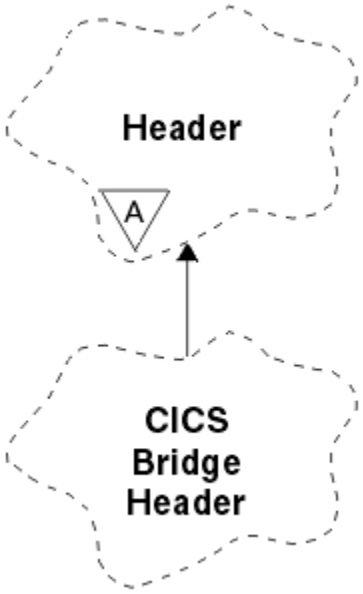



*Figure 50. ImqCICSBridgeHeader class*

Objects of this class are used by applications that send messages to the CICS bridge through IBM MQ for z/OS.


- "Object attributes" on page 1867
- "Constructors" on page 1870
- "Overloaded ImqItem methods" on page 1870
- "Object methods (public)" on page 1870
- "Object data (protected)" on page 1872
- "Reason codes" on page 1872
- "Return codes" on page 1872


### Object attributes

**ADS descriptor**
Send/receive ADS descriptor. This is set using MQCADSD_NONE. The initial value is MQCADSD_NONE. The following additional values are possible:

- MQCADSD_NONE
- MQCADSD_SEND
- MQCADSD_RECV

- MQCADSD_MSGFORMAT

**attention identifier**
AID key. The field must be of length MQ_ATTENTION_ID_LENGTH.

**authenticator**
RACF password or passticket. The initial value contains blanks, of length MQ_AUTHENTICATOR_LENGTH.

**bridge abend code**
Bridge abend code, of length MQ_ABEND_CODE_LENGTH. The initial value is four blank characters. The value returned in this field is dependent on the return code. See Table 676 on page 1872 for more details.

**bridge cancel code**
Bridge abend transaction code. The field is reserved, must contain blanks, and be of length MQ_CANCEL_CODE_LENGTH.

**bridge completion code**
Completion code, which can contain either the IBM MQ completion code or the CICS EIBRESP value. The field has the initial value of MQCC_OK. The value returned in this field is dependent on the return code. See Table 676 on page 1872 for more details.

**bridge error offset**
Bridge error offset. The initial value is zero. This attribute is read-only.

**bridge reason code**
Reason code. This field can contain either the IBM MQ reason or the CICS EIBRESP2 value. The field has the initial value of MQRC_NONE. The value returned in this field is dependent on the return code. See Table 676 on page 1872 for more details.

**bridge return code**
Return code from the CICS bridge. The initial value is MQCRC_OK.

**conversational task**
Whether the task can be conversational. The initial value is MQCCT_NO. The following additional values are possible:

- MQCCT_YES
- MQCCT_NO

**cursor position**
Cursor position. The initial value is zero.

**facility keep time**
CICS bridge facility release time.

**facility like**
Terminal emulated attribute. The field must be of length MQ_FACILITY_LIKE_LENGTH.

**facility token**
BVT token value. The field must be of length MQ_FACILITY_LENGTH. The initial value is MQCFAC_NONE.

**function**
Function, which can contain either the IBM MQ call name or the CICS EIBFN function. The field has the initial value of MQCFUNC_NONE, with length MQ_FUNCTION_LENGTH. The value returned in this field is dependent on the return code. See Table 676 on page 1872 for more details.

The following additional values are possible when **function** contains an IBM MQ call name:

- MQCFUNC_MQCONN
- MQCFUNC_MQGET
- MQCFUNC_MQINQ
- MQCFUNC_NONE
- MQCFUNC_MQOPEN

- MQCFUNC_PUT
- MQCFUNC_MQPUT1

**get wait interval**
Wait interval for an MQGET call issued by the CICS bridge task. The initial value is MQCGWI_DEFAULT. The field applies only when **uow control** has the value MQCUOWC_FIRST. The following additional values are possible:

- MQCGWI_DEFAULT
- MQWI_UNLIMITED

**link type**
Link type. The initial value is MQCLT_PROGRAM. The following additional values are possible:

- MQCLT_PROGRAM
- MQCLT_TRANSACTION

**next transaction identifier**
ID of the next transaction to attach. The field must be of length MQ_TRANSACTION_ID_LENGTH.

**output data length**
COMMAREA data length. The initial value is MQCODL_AS_INPUT.

**reply-to format**
Format name of the reply message. The initial value is MQFMT_NONE with length MQ_FORMAT_LENGTH.

**start code**
Transaction start code. The field must be of length MQ_START_CODE_LENGTH. The initial value is MQCSC_NONE. The following additional values are possible:

- MQCSC_START
- MQCSC_STARTDATA
- MQCSC_TERMINPUT
- MQCSC_NONE

**task end status**
Task end status. The initial value is MQCTES_NOSYNC. The following additional values are possible:

- MQCTES_COMMIT
- MQCTES_BACKOUT
- MQCTES_ENDTASK
- MQCTES_NOSYNC

**transaction identifier**
ID of the transaction to attach. The initial value must contain blanks, and must be of length MQ_TRANSACTION_ID_LENGTH. The field applies only when **uow control** has the value MQCUOWC_FIRST or MQCUOWC_ONLY.

**UOW control**
UOW control. The initial value is MQCUOWC_ONLY. The following additional values are possible:

- MQCUOWC_FIRST
- MQCUOWC_MIDDLE
- MQCUOWC_LAST
- MQCUOWC_ONLY
- MQCUOWC_COMMIT
- MQCUOWC_BACKOUT
- MQCUOWC_CONTINUE

**version**
The MQCIH version number. The initial value is MQCIH_VERSION_2. The only other supported value is MQCIH_VERSION_1.

## Constructors

**ImqCICSBridgeHeader( );**
The default constructor.

**ImqCICSBridgeHeader( const ImqCICSBridgeHeader & *header* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut( ImqMessage & *msg* );**
Inserts an MQCIH data structure into the message buffer at the beginning, moving existing message data further along, and sets the message format to MQFMT_CICS.

See the parent class method description for more details.

**virtual ImqBoolean pasteIn( ImqMessage & *msg* );**
Reads an MQCIH data structure from the message buffer. To be successful, the encoding of the *msg* object must be MQENC_NATIVE. Retrieve messages with MQGMO_CONVERT to MQENC_NATIVE. To be successful, the ImqMessage format must be MQFMT_CICS.

See the parent class method description for more details.

## Object methods (public)

**void operator = ( const ImqCICSBridgeHeader & *header* );**
Copies instance data from the *header*, replacing the existing instance data.

**MQLONG ADSDescriptor( ) const;**
Returns a copy of the **ADS descriptor**.

**void setADSDescriptor( const MQLONG *descriptor* = MQCADSD_NONE );**
Sets the **ADS descriptor**.

**ImqString attentionIdentifier( ) const;**
Returns a copy of the **attention identifier**, padded with trailing blanks to length MQ_ATTENTION_ID_LENGTH.

**void setAttentionIdentifier( const char * *data* = 0 );**
Sets the **attention identifier**, padded with trailing blanks to length MQ_ATTENTION_ID_LENGTH. If no *data* is supplied, resets **attention identifier** to the initial value.

**ImqString authenticator( ) const;**
Returns a copy of the **authenticator**, padded with trailing blanks to length MQ_AUTHENTICATOR_LENGTH.

**void setAuthenticator( const char * *data* = 0 );**
Sets the **authenticator**, padded with trailing blanks to length MQ_AUTHENTICATOR_LENGTH. If no *data* is supplied, resets **authenticator** to the initial value.

**ImqString bridgeAbendCode( ) const;**
Returns a copy of the **bridge abend code**, padded with trailing blanks to length MQ_ABEND_CODE_LENGTH.

**ImqString bridgeCancelCode( ) const;**
Returns a copy of the **bridge cancel code**, padded with trailing blanks to length MQ_CANCEL_CODE_LENGTH.

**void setBridgeCancelCode( const char * *data* = 0 );**
Sets the **bridge cancel code**, padded with trailing blanks to length MQ_CANCEL_CODE_LENGTH. If no *data* is supplied, resets the **bridge cancel code** to the initial value.

**MQLONG bridgeCompletionCode( ) const;**
Returns a copy of the **bridge completion code**.

**MQLONG bridgeErrorOffset( ) const ;**
Returns a copy of the **bridge error offset**.

**MQLONG bridgeReasonCode( ) const;**
Returns a copy of the **bridge reason code**.

**MQLONG bridgeReturnCode( ) const;**
Returns the **bridge return code**.

**MQLONG conversationalTask( ) const;**
Returns a copy of the **conversational task**.

**void setConversationalTask( const MQLONG *task* = MQCCT_NO );**
Sets the **conversational task**.

**MQLONG cursorPosition( ) const ;**
Returns a copy of the **cursor position**.

**void setCursorPosition( const MQLONG *position* = 0 );**
Sets the **cursor position**.

**MQLONG facilityKeepTime( ) const;**
Returns a copy of the **facility keep time**.

**void setFacilityKeepTime( const MQLONG *time* = 0 );**
Sets the **facility keep time**.

**ImqString facilityLike( ) const;**
Returns a copy of the **facility like**, padded with trailing blanks to length MQ_FACILITY_LIKE_LENGTH.

**void setFacilityLike( const char * *name* = 0 );**
Sets the **facility like**, padded with trailing blanks to length MQ_FACILITY_LIKE_LENGTH. If no *name* is supplied, resets **facility like** the initial value.

**ImqBinary facilityToken( ) const;**
Returns a copy of the **facility token**.

**ImqBoolean setFacilityToken( const ImqBinary & *token* );**
Sets the **facility token**. The **data length** of *token* must be either zero or MQ_FACILITY_LENGTH. It returns TRUE if successful.

**void setFacilityToken( const MQBYTE8 *token* = 0);**
Sets the **facility token**. *token* can be zero, which is the same as specifying MQCFAC_NONE. If *token* is nonzero it must address MQ_FACILITY_LENGTH bytes of binary data. When using predefined values such as MQCFAC_NONE, you might need to make a cast to ensure a signature match. For example, (MQBYTE *)MQCFAC_NONE.

**ImqString function( ) const;**
Returns a copy of the **function**, padded with trailing blanks to length MQ_FUNCTION_LENGTH.

**MQLONG getWaitInterval( ) const;**
Returns a copy of the **get wait interval**.

**void setGetWaitInterval( const MQLONG *interval* = MQCGWI_DEFA**
Sets the **get wait interval**.

**MQLONG linkType( ) const;**
Returns a copy of the **link type**.

**void setLinkType( const MQLONG *type* = MQCLT_PROGRAM );**
Sets the **link type**.

**ImqString nextTransactionIdentifier( ) const ;**
Returns a copy of the **next transaction identifier** data, padded with trailing blanks to length MQ_TRANSACTION_ID_LENGTH.

**MQLONG outputDataLength( ) const;**
Returns a copy of the **output data length**.

**void setOutputDataLength( const MQLONG *length* = MQCODL_AS_INPUT );**
Sets the **output data length**.

**ImqString replyToFormat( ) const;**
Returns a copy of the **reply-to format** name, padded with trailing blanks to length MQ_FORMAT_LENGTH.

**void setReplyToFormat( const char * *name* = 0 );**
Sets the **reply-to format**, padded with trailing blanks to length MQ_FORMAT_LENGTH. If no *name* is supplied, resets **reply-to format** to the initial value.

**ImqString startCode( ) const;**
Returns a copy of the **start code**, padded with trailing blanks to length MQ_START_CODE_LENGTH.

**void setStartCode( const char * *data* = 0 );**
Sets the **start code** data, padded with trailing blanks to length MQ_START_CODE_LENGTH. If no *data* is supplied, resets **start code** to the initial value.

**MQLONG taskEndStatus( ) const;**
Returns a copy of the **task end status**.

**ImqString transactionIdentifier( ) const;**
Returns a copy of the **transaction identifier** data, padded with trailing blanks to the length MQ_TRANSACTION_ID_LENGTH.

**void setTransactionIdentifier( const char * *data* = 0 );**
Sets the **transaction identifier**, padded with trailing blanks to length MQ_TRANSACTION_ID_LENGTH. If no *data* is supplied, resets **transaction identifier** to the initial value.

**MQLONG UOWControl( ) const;**
Returns a copy of the **UOW control**.

**void setUOWControl( const MQLONG *control* = MQCUOWC_ONLY );**
Sets the **UOW control**.

**MQLONG version( ) const;**
Returns the **version** number.

**ImqBoolean setVersion( const MQLONG *version* = MQCIH_VERSION_2 );**
Sets the **version** number. It returns TRUE if successful.

## Object data (protected)

**MQLONG *olVersion***
The maximum MQCIH version number that can be accommodated in the storage allocated for *opcih*.

**PMQCIH *opcih***
The address of an MQCIH data structure. The amount of storage allocated is indicated by *olVersion*.

## Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR
- MQRC_WRONG_VERSION

## Return codes

*Table 676. ImqCICSBridgeHeader class return codes*

| Return Code | Function | CompCode | Reason | Abend Code |
|---|---|---|---|---|
| MQCRC_OK | | | | |
| MQCRC_BRIDGE_ERROR | | | MQFB_CICS | |

| Table 676. ImqCICSBridgeHeader class return codes (continued) | | | | |
|---|---|---|---|---|
| **Return Code** | **Function** | **CompCode** | **Reason** | **Abend Code** |
| MQCRC_MQ_API_ERROR | IBM MQ call name | IBM MQ CompCode | IBM MQ Reason | |
| MQCRC_BRIDGE_TIMEOUT | IBM MQ call name | IBM MQ CompCode | IBM MQ Reason | |
| MQCRC_CICS_EXEC_ERROR | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | |
| MQCRC_SECURITY_ERROR | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | |
| MQCRC_PROGRAM_NOT_AVAILABLE | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | |
| MQCRC_TRANSID_NOT_AVAILABLE | CICS EIBFN | CICS EIBRESP | CICS EIBRESP2 | |
| MQCRC_BRIDGE_ABEND | | | | CICS ABCODE |
| MQCRC_APPLICATION_ABEND | | | | CICS ABCODE |

## ImqDeadLetterHeader C++ class

This class encapsulates features of the MQDLH data structure.

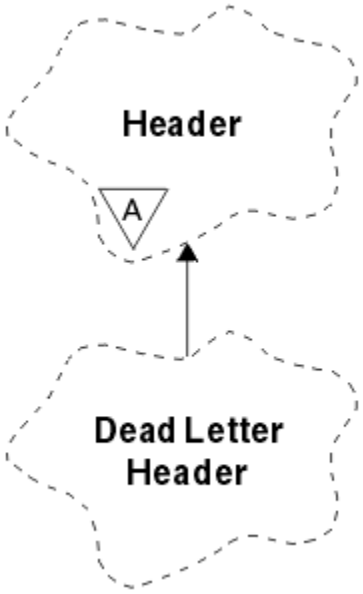



*Figure 51. ImqDeadLetterHeader class*

Objects of this class are typically used by an application that encounters an message that cannot be processed. A new message comprising a dead-letter header and the message content is placed on the dead-letter queue, and the message is discarded.


- "Object attributes" on page 1874
- "Constructors" on page 1874
- "Overloaded ImqItem methods" on page 1874
- "Object methods (public)" on page 1874
- "Object data (protected)" on page 1875
- "Reason codes" on page 1875

## Object attributes

**dead-letter reason code**
The reason the message arrived on the dead-letter queue. The initial value is MQRC_NONE.

**destination queue manager name**
The name of the original destination queue manager. The name is a string of length MQ_Q_MGR_NAME_LENGTH. Its initial value is null.

**destination queue name**
The name of the original destination queue. The name is a string of length MQ_Q_NAME_LENGTH. Its initial value is null.

**put application name**
The name of the application that put the message on the dead-letter queue. The name is a string of length MQ_PUT_APPL_NAME_LENGTH. Its initial value is null.

**put application type**
The type of application that put the message on the dead-letter queue. The initial value is zero.

**put date**
The date when the message was put on the dead-letter queue. The date is a string of length MQ_PUT_DATE_LENGTH. Its initial value is a null string.

**put time**
The time when the message was put on the dead-letter queue. The time is a string of length MQ_PUT_TIME_LENGTH. Its initial value is a null string.

## Constructors

**ImqDeadLetterHeader( );**
The default constructor.

**ImqDeadLetterHeader( const ImqDeadLetterHeader & *header* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Inserts an MQDLH data structure into the message buffer at the beginning, moving existing message data further along. Sets the *msg* **format** to MQFMT_DEAD_LETTER_HEADER.

See the ImqHeader class method description on page "ImqHeader C++ class" on page 1882 for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Reads an MQDLH data structure from the message buffer.

To be successful, the ImqMessage **format** must be MQFMT_DEAD_LETTER_HEADER.

See the ImqHeader class method description on page "ImqHeader C++ class" on page 1882 for further details.

## Object methods (public)

**void operator = ( const ImqDeadLetterHeader & *header* );**
Copies instance data is copied from *header*, replacing the existing instance data.

**MQLONG deadLetterReasonCode ( ) const ;**
Returns the **dead-letter reason code**.

**void setDeadLetterReasonCode ( const MQLONG *reason* );**
Sets the **dead-letter reason code**.

**ImqString destinationQueueManagerName ( ) const ;**
Returns the **destination queue manager name**, stripped of any trailing blanks.

**void setDestinationQueueManagerName ( const char * *name* );**
Sets the **destination queue manager name**. Truncates data longer than MQ_Q_MGR_NAME_LENGTH (48 characters).

**ImqString destinationQueueName ( ) const ;**
Returns a copy of the **destination queue name**, stripped of any trailing blanks.

**void setDestinationQueueName ( const char * *name* );**
Sets the **destination queue name**. Truncates data longer than MQ_Q_NAME_LENGTH (48 characters).

**ImqString putApplicationName ( ) const ;**
Returns a copy of the **put application name**, stripped of any trailing blanks.

**void setPutApplicationName ( const char * *name* = 0 );**
Sets the **put application name**. Truncates data longer than MQ_PUT_APPL_NAME_LENGTH (28 characters).

**MQLONG putApplicationType ( ) const ;**
Returns the **put application type**.

**void setPutApplicationType ( const MQLONG *type* = MQAT_NO_CONTEXT );**
Sets the **put application type**.

**ImqString putDate ( ) const ;**
Returns a copy of the **put date**, stripped of any trailing blanks.

**void setPutDate ( const char * *date* = 0 );**
Sets the **put date**. Truncates data longer than MQ_PUT_DATE_LENGTH (8 characters).

**ImqString putTime ( ) const ;**
Returns a copy of the **put time**, stripped of any trailing blanks.

**void setPutTime ( const char * *time* = 0 );**
Sets the **put time**. Truncates data longer than MQ_PUT_TIME_LENGTH (8 characters).

## Object data (protected)

**MQDLH *omqdlh***
The MQDLH data structure.

## Reason codes

- MQRC_INCONSISTENT_FORMAT
- MQRC_STRUC_ID_ERROR
- MQRC_ENCODING_ERROR

# ImqDistributionList C++ class

This class encapsulates a dynamic distribution list that references one or more queues for the purpose of sending a message or messages to multiple destinations.

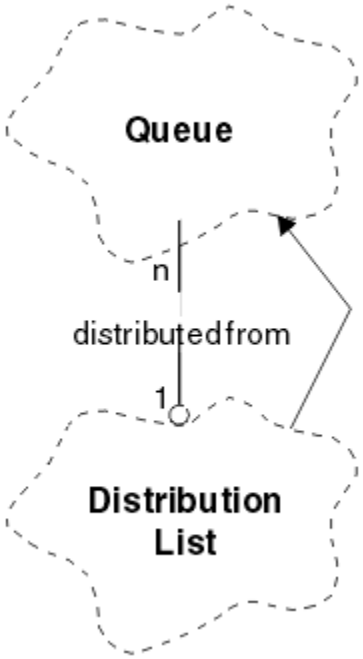



*Figure 52. ImqDistributionList class*


- "Object attributes" on page 1876
- "Constructors" on page 1876
- "Object methods (public)" on page 1876
- "Object methods (protected)" on page 1877


## Object attributes

**first distributed queue**
The first of one or more objects of class , in no particular order, in which the **distribution list reference** addresses this object.

Initially there are no such objects. To open an ImqDistributionList successfully, there must be at least one such object.

**Note:** When an ImqDistributionList object is opened, any open objects that reference it are automatically closed.

## Constructors

**ImqDistributionList( );**
The default constructor.

**ImqDistributionList( const ImqDistributionList & *list* );**
The copy constructor.

## Object methods (public)

**void operator = ( const ImqDistributionList & *list* );**
All objects that reference **this** object are dereferenced before copying. No objects will reference **this** object after the invocation of this method.

*** firstDistributedQueue ( ) const ;**
Returns the **first distributed queue**.

### Object methods (protected)

**void setFirstDistributedQueue ( * *queue* = 0 );**
Sets the **first distributed queue**.

## ImqError C++ class

This abstract class provides information on errors associated with an object.

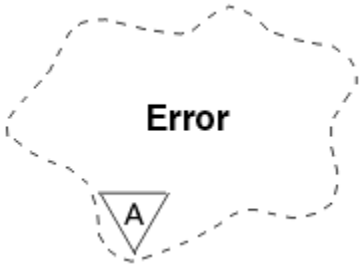



*Figure 53. ImqError class*


- "Object attributes" on page 1877
- "Constructors" on page 1877
- "Object methods (public)" on page 1877
- "Object methods (protected)" on page 1878
- "Reason codes" on page 1878


### Object attributes

**completion code**
The most recent completion code. The initial value is zero. The following additional values are possible:

- MQCC_OK
- MQCC_WARNING
- MQCC_FAILED

**reason code**
The most recent reason code. The initial value is zero.

### Constructors

**ImqError( );**
The default constructor.

**ImqError( const ImqError & *error* );**
The copy constructor.

### Object methods (public)

**void operator = ( const ImqError & *error* );**
Copies instance data from *error*, replacing the existing instance data.

**void clearErrorCodes ( );**
Sets the **completion code** and **reason code** both to zero.

**MQLONG completionCode ( ) const ;**
Returns the **completion code**.

**MQLONG reasonCode ( ) const ;**
Returns the **reason code**.

### Object methods (protected)

**ImqBoolean checkReadPointer ( const void * *pointer*, const size_t *length* );**
Verifies that the combination of pointer and length is valid for read-only access, and returns TRUE if successful.

**ImqBoolean checkWritePointer ( const void * *pointer*, const size_t *length* );**
Verifies that the combination of pointer and length is valid for read-write access, and returns TRUE if successful.

**void setCompletionCode ( const MQLONG *code* = 0 );**
Sets the **completion code**.

**void setReasonCode ( const MQLONG *code* = 0 );**
Sets the **reason code**.

### Reason codes

- MQRC_BUFFER_ERROR

## ImqGetMessageOptions C++ class

This class encapsulates the MQGMO data structure

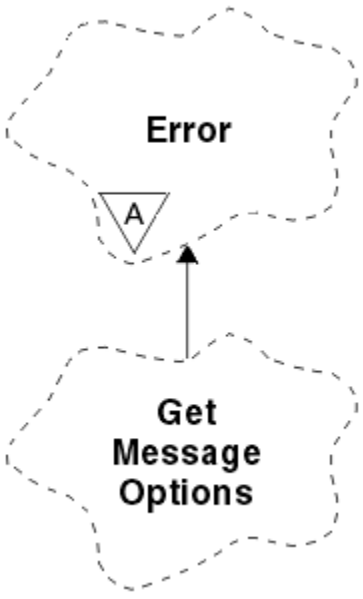



*Figure 54. ImqGetMessageOptions class*


- "Object attributes" on page 1879
- "Constructors" on page 1880
- "Object methods (public)" on page 1880
- "Object methods (protected)" on page 1881
- "Object data (protected)" on page 1881
- "Reason codes" on page 1881

## Object attributes

**group status**
Status of a message for a group of messages. The initial value is MQGS_NOT_IN_GROUP. The following additional values are possible:

- MQGS_MSG_IN_GROUP
- MQGS_LAST_MSG_IN_GROUP

**match options**
Options for selecting incoming messages. The initial value is MQMO_MATCH_MSG_ID | MQMO_MATCH_CORREL_ID. The following additional values are possible:

- MQMO_GROUP_ID
- MQMO_MATCH_MSG_SEQ_NUMBER
- MQMO_MATCH_OFFSET
- MQMO_MSG_TOKEN
- MQMO_NONE

**message token**
Message token. A binary value (MQBYTE16) of length MQ_MSG_TOKEN_LENGTH. The initial value is MQMTOK_NONE.

**options**
Options applicable to a message. The initial value is MQGMO_NO_WAIT. The following additional values are possible:

- MQGMO_WAIT
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_NO_SYNCPOINT
- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_BROWSE_FIRST
- MQGMO_BROWSE_NEXT
- MQGMO_BROWSE_MSG_UNDER_CURSOR
- MQGMO_MSG_UNDER_CURSOR
- MQGMO_LOCK
- MQGMO_UNLOCK
- MQGMO_ACCEPT_TRUNCATED_MSG
- MQGMO_SET_SIGNAL
- MQGMO_FAIL_IF_QUIESCING
- MQGMO_CONVERT
- MQGMO_LOGICAL_ORDER
- MQGMO_COMPLETE_MSG
- MQGMO_ALL_MSGS_AVAILABLE
- MQGMO_ALL_SEGMENTS_AVAILABLE
- MQGMO_NONE

**resolved queue name**
Resolved queue name. This attribute is read-only. Names are never longer than 48 characters and can be padded to that length with nulls. The initial value is a null string.

**returned length**
Returned length. The initial value is MQRL_UNDEFINED. This attribute is read-only.

**segmentation**
The ability to segment a message. The initial value is MQSEG_INHIBITED. The additional value, MQSEG_ALLOWED, is possible.

**segment status**
The segmentation status of a message. The initial value is MQSS_NOT_A_SEGMENT. The following additional values are possible:

- MQSS_SEGMENT
- MQSS_LAST_SEGMENT

**syncpoint participation**
TRUE when messages are retrieved under syncpoint control.

**wait interval**
The length of time that the class **get** method pauses while waiting for a suitable message to arrive, if one is not already available. The initial value is zero, which effects an indefinite wait. The additional value, MQWI_UNLIMITED, is possible. This attribute is ignored unless the **options** include MQGMO_WAIT.

## Constructors

**ImqGetMessageOptions( );**
The default constructor.

**ImqGetMessageOptions( const ImqGetMessageOptions & *gmo* );**
The copy constructor.

## Object methods (public)

**void operator = ( const ImqGetMessageOptions & *gmo* );**
Copies instance data from *gmo*, replacing the existing instance data.

**MQCHAR groupStatus ( ) const ;**
Returns the **group status**.

**void setGroupStatus ( const MQCHAR *status* );**
Sets the **group status**.

**MQLONG matchOptions ( ) const ;**
Returns the **match options**.

**void setMatchOptions ( const MQLONG *options* );**
Sets the **match options**.

**ImqBinary messageToken( ) const;**
Returns the **message token**.

**ImqBoolean setMessageToken( const ImqBinary & *token* );**
Sets the **message token**. The **data length** of *token* must be either zero or MQ_MSG_TOKEN_LENGTH. This method returns TRUE if successful.

**void setMessageToken( const MQBYTE16 *token* = 0 );**
Sets the **message token**. *token* can be zero, which is the same as specifying MQMTOK_NONE. If *token* is nonzero, then it must address MQ_MSG_TOKEN_LENGTH bytes of binary data.

When using predefined values, such as MQMTOK_NONE, you might not need to make a cast to ensure a signature match, for example (MQBYTE *)MQMTOK_NONE.

**MQLONG options ( ) const ;**
Returns the **options**.

**void setOptions ( const MQLONG *options* );**
Sets the **options**, including the **syncpoint participation** value.

**ImqString resolvedQueueName ( ) const ;**
Returns a copy of the **resolved queue name**.

**MQLONG returnedLength( ) const;**
Returns the **returned length**.

**MQCHAR segmentation ( ) const ;**
Returns the **segmentation**.

**void setSegmentation ( const MQCHAR *value* );**
Sets the **segmentation**.

**MQCHAR segmentStatus ( ) const ;**
Returns the **segment status**.

**void setSegmentStatus ( const MQCHAR *status* );**
Sets the **segment status**.

**ImqBoolean syncPointParticipation ( ) const ;**
Returns the **syncpoint participation** value, which is TRUE if the **options** include either MQGMO_SYNCPOINT or MQGMO_SYNCPOINT_IF_PERSISTENT.

**void setSyncPointParticipation ( const ImqBoolean *sync* );**
Sets the **syncpoint participation** value. If *sync* is TRUE, alters the **options** to include MQGMO_SYNCPOINT, and to exclude both MQGMO_NO_SYNCPOINT and MQGMO_SYNCPOINT_IF_PERSISTENT. If *sync* is FALSE, alters the **options** to include MQGMO_NO_SYNCPOINT, and to exclude both MQGMO_SYNCPOINT and MQGMO_SYNCPOINT_IF_PERSISTENT.

**MQLONG waitInterval ( ) const ;**
Returns the **wait interval**.

**void setWaitInterval ( const MQLONG *interval* );**
Sets the **wait interval**.

## Object methods (protected)

**static void setVersionSupported ( const MQLONG );**
Sets the **MQGMO** version. Defaults to **MQGMO_VERSION_3**.

## Object data (protected)

**MQGMO *omqgmo***
An MQGMO Version 2 data structure. Access MQGMO fields supported for MQGMO_VERSION_2 only.

**PMQGMO *opgmo***
The address of an MQGMO data structure. The version number for this address is indicated in *olVersion*. Inspect the version number before accessing MQGMO fields, to ensure that they are present.

**MQLONG *olVersion***
The version number of the MQGMO data structure addressed by *opgmo*.

## Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR

# ImqHeader C++ class

This abstract class encapsulates common features of the MQDLH data structure.

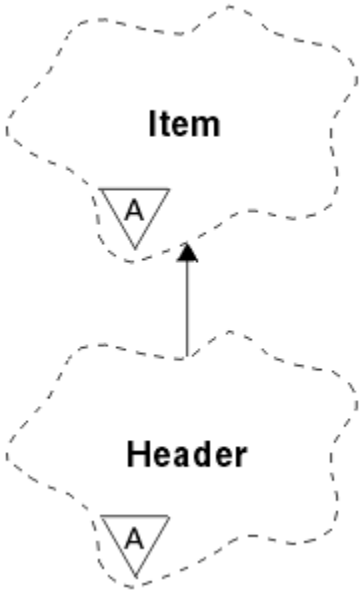



*Figure 55. ImqHeader class*


- "Object attributes" on page 1882
- "Constructors" on page 1882
- "Object methods (public)" on page 1883


## Object attributes

**character set**
The original coded character set identifier. Initially MQCCSI_Q_MGR.

**encoding**
The original encoding. Initially MQENC_NATIVE.

**format**
The original format. Initially MQFMT_NONE.

**header flags**
The initial values are:

- Zero for objects of the ImqDeadLetterHeader class
- MQIIH_NONE for objects of the ImqIMSBridgeHeader class
- MQRMHF_LAST for objects of the ImqReferenceHeader class
- MQCIH_NONE for objects of the ImqCICSBridgeHeader class
- MQWIH_NONE for objects of the ImqWorkHeader class

## Constructors

**ImqHeader( );**
The default constructor.

**ImqHeader( const ImqHeader &** ***header*** **);**
The copy constructor.

### Object methods (public)

**void operator = ( const ImqHeader & *header* );**
Copies instance data from *header*, replacing the existing instance data.

**virtual MQLONG characterSet ( ) const ;**
Returns the **character set**.

**virtual void setCharacterSet ( const MQLONG *ccsid* = MQCCSI_Q_MGR );**
Sets the **character set**.

**virtual MQLONG encoding ( ) const ;**
Returns the **encoding**.

**virtual void setEncoding ( const MQLONG *encoding* = MQENC_NATIVE );**
Sets the **encoding**.

**virtual ImqString format ( ) const ;**
Returns a copy of the **format**, including trailing blanks.

**virtual void setFormat ( const char * *name* = 0 );**
Sets the **format**, padded to 8 characters with trailing blanks.

**virtual MQLONG headerFlags ( ) const ;**
Returns the **header flags**.

**virtual void setHeaderFlags ( const MQLONG *flags* = 0 );**
Sets the **header flags**.

## ImqIMSBridgeHeader C++ class

This class encapsulates features of the MQIIH data structure.

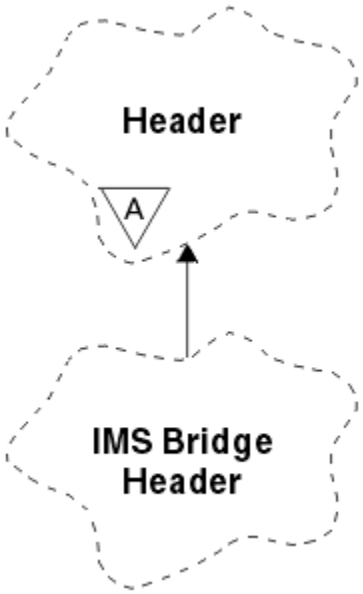



*Figure 56. ImqIMSBridgeHeader class*

Objects of this class are used by applications that send messages to the IMS bridge through IBM MQ for z/OS.

**Note:** The ImqHeader **character set** and **encoding** must have default values and must not be set to any other values.


- "Object attributes" on page 1884
- "Constructors" on page 1884
- "Overloaded ImqItem methods" on page 1884

- "Object methods (public)" on page 1885
- "Object data (protected)" on page 1885
- "Reason codes" on page 1885


## Object attributes

**authenticator**
RACF password or passticket, of length MQ_AUTHENTICATOR_LENGTH. The initial value is MQIAUT_NONE.

**commit mode**
Commit mode. See the *OTMA User's Guide* for more information about IMS commit modes. The initial value is MQICM_COMMIT_THEN_SEND. The additional value, MQICM_SEND_THEN_COMMIT, is possible.

**logical terminal override**
Logical terminal override, of length MQ_LTERM_OVERRIDE_LENGTH. The initial value is a null string.

**message format services map name**
MFS map name, of length MQ_MFS_MAP_NAME_LENGTH. The initial value is a null string.

**reply-to format**
Format of any reply, of length MQ_FORMAT_LENGTH. The initial value is MQFMT_NONE.

**security scope**
Scope of IMS security processing. The initial value is MQISS_CHECK. The additional value, MQISS_FULL, is possible.

**transaction instance id**
Transaction instance identity, a binary (MQBYTE16) value of length MQ_TRAN_INSTANCE_ID_LENGTH. The initial value is MQITII_NONE.

**transaction state**
State of the IMS conversation. The initial value is MQITS_NOT_IN_CONVERSATION. The additional value, MQITS_IN_CONVERSATION, is possible.

## Constructors

**ImqIMSBridgeHeader( );**
The default constructor.

**ImqIMSBridgeHeader( const ImqIMSBridgeHeader & *header* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Inserts an MQIIH data structure into the message buffer at the beginning, moving existing message data further along. Sets the *msg* **format** to MQFMT_IMS.

See the parent class method description for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Reads an MQIIH data structure from the message buffer.

To be successful, the **encoding** of the *msg* object must be MQENC_NATIVE. Retrieve messages with MQGMO_CONVERT to MQENC_NATIVE.

To be successful, the ImqMessage **format** must be MQFMT_IMS.

See the parent class method description for further details.

## Object methods (public)

**void operator = ( const ImqIMSBridgeHeader & *header* );**
Copies instance data from *header*, replacing the existing instance data.

**ImqString authenticator ( ) const ;**
Returns a copy of the **authenticator**, padded with trailing blanks to length MQ_AUTHENTICATOR_LENGTH.

**void setAuthenticator ( const char * *name* );**
Sets the **authenticator**.

**MQCHAR commitMode ( ) const ;**
Returns the **commit mode**.

**void setCommitMode ( const MQCHAR *mode* );**
Sets the **commit mode**.

**ImqString logicalTerminalOverride ( ) const ;**
Returns a copy of the **logical terminal override**.

**void setLogicalTerminalOverride ( const char * *override* );**
Sets the **logical terminal override**.

**ImqString messageFormatServicesMapName ( ) const ;**
Returns a copy of the **message format services map name**.

**void setMessageFormatServicesMapName ( const char * *name* );**
Sets the **message format services map name**.

**ImqString replyToFormat ( ) const ;**
Returns a copy of the **reply-to format**, padded with trailing blanks to length MQ_FORMAT_LENGTH.

**void setReplyToFormat ( const char * *format* );**
Sets the **reply-to format**, padded with trailing blanks to length MQ_FORMAT_LENGTH.

**MQCHAR securityScope ( ) const ;**
Returns the **security scope**.

**void setSecurityScope ( const MQCHAR *scope* );**
Sets the **security scope**.

**ImqBinary transactionInstanceId ( ) const ;**
Returns a copy of the **transaction instance id**.

**ImqBoolean setTransactionInstanceId ( const ImqBinary & *id* );**
Sets the **transaction instance id**. The **data length** of *token* must be either zero or MQ_TRAN_INSTANCE_ID_LENGTH. This method returns TRUE if successful.

**void setTransactionInstanceId ( const MQBYTE16 *id* = 0 );**
Sets the **transaction instance id**. *id* can be zero, which is the same as specifying MQITII_NONE. If *id* is nonzero, it must address MQ_TRAN_INSTANCE_ID_LENGTH bytes of binary data. When using predefined values such as MQITII_NONE, you might need to make a cast to ensure a signature match, for example (MQBYTE *)MQITII_NONE.

**MQCHAR transactionState ( ) const ;**
Returns the **transaction state**.

**void setTransactionState ( const MQCHAR *state* );**
Sets the **transaction state**.

## Object data (protected)

**MQIIH *omqiih***
The MQIIH data structure.

## Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR

- MQRC_INCONSISTENT_FORMAT
- MQRC_ENCODING_ERROR
- MQRC_STRUC_ID_ERROR

# ImqItem C++ class

This abstract class represents an item, perhaps one of several, within a message.

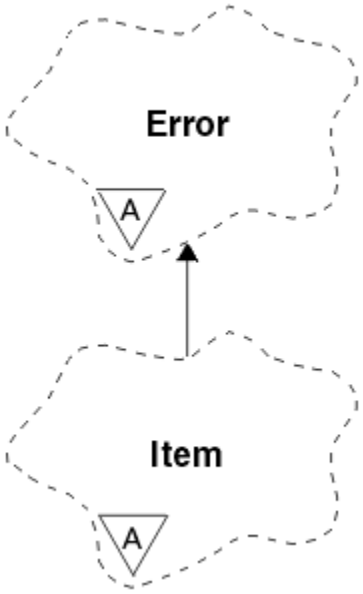



*Figure 57. ImqItem class*

Items are concatenated together in a message buffer. Each specialization is associated with a particular data structure that begins with a structure id.

Polymorphic methods in this abstract class allow items to be copied to and from messages.
The ImqMessage class **readItem** and **writeItem** methods provide another style of invoking these polymorphic methods that is more natural for application programs.


- "Object attributes" on page 1886
- "Constructors" on page 1886
- "Class methods (public)" on page 1887
- "Object methods (public)" on page 1887
- "Reason codes" on page 1887


## Object attributes

**structure id**
A string of four characters at the beginning of the data structure. This attribute is read-only. Consider this attribute for derived classes. It is not included automatically.

## Constructors

**ImqItem( );**
The default constructor.

**ImqItem( const ImqItem &** ***item*** **);**
The copy constructor.

## Class methods (public)

**static ImqBoolean structureIdIs ( const char * *structure-id-to-test*, const ImqMessage & *msg* );**

Returns TRUE if the **structure id** of the next ImqItem in the incoming *msg* is the same as *structure-id-to-test*. The next item is identified as that part of the message buffer currently addressed by the ImqCache **data pointer**. This method relies on the **structure id** and therefore is not guaranteed to work for all ImqItem derived classes.

## Object methods (public)

**void operator = ( const ImqItem & *item* );**

Copies instance data from *item*, replacing the existing instance data.

**virtual ImqBoolean copyOut ( ImqMessage & *msg* ) = 0 ;**

Writes this object as the next item in an outgoing message buffer, appending it to any existing items. If the write operation is successful, increases the ImqCache **data length**. This method returns TRUE if successful.

Override this method to work with a specific subclass.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* ) = 0 ;**

Reads this object *destructively* from the incoming message buffer. The read is destructive in that the ImqCache **data pointer** is moved on. However, the buffer content remains the same, so data can be re-read by resetting the ImqCache **data pointer**.

The (sub)class of this object must be consistent with the **structure id** found next in the message buffer of the *msg* object.

The **encoding** of the *msg* object should be MQENC_NATIVE. It is recommended that messages be retrieved with the ImqMessage **encoding** set to MQENC_NATIVE, and with the ImqGetMessageOptions **options** including MQGMO_CONVERT.

If the read operation is successful, the ImqCache **data length** is reduced. This method returns TRUE if successful.

Override this method to work with a specific subclass.

## Reason codes

- MQRC_ENCODING_ERROR
- MQRC_STRUC_ID_ERROR
- MQRC_INCONSISTENT_FORMAT
- MQRC_INSUFFICIENT_BUFFER
- MQRC_INSUFFICIENT_DATA

# ImqMessage C++ class

This class encapsulates an MQMD data structure and also handles the construction and reconstruction of message data.

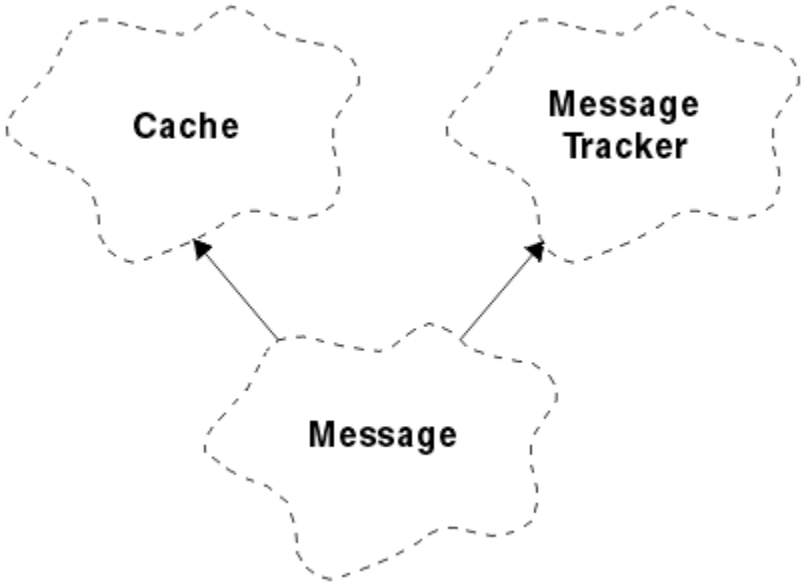



*Figure 58. ImqMessage class*


- "Object attributes" on page 1888
- "Constructors" on page 1892
- "Object methods (public)" on page 1892
- "Object methods (protected)" on page 1894
- "Object data (protected)" on page 1894


## Object attributes

**application id data**
Identity information associated with a message. The initial value is a null string.

**application origin data**
Origin information associated with a message. The initial value is a null string.

**backout count**
The number of times that a message has been tentatively retrieved and subsequently backed out. The initial value is zero. This attribute is read-only.

**character set**
Coded Character Set Id. The initial value is MQCCSI_Q_MGR. The following additional values are possible:

- MQCCSI_INHERIT
- MQCCSI_EMBEDDED

You can also use a Coded Character Set Id of your choice. For information about this, see "Code page conversion" on page 910.

**encoding**
The machine encoding of the message data. The initial value is MQENC_NATIVE.

**expiry**
A time-dependent quantity that controls how long IBM MQ retains an unretrieved message before discarding it. The initial value is MQEI_UNLIMITED.

**format**
The name of the format (template) that describes the layout of data in the buffer. Names longer than eight characters are truncated to eight characters. Names are always padded with blanks to eight characters. The initial constant value is MQFMT_NONE. The following additional constants are possible:

- MQFMT_ADMIN
- MQFMT_CICS
- MQFMT_COMMAND_1
- MQFMT_COMMAND_2
- MQFMT_DEAD_LETTER_HEADER
- MQFMT_DIST_HEADER
- MQFMT_EVENT
- MQFMT_IMS
- MQFMT_IMS_VAR_STRING
- MQFMT_MD_EXTENSION
- MQFMT_PCF
- MQFMT_REF_MSG_HEADER
- MQFMT_RF_HEADER
- MQFMT_STRING
- MQFMT_TRIGGER
- MQFMT_WORK_INFO_HEADER
- MQFMT_XMIT_Q_HEADER

You can also use an application-specific string of your choice. For more information about this, see the "Format (MQCHAR8)" on page 417 field of the message descriptor (MQMD).

**message flags**
Segmentation control information. The initial value is MQMF_SEGMENTATION_INHIBITED. The following additional values are possible:

- MQMF_SEGMENTATION_ALLOWED
- MQMF_MSG_IN_GROUP
- MQMF_LAST_MSG_IN_GROUP
- MQMF_SEGMENT
- MQMF_LAST_SEGMENT
- MQMF_NONE

**message type**
The broad categorization of a message. The initial value is MQMT_DATAGRAM. The following additional values are possible:

- MQMT_SYSTEM_FIRST
- MQMT_SYSTEM_LAST
- MQMT_DATAGRAM
- MQMT_REQUEST
- MQMT_REPLY
- MQMT_REPORT
- MQMT_APPL_FIRST
- MQMT_APPL_LAST

You can also use an application-specific value of your choice. For more information about this, see the "MsgType (MQLONG)" on page 428 field of the message descriptor (MQMD).

**offset**
Offset information. The initial value is zero.

**original length**
The original length of a segmented message. The initial value is MQOL_UNDEFINED.

**persistence**
Indicates that the message is important and must at all times be backed up using persistent storage. This option implies a performance penalty. The initial value is MQPER_PERSISTENCE_AS_Q_DEF. The following additional values are possible:

- MQPER_PERSISTENT
- MQPER_NOT_PERSISTENT

**priority**
The relative priority for transmission and delivery. Messages of the same priority are usually delivered in the same sequence as they were supplied (although there are several criteria that must be satisfied to guarantee this). The initial value is MQPRI_PRIORITY_AS_Q_DEF.

**property validation**
Specifies whether validation of properties should take place when a property of the message is set. The initial value is **MQCMHO_DEFAULT_VALIDATION**. The following additional values are possible:

- MQCMHO_VALIDATE
- MQCMHO_NO_VALIDATION

The following methods act on **property validation**:

**MQLONG propertyValidation( ) const ;**
Returns the **property validation** option.

**void setPropertyValidation( const MQLONG *option* );**
Sets the **property validation** option.

**put application name**
The name of the application that put a message. The initial value is a null string.

**put application type**
The type of application that put a message. The initial value is MQAT_NO_CONTEXT. The following additional values are possible:

- MQAT_AIX
- MQAT_CICS
- MQAT_CICS_BRIDGE
- MQAT_DOS
- MQAT_IMS
- MQAT_IMS_BRIDGE
- MQAT_MVS
- MQAT_NOTES_AGENT
- MQAT_OS2
- MQAT_OS390
- MQAT_OS400
- MQAT_QMGR
- MQAT_UNIX
- MQAT_WINDOWS
- MQAT_WINDOWS_NT

- MQAT_XCF
- MQAT_DEFAULT
- MQAT_UNKNOWN
- MQAT_USER_FIRST
- MQAT_USER_LAST

You can also use an application-specific string of your choice. For more information about this, see the "PutApplType (MQLONG)" on page 433 field of the message descriptor (MQMD).

**put date**
The date on which a message was put. The initial value is a null string.

**put time**
The time at which a message was put. The initial value is a null string.

**reply-to queue manager name**
The name of the queue manager to which any reply should be sent. The initial value is a null string.

**reply-to queue name**
The name of the queue to which any reply should be sent. The initial value is a null string.

**report**
Feedback information associated with a message. The initial value is MQRO_NONE. The following additional values are possible:

- MQRO_EXCEPTION
- MQRO_EXCEPTION_WITH_DATA
- MQRO_EXCEPTION_WITH_FULL_DATA *
- MQRO_EXPIRATION
- MQRO_EXPIRATION_WITH_DATA
- MQRO_EXPIRATION_WITH_FULL_DATA *
- MQRO_COA
- MQRO_COA_WITH_DATA
- MQRO_COA_WITH_FULL_DATA *
- MQRO_COD
- MQRO_COD_WITH_DATA
- MQRO_COD_WITH_FULL_DATA *
- MQRO_PAN
- MQRO_NAN
- MQRO_NEW_MSG_ID
- MQRO_NEW_CORREL_ID
- MQRO_COPY_MSG_ID_TO_CORREL_ID
- MQRO_PASS_CORREL_ID
- MQRO_DEAD_LETTER_Q
- MQRO_DISCARD_MSG

where * indicates values that are not supported on IBM MQ for z/OS.

**sequence number**
Sequence information identifying a message within a group. The initial value is one.

**total message length**
The number of bytes that were available during the most recent attempt to read a message. This number will be greater than the ImqCache **message length** if the last message was truncated, or if the last message was not read because truncation would have occurred. This attribute is read-only. The initial value is zero.

This attribute can be useful in any situation involving truncated messages.

**user id**
A user identity associated with a message. The initial value is a null string.

## Constructors

**ImqMessage( );**
The default constructor.

**ImqMessage( const ImqMessage & *msg* );**
The copy constructor. See the **operator =** method for details.

## Object methods (public)

**void operator = ( const ImqMessage & *msg* );**
Copies the MQMD and message data from *msg*. If a buffer has been supplied by the user for this object, the amount of data copied is restricted to the available buffer size. Otherwise, the system ensures that a buffer of adequate size is made available for the copied data.

**ImqString applicationIdData ( ) const ;**
Returns a copy of the **application id data**.

**void setApplicationIdData ( const char * *data* = 0 );**
Sets the **application id data**.

**ImqString applicationOriginData ( ) const ;**
Returns a copy of the **application origin data**.

**void setApplicationOriginData ( const char * *data* = 0 );**
Sets the **application origin data**.

**MQLONG backoutCount ( ) const ;**
Returns the **backout count**.

**MQLONG characterSet ( ) const ;**
Returns the **character set**.

**void setCharacterSet ( const MQLONG *ccsid* = MQCCSI_Q_MGR );**
Sets the **character set**.

**MQLONG encoding ( ) const ;**
Returns the **encoding**.

**void setEncoding ( const MQLONG *encoding* = MQENC_NATIVE );**
Sets the **encoding**.

**MQLONG expiry ( ) const ;**
Returns the **expiry**.

**void setExpiry ( const MQLONG *expiry* );**
Sets the **expiry**.

**ImqString format ( ) const ;**
Returns a copy of the **format**, including trailing blanks.

**ImqBoolean formatIs ( const char * *format-to-test* ) const ;**
Returns TRUE if the **format** is the same as *format-to-test*.

**void setFormat ( const char * *name* = 0 );**
Sets the **format**, padded to eight characters with trailing blanks.

**MQLONG messageFlags ( ) const ;**
Returns the **message flags**.

**void setMessageFlags ( const MQLONG *flags* );**
Sets the **message flags**.

**MQLONG messageType ( ) const ;**
Returns the **message type**.

**void setMessageType ( const MQLONG *type* );**
Sets the **message type**.

**MQLONG offset ( ) const ;**
Returns the **offset**.

**void setOffset ( const MQLONG *offset* );**
Sets the **offset**.

**MQLONG originalLength ( ) const ;**
Returns the **original length**.

**void setOriginalLength ( const MQLONG *length* );**
Sets the **original length**.

**MQLONG persistence ( ) const ;**
Returns the **persistence**.

**void setPersistence ( const MQLONG *persistence* );**
Sets the **persistence**.

**MQLONG priority ( ) const ;**
Returns the **priority**.

**void setPriority ( const MQLONG *priority* );**
Sets the **priority**.

**ImqString putApplicationName ( ) const ;**
Returns a copy of the **put application name**.

**void setPutApplicationName ( const char * *name* = 0 );**
Sets the **put application name**.

**MQLONG putApplicationType ( ) const ;**
Returns the **put application type**.

**void setPutApplicationType ( const MQLONG *type* = MQAT_NO_CONTEXT );**
Sets the **put application type**.

**ImqString putDate ( ) const ;**
Returns a copy of the **put date**.

**void setPutDate ( const char * *date* = 0 );**
Sets the **put date**.

**ImqString putTime ( ) const ;**
Returns a copy of the **put time**.

**void setPutTime ( const char * *time* = 0 );**
Sets the **put time**.

**ImqBoolean readItem ( ImqItem & *item* );**
Reads into the *item* object from the message buffer, using the ImqItem **pasteIn** method. It returns TRUE if successful.

**ImqString replyToQueueManagerName ( ) const ;**
Returns a copy of the **reply-to queue manager name**.

**void setReplyToQueueManagerName ( const char * *name* = 0 );**
Sets the **reply-to queue manager name**.

**ImqString replyToQueueName ( ) const ;**
Returns a copy of the **reply-to queue name**.

**void setReplyToQueueName ( const char * *name* = 0 );**
Sets the **reply-to queue name**.

**MQLONG report ( ) const ;**
Returns the **report**.

**void setReport ( const MQLONG *report* );**
Sets the **report**.

**MQLONG sequenceNumber ( ) const ;**
Returns the **sequence number**.

**void setSequenceNumber ( const MQLONG *number* );**
Sets the **sequence number**.

**size_t totalMessageLength ( ) const ;**
Returns the **total message length**.

**ImqString userId ( ) const ;**
Returns a copy of the **user id**.

**void setUserId ( const char * *id* = 0 );**
Sets the **user id**.

**ImqBoolean writeItem ( ImqItem & *item* );**
Writes from the *item* object into the message buffer, using the ImqItem **copyOut** method. Writing can take the form of insertion, replacement, or an append: this depends on the class of the *item* object. This method returns TRUE if successful.

### Object methods (protected)

**static void setVersionSupported ( const MQLONG );**
Sets the **MQMD version**. Defaults to **MQMD_VERSION_2**.

### Object data (protected)

**MQMD1 *omqmd***
( IBM MQ for z/OS only.) The MQMD data structure.

**MQMD2 *omqmd***
(Platforms other than z/OS.) The MQMD data structure.

## ImqMessageTracker C++ class

This class encapsulates those attributes of an ImqMessage or ImqQueue object that can be associated with either object.

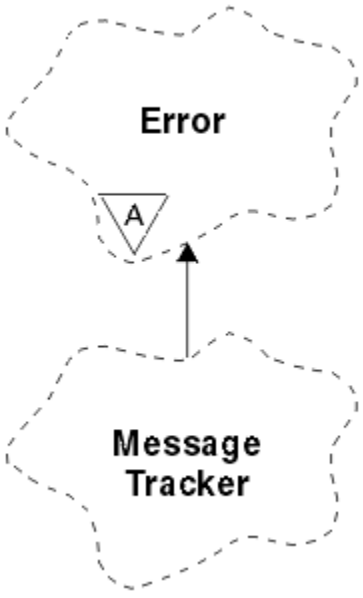



*Figure 59. ImqMessageTracker class*

This class relates to the MQI calls listed in "ImqMessageTracker cross reference" on page 1846.

- "Object attributes" on page 1895

- "Constructors" on page 1896
- "Object methods (public)" on page 1896
- "Reason codes" on page 1897


## Object attributes

**accounting token**
A binary value (MQBYTE32) of length MQ_ACCOUNTING_TOKEN_LENGTH. The initial value is MQACT_NONE.

**correlation id**
A binary value (MQBYTE24) of length MQ_CORREL_ID_LENGTH that you assign to correlate messages. The initial value is MQCI_NONE. The additional value, MQCI_NEW_SESSION, is possible.

**feedback**
Feedback information to be sent with a message. The initial value is MQFB_NONE. The following additional values are possible:

- MQFB_SYSTEM_FIRST
- MQFB_SYSTEM_LAST
- MQFB_APPL_FIRST
- MQFB_APPL_LAST
- MQFB_COA
- MQFB_COD
- MQFB_EXPIRATION
- MQFB_PAN
- MQFB_NAN
- MQFB_QUIT
- MQFB_DATA_LENGTH_ZERO
- MQFB_DATA_LENGTH_NEGATIVE
- MQFB_DATA_LENGTH_TOO_BIG
- MQFB_BUFFER_OVERFLOW
- MQFB_LENGTH_OFF_BY_ONE
- MQFB_IIH_ERROR
- MQFB_NOT_AUTHORIZED_FOR_IMS
- MQFB_IMS_ERROR
- MQFB_IMS_FIRST
- MQFB_IMS_LAST
- MQFB_CICS_APPL_ABENDED
- MQFB_CICS_APPL_NOT_STARTED
- MQFB_CICS_BRIDGE_FAILURE
- MQFB_CICS_CCSID_ERROR
- MQFB_CICS_CIH_ERROR
- MQFB_CICS_COMMAREA_ERROR
- MQFB_CICS_CORREL_ID_ERROR
- MQFB_CICS_DLQ_ERROR
- MQFB_CICS_ENCODING_ERROR
- MQFB_CICS_INTERNAL_ERROR
- MQFB_CICS_NOT_AUTHORIZED

- MQFB_CICS_UOW_BACKED_OUT
- MQFB_CICS_UOW_ERROR

You can also use an application-specific string of your choice. For more information about this, see the "Feedback (MQLONG)" on page 414 field of the message descriptor (MQMD).

**group id**
A binary value (MQBYTE24) of length MQ_GROUP_ID_LENGTH unique within a queue. The initial value is MQGI_NONE.

**message id**
A binary value (MQBYTE24) of length MQ_MSG_ID_LENGTH unique within a queue. The initial value is MQMI_NONE.

## Constructors

**ImqMessageTracker( );**
The default constructor.

**ImqMessageTracker( const ImqMessageTracker & *tracker* );**
The copy constructor. See the **operator =** method for details.

## Object methods (public)

**void operator = ( const ImqMessageTracker & *tracker* );**
Copies instance data from *tracker*, replacing the existing instance data.

**ImqBinary accountingToken ( ) const ;**
Returns a copy of the **accounting token**.

**ImqBoolean setAccountingToken ( const ImqBinary & *token* );**
Sets the **accounting token**. The **data length** of *token* must be either zero or MQ_ACCOUNTING_TOKEN_LENGTH. This method returns TRUE if successful.

**void setAccountingToken ( const MQBYTE32 *token* = 0 );**
Sets the **accounting token**. *token* can be zero, which is the same as specifying MQACT_NONE. If *token* is nonzero, it must address MQ_ACCOUNTING_TOKEN_LENGTH bytes of binary data. When using predefined values such as MQACT_NONE, you might need to make a cast to ensure a signature match; for example, (MQBYTE *)MQACT_NONE.

**ImqBinary correlationId ( ) const ;**
Returns a copy of the **correlation id**.

**ImqBoolean setCorrelationId ( const ImqBinary & *token* );**
Sets the **correlation id**. The **data length** of *token* must be either zero or MQ_CORREL_ID_LENGTH. This method returns TRUE if successful.

**void setCorrelationId ( const MQBYTE24 *id* = 0 );**
Sets the **correlation id**. *id* can be zero, which is the same as specifying MQCI_NONE. If *id* is nonzero, it must address MQ_CORREL_ID_LENGTH bytes of binary data. When using predefined values such as MQCI_NONE, you might need to make a cast to ensure a signature match; for example, (MQBYTE *)MQCI_NONE.

**MQLONG feedback ( ) const ;**
Returns the **feedback**.

**void setFeedback ( const MQLONG *feedback* );**
Sets the **feedback**.

**ImqBinary groupId ( ) const ;**
Returns a copy of the **group id**.

**ImqBoolean setGroupId ( const ImqBinary & *token* );**
Sets the **group id**. The **data length** of *token* must be either zero or MQ_GROUP_ID_LENGTH. This method returns TRUE if successful.

**void setGroupId ( const MQBYTE24 *id* = 0 );**
Sets the **group id**. *id* can be zero, which is the same as specifying MQGI_NONE. If *id* is nonzero, it must address MQ_GROUP_ID_LENGTH bytes of binary data. When using predefined values such as MQGI_NONE, you might need to make a cast to ensure a signature match, for example (MQBYTE *)MQGI_NONE.

**ImqBinary messageId ( ) const ;**
Returns a copy of the **message id**.

**ImqBoolean setMessageId ( const ImqBinary & *token* );**
Sets the **message id**. The **data length** of *token* must be either zero or MQ_MSG_ID_LENGTH. This method returns TRUE if successful.

**void setMessageId ( const MQBYTE24 *id* = 0 );**
Sets the **message id**. *id* can be zero, which is the same as specifying MQMI_NONE. If *id* is nonzero, it must address MQ_MSG_ID_LENGTH bytes of binary data. When using predefined values such as MQMI_NONE, you might need to make a cast to ensure a signature match, for example (MQBYTE *)MQMI_NONE.

### Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR

## ImqNamelist C++ class

This class encapsulates a namelist.

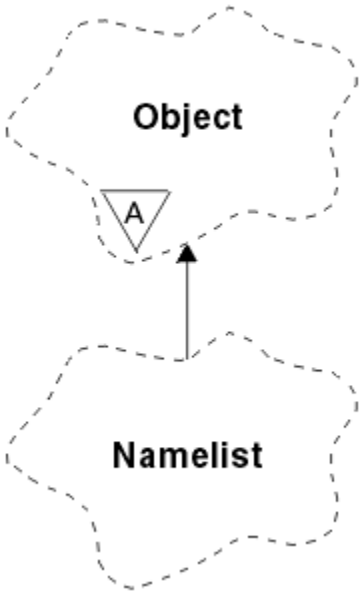



*Figure 60. ImqNamelist class*

This class relates to the MQI calls listed in "ImqNamelist cross reference" on page 1846.


- "Object attributes" on page 1897
- "Constructors" on page 1898
- "Object methods (public)" on page 1898
- "Reason codes" on page 1898


### Object attributes

**name count**
The number of object names in **namelist names**. This attribute is read-only.

**namelist names**
Object names, the number of which is indicated by the **name count**. This attribute is read-only.

### Constructors

**ImqNamelist( );**
The default constructor.

**ImqNamelist( const ImqNamelist & *list* );**
The copy constructor. The ImqObject **open status** is false.

**ImqNamelist( const char * *name* );**
Sets the ImqObject name to **name**.

### Object methods (public)

**void operator = ( const ImqNamelist & *list* );**
Copies instance data from *list*, replacing the existing instance data. The ImqObject **open status** is false.

**ImqBoolean nameCount( MQLONG & *count* );**
Provides a copy of the **name count**. It returns TRUE if successful.

**MQLONG nameCount ( );**
Returns the **name count** without any indication of possible errors.

**ImqBoolean namelistName ( const MQLONG *index*, ImqString & *name* );**
Provides a copy of one the **namelist names** by zero based index. It returns TRUE if successful.

**ImqString namelistName ( const MQLONG *index* );**
Returns one of the **namelist names** by zero-based index without any indication of possible errors.

### Reason codes

- MQRC_INDEX_ERROR
- MQRC_INDEX_NOT_PRESENT

## ImqObject C++ class

This class is abstract. When an object of this class is destroyed, it is automatically closed, and its ImqQueueManager connection severed.

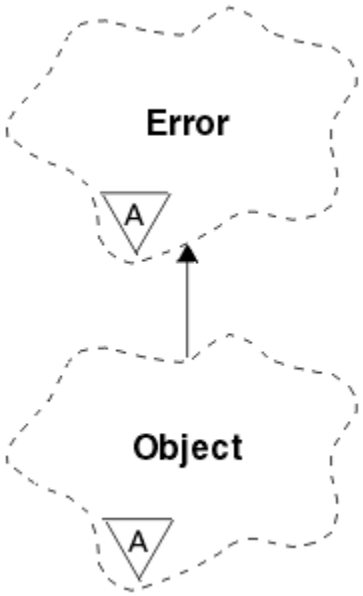



*Figure 61. ImqObject class*

This class relates to the MQI calls listed in “ImqObject cross reference” on page 1846.


- “Class attributes” on page 1899
- “Object attributes” on page 1899
- “Constructors” on page 1900
- “Class methods (public)” on page 1900
- “Object methods (public)” on page 1900
- “Object methods (protected)” on page 1902
- “Object data (protected)” on page 1903
- “Reason codes” on page 1903


## Class attributes

**behavior**
Controls the behavior of implicit opening.

**IMQ_IMPL_OPEN (8L)**
Implicit opening is allowed. This is the default.

## Object attributes

**alteration date**
The alteration date. This attribute is read-only.

**alteration time**
The alteration time. This attribute is read-only.

**alternate user id**
The alternate user id, up to MQ_USER_ID_LENGTH characters. The initial value is a null string.

**alternate security id**
The alternate security id. A binary value (MQBYTE40) of length MQ_SECURITY_ID_LENGTH. The initial value is MQSID_NONE.

**close options**
Options that apply when an object is closed. The initial value is MQCO_NONE. This attribute is ignored during implicit reopen operations, where a value of MQCO_NONE is always used.

**connection reference**
A reference to an ImqQueueManager object that provides the required connection to a (local) queue manager. For an ImqQueueManager object, it is the object itself. The initial value is zero.

**Note:** Do not confuse this with the **queue manager name** that identifies a queue manager (possibly remote) for a named queue.

**description**
The descriptive name (up to 64 characters) of the queue manager, queue, namelist, or process. This attribute is read-only.

**name**
The name (up to 48 characters) of the queue manager, queue, namelist, or process. The initial value is a null string. The name of a model queue changes after an **open** to the name of the resulting dynamic queue.

**Note:** An ImqQueueManager can have a null name, representing the default queue manager. The name changes to the actual queue manager after a successful **open**. An ImqDistributionList is dynamic and must have a null name.

**next managed object**
This is the next object of this class, in no particular order, having the same **connection reference** as this object. The initial value is zero.

**open options**
Options that apply when an object is opened. The initial value is MQOO_INQUIRE. There are two ways to set appropriate values:

1. Do not set the **open options** and do not use the **open** method. IBM MQ automatically adjusts the **open options** and automatically opens, reopens, and closes objects as required. This can result in unnecessary reopen operations, because IBM MQ uses the **openFor** method, and this adds **open options** incrementally only.
2. Set the **open options** before using any methods that result in an MQI call (see "C++ and MQI cross-reference" on page 1840 ). This ensures that unnecessary reopen operations do not occur. Set open options explicitly if any of the potential reopen problems are likely to occur (see Reopen ).

   If you use the **open** method, you ***must*** ensure that the **open options** are appropriate first. However, using the **open** method is not mandatory; IBM MQ still exhibits the same behavior as in case 1, but in this circumstance, the behavior is efficient.

Zero is not a valid value; set the appropriate value before attempting to open the object. This can be done using either **setOpenOptions** ( *lOpenOptions* ) followed by **open** ( ), or **openFor** ( *lRequiredOpenOption* ).

**Note:**

1. MQOO_OUTPUT is substituted for MQOO_INQUIRE during the **open** method for a distribution list, as MQOO_OUTPUT is the only valid **open option** at this time. However, it is good practice always to set MQOO_OUTPUT explicitly in application programs that use the **open** method.
2. Specify MQOO_RESOLVE_NAMES if you want to use the **resolved queue manager name** and **resolved queue name** attributes of the class.

**open status**
Whether the object is open (TRUE) or closed (FALSE). The initial value is FALSE. This attribute is read-only.

**previous managed object**
The previous object of this class, in no particular order, having the same **connection reference** as this object. The initial value is zero.

**queue manager identifier**
The queue manager identifier. This attribute is read-only.

## Constructors

**ImqObject( );**
The default constructor.

**ImqObject( const ImqObject & *object* );**
The copy constructor. The **open status** will be FALSE.

## Class methods (public)

**static MQLONG behavior( );**
Returns the **behavior**.

**void setBehavior( const MQLONG *behavior* = 0 );**
Sets the **behavior**.

## Object methods (public)

**void operator = ( const ImqObject & *object* );**
Performs a close if necessary, and copies the instance data from *object*. The **open status** will be FALSE.

**ImqBoolean alterationDate( ImqString & *date* );**
Provides a copy of the **alteration date**. It returns TRUE if successful.

**ImqString alterationDate( );**
Returns the **alteration date** without any indication of possible errors.

**ImqBoolean alterationTime( ImqString &** ***time*** **);**
Provides a copy of the **alteration time**. It returns TRUE if successful.

**ImqString alterationTime( );**
Returns the **alteration time** without any indication of possible errors.

**ImqString alternateUserId ( ) const ;**
Returns a copy of the **alternate user id**.

**ImqBoolean setAlternateUserId ( const char *** ***id*** **);**
Sets the **alternate user id**. The **alternate user id** can be set only while the **open status** is FALSE. This method returns TRUE if successful.

**ImqBinary alternateSecurityId( ) const ;**
Returns a copy of the **alternate security id.**

**ImqBoolean setAlternateSecurityId( const ImqBinary &** ***token*** **);**
Sets the **alternate security id**. The **alternate security id** can be set only while the **open status** is FALSE. The data length of *token* must be either zero or MQ_SECURITY_ID_LENGTH. It returns TRUE if successful.

**ImqBoolean setAlternateSecurityId( const MQBYTE*** ***token*** **= 0);**
Sets the **alternate security id**. *token* can be zero, which is the same as specifying MQSID_NONE. If *token* is nonzero, it must address MQ_SECURITY_ID_LENGTH bytes of binary data. When using predefined values such as MQSID_NONE, you might need to make a cast to ensure signature match; for example, (MQBYTE *)MQSID_NONE.

The **alternate security id** can be set only while the **open status** is TRUE. It returns TRUE if successful.

**ImqBoolean setAlternateSecurityId( const unsigned char *** ***id*** **= 0);**
Sets the **alternate security id**.

**ImqBoolean close ( );**
Sets the **open status** to FALSE. It returns TRUE if successful.

**MQLONG closeOptions ( ) const ;**
Returns the **close options**.

**void setCloseOptions ( const MQLONG** ***options*** **);**
Sets the **close options**.

**ImqQueueManager * connectionReference ( ) const ;**
Returns the **connection reference**.

**void setConnectionReference ( ImqQueueManager &** ***manager*** **);**
Sets the **connection reference**.

**void setConnectionReference ( ImqQueueManager *** ***manager*** **= 0 );**
Sets the **connection reference**.

**virtual ImqBoolean description ( ImqString &** ***description*** **) = 0 ;**
Provides a copy of the **description**. It returns TRUE if successful.

**ImqString description ( );**
Returns a copy of the **description** without any indication of possible errors.

**virtual ImqBoolean name ( ImqString &** ***name*** **);**
Provides a copy of the **name**. It returns TRUE if successful.

**ImqString name ( );**
Returns a copy of the **name** without any indication of possible errors.

**ImqBoolean setName ( const char *** ***name*** **= 0 );**
Sets the **name**. The **name** can only be set while the **open status** is FALSE, and, for an ImqQueueManager, while the **connection status** is FALSE. It returns TRUE if successful.

**ImqObject * nextManagedObject ( ) const ;**
Returns the **next managed object**.

**ImqBoolean open ( );**
Changes the **open status** to TRUE by opening the object as necessary, using among other attributes the **open options** and the **name**. This method uses the **connection reference** information and the ImqQueueManager **connect** method if necessary to ensure that the ImqQueueManager **connection status** is TRUE. It returns the **open status**.

**ImqBoolean openFor ( const MQLONG *required-options* = 0 );**
Attempts to ensure that the object is open with **open options**, or with **open options** that guarantee the behavior implied by the *required-options* parameter value.

If *required-options* is zero, input is required, and any input option suffices. So, if the **open options** already contain one of:

- MQOO_INPUT_AS_Q_DEF
- MQOO_INPUT_SHARED
- MQOO_INPUT_EXCLUSIVE

the **open options** are already satisfactory and are not changed; if the **open options** do not already contain any of these options, MQOO_INPUT_AS_Q_DEF is set in the **open options**.

If *required-options* is nonzero, the required options are added to the **open options** ; if *required-options* is any of these options, the others are reset.

If any of the **open options** are changed and the object is already open, the object is closed temporarily and reopened in order to adjust the **open options**.

It returns TRUE if successful. Success indicates that the object is open with appropriate options.

**MQLONG openOptions ( ) const ;**
Returns the **open options**.

**ImqBoolean setOpenOptions ( const MQLONG *options* );**
Sets the **open options**. The **open options** can be set only while the **open status** is FALSE. It returns TRUE if successful.

**ImqBoolean openStatus ( ) const ;**
Returns the **open status**.

**ImqObject * previousManagedObject ( ) const ;**
Returns the **previous managed object**.

**ImqBoolean queueManagerIdentifier( ImqString & *id* );**
Provides a copy of the **queue manager identifier**. It returns TRUE if successful.

**ImqString queueManagerIdentifier( );**
Returns the **queue manager identifier** without any indication of possible errors.

## Object methods (protected)

**virtual ImqBoolean closeTemporarily ( );**
Closes an object safely before reopening. It returns TRUE if successful. This method assumes that the **open status** is TRUE.

**MQHCONN connectionHandle ( ) const ;**
Returns the MQHCONN associated with the **connection reference**. This value is zero if there is no **connection reference** or if the Manager is not connected.

**ImqBoolean inquire ( const MQLONG *int-attr*, MQLONG & *value* );**
Returns an integer value, the index of which is an MQIA_* value. In case of error, the value is set to MQIAV_UNDEFINED.

**ImqBoolean inquire ( const MQLONG *char-attr*, char * & *buffer*, const size_t *length* );**
Returns a character string, the index of which is an MQCA_* value.

**Note:** Both of these methods return only a single attribute value. If a *snapshot* is required of more than one value, where the values are consistent with each other for an instant, IBM MQ C++ does not provide this facility and you must use the MQINQ call with appropriate parameters.

**virtual void openInformationDisperse ( );**
Disperses information from the variable section of the MQOD data structure immediately after an MQOPEN call.

**virtual ImqBoolean openInformationPrepare ( );**
Prepares information for the variable section of the MQOD data structure immediately before an MQOPEN call, and returns TRUE if successful.

**ImqBoolean set ( const MQLONG *int-attr*, const MQLONG *value* );**
Sets an IBM MQ integer attribute.

**ImqBoolean set ( const MQLONG *char-attr*, const char * *buffer*, const size_t *required-length* );**
Sets an IBM MQ character attribute.

**void setNextManagedObject ( const ImqObject * *object* = 0 );**
Sets the **next managed object**.

**Attention:** Use this function only if you are sure it will not break the managed object list.

**void setPreviousManagedObject ( const ImqObject * *object* = 0 );**
Sets the **previous managed object**.

**Attention:** Use this function only if you are sure it will not break the managed object list.

## Object data (protected)

**MQHOBJ *ohobj***
The IBM MQ object handle (valid only when **open status** is TRUE).

**MQOD *omqod***
The embedded MQOD data structure. The amount of storage allocated for this data structure is that required for an MQOD Version 2. Inspect the version number *(omqod.Version)* and access the other fields as follows:

**MQOD_VERSION_1**
All other fields in *omqod* can be accessed.

**MQOD_VERSION_2**
All other fields in *omqod* can be accessed.

**MQOD_VERSION_3**
*omqod.pmqod* is a pointer to a dynamically allocated, larger, MQOD. No other fields in *omqod* can be accessed. All fields addressed by *omqod.pmqod* can be accessed.

**Note:** *omqod.pmqod.Version* can be less than *omqod.Version*, indicating that the IBM MQ MQI client has more functionality than the IBM MQ server.

## Reason codes

- MQRC_ATTRIBUTE_LOCKED
- MQRC_INCONSISTENT_OBJECT_STATE
- MQRC_NO_CONNECTION_REFERENCE
- MQRC_STORAGE_NOT_AVAILABLE
- MQRC_REOPEN_SAVED_CONTEXT_ERR
- (reason codes from MQCLOSE)
- (reason codes from MQCONN)
- (reason codes from MQINQ)
- (reason codes from MQOPEN)
- (reason codes from MQSET)

# ImqProcess C++ class

This class encapsulates an application process (an IBM MQ object of type MQOT_PROCESS) that can be triggered by a trigger monitor.

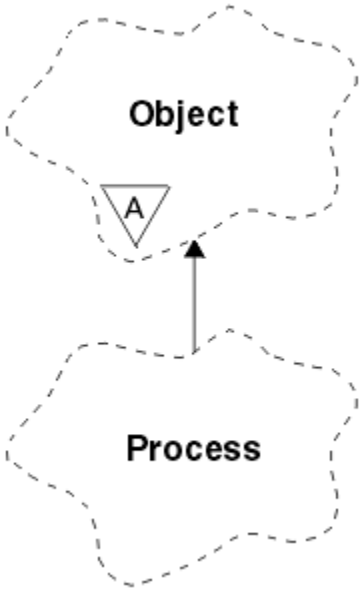



*Figure 62. ImqProcess class*


- "Object attributes" on page 1904
- "Constructors" on page 1904
- "Object methods (public)" on page 1904


## Object attributes

**application id**
The identity of the application process. This attribute is read-only.

**application type**
The type of the application process. This attribute is read-only.

**environment data**
The environment information for the process. This attribute is read-only.

**user data**
User data for the process. This attribute is read-only.

## Constructors

**ImqProcess( );**
The default constructor.

**ImqProcess( const ImqProcess &** ***process*** **);**
The copy constructor. The ImqObject **open status** is FALSE.

**ImqProcess( const char *** ***name*** **);**
Sets the ImqObject **name**.

## Object methods (public)

**void operator = ( const ImqProcess &** ***process*** **);**
Performs a close if necessary, and then copies instance data from *process*. The ImqObject **open status** will be FALSE.

**ImqBoolean applicationId ( ImqString & *id* );**
Provides a copy of the **application id**. It returns TRUE if successful.

**ImqString applicationId ( );**
Returns the **application id** without any indication of possible errors.

**ImqBoolean applicationType ( MQLONG & *type* );**
Provides a copy of the **application type**. It returns TRUE if successful.

**MQLONG applicationType ( );**
Returns the **application type** without any indication of possible errors.

**ImqBoolean environmentData ( ImqString & *data* );**
Provides a copy of the **environment data**. It returns TRUE if successful.

**ImqString environmentData ( );**
Returns the **environment data** without any indication of possible errors.

**ImqBoolean userData ( ImqString & *data* );**
Provides a copy of the **user data**. It returns TRUE if successful.

**ImqString userData ( );**
Returns the **user data** without any indication of possible errors.

# ImqPutMessageOptions C++ class

This class encapsulates the MQPMO data structure.

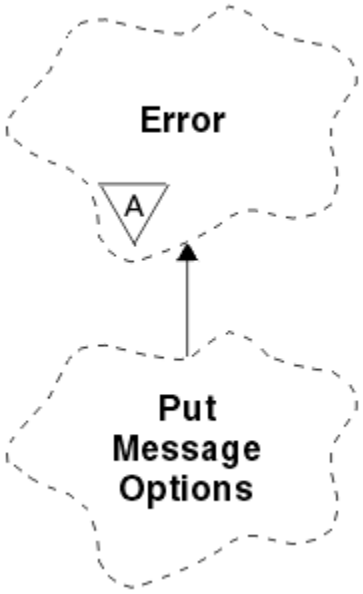



*Figure 63. ImqPutMessageOptions class*


- "Object attributes" on page 1905
- "Constructors" on page 1906
- "Object methods (public)" on page 1906
- "Object data (protected)" on page 1907
- "Reason codes" on page 1907


## Object attributes

**context reference**
An ImqQueue that provides a context for messages. Initially there is no reference.

**options**
The put message options. The initial value is MQPMO_NONE. The following additional values are possible:

- MQPMO_SYNCPOINT
- MQPMO_NO_SYNCPOINT
- MQPMO_NEW_MSG_ID
- MQPMO_NEW_CORREL_ID
- MQPMO_LOGICAL_ORDER
- MQPMO_NO_CONTEXT
- MQPMO_DEFAULT_CONTEXT
- MQPMO_PASS_IDENTITY_CONTEXT
- MQPMO_PASS_ALL_CONTEXT
- MQPMO_SET_IDENTITY_CONTEXT
- MQPMO_SET_ALL_CONTEXT
- MQPMO_ALTERNATE_USER_AUTHORITY
- MQPMO_FAIL_IF_QUIESCING

**record fields**
The flags that control the inclusion of put message records when a message is put. The initial value is MQPMRF_NONE. The following additional values are possible:

- MQPMRF_MSG_ID
- MQPMRF_CORREL_ID
- MQPMRF_GROUP_ID
- MQPMRF_FEEDBACK
- MQPMRF_ACCOUNTING_TOKEN

ImqMessageTracker attributes are taken from the object for any field that is specified. ImqMessageTracker attributes are taken from the ImqMessage object for any field that is *not* specified.

**resolved queue manager name**
Name of a destination queue manager determined during a put. The initial value is null. This attribute is read-only.

**resolved queue name**
Name of a destination queue determined during a put. The initial value is null. This attribute is read-only.

**syncpoint participation**
TRUE when messages are put under syncpoint control.

## Constructors

**ImqPutMessageOptions( );**
The default constructor.

**ImqPutMessageOptions( const ImqPutMessageOptions & *pmo* );**
The copy constructor.

## Object methods (public)

**void operator = ( const ImqPutMessageOptions & *pmo* );**
Copies instance data from *pmo*, replacing the existing instance data.

**ImqQueue * contextReference ( ) const ;**
Returns the **context reference**.

**void setContextReference ( const ImqQueue & *queue* );**
Sets the **context reference**.

**void setContextReference ( const ImqQueue * *queue* = 0 );**
Sets the **context reference**.

**MQLONG options ( ) const ;**
Returns the **options**.

**void setOptions ( const MQLONG *options* );**
Sets the **options**, including the **syncpoint participation** value.

**MQLONG recordFields ( ) const ;**
Returns the **record fields**.

**void setRecordFields ( const MQLONG *fields* );**
Sets the **record fields**.

**ImqString resolvedQueueManagerName ( ) const ;**
Returns a copy of the **resolved queue manager name**.

**ImqString resolvedQueueName ( ) const ;**
Returns a copy of the **resolved queue name**.

**ImqBoolean syncPointParticipation ( ) const ;**
Returns the **syncpoint participation** value, which is TRUE if the **options** include MQPMO_SYNCPOINT.

**void setSyncPointParticipation ( const ImqBoolean *sync* );**
Sets the **syncpoint participation** value. If *sync* is TRUE, the **options** are altered to include MQPMO_SYNCPOINT, and to exclude MQPMO_NO_SYNCPOINT. If *sync* is FALSE, the **options** are altered to include MQPMO_NO_SYNCPOINT, and to exclude MQPMO_SYNCPOINT.

## Object data (protected)

**MQPMO *omqpmo***
The MQPMO data structure.

## Reason codes

- MQRC_STORAGE_NOT_AVAILABLE

# ImqQueue C++ class

This class encapsulates a message queue (an IBM MQ object of type MQOT_Q).

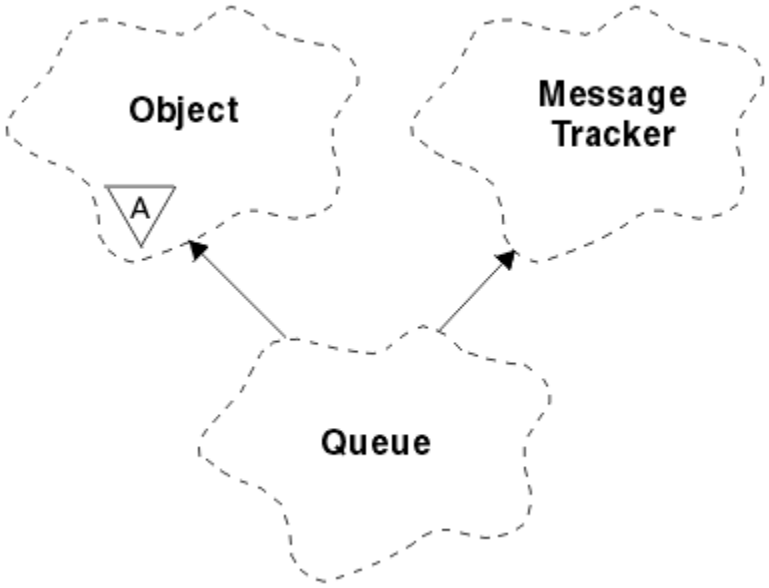



*Figure 64. ImqQueue class*

This class relates to the MQI calls listed in Table 674 on page 1848.


- "Object attributes" on page 1908
- "Constructors" on page 1911
- "Object methods (public)" on page 1911
- "Object methods (protected)" on page 1917
- "Reason codes" on page 1917


## Object attributes

**backout requeue name**
Excessive backout requeue name. This attribute is read-only.

**backout threshold**
Backout threshold. This attribute is read-only.

**base queue name**
Name of the queue that the alias resolves to. This attribute is read-only.

**cluster name**
Cluster name. This attribute is read-only.

**cluster namelist name**
Cluster namelist name. This attribute is read-only.

**cluster workload rank**
Cluster workload rank. This attribute is read-only.

**cluster workload priority**
Cluster workload priority. This attribute is read-only.

**cluster workload use queue**
Cluster workload use queue value. This attribute is read-only.

**creation date**
Queue creation data. This attribute is read-only.

**creation time**
Queue creation time. This attribute is read-only.

**current depth**
Number of messages on the queue. This attribute is read-only.

**default bind**
Default bind. This attribute is read-only.

**default input open option**
Default open-for-input option. This attribute is read-only.

**default persistence**
Default message persistence. This attribute is read-only.

**default priority**
Default message priority. This attribute is read-only.

**definition type**
Queue definition type. This attribute is read-only.

**depth high event**
Control attribute for queue depth high events. This attribute is read-only.

**depth high limit**
High limit for the queue depth. This attribute is read-only.

**depth low event**
Control attribute for queue depth low events. This attribute is read-only.

**depth low limit**
Low limit for the queue depth. This attribute is read-only.

**depth maximum event**
Control attribute for queue depth maximum events. This attribute is read-only.

**distribution list reference**
Optional reference to an ImqDistributionList that can be used to distribute messages to more than one queue, including this one. The initial value is null.

**Note:** When an ImqQueue object is opened, any open ImqDistributionList object that it references is automatically closed.

**distribution lists**
The capability of a transmission queue to support distribution lists. This attribute is read-only.

**dynamic queue name**
Dynamic queue name. The initial value is AMQ.* for all Windows, UNIX, and Linux platforms.

**harden get backout**
Whether to harden the backout count. This attribute is read-only.

**index type**
Index type. This attribute is read-only.

**inhibit get**
Whether get operations are allowed. The initial value is dependent on the queue definition. This attribute is valid for an alias or local queue only.

**inhibit put**
Whether put operations are allowed. The initial value is dependent on the queue definition.

**initiation queue name**
Name of the initiation queue. This attribute is read-only.

**maximum depth**
Maximum number of messages allowed on the queue. This attribute is read-only.

**maximum message length**
Maximum length for any message on this queue, which can be less than the maximum for any queue managed by the associated queue manager. This attribute is read-only.

**message delivery sequence**
Whether message priority is relevant. This attribute is read-only.

**next distributed queue**
Next object of this class, in no particular order, having the same **distribution list reference** as this object. The initial value is zero.

If an object in a chain is deleted, the previous object and next object are updated so that their distributed queue links no longer point to the deleted object.

**non-persistent message class**
Level of reliability for non-persistent messages put to this queue. This attribute is read-only.

**open input count**
Number of ImqQueue objects that are open for input. This attribute is read-only.

**open output count**
Number of ImqQueue objects that are open for output. This attribute is read-only.

**previous distributed queue**
Previous object of this class, in no particular order, having the same **distribution list reference** as this object. The initial value is zero.

If an object in a chain is deleted, the previous object and next object are updated so that their distributed queue links no longer point to the deleted object.

**process name**
Name of the process definition. This attribute is read-only.

**queue accounting**
Level of accounting information for queues. This attribute is read-only.

**queue manager name**
Name of the queue manager (possibly remote) where the queue resides. Do not confuse the queue manager named here with the ImqObject **connection reference**, which references the (local) queue manager providing a connection. The initial value is null.

**queue monitoring**
Level of monitoring data collection for the queue. This attribute is read-only.

**queue statistics**
Level of statistics data for the queue. This attribute is read-only.

**queue type**
Queue type. This attribute is read-only.

**remote queue manager name**
Name of the remote queue manager. This attribute is read-only.

**remote queue name**
Name of the remote queue as known on the remote queue manager. This attribute is read-only.

**resolved queue manager name**
Resolved queue manager name. This attribute is read-only.

**resolved queue name**
Resolved queue name. This attribute is read-only.

**retention interval**
Queue retention interval. This attribute is read-only.

**scope**
Scope of the queue definition. This attribute is read-only.

**service interval**
Service interval. This attribute is read-only.

**service interval event**
Control attribute for service interval events. This attribute is read-only.

**shareability**
Whether the queue can be shared. This attribute is read-only.

**storage class**
Storage class. This attribute is read-only.

**transmission queue name**
Name of the transmission queue. This attribute is read-only.

**trigger control**
Trigger control. The initial value depends on the queue definition. This attribute is valid for a local queue only.

**trigger data**
Trigger data. The initial value depends on the queue definition. This attribute is valid for a local queue only.

**trigger depth**
Trigger depth. The initial value depends on the queue definition. This attribute is valid for a local queue only.

**trigger message priority**
Threshold message priority for triggers. The initial value depends on the queue definition. This attribute is valid for a local queue only.

**trigger type**
Trigger type. The initial value depends on the queue definition. This attribute is valid for a local queue only.

**usage**
Usage. This attribute is read-only.

## Constructors

**ImqQueue( );**
The default constructor.

**ImqQueue( const ImqQueue & *queue* );**
The copy constructor. The ImqObject **open status** will be FALSE.

**ImqQueue( const char * *name* );**
Sets the ImqObject **name**.

## Object methods (public)

**void operator = ( const ImqQueue & *queue* );**
Performs a close if necessary, and then copies instance data from *queue*. The ImqObject **open status** will be FALSE.

**ImqBoolean backoutRequeueName ( ImqString & *name* );**
Provides a copy of the **backout requeue name**. It returns TRUE if successful.

**ImqString backoutRequeueName ( );**
Returns the **backout requeue name** without any indication of possible errors.

**ImqBoolean backoutThreshold ( MQLONG & *threshold* );**
Provides a copy of the **backout threshold**. It returns TRUE if successful.

**MQLONG backoutThreshold ( );**
Returns the **backout threshold** value without any indication of possible errors.

**ImqBoolean baseQueueName ( ImqString & *name* );**
Provides a copy of the **base queue name**. It returns TRUE if successful.

**ImqString baseQueueName ( );**
Returns the **base queue name** without any indication of possible errors.

**ImqBoolean clusterName( ImqString & *name* );**
Provides a copy of the **cluster name**. It returns TRUE if successful.

**ImqString clusterName( );**
Returns the **cluster name** without any indication of possible errors.

**ImqBoolean clusterNamelistName( ImqString &** ***name*** **);**
Provides a copy of the **cluster namelist name**. It returns TRUE if successful.

**ImqString clusterNamelistName( );**
Returns the **cluster namelist name** without any indication of errors.

**ImqBoolean clusterWorkLoadPriority ( MQLONG & priority );**
Provides a copy of the cluster workload priority value. It returns TRUE if successful.

**MQLONG clusterWorkLoadPriority ( );**
Returns the cluster workload priority value without any indication of possible errors.

**ImqBoolean clusterWorkLoadRank ( MQLONG & rank );**
Provides a copy of the cluster workload rank value. It returns TRUE if successful.

**MQLONG clusterWorkLoadRank ( );**
Returns the cluster workload rank value without any indication of possible errors.

**ImqBoolean clusterWorkLoadUseQ ( MQLONG & useq );**
Provides a copy of the cluster workload use queue value. It returns TRUE if successful.

**MQLONG clusterWorkLoadUseQ ( );**
Returns the cluster workload use queue value without any indication of possible errors.

**ImqBoolean creationDate ( ImqString &** ***date*** **);**
Provides a copy of the **creation date**. It returns TRUE if successful.

**ImqString creationDate ( );**
Returns the **creation date** without any indication of possible errors.

**ImqBoolean creationTime ( ImqString &** ***time*** **);**
Provides a copy of the **creation time**. It returns TRUE if successful.

**ImqString creationTime ( );**
Returns the **creation time** without any indication of possible errors.

**ImqBoolean currentDepth ( MQLONG &** ***depth*** **);**
Provides a copy of the **current depth**. It returns TRUE if successful.

**MQLONG currentDepth ( );**
Returns the **current depth** without any indication of possible errors.

**ImqBoolean defaultInputOpenOption ( MQLONG &** ***option*** **);**
Provides a copy of the **default input open option**. It returns TRUE if successful.

**MQLONG defaultInputOpenOption ( );**
Returns the **default input open option** without any indication of possible errors.

**ImqBoolean defaultPersistence ( MQLONG &** ***persistence*** **);**
Provides a copy of the **default persistence**. It returns TRUE if successful.

**MQLONG defaultPersistence ( );**
Returns the **default persistence** without any indication of possible errors.

**ImqBoolean defaultPriority ( MQLONG &** ***priority*** **);**
Provides a copy of the **default priority**. It returns TRUE if successful.

**MQLONG defaultPriority ( );**
Returns the **default priority** without any indication of possible errors.

**ImqBoolean defaultBind ( MQLONG &** ***bind*** **);**
Provides a copy of the **default bind**. It returns TRUE if successful.

**MQLONG defaultBind ( );**
Returns the **default bind** without any indication of possible errors.

**ImqBoolean definitionType ( MQLONG &** ***type*** **);**
Provides a copy of the **definition type**. It returns TRUE if successful.

**MQLONG definitionType ( );**
Returns the **definition type** without any indication of possible errors.

**ImqBoolean depthHighEvent ( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **depth high event**. It returns TRUE if successful.

**MQLONG depthHighEvent ( );**
Returns the enablement state of the **depth high event** without any indication of possible errors.

**ImqBoolean depthHighLimit ( MQLONG &** ***limit*** **);**
Provides a copy of the **depth high limit**. It returns TRUE if successful.

**MQLONG depthHighLimit ( );**
Returns the **depth high limit** value without any indication of possible errors.

**ImqBoolean depthLowEvent ( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **depth low event**. It returns TRUE if successful.

**MQLONG depthLowEvent ( );**
Returns the enablement state of the **depth low event** without any indication of possible errors.

**ImqBoolean depthLowLimit ( MQLONG &** ***limit*** **);**
Provides a copy of the **depth low limit**. It returns TRUE if successful.

**MQLONG depthLowLimit ( );**
Returns the **depth low limit** value without any indication of possible errors.

**ImqBoolean depthMaximumEvent ( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **depth maximum event**. It returns TRUE if successful.

**MQLONG depthMaximumEvent ( );**
Returns the enablement state of the **depth maximum event** without any indication of possible errors.

**ImqDistributionList * distributionListReference ( ) const ;**
Returns the **distribution list reference**.

**void setDistributionListReference ( ImqDistributionList &** ***list*** **);**
Sets the **distribution list reference**.

**void setDistributionListReference ( ImqDistributionList *** ***list*** **= 0 );**
Sets the **distribution list reference**.

**ImqBoolean distributionLists ( MQLONG &** ***support*** **);**
Provides a copy of the **distribution lists** value. It returns TRUE if successful.

**MQLONG distributionLists ( );**
Returns the **distribution lists** value without any indication of possible errors.

**ImqBoolean setDistributionLists ( const MQLONG** ***support*** **);**
Sets the **distribution lists** value. It returns TRUE if successful.

**ImqString dynamicQueueName ( ) const ;**
Returns a copy of the **dynamic queue name**.

**ImqBoolean setDynamicQueueName ( const char *** ***name*** **);**
Sets the **dynamic queue name**. The **dynamic queue name** can be set only while the ImqObject **open status** is FALSE. It returns TRUE if successful.

**ImqBoolean get ( ImqMessage &** ***msg*****, ImqGetMessageOptions &** ***options*** **);**
Retrieves a message from the queue, using the specified *options*. Invokes the ImqObject **openFor** method if necessary to ensure that the ImqObject **open options** include either one of the MQOO_INPUT_* values, or the MQOO_BROWSE value, depending on the *options*. If the *msg* object has an ImqCache **automatic buffer**, the buffer grows to accommodate any message retrieved. The **clearMessage** method is invoked against the *msg* object before retrieval.

This method returns TRUE if successful.

**Note:** The result of the method invocation is FALSE if the ImqObject **reason code** is MQRC_TRUNCATED_MSG_FAILED, even though this **reason code** is classified as a warning. If a truncated message is accepted, the ImqCache **message length** reflects the truncated length. In either event, the ImqMessage **total message length** indicates the number of bytes that were available.

**ImqBoolean get ( ImqMessage &** ***msg*** **);**
As for the previous method, except that default get message options are used.

**ImqBoolean get ( ImqMessage & *msg*, ImqGetMessageOptions & *options*, const size_t *buffer-size* );**
As for the previous two methods, except that an overriding *buffer-size* is indicated. If the *msg* object employs an ImqCache **automatic buffer**, the **resizeBuffer** method is invoked on the *msg* object prior to message retrieval, and the buffer does not grow further to accommodate any larger message.

**ImqBoolean get ( ImqMessage & *msg*, const size_t *buffer-size* );**
As for the previous method, except that default get message options are used.

**ImqBoolean hardenGetBackout ( MQLONG & *harden* );**
Provides a copy of the **harden get backout** value. It returns TRUE if successful.

**MQLONG hardenGetBackout ( );**
Returns the **harden get backout** value without any indication of possible errors.

**ImqBoolean indexType( MQLONG & *type* );**
Provides a copy of the **index type**. It returns TRUE if successful.

**MQLONG indexType( );**
Returns the **index type** without any indication of possible errors.

**ImqBoolean inhibitGet ( MQLONG & *inhibit* );**
Provides a copy of the **inhibit get** value. It returns TRUE if successful.

**MQLONG inhibitGet ( );**
Returns the **inhibit get** value without any indication of possible errors.

**ImqBoolean setInhibitGet ( const MQLONG *inhibit* );**
Sets the **inhibit get** value. It returns TRUE if successful.

**ImqBoolean inhibitPut ( MQLONG & *inhibit* );**
Provides a copy of the **inhibit put** value. It returns TRUE if successful.

**MQLONG inhibitPut ( );**
Returns the **inhibit put** value without any indication of possible errors.

**ImqBoolean setInhibitPut ( const MQLONG *inhibit* );**
Sets the **inhibit put** value. It returns TRUE if successful.

**ImqBoolean initiationQueueName ( ImqString & *name* );**
Provides a copy of the **initiation queue name**. It returns TRUE if successful.

**ImqString initiationQueueName ( );**
Returns the **initiation queue name** without any indication of possible errors.

**ImqBoolean maximumDepth ( MQLONG & *depth* );**
Provides a copy of the **maximum depth**. It returns TRUE if successful.

**MQLONG maximumDepth ( );**
Returns the **maximum depth** without any indication of possible errors.

**ImqBoolean maximumMessageLength ( MQLONG & *length* );**
Provides a copy of the **maximum message length**. It returns TRUE if successful.

**MQLONG maximumMessageLength ( );**
Returns the **maximum message length** without any indication of possible errors.

**ImqBoolean messageDeliverySequence ( MQLONG & *sequence* );**
Provides a copy of the **message delivery sequence**. It returns TRUE if successful.

**MQLONG messageDeliverySequence ( );**
Returns the **message delivery sequence** value without any indication of possible errors.

**ImqQueue * nextDistributedQueue ( ) const ;**
Returns the **next distributed queue**.

**ImqBoolean nonPersistentMessageClass ( MQLONG & monq );**
Provides a copy of the non persistent message class value. It returns TRUE if successful.

**MQLONG nonPersistentMessageClass ( );**
Returns the non persistent message class value without any indication of possible errors.

**ImqBoolean openInputCount ( MQLONG & *count* );**
Provides a copy of the **open input count**. It returns TRUE if successful.

**MQLONG openInputCount ( );**
Returns the **open input count** without any indication of possible errors.

**ImqBoolean openOutputCount ( MQLONG &** ***count*** **);**
Provides a copy of the **open output count**. It returns TRUE if successful.

**MQLONG openOutputCount ( );**
Returns the **open output count** without any indication of possible errors.

**ImqQueue * previousDistributedQueue ( ) const ;**
Returns the **previous distributed queue**.

**ImqBoolean processName ( ImqString &** ***name*** **);**
Provides a copy of the **process name**. It returns TRUE if successful.

**ImqString processName ( );**
Returns the **process name** without any indication of possible errors.

**ImqBoolean put ( ImqMessage &** ***msg*** **);**
Places a message onto the queue, using default put message options. Uses the ImqObject **openFor** method if necessary to ensure that the ImqObject **open options** include MQOO_OUTPUT.

This method returns TRUE if successful.

**ImqBoolean put ( ImqMessage &** ***msg*****, ImqPutMessageOptions &** ***pmo*** **);**
Places a message onto the queue, using the specified *pmo*. Uses the ImqObject **openFor** method as necessary to ensure that the ImqObject **open options** include MQOO_OUTPUT, and (if the *pmo* **options** include any of MQPMO_PASS_IDENTITY_CONTEXT, MQPMO_PASS_ALL_CONTEXT, MQPMO_SET_IDENTITY_CONTEXT, or MQPMO_SET_ALL_CONTEXT) corresponding MQOO_*_CONTEXT values.

This method returns TRUE if successful.

**Note:** If the *pmo* includes a **context reference**, the referenced object is opened, if necessary, to provide a context.

**ImqBoolean queueAccounting ( MQLONG & acctq );**
Provides a copy of the queue accounting value. It returns TRUE if successful.

**MQLONG queueAccounting ( );**
Returns the queue accounting value without any indication of possible errors.

**ImqString queueManagerName ( ) const ;**
Returns the **queue manager name**.

**ImqBoolean setQueueManagerName ( const char *** ***name*** **);**
Sets the **queue manager name**. The **queue manager name** can be set only while the ImqObject **open status** is FALSE. This method returns TRUE if successful.

**ImqBoolean queueMonitoring ( MQLONG & monq );**
Provides a copy of the queue monitoring value. It returns TRUE if successful.

**MQLONG queueMonitoring ( );**
Returns the queue monitoring value without any indication of possible errors.

**ImqBoolean queueStatistics ( MQLONG & statq );**
Provides a copy of the queue statistics value. It returns TRUE if successful.

**MQLONG queueStatistics ( );**
Returns the queue statistics value without any indication of possible errors.

**ImqBoolean queueType ( MQLONG &** ***type*** **);**
Provides a copy of the **queue type** value. It returns TRUE if successful.

**MQLONG queueType ( );**
Returns the **queue type** without any indication of possible errors.

**ImqBoolean remoteQueueManagerName ( ImqString &** ***name*** **);**
Provides a copy of the **remote queue manager name**. It returns TRUE if successful.

**ImqString remoteQueueManagerName ( );**
Returns the **remote queue manager name** without any indication of possible errors.

**ImqBoolean remoteQueueName ( ImqString &** ***name*** **);**
Provides a copy of the **remote queue name**. It returns TRUE if successful.

**ImqString remoteQueueName ( );**
Returns the **remote queue name** without any indication of possible errors.

**ImqBoolean resolvedQueueManagerName( ImqString &** ***name*** **);**
Provides a copy of the **resolved queue manager name**. It returns TRUE if successful.

**Note:** This method fails unless MQOO_RESOLVE_NAMES is among the ImqObject **open options**.

**ImqString resolvedQueueManagerName( ) ;**
Returns the **resolved queue manager name**, without any indication of possible errors.

**ImqBoolean resolvedQueueName( ImqString &** ***name*** **);**
Provides a copy of the **resolved queue name**. It returns TRUE if successful.

**Note:** This method fails unless MQOO_RESOLVE_NAMES is among the ImqObject **open options**.

**ImqString resolvedQueueName( ) ;**
Returns the **resolved queue name**, without any indication of possible errors.

**ImqBoolean retentionInterval ( MQLONG &** ***interval*** **);**
Provides a copy of the **retention interval**. It returns TRUE if successful.

**MQLONG retentionInterval ( );**
Returns the **retention interval** without any indication of possible errors.

**ImqBoolean scope ( MQLONG &** ***scope*** **);**
Provides a copy of the **scope**. It returns TRUE if successful.

**MQLONG scope ( );**
Returns the **scope** without any indication of possible errors.

**ImqBoolean serviceInterval ( MQLONG &** ***interval*** **);**
Provides a copy of the **service interval**. It returns TRUE if successful.

**MQLONG serviceInterval ( );**
Returns the **service interval** without any indication of possible errors.

**ImqBoolean serviceIntervalEvent ( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **service interval event**. It returns TRUE if successful.

**MQLONG serviceIntervalEvent ( );**
Returns the enablement state of the **service interval event** without any indication of possible errors.

**ImqBoolean shareability ( MQLONG &** ***shareability*** **);**
Provides a copy of the **shareability** value. It returns TRUE if successful.

**MQLONG shareability ( );**
Returns the **shareability** value without any indication of possible errors.

**ImqBoolean storageClass( ImqString &** ***class*** **);**
Provides a copy of the **storage class**. It returns TRUE if successful.

**ImqString storageClass( );**
Returns the **storage class** without any indication of possible errors.

**ImqBoolean transmissionQueueName ( ImqString &** ***name*** **);**
Provides a copy of the **transmission queue name**. It returns TRUE if successful.

**ImqString transmissionQueueName ( );**
Returns the **transmission queue name** without any indication of possible errors.

**ImqBoolean triggerControl ( MQLONG &** ***control*** **);**
Provides a copy of the **trigger control** value. It returns TRUE if successful.

**MQLONG triggerControl ( );**
Returns the **trigger control** value without any indication of possible errors.

**ImqBoolean setTriggerControl ( const MQLONG *control* );**
Sets the **trigger control** value. It returns TRUE if successful.

**ImqBoolean triggerData ( ImqString & *data* );**
Provides a copy of the **trigger data**. It returns TRUE if successful.

**ImqString triggerData ( );**
Returns a copy of the **trigger data** without any indication of possible errors.

**ImqBoolean setTriggerData ( const char * *data* );**
Sets the **trigger data**. It returns TRUE if successful.

**ImqBoolean triggerDepth ( MQLONG & *depth* );**
Provides a copy of the **trigger depth**. It returns TRUE if successful.

**MQLONG triggerDepth ( );**
Returns the **trigger depth** without any indication of possible errors.

**ImqBoolean setTriggerDepth ( const MQLONG *depth* );**
Sets the **trigger depth**. It returns TRUE if successful.

**ImqBoolean triggerMessagePriority ( MQLONG & *priority* );**
Provides a copy of the **trigger message priority**. It returns TRUE if successful.

**MQLONG triggerMessagePriority ( );**
Returns the **trigger message priority** without any indication of possible errors.

**ImqBoolean setTriggerMessagePriority ( const MQLONG *priority* );**
Sets the **trigger message priority**. It returns TRUE if successful.

**ImqBoolean triggerType ( MQLONG & *type* );**
Provides a copy of the **trigger type**. It returns TRUE if successful.

**MQLONG triggerType ( );**
Returns the **trigger type** without any indication of possible errors.

**ImqBoolean setTriggerType ( const MQLONG *type* );**
Sets the **trigger type**. It returns TRUE if successful.

**ImqBoolean usage ( MQLONG & *usage* );**
Provides a copy of the **usage** value. It returns TRUE if successful.

**MQLONG usage ( );**
Returns the **usage** value without any indication of possible errors.

## Object methods (protected)

**void setNextDistributedQueue ( ImqQueue * *queue* = 0 );**
Sets the **next distributed queue**.

**Attention:** Use this function only if you are sure it will not break the distributed queue list.

**void setPreviousDistributedQueue ( ImqQueue * *queue* = 0 );**
Sets the **previous distributed queue**.

**Attention:** Use this function only if you are sure it will not break the distributed queue list.

## Reason codes

- MQRC_ATTRIBUTE_LOCKED
- MQRC_CONTEXT_OBJECT_NOT_VALID
- MQRC_CONTEXT_OPEN_ERROR
- MQRC_CURSOR_NOT_VALID
- MQRC_NO_BUFFER
- MQRC_REOPEN_EXCL_INPUT_ERROR
- MQRC_REOPEN_INQUIRE_ERROR

- MQRC_REOPEN_TEMPORARY_Q_ERROR
- (reason codes from MQGET)
- (reason codes from MQPUT)

## ImqQueueManager C++ class

This class encapsulates a queue manager (an IBM MQ object of type MQOT_Q_MGR).

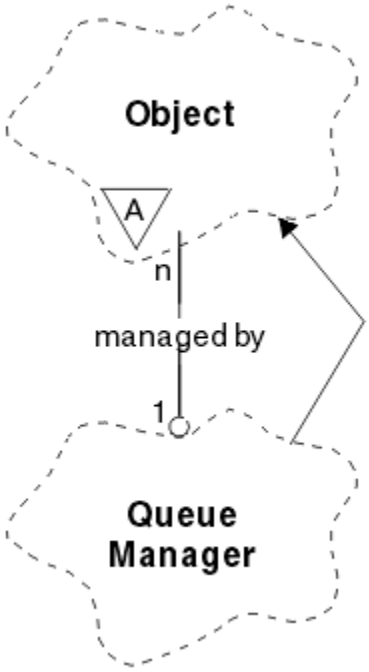



*Figure 65. ImqQueueManager class*

This class relates to the MQI calls listed in "ImqQueueManager cross-reference" on page 1850. Not all the listed methods are applicable to all platforms; see ALTER QMGR for more details.


- "Class attributes" on page 1918
- "Object attributes" on page 1919
- "Constructors" on page 1924
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- "Class methods (public)" on page 1924
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- "Object data (protected)" on page 1933
- "Reason codes" on page 1933


### Class attributes

**behavior**
Controls the behavior of implicit connection and disconnection.

**IMQ_EXPL_DISC_BACKOUT (0L)**
An explicit call to the **disconnect** method implies backout. This attribute is mutually exclusive with IMQ_EXPL_DISC_COMMIT.

**IMQ_EXPL_DISC_COMMIT (1L)**
An explicit call to the **disconnect** method implies commit (the default). This attribute is mutually exclusive with IMQ_EXPL_DISC_BACKOUT.

**IMQ_IMPL_CONN (2L)**
Implicit connection is allowed (the default).

**IMQ_IMPL_DISC_BACKOUT (0L)**
An implicit call to the **disconnect** method, which can occur during object destruction, implies backout. This attribute is mutually exclusive with the IMQ_IMPL_DISC_COMMIT.

**IMQ_IMPL_DISC_COMMIT (4L)**
An implicit call to the **disconnect** method, which can occur during object destruction, implies commit (the default). This attribute is mutually exclusive with IMQ_IMPL_DISC_BACKOUT.

At IBM MQ V7.0 and above, C++ applications that make use of an implicit connection, need to specify IMQ_IMPL_CONN along with any other options provided in the `setBehavior()` method on an object of class `ImqQueueManager`. If your application does not use the `setBehavior()` method to explicitly set the behavior options, for example,

```
ImqQueueManager_object.setBehavior(IMQ_IMPL_DISC_COMMIT)
```

this change does not affect you since MQ_IMPL_CONN is enabled by default.

If your application explicitly sets the behavior options, for example,

```
ImqQueueManager_object.setBehavior(IMQ_IMPL_DISC_COMMIT)
```

you need to include IMQ_IMPL_CONN in the `setBehavior()` method as follows, to allow your application to complete an implicit connection:

```
ImqQueueManager_object.setBehavior(IMQ_IMPL_CONN | IMQ_IMPL_DISC_COMMIT)
```

## Object attributes

**accounting connections override**
Allows applications to override the setting of the MQI accounting and queue accounting values.This attribute is read-only.

**accounting interval**
How long before intermediate accounting records are written (in seconds). This attribute is read-only.

**activity recording**
Controls the generation of activity reports. This attribute is read-only.

**adopt new mca check**
The elements checked to determine if an MCA should be adopted when a new inbound channel is detected that has the same name as an MCA that is already active. This attribute is read-only.

**adopt new mca type**
Whether an orphaned instance of an MCA of a particular channel type should be restarted automatically when a new inbound channel request matching the adopt new mca check parameters is detected. This attribute is read-only.

**authentication type**
Indicates the type of authentication which is being performed.

**authority event**
Controls authority events. This attribute is read-only.

**begin options**
Options that apply to the **begin** method. The initial value is MQBO_NONE.

**bridge event**
Whether IMS bridge events are generated. This attribute is read-only.

**channel auto definition**
Channel auto definition value. This attribute is read-only.

**channel auto definition event**
Channel auto definition event value. This attribute is read-only.

**channel auto definition exit**
Channel auto definition exit name. This attribute is read-only.

**channel event**
Whether channel events are generated. This attribute is read-only.

**channel initiator adapters**
The number of adapter subtasks to use for processing IBM MQ calls. This attribute is read-only.

**channel initiator control**
Whether the Channel Initiator should be started automatically when the Queue Manager is started. This attribute is read-only.

**channel initiator dispatchers**
The number of dispatchers to use for the channel initiator. This attribute is read-only.

**channel initiator trace autostart**
Whether channel initiator trace should start automatically or not. This attribute is read-only.

**channel initiator trace table size**
The size of the channel initiator's trace data space (in MB). This attribute is read-only.

**channel monitoring**
Controls the collection of online monitoring data for channels. This attribute is read-only.

**channel reference**
A reference to a channel definition for use during client connection. While connected, this attribute can be set to null, but cannot be changed to any other value. The initial value is null.

**channel statistics**
Controls the collection of statistics data for channels. This attribute is read-only.

**character set**
Coded character set identifier (CCSID). This attribute is read-only.

**cluster sender monitoring**
Controls the collection of online monitoring data for automatically-defined cluster sender channels. This attribute is read-only.

**cluster sender statistics**
Controls the collection of statistics data for automatically defined cluster sender channels. This attribute is read-only.

**cluster workload data**
Cluster workload exit data. This attribute is read-only.

**cluster workload exit**
Cluster workload exit name. This attribute is read-only.

**cluster workload length**
Cluster workload length. This attribute is read-only.

**cluster workload mru**
Cluster workload most recently used channels value. This attribute is read-only.

**cluster workload use queue**
Cluster workload use queue value. This attribute is read-only.

**command event**
Whether command events are generated. This attribute is read-only.

**command input queue name**
System command input queue name. This attribute is read-only.

**command level**
Command level supported by the queue manager. This attribute is read-only.

**command server control**
Whether the Command Server should be started automatically when the Queue Manager is started. This attribute is read-only.

**connect options**
Options that apply to the **connect** method. The initial value is MQCNO_NONE. The following additional values may be possible, depending on platform:

- MQCNO_STANDARD_BINDING
- MQCNO_FASTPATH_BINDING
- MQCNO_HANDLE_SHARE_NONE
- MQCNO_HANDLE_SHARE_BLOCK
- MQCNO_HANDLE_SHARE_NO_BLOCK
- MQCNO_SERIALIZE_CONN_TAG_Q_MGR
- MQCNO_SERIALIZE_CONN_TAG_QSG
- MQCNO_RESTRICT_CONN_TAG_Q_MGR
- MQCNO_RESTRICT_CONN_TAG_QSG

**connection id**
A unique identifier that allows MQ to reliably identify an application.

**connection status**
TRUE when connected to the queue manager. This attribute is read-only.

**connection tag**
A tag to be associated with a connection. This attribute can only be set when not connected. The initial value is null.

**cryptographic hardware**
Configuration details for cryptographic hardware. For MQ MQI client connections.

**dead-letter queue name**
Name of the dead-letter queue. This attribute is read-only.

**default transmission queue name**
Default transmission queue name. This attribute is read-only.

**distribution lists**
Capability of the queue manager to support distribution lists.

**dns group**
The name of the group that the TCP listener that handles inbound transmissions for the queue-sharing group should join when using Workload Manager Dynamic Domain Name Services support. This attribute is read-only.

**dns wlm**
Whether the TCP listener that handles inbound transmissions for the queue-sharing group should register with Workload Manager for Dynamic Domain Name Services. This attribute is read-only.

**first authentication record**
The first of one or more objects of class ImqAuthenticationRecord, in no particular order, in which the ImqAuthenticationRecord connection reference addresses this object. For MQ MQI client connections.

**first managed object**
The first of one or more objects of class ImqObject, in no particular order, in which the ImqObject **connection reference** addresses this object. The initial value is zero.

**inhibit event**
Controls inhibit events. This attribute is read-only.

**ip address version**
Which IP protocol (IPv4 or IPv6) to use for a channel connection. This attribute is read-only.

**key repository**
Location of the key database file in which keys and certificates are stored. For IBM MQ MQI client connections.

**key reset count**
The number of unencrypted bytes sent and received within an SSL conversation before the secret key is renegotiated. This attribute applies only to client connections using MQCONNX. See also ssl key reset count.

**listener timer**
The time interval (in seconds) between attempts by IBM MQ to restart the listener if there has been an APPC or TCP/IP failure. This attribute is read-only.

**local event**
Controls local events. This attribute is read-only.

**logger event**
Controls whether recovery log events are generated. This attribute is read-only.

**lu group name**
The generic LU name that the LU 6.2 listener that handles inbound transmissions for the queue-sharing group should use. This attribute is read-only.

**lu name**
The name of the LU to use for outbound LU 6.2 transmissions. This attribute is read-only.

**lu62 arm suffix**
The suffix of the SYS1.PARMLIB member APPCPMxx, that nominates the LUADD for this channel initiator. This attribute is read-only.

**lu62 channels**
The maximum number of channels that can be current or clients that can be connected, that use the LU 6.2 transmission protocol. This attribute is read-only.

**maximum active channels**
The maximum number of channels that can be active at any time. This attribute is read-only.

**maximum channels**
The maximum number of channels that can be current (including server-connection channels with connected clients). This attribute is read-only.

**maximum handles**
Maximum number of handles. This attribute is read-only.

**maximum message length**
Maximum possible length for any message on any queue managed by this queue manager. This attribute is read-only.

**maximum priority**
Maximum message priority. This attribute is read-only.

**maximum uncommitted messages**
Maximum number of uncommitted messages within a unit or work. This attribute is read-only.

**mqi accounting**
Controls the collection of accounting information for MQI data. This attribute is read-only.

**mqi statistics**
Controls the collection of statistics monitoring information for the queue manager. This attribute is read-only.

**outbound port maximum**
The higher end of the range of port numbers to be used when binding outgoing channels. This attribute is read-only.

**outbound port minimum**
The lower end of the range of port numbers to be used when binding outgoing channels. This attribute is read-only.

**password**
password associated with user ID

**performance event**
Controls performance events. This attribute is read-only.

**platform**
Platform on which the queue manager resides. This attribute is read-only.

**queue accounting**
Controls the collection of accounting information for queues. This attribute is read-only.

**queue monitoring**
Controls the collection of online monitoring data for queues. This attribute is read-only.

**queue statistics**
Controls the collection of statistics data for queues. This attribute is read-only.

**receive timeout**
Approximately how long a TCP/IP message channel will wait to receive data, including heartbeats, from its partner, before returning to the inactive state. This attribute is read-only.

**receive timeout minimum**
The minimum time that a TCP/IP channel will wait to receive data, including heartbeats, from its partner, before returning to the inactive state. This attribute is read-only.

**receive timeout type**
A qualifier applied to **receive timeout**. This attribute is read-only.

**remote event**
Controls remote events. This attribute is read-only.

**repository name**
Repository name. This attribute is read-only.

**repository namelist**
Repository namelist name. This attribute is read-only.

**shared queue manager name**
Whether MQOPENs of a shared queue where the ObjectQMgrName is another queue manager in the queue-sharing group should resolve to an open of the shared queue on the local queue manager. This attribute is read-only.

**ssl event**
Whether SSL events are generated. This attribute is read-only.

**ssl FIPS required**
Whether only FIPS-certified algorithms should be used if the cryptography is executed in IBM MQ software. This attribute is read-only.

**ssl key reset count**
The number of unencrypted bytes sent and received within an SSL conversation before the secret key is renegotiated. This attribute is read-only.

**start-stop event**
Controls start-stop events. This attribute is read-only.

**statistics interval**
How often statistics monitoring data is written to the monitoring queue. This attribute is read-only.

**syncpoint availability**
Availability of syncpoint participation. This attribute is read-only.

**Note:** Queue manager-coordinated global units of work are not supported on the IBM i platform.

You can program a unit of work, externally coordinated by IBM i, using the _Rcommit and _Rback native system calls. Start this type of unit of work by starting the IBM MQ application under job-level commitment control using the STRCMTCTL command. See Interfaces to the IBM i external syncpoint manager for further details. **Backout** and **commit** are supported on the IBM i platform for local units of work coordinated by a queue manager.

**tcp channels**
The maximum number of channels that can be current or clients that can be connected, that use the TCP/IP transmission protocol. This attribute is read-only.

**tcp keepalive**
Whether the TCP KEEPALIVE facility is to be used to check that the other end of the connection is still available. This attribute is read-only.

**tcp name**
The name of either the sole or default TCP/IP system to be used, depending on the value of **tcp stack type**. This attribute is read-only.

**tcp stack type**
Whether the channel initiator is permitted to only use the TCP/IP address space specified in **tcp name** or can bind to any selected TCP/IP address. This attribute is read-only.

**trace route recording**
Controls the recording of route tracing information. This attribute is read-only.

**trigger interval**
Trigger interval. This attribute is read-only.

**user id**
On UNIX and Linux platforms, the application's real user ID. On Windows platforms, the application's user ID.

## Constructors

**ImqQueueManager( );**
The default constructor.

**ImqQueueManager( const ImqQueueManager & *manager* );**
The copy constructor. The **connection status** will be FALSE.

**ImqQueueManager( const char * *name* );**
Sets the ImqObject **name** to *name*.

## Destructors

When an ImqQueueManager object is destroyed, it is automatically disconnected.

## Class methods (public)

**static MQLONG behavior( );**
Returns the **behavior**.

**void setBehavior( const MQLONG *behavior* = 0 );**
Sets the **behavior**.

## Object methods (public)

**void operator = ( const ImqQueueManager & *mgr* );**
Disconnects if necessary, and copies instance data from *mgr*. The **connection status** is be FALSE.

**ImqBoolean accountingConnOverride ( MQLONG & statint );**
Provides a copy of the accounting connections override value. It returns TRUE if successful.

**MQLONG accountingConnOverride ( );**
Returns the accounting connections override value without any indication of possible errors.

**ImqBoolean accountingInterval ( MQLONG & statint );**
Provides a copy of the accounting interval value. It returns TRUE if successful.

**MQLONG accountingInterval ( );**
Returns the accounting interval value without any indication of possible errors.

**ImqBoolean activityRecording ( MQLONG & rec );**
Provides a copy of the activity recording value. It returns TRUE if successful.

**MQLONG activityRecording ( );**
Returns the activity recording value without any indication of possible errors.

**ImqBoolean adoptNewMCACheck ( MQLONG & check );**
Provides a copy of the adopt new MCA check value. It returns TRUE if successful.

**MQLONG adoptNewMCACheck ( );**
Returns the adopt new MCA check value without any indication of possible errors.

**ImqBoolean adoptNewMCAType ( MQLONG & type );**
Provides a copy of the adopt new MCA type. It returns TRUE if successful.

**MQLONG adoptNewMCAType ( );**
Returns the adopt new MCA type without any indication of possible errors.

**QLONG authenticationType ( ) const;**
Returns the authentication type.

**void setAuthenticationType ( const MQLONG type = MQCSP_AUTH_NONE );**
Sets the authentication type.

**ImqBoolean authorityEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **authority event**. It returns TRUE if successful.

**MQLONG authorityEvent( );**
Returns the enablement state of the **authority event** without any indication of possible errors.

**ImqBoolean backout( );**
Backs out uncommitted changes. It returns TRUE if successful.

**ImqBoolean begin( );**
Begins a unit of work. The **begin options** affect the behavior of this method. It returns TRUE if successful, but it also returns TRUE even if the underlying MQBEGIN call returns MQRC_NO_EXTERNAL_PARTICIPANTS or MQRC_PARTICIPANT_NOT_AVAILABLE (which are both associated with MQCC_WARNING).

**MQLONG beginOptions( ) const ;**
Returns the **begin options**.

**void setBeginOptions( const MQLONG** ***options*** **= MQBO_NONE );**
Sets the **begin options**.

**ImqBoolean bridgeEvent ( MQLONG & event);**
Provides a copy of the bridge event value. It returns TRUE if successful.

**MQLONG bridgeEvent ( );**
Returns the bridge event value without any indication of possible errors.

**ImqBoolean channelAutoDefinition( MQLONG &** ***value*** **);**
Provides a copy of the **channel auto definition** value. It returns TRUE if successful.

**MQLONG channelAutoDefinition( );**
Returns the **channel auto definition** value without any indication of possible errors.

**ImqBoolean channelAutoDefinitionEvent( MQLONG &** ***value*** **);**
Provides a copy of the **channel auto definition event** value. It returns TRUE if successful.

**MQLONG channelAutoDefinitionEvent( );**
Returns the **channel auto definition event** value without any indication of possible errors.

**ImqBoolean channelAutoDefinitionExit( ImqString &** ***name*** **);**
Provides a copy of the **channel auto definition exit** name. It returns TRUE if successful.

**ImqString channelAutoDefinitionExit( );**
Returns the **channel auto definition exit** name without any indication of possible errors.

**ImqBoolean channelEvent ( MQLONG & event);**
Provides a copy of the channel event value. It returns TRUE if successful.

**MQLONG channelEvent( );**
Returns the channel event value without any indication of possible errors.

**MQLONG channelInitiatorAdapters ( );**
Returns the channel initiator adapters value without any indication of possible errors.

**ImqBoolean channelInitiatorAdapters ( MQLONG & adapters );**
Provides a copy of the channel initiator adapters value. It returns TRUE if successful.

**MQLONG channelInitiatorControl ( );**
Returns the channel initiator startup value without any indication of possible errors.

**ImqBoolean channelInitiatorControl ( MQLONG & init );**
Provides a copy of the channel initiator control startup value. It returns TRUE if successful.

**MQLONG channelInitiatorDispatchers ( );**
Returns the channel initiator dispatchers value without any indication of possible errors.

**ImqBoolean channelInitiatorDispatchers ( MQLONG & dispatchers );**
Provides a copy of the channel initiator dispatchers value. It returns TRUE if successful.

**MQLONG channelInitiatorTraceAutoStart ( );**
Returns the channel initiator trace auto start value without any indication of possible errors.

**ImqBoolean channelInitiatorTraceAutoStart ( MQLONG & auto);**
Provides a copy of the channel initiator trace auto start value. It returns TRUE if successful.

**MQLONG channelInitiatorTraceTableSize ( );**
Returns the channel initiator trace table size value without any indication of possible errors.

**ImqBoolean channelInitiatorTraceTableSize ( MQLONG & size);**
Provides a copy of the channel initiator trace table size value. It returns TRUE if successful.

**ImqBoolean channelMonitoring ( MQLONG & monchl );**
Provides a copy of the channel monitoring value. It returns TRUE if successful.

**MQLONG channelMonitoring ( );**
Returns the channel monitoring value without any indication of possible errors.

**ImqBoolean channelReference( ImqChannel * &** ***pchannel*** **);**
Provides a copy of the **channel reference**. If the **channel reference** is invalid, sets *pchannel* to null. This method returns TRUE if successful.

**ImqChannel * channelReference( );**
Returns the **channel reference** without any indication of possible errors.

**ImqBoolean setChannelReference( ImqChannel &** ***channel*** **);**
Sets the **channel reference**. This method returns TRUE if successful.

**ImqBoolean setChannelReference( ImqChannel *** ***channel*** **= 0 );**
Sets or resets the **channel reference**. This method returns TRUE if successful.

**ImqBoolean channelStatistics ( MQLONG & statchl );**
Provides a copy of the channel statistics value. It returns TRUE if successful.

**MQLONG channelStatistics ( );**
Returns the channel statistics value without any indication of possible errors.

**ImqBoolean characterSet( MQLONG &** ***ccsid*** **);**
Provides a copy of the **character set**. It returns TRUE if successful.

**MQLONG characterSet( );**
Returns a copy of the **character set**, without any indication of possible errors.

**MQLONG clientSslKeyResetCount ( ) const;**
Returns the SSL key reset count value used on client connections.

**void setClientSslKeyResetCount( const MQLONG count );**
Sets the SSL key reset count used on client connections.

**ImqBoolean clusterSenderMonitoring ( MQLONG & monacls );**
Provides a copy of the cluster sender monitoring default value. It returns TRUE if successful.

**MQLONG clusterSenderMonitoring ( );**
Returns the cluster sender monitoring default value without any indication of possible errors.

**ImqBoolean clusterSenderStatistics ( MQLONG & statacls );**
Provides a copy of the cluster sender statistics value. It returns TRUE if successful.

**MQLONG clusterSenderStatistics ( );**
Returns the cluster sender statistics value without any indication of possible errors.

**ImqBoolean clusterWorkloadData( ImqString &** ***data*** **);**
Provides a copy of the **cluster workload exit data**. It returns TRUE if successful.

**ImqString clusterWorkloadData( );**
Returns the **cluster workload exit data** without any indication of possible errors.

**ImqBoolean clusterWorkloadExit( ImqString &** ***name*** **);**
Provides a copy of the **cluster workload exit name**. It returns TRUE if successful.

**ImqString clusterWorkloadExit( );**
Returns the **cluster workload exit name** without any indication of possible errors.

**ImqBoolean clusterWorkloadLength( MQLONG &** ***length*** **);**
Provides a copy of the **cluster workload length**. It returns TRUE if successful.

**MQLONG clusterWorkloadLength( );**
Returns the **cluster workload length** without any indication of possible errors.

**ImqBoolean clusterWorkLoadMRU ( MQLONG & mru );**
Provides a copy of the cluster workload most recently used channels value. It returns TRUE if successful.

**MQLONG clusterWorkLoadMRU ( );**
Returns the cluster workload most recently used channels value without any indication of possible errors.

**ImqBoolean clusterWorkLoadUseQ ( MQLONG & useq );**
Provides a copy of the cluster workload use queue value. It returns TRUE if successful.

**MQLONG clusterWorkLoadUseQ ( );**
Returns the cluster workload use queue value without any indication of possible errors.

**ImqBoolean commandEvent ( MQLONG & event );**
Provides a copy of the command event value. It returns TRUE if successful.

**MQLONG commandEvent ( );**
Returns the command event value without any indication of possible errors.

**ImqBoolean commandInputQueueName( ImqString &** ***name*** **);**
Provides a copy of the **command input queue name**. It returns TRUE if successful.

**ImqString commandInputQueueName( );**
Returns the **command input queue name** without any indication of possible errors.

**ImqBoolean commandLevel( MQLONG &** ***level*** **);**
Provides a copy of the **command level**. It returns TRUE if successful.

**MQLONG commandLevel( );**
Returns the **command level** without any indication of possible errors.

**MQLONG commandServerControl ( );**
Returns the command server startup value without any indication of possible errors.

**ImqBoolean commandServerControl ( MQLONG & server );**
Provides a copy of the command server control startup value. It returns TRUE if successful.

**ImqBoolean commit( );**
Commits uncommitted changes. It returns TRUE if successful.

**ImqBoolean connect( );**
Connects to the queue manager with the given ImqObject **name**, the default being the local queue manager. If you want to connect to a specific queue manager, use the ImqObject **setName** method before connection. If there is a **channel reference**, it is used to pass information about the channel

definition to MQCONNX in an MQCD. The ChannelType in the MQCD is set to MQCHT_CLNTCONN. **channel reference** information, which is only meaningful for client connections, is ignored for server connections. The **connect options** affect the behavior of this method. This method sets the **connection status** to TRUE if successful. It returns the new connection status.

If there is a first authentication record, the chain of authentication records is used to authenticate digital certificates for secure client channels.

You can connect more than one ImqQueueManager object to the same queue manager. All use the same MQHCONN connection handle and share UOW functionality for the connection associated with the thread. The first ImqQueueManager to connect obtains the MQHCONN handle. The last ImqQueueManager to disconnect performs the MQDISC.

For a multithreaded program, it is recommended that a separate ImqQueueManager object is used for each thread.

**ImqBinary connectionId ( ) const ;**
Returns the connection ID.

**ImqBinary connectionTag ( ) const ;**
Returns the **connection tag**.

**ImqBoolean setConnectionTag ( const MQBYTE128 *tag* = 0 );**
Sets the **connection tag**. If *tag* is zero, clears the **connection tag**. This method returns TRUE if successful.

**ImqBoolean setConnectionTag ( const ImqBinary & *tag* );**
Sets the **connection tag**. The **data length** of *tag* must be either zero (to clear the **connection tag** ) or MQ_CONN_TAG_LENGTH. This method returns TRUE if successful.

**MQLONG connectOptions( ) const ;**
Returns the **connect options**.

**void setConnectOptions( const MQLONG *options* = MQCNO_NONE );**
Sets the **connect options**.

**ImqBoolean connectionStatus( ) const ;**
Returns the **connection status**.

**ImqString cryptographicHardware ( );**
Returns the **cryptographic hardware**.

**ImqBoolean setCryptographicHardware ( const char * *hardware* = 0 );**
Sets the **cryptographic hardware**. This method returns TRUE if successful.

**ImqBoolean deadLetterQueueName( ImqString & *name* );**
Provides a copy of the **dead-letter queue name**. It returns TRUE if successful.

**ImqString deadLetterQueueName( );**
Returns a copy of the **dead-letter queue name**, without any indication of possible errors.

**ImqBoolean defaultTransmissionQueueName( ImqString & *name* );**
Provides a copy of the **default transmission queue name**. It returns TRUE if successful.

**ImqString defaultTransmissionQueueName( );**
Returns the **default transmission queue name** without any indication of possible errors.

**ImqBoolean disconnect( );**
Disconnects from the queue manager and sets the **connection status** to FALSE. Closes all ImqProcess and ImqQueue objects associated with this object, and severs their **connection reference** before disconnection. If more than one ImqQueueManager object is connected to the same queue manager, only the last to disconnect performs a physical disconnection; others perform a logical disconnection. Uncommitted changes are committed on physical disconnection only.

This method returns TRUE if successful. If it is called when there is no existing connection, the return code is also true.

**ImqBoolean distributionLists( MQLONG & *support* );**
Provides a copy of the **distribution lists** value. It returns TRUE if successful.

**MQLONG distributionLists( );**
Returns the **distribution lists** value without any indication of possible errors.

**ImqBoolean dnsGroup ( ImqString & group );**
Provides a copy of the DNS group name. It returns TRUE if successful.

**ImqString dnsGroup ( );**
Returns the DNS group name without any indication of possible errors.

**ImqBoolean dnsWlm ( MQLONG & wlm );**
Provides a copy of the DNS WLM value. It returns TRUE if successful.

**MQLONG dnsWlm ( );**
Returns the DNS WLM value without any indication of possible errors.

**ImqAuthenticationRecord * firstAuthenticationRecord ( ) const ;**
Returns the **first authentication record**.

**void setFirstAuthenticationRecord ( const ImqAuthenticationRecord *** ***air*** **= 0 );**
Sets the **first authentication record**.

**ImqObject * firstManagedObject( ) const ;**
Returns the **first managed object**.

**ImqBoolean inhibitEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **inhibit event**. It returns TRUE if successful.

**MQLONG inhibitEvent( );**
Returns the enablement state of the **inhibit event** without any indication of possible errors.

**ImqBoolean ipAddressVersion ( MQLONG & version );**
Provides a copy of the IP address version value. It returns TRUE if successful.

**MQLONG ipAddressVersion ( );**
Returns the IP address version value without any indication of possible errors.

**ImqBoolean keepAlive ( MQLONG & keepalive );**
Provides a copy of the keep alive value. It returns TRUE if successful.

**MQLONG keepAlive ( );**
Returns the keep alive value without any indication of possible errors.

**ImqString keyRepository ( );**
Returns the **key repository**.

**ImqBoolean setKeyRepository ( const char *** ***repository*** **= 0 );**
Sets the **key repository**. It returns TRUE if successful.

**ImqBoolean listenerTimer ( MQLONG & timer );**
Provides a copy of the listener timer value. It returns TRUE if successful.

**MQLONG listenerTimer ( );**
Returns the listener timer value without any indication of possible errors.

**ImqBoolean localEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **local event**. It returns TRUE if successful.

**MQLONG localEvent( );**
Returns the enablement state of the **local event** without any indication of possible errors.

**ImqBoolean loggerEvent ( MQLONG & count );**
Provides a copy of the logger event value. It returns TRUE if successful.

**MQLONG loggerEvent ( );**
Returns the logger event value without any indication of possible errors.

**ImqBoolean luGroupName ( ImqString & name );.**
Provides a copy of the LU group name. It returns TRUE if successful

**ImqString luGroupName ( );**
Returns the LU group name without any indication of possible errors.

**ImqBoolean lu62ARMSuffix ( ImqString & suffix );**
Provides a copy of the LU62 ARM suffix. It returns TRUE if successful.

**ImqString lu62ARMSuffix ( );**
Returns the LU62 ARM suffix without any indication of possible errors

**ImqBoolean luName ( ImqString & name );**
Provides a copy of the LU name. It returns TRUE if successful.

**ImqString luName ( );**
Returns the LU name without any indication of possible errors.

**ImqBoolean maximumActiveChannels ( MQLONG & channels);**
Provides a copy of the maximum active channels value. It returns TRUE if successful.

**MQLONG maximumActiveChannels ( );**
Returns the maximum active channels value without any indication of possible errors.

**ImqBoolean maximumCurrentChannels ( MQLONG & channels );**
Provides a copy of the maximum current channels value. It returns TRUE if successful.

**MQLONG maximumCurrentChannels ( );**
Returns the maximum current channels value without any indication of possible errors.

**ImqBoolean maximumHandles( MQLONG &** ***number*** **);**
Provides a copy of the **maximum handles**. It returns TRUE if successful.

**MQLONG maximumHandles( );**
Returns the **maximum handles** without any indication of possible errors.

**ImqBoolean maximumLu62Channels ( MQLONG & channels );**
Provides a copy of the maximum LU62 channels value. It returns TRUE if successful.

**MQLONG maximumLu62Channels ( );.**
Returns the maximum LU62 channels value without any indication of possible errors

**ImqBoolean maximumMessageLength( MQLONG &** ***length*** **);**
Provides a copy of the **maximum message length**. It returns TRUE if successful.

**MQLONG maximumMessageLength( );**
Returns the **maximum message length** without any indication of possible errors.

**ImqBoolean maximumPriority( MQLONG &** ***priority*** **);**
Provides a copy of the **maximum priority**. It returns TRUE if successful.

**MQLONG maximumPriority( );**
Returns a copy of the **maximum priority**, without any indication of possible errors.

**ImqBoolean maximumTcpChannels ( MQLONG & channels );**
Provides a copy of the maximum TCP channels value. It returns TRUE if successful.

**MQLONG maximumTcpChannels ( );**
Returns the maximum TCP channels value without any indication of possible errors.

**ImqBoolean maximumUncommittedMessages( MQLONG &** ***number*** **);**
Provides a copy of the **maximum uncommitted messages**. It returns TRUE if successful.

**MQLONG maximumUncommittedMessages( );**
Returns the **maximum uncommitted messages** without any indication of possible errors.

**ImqBoolean mqiAccounting ( MQLONG & statint );**
Provides a copy of the MQI accounting value. It returns TRUE if successful.

**MQLONG mqiAccounting ( );**
Returns the MQI accounting value without any indication of possible errors.

**ImqBoolean mqiStatistics ( MQLONG & statmqi );**
Provides a copy of the MQI statistics value. It returns TRUE if successful.

**MQLONG mqiStatistics ( );**
Returns the MQI statistics value without any indication of possible errors.

**ImqBoolean outboundPortMax ( MQLONG & max );**
Provides a copy of the maximum outbound port value. It returns TRUE if successful.

**MQLONG outboundPortMax ( );**
Returns the maximum outbound port value without any indication of possible errors.

**ImqBoolean outboundPortMin ( MQLONG & min );**
Provides a copy of the minimum outbound port value. It returns TRUE if successful.

**MQLONG outboundPortMin ( );**
Returns the minimum outbound port value without any indication of possible errors.

**ImqBinary password ( ) const;**
Returns the password used on client connections.

**ImqBoolean setPassword ( const ImqString & password );**
Sets the password used on client connections.

**ImqBoolean setPassword ( const char * = 0 password );**
Sets the password used on client connections.

**ImqBoolean setPassword ( const ImqBinary & password );**
Sets the password used on client connections.

**ImqBoolean performanceEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **performance event**. It returns TRUE if successful.

**MQLONG performanceEvent( );**
Returns the enablement state of the **performance event** without any indication of possible errors.

**ImqBoolean platform( MQLONG &** ***platform*** **);**
Provides a copy of the **platform**. It returns TRUE if successful.

**MQLONG platform( );**
Returns the **platform** without any indication of possible errors.

**ImqBoolean queueAccounting ( MQLONG & acctq );**
Provides a copy of the queue accounting value. It returns TRUE if successful.

**MQLONG queueAccounting ( );**
Returns the queue accounting value without any indication of possible errors.

**ImqBoolean queueMonitoring ( MQLONG & monq );**
Provides a copy of the queue monitoring value. It returns TRUE if successful.

**MQLONG queueMonitoring ( );**
Returns the queue monitoring value without any indication of possible errors.

**ImqBoolean queueStatistics ( MQLONG & statq );**
Provides a copy of the queue statistics value. It returns TRUE if successful.

**MQLONG queueStatistics ( );**
Returns the queue statistics value without any indication of possible errors.

**ImqBoolean receiveTimeout ( MQLONG & timeout );**
Provides a copy of the receive timeout value. It returns TRUE if successful.

**MQLONG receiveTimeout ( );**
Returns the receive timeout value without any indication of possible errors.

**ImqBoolean receiveTimeoutMin ( MQLONG & min );**
Provides a copy of the minimum receive timeout value. It returns TRUE if successful.

**MQLONG receiveTimeoutMin ( );**
Returns the minimum receive timeout value without any indication of possible errors.

**ImqBoolean receiveTimeoutType ( MQLONG & type );**
Provides a copy of the receive timeout type. It returns TRUE if successful.

**MQLONG receiveTimeoutType ( );**
Returns the receive timeout type without any indication of possible errors.

**ImqBoolean remoteEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **remote event**. It returns TRUE if successful.

**MQLONG remoteEvent( );**
Returns the enablement state of the **remote event** without any indication of possible errors.

**ImqBoolean repositoryName( ImqString &** ***name*** **);**
Provides a copy of the **repository name**. It returns TRUE if successful.

**ImqString repositoryName( );**
Returns the **repository name** without any indication of possible errors.

**ImqBoolean repositoryNamelistName( ImqString &** ***name*** **);**
Provides a copy of the **repository namelist name**. It returns TRUE if successful.

**ImqString repositoryNamelistName( );**
Returns a copy of the **repository namelist name** without any indication of possible errors.

**ImqBoolean sharedQueueQueueManagerName ( MQLONG & name );**
Provides a copy of the shared queue queue manager name value. It returns TRUE if successful.

**MQLONG sharedQueueQueueManagerName ( );**
Returns the shared queue queue manager name value without any indication of possible errors.

**ImqBoolean sslEvent ( MQLONG & event );**
Provides a copy of the SSL event value. It returns TRUE if successful.

**MQLONG sslEvent ( );**
Returns the SSL event value without any indication of possible errors.

**ImqBoolean sslFips ( MQLONG & sslfips );**
Provides a copy of the SSL FIPS value. It returns TRUE if successful.

**MQLONG sslFips ( );**
Returns the SSL FIPS value without any indication of possible errors.

**ImqBoolean sslKeyResetCount ( MQLONG & count );**
Provides a copy of the SSL key reset count value. It returns TRUE if successful.

**MQLONG sslKeyResetCount ( );**
Returns the SSL key reset count value without any indication of possible errors.

**ImqBoolean startStopEvent( MQLONG &** ***event*** **);**
Provides a copy of the enablement state of the **start-stop event**. It returns TRUE if successful.

**MQLONG startStopEvent( );**
Returns the enablement state of the **start-stop event** without any indication of possible errors.

**ImqBoolean statisticsInterval ( MQLONG & statint );**
Provides a copy of the statistics interval value. It returns TRUE if successful.

**MQLONG statisticsInterval ( );**
Returns the statistics interval value without any indication of possible errors.

**ImqBoolean syncPointAvailability( MQLONG &** ***sync*** **);**
Provides a copy of the **syncpoint availability** value. It returns TRUE if successful.

**MQLONG syncPointAvailability( );**
Returns a copy of the **syncpoint availability** value, without any indication of possible errors.

**ImqBoolean tcpName ( ImqString & name );**
Provides a copy of the TCP system name. It returns TRUE if successful.

**ImqString tcpName ( );**
Returns the TCP system name without any indication of possible errors.

**ImqBoolean tcpStackType ( MQLONG & type );**
Provides a copy of the TCP stack type. It returns TRUE if successful.

**MQLONG tcpStackType ( );**
Returns the TCP stack type without any indication of possible errors.

**ImqBoolean traceRouteRecording ( MQLONG & routerec );**
Provides a copy of the trace route recording value. It returns TRUE if successful.

**MQLONG traceRouteRecording ( );**
Returns the trace route recording value without any indication of possible errors.

**ImqBoolean triggerInterval( MQLONG &** ***interval*** **);**
Provides a copy of the **trigger interval**. It returns TRUE if successful.

**MQLONG triggerInterval( );**
Returns the **trigger interval** without any indication of possible errors.

**ImqBinary userId ( ) const;**
Returns the user ID used on client connections.

**ImqBoolean setUserId ( const ImqString & id );**
Sets the user ID used on client connections.

**ImqBoolean setUserId ( const char * = 0 id );**
Sets the user ID used on client connections.

**ImqBoolean setUserId ( const ImqBinary & id );**
Sets the user ID used on client connections.

## Object methods (protected)

**void setFirstManagedObject ( const ImqObject *** *object* **= 0 );**
Sets the **first managed object**.

## Object data (protected)

**MQHCONN** ***ohconn***
The IBM MQ connection handle (meaningful only while the **connection status** is TRUE).

## Reason codes

- MQRC_ATTRIBUTE_LOCKED
- MQRC_ENVIRONMENT_ERROR
- MQRC_FUNCTION_NOT_SUPPORTED
- MQRC_REFERENCE_ERROR
- (reason codes for MQBACK)
- (reason codes for MQBEGIN)
- (reason codes for MQCMIT)
- (reason codes for MQCONNX)
- (reason codes for MQDISC)
- (reason codes for MQCONN)

# ImqReferenceHeader C++ class

This class encapsulates features of the MQRMH data structure.

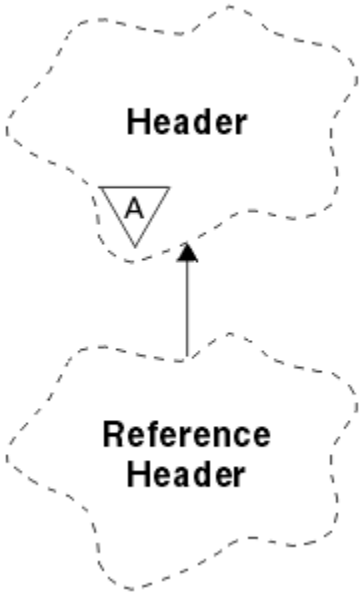


*Figure 66. ImqReferenceHeader class*

This class relates to the MQI calls listed in "ImqReferenceHeader cross-reference" on page 1854.


- "Object attributes" on page 1934
- "Constructors" on page 1935
- "Overloaded ImqItem methods" on page 1935
- "Object methods (public)" on page 1935
- "Object data (protected)" on page 1936
- "Reason codes" on page 1936


## Object attributes

**destination environment**
Environment for the destination. The initial value is a null string.

**destination name**
Name of the data destination. The initial value is a null string.

**instance id**
Instance identifier. A binary value (MQBYTE24) of length MQ_OBJECT_INSTANCE_ID_LENGTH. The initial value is MQOII_NONE.

**logical length**
Logical, or intended, length of message data that follows this header. The initial value is zero.

**logical offset**
Logical offset for the message data that follows, to be interpreted in the context of the data as a whole, at the ultimate destination. The initial value is zero.

**logical offset 2**
High-order extension to the **logical offset**. The initial value is zero.

**reference type**
Reference type. The initial value is a null string.

**source environment**
Environment for the source. The initial value is a null string.

**source name**
Name of the data source. The initial value is a null string.

## Constructors

**ImqReferenceHeader( );**
The default constructor.

**ImqReferenceHeader( const ImqReferenceHeader & *header* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Inserts an MQRMH data structure into the message buffer at the beginning, moving existing message data further along, and sets the *msg* **format** to MQFMT_REF_MSG_HEADER.

See the ImqHeader class method description on "ImqHeader C++ class" on page 1882 for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Reads an MQRMH data structure from the message buffer.

To be successful, the ImqMessage **format** must be MQFMT_REF_MSG_HEADER.

See the ImqHeader class method description on "ImqHeader C++ class" on page 1882 for further details.

## Object methods (public)

**void operator = ( const ImqReferenceHeader & *header* );**
Copies instance data from *header*, replacing the existing instance data.

**ImqString destinationEnvironment ( ) const ;**
Returns a copy of the **destination environment**.

**void setDestinationEnvironment ( const char * *environment* = 0 );**
Sets the **destination environment**.

**ImqString destinationName ( ) const ;**
Returns a copy of the **destination name**.

**void setDestinationName ( const char * *name* = 0 );**
Sets the **destination name**.

**ImqBinary instanceId ( ) const ;**
Returns a copy of the **instance id**.

**ImqBoolean setInstanceId ( const ImqBinary & *id* );**
Sets the **instance id**. The **data length** of *token* must be either 0 or MQ_OBJECT_INSTANCE_ID_LENGTH. This method returns TRUE if successful.

**void setInstanceId ( const MQBYTE24 *id* = 0 );**
Sets the **instance id**. *id* can be zero, which is the same as specifying MQOII_NONE. If *id* is nonzero, it must address MQ_OBJECT_INSTANCE_ID_LENGTH bytes of binary data. When using pre-defined values such as MQOII_NONE, you might need to make a cast to ensure a signature match, for example (MQBYTE *)MQOII_NONE.

**MQLONG logicalLength ( ) const ;**
Returns the **logical length**.

**void setLogicalLength ( const MQLONG *length* );**
Sets the **logical length**.

**MQLONG logicalOffset ( ) const ;**
Returns the **logical offset**.

**void setLogicalOffset ( const MQLONG *offset* );**
Sets the **logical offset**.

**MQLONG logicalOffset2 ( ) const ;**
Returns the **logical offset 2**.

**void setLogicalOffset2 ( const MQLONG *offset* );**
Sets the **logical offset 2**.

**ImqString referenceType ( ) const ;**
Returns a copy of the **reference type**.

**void setReferenceType ( const char * *name* = 0 );**
Sets the **reference type**.

**ImqString sourceEnvironment ( ) const ;**
Returns a copy of the **source environment**.

**void setSourceEnvironment ( const char * *environment* = 0 );**
Sets the **source environment**.

**ImqString sourceName ( ) const ;**
Returns a copy of the **source name**.

**void setSourceName ( const char * *name* = 0 );**
Sets the **source name**.

## Object data (protected)

**MQRMH *omqrmh***
The MQRMH data structure.

## Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR
- MQRC_STRUC_LENGTH_ERROR
- MQRC_STRUC_ID_ERROR
- MQRC_INSUFFICIENT_DATA
- MQRC_INCONSISTENT_FORMAT
- MQRC_ENCODING_ERROR

# ImqString C++ class

This class provides character string storage and manipulation for null-terminated strings.

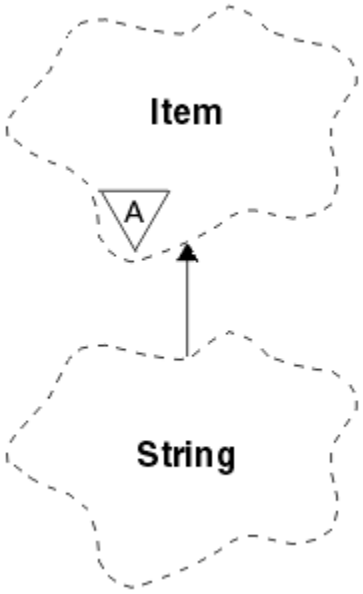


*Figure 67. ImqString class*

Use an ImqString in place of a **char *** in most situations where a parameter calls for a **char ***.


- "Object attributes" on page 1937
- "Constructors" on page 1937
- "Class methods (public)" on page 1938
- "Overloaded ImqItem methods" on page 1938
- "Object methods (public)" on page 1938
- "Object methods (protected)" on page 1941
- "Reason codes" on page 1941


## Object attributes

**characters**
Characters in the **storage** that precede a trailing null.

**length**
Number of bytes in the **characters**. If there is no **storage**, the **length** is zero. The initial value is zero.

**storage**
A volatile array of bytes of arbitrary size. A trailing null must always be present in the **storage** after the **characters**, so that the end of the **characters** can be detected. Methods ensure that this situation is maintained, but ensure, when setting bytes in the array directly, that a trailing null exists after modification. Initially, there is no **storage** attribute.

## Constructors

**ImqString( );**
The default constructor.

**ImqString( const ImqString & *string* );**
The copy constructor.

**ImqString( const char *c* );**
The **characters** comprise *c*.

**ImqString( const char * *text* );**
The **characters** are copied from *text*.

**ImqString( const void * *buffer*, const size_t *length* );**
Copies *length* bytes starting from *buffer* and assigns them to the **characters**. Substitution is made for any null characters copied. The substitution character is a period (.). No special consideration is given to any other non-printable or non-displayable characters copied.

## Class methods (public)

**static ImqBoolean copy( char * *destination-buffer*, const size_t *length*, const char * *source-buffer*, const char *pad* = 0 );**
Copies up to *length* bytes from *source-buffer* to *destination-buffer*. If the number of characters in *source-buffer* is insufficient, fills the remaining space in *destination-buffer* with *pad* characters. *source-buffer* can be zero. *destination-buffer* can be zero if *length* is also zero. Any error codes are lost. This method returns TRUE if successful.

**static ImqBoolean copy ( char * *destination-buffer*, const size_t *length*, const char * *source-buffer*, ImqError & *error-object*, const char *pad* = 0 );**
Copies up to *length* bytes from *source-buffer* to *destination-buffer*. If the number of characters in *source-buffer* is insufficient, fills the remaining space in *destination-buffer* with *pad* characters. *source-buffer* can be zero. *destination-buffer* can be zero if *length* is also zero. Any error codes are set in *error-object*. This method returns TRUE if successful.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Copies the **characters** to the message buffer, replacing any existing content. Sets the *msg* **format** to MQFMT_STRING.

See the parent class method description for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Sets the **characters** by transferring the remaining data from the message buffer, replacing the existing **characters**.

To be successful, the **encoding** of the *msg* object must be MQENC_NATIVE. Retrieve messages with MQGMO_CONVERT to MQENC_NATIVE.

To be successful, the ImqMessage **format** must be MQFMT_STRING.

See the parent class method description for further details.

## Object methods (public)

**char & operator [ ] ( const size_t *offset* ) const ;**
References the character at offset *offset* in the **storage**. Ensure that the relevant byte exists and is addressable.

**ImqString operator ( ) ( const size_t *offset*, const size_t *length* = 1 ) const ;**
Returns a substring by copying bytes from the **characters** starting at *offset*. If *length* is zero, returns the rest of the **characters**. If the combination of *offset* and *length* does not produce a reference within the **characters**, returns an empty ImqString.

**void operator = ( const ImqString & *string* );**
Copies instance data from *string*, replacing the existing instance data.

**ImqString operator + ( const char *c* ) const ;**
Returns the result of appending *c* to the **characters**.

**ImqString operator + ( const char * *text* ) const ;**
Returns the result of appending *text* to the **characters**. This can also be inverted. For example:

```
strOne + "string two" ;
"string one" + strTwo ;
```

**Note:** Although most compilers accept **strOne + "string two";** Microsoft Visual C++ requires **strOne + (char *)"string two" ;**

**ImqString operator + ( const ImqString & *string1* ) const ;**
Returns the result of appending *string1* to the **characters**.

**ImqString operator + ( const double *number* ) const ;**
Returns the result of appending *number* to the **characters** after conversion to text.

**ImqString operator + ( const long *number* ) const ;**
Returns the result of appending *number* to the **characters** after conversion to text.

**void operator += ( const char *c* );**
Appends *c* to the **characters**.

**void operator += ( const char * *text* );**
Appends *text* to the **characters**.

**void operator += ( const ImqString & *string* );**
Appends *string* to the **characters**.

**void operator += ( const double *number* );**
Appends *number* to the **characters** after conversion to text.

**void operator += ( const long *number* );**
Appends *number* to the **characters** after conversion to text.

**operator char * ( ) const ;**
Returns the address of the first byte in the **storage**. This value can be zero, and is volatile. Use this method only for read-only purposes.

**ImqBoolean operator < ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. The result is TRUE if less than and FALSE if greater than or equal to.

**ImqBoolean operator > ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. The result is TRUE if greater than and FALSE if less than or equal to.

**ImqBoolean operator <= ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. The result is TRUE if less than or equal to and FALSE if greater than.

**ImqBoolean operator >= ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. The result is TRUE if greater than or equal to and FALSE if less than.

**ImqBoolean operator == ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. It returns either TRUE or FALSE.

**ImqBoolean operator != ( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string* using the **compare** method. It returns either TRUE or FALSE.

**short compare( const ImqString & *string* ) const ;**
Compares the **characters** with those of *string*. The result is zero if the **characters** are equal, negative if less than and positive if greater than. Comparison is case sensitive. A null ImqString is regarded as less than a nonnull ImqString.

**ImqBoolean copyOut( char * *buffer*, const size_t *length*, const char *pad* = 0 );**

Copies up to *length* bytes from the **characters** to the *buffer*. If the number of **characters** is insufficient, fills the remaining space in *buffer* with *pad* characters. *buffer* can be zero if *length* is also zero. It returns TRUE if successful.

**size_t copyOut( long & *number* ) const ;**

Sets *number* from the **characters** after conversion from text, and returns the number of characters involved in the conversion. If this is zero, no conversion has been performed and *number* is not set. A convertible character sequence must begin with the following values:

```
<blank(s)>
<+|->
digit(s)
```

**size_t copyOut( ImqString & *token*, const char *c* = ' ' ) const ;**

If the **characters** contain one or more characters that are different from *c*, identifies a token as the first contiguous sequence of such characters. In this case *token* is set to that sequence, and the value returned is the sum of the number of leading characters *c* and the number of bytes in the sequence. Otherwise, returns zero and does not set *token*.

**size_t cutOut( long & *number* );**

Sets *number* as for the **copy** method, but also removes from **characters** the number of bytes indicated by the return value. For example, the string shown in the following example can be cut into three numbers by using **cutOut** ( *number* ) three times:

```
strNumbers = "-1 0   +55 "

while ( strNumbers.cutOut( number ) );
number becomes -1, then 0, then 55
leaving strNumbers == " "
```

**size_t cutOut( ImqString & *token*, const char *c* = ' ' '**

Sets *token* as for the **copyOut** method, and removes from **characters** the *strToken* characters and also any characters *c* that precede the *token* characters. If *c* is not a blank, removes characters *c* that directly succeed the *token* characters. Returns the number of characters removed. For example, the string shown in the following example can be cut into three tokens by using **cutOut** ( *token* ) three times:

```
strText = " Program Version 1.1 "

while ( strText.cutOut( token ) );

// token becomes "Program", then "Version",
// then "1.1" leaving strText == " "
```

The following example shows how to parse a DOS path name:

```
strPath = "C:\OS2\BITMAP\OS2LOGO.BMP"

strPath.cutOut( strDrive, ':' );
strPath.stripLeading( ':' );
while ( strPath.cutOut( strFile, '\' ) );

// strDrive becomes "C".
// strFile becomes "OS2", then "BITMAP",
// then "OS2LOGO.BMP" leaving strPath empty.
```

**ImqBoolean find( const ImqString & *string* );**

Searches for an exact match for *string* anywhere within the **characters**. If no match is found, it returns FALSE. Otherwise, it returns TRUE. If *string* is null, it returns TRUE.

**ImqBoolean find( const ImqString &*string*, size_t &*offset* );**
Searches for an exact match for *string* somewhere within the **characters** from offset *offset* onwards. If *string* is null, it returns TRUE without updating *offset*. If no match is found, it returns FALSE (the value of *offset* might have been increased). If a match is found, it returns TRUE and updates *offset* to the offset of *string* within the **characters**.

**size_t length( ) const ;**
Returns the **length**.

**ImqBoolean pasteIn( const double *number*, const char * *format* = "%f" );**
Appends *number* to the **characters** after conversion to text. It returns TRUE if successful.

The specification *format* is used to format the floating point conversion. If specified, it must be one suitable for use with **printf** and floating point numbers, for example **%.3f**.

**ImqBoolean pasteIn( const long *number* );**
Appends *number* to the **characters** after conversion to text. It returns TRUE if successful.

**ImqBoolean pasteIn( const void * *buffer*, const size_t *length* );**
Appends *length* bytes from *buffer* to the **characters**, and adds a final trailing null. Substitutes any null characters copied. The substitution character is a period (.). No special consideration is given to any other nonprintable or nondisplayable characters copied. This method returns TRUE if successful.

**ImqBoolean set( const char * *buffer*, const size_t *length* );**
Sets the **characters** from a fixed-length character field, which might contain a null. Appends a null to the characters from the fixed-length field if necessary. This method returns TRUE if successful.

**ImqBoolean setStorage( const size_t *length* );**
Allocates (or reallocates) the **storage**. Preserves any original **characters**, including any trailing null, if there is still room for them, but does not initialize any additional storage.

This method returns TRUE if successful.

**size_t storage( ) const ;**
Returns the number of bytes in the **storage**.

**size_t stripLeading( const char *c* = ' ' );**
Strips leading characters *c* from the **characters** and returns the number removed.

**size_t stripTrailing( const char *c* = ' ' );**
Strips trailing characters *c* from the **characters** and returns the number removed.

**ImqString upperCase( ) const ;**
Returns an uppercase copy of the **characters**.

## Object methods (protected)

**ImqBoolean assign ( const ImqString &*string* );**
Equivalent to the equivalent **operator =** method, but non-virtual. It returns TRUE if successful.

## Reason codes

- MQRC_DATA_TRUNCATED
- MQRC_NULL_POINTER
- MQRC_STORAGE_NOT_AVAILABLE
- MQRC_BUFFER_ERROR
- MQRC_INCONSISTENT_FORMAT

# ImqTrigger C++ class

This class encapsulates the MQTM (trigger message) data structure.

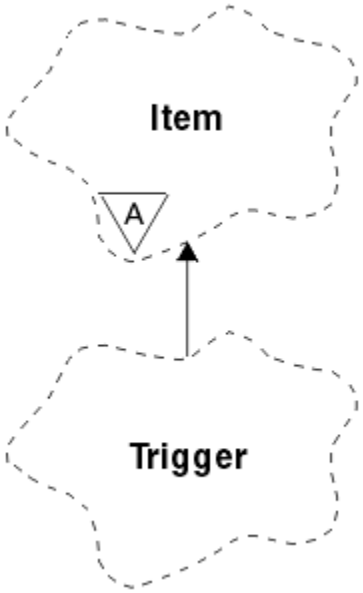


*Figure 68. ImqTrigger class*

Objects of this class are typically used by a trigger monitor program. The task of a trigger monitor program is to wait for these particular messages and act on them to ensure that other IBM MQ applications are started when messages are waiting for them.

See the IMQSTRG sample program for a usage example.


- "Object attributes" on page 1942
- "Constructors" on page 1943
- "Overloaded ImqItem methods" on page 1943
- "Object methods (public)" on page 1943
- "Object data (protected)" on page 1944
- "Reason codes" on page 1944


## Object attributes

**application id**
Identity of the application that sent the message. The initial value is a null string.

**application type**
Type of application that sent the message. The initial value is zero. The following additional values are possible:

- MQAT_AIX
- MQAT_CICS
- MQAT_DOS
- MQAT_IMS
- MQAT_MVS
- MQAT_NOTES_AGENT
- MQAT_OS2
- MQAT_OS390
- MQAT_OS400

- MQAT_UNIX
- MQAT_WINDOWS
- MQAT_WINDOWS_NT
- MQAT_USER_FIRST
- MQAT_USER_LAST

**environment data**
Environment data for the process. The initial value is a null string.

**process name**
Process name. The initial value is a null string.

**queue name**
Name of the queue to be started. The initial value is a null string.

**trigger data**
Trigger data for the process. The initial value is a null string.

**user data**
User data for the process. The initial value is a null string.

## Constructors

**ImqTrigger( );**
The default constructor.

**ImqTrigger( const ImqTrigger & *trigger* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut ( ImqMessage & *msg* );**
Writes an MQTM data structure to the message buffer, replacing any existing content. Sets the *msg* **format** to MQFMT_TRIGGER.

See the ImqItem class method description at "ImqItem C++ class" on page 1886 for further details.

**virtual ImqBoolean pasteIn ( ImqMessage & *msg* );**
Reads an MQTM data structure from the message buffer.

To be successful, the ImqMessage **format** must be MQFMT_TRIGGER.

See the ImqItem class method description at "ImqItem C++ class" on page 1886 for further details.

## Object methods (public)

**void operator = ( const ImqTrigger & *trigger* );**
Copies instance data from *trigger*, replacing the existing instance data.

**ImqString applicationId ( ) const ;**
Returns a copy of the **application id**.

**void setApplicationId ( const char * *id* );**
Sets the **application id**.

**MQLONG applicationType ( ) const ;**
Returns the **application type**.

**void setApplicationType ( const MQLONG *type* );**
Sets the **application type**.

**ImqBoolean copyOut ( MQTMC2 * *ptmc2* );**
Encapsulates the MQTM data structure, which is the one received on initiation queues. Fills in an equivalent MQTMC2 data structure provided by the caller, and sets the QMgrName field (which is not present in the MQTM data structure) to all blanks. The MQTMC2 data structure is traditionally used as a parameter to applications started by a trigger monitor. This method returns TRUE if successful.

**ImqString environmentData ( ) const ;**
Returns a copy of the **environment data**.

**void setEnvironmentData ( const char * *data* );**
Sets the **environment data**.

**ImqString processName ( ) const ;**
Returns a copy of the **process name**.

**void setProcessName ( const char * *name* );**
Sets the **process name**, padded with blanks to 48 characters.

**ImqString queueName ( ) const ;**
Returns a copy of the **queue name**.

**void setQueueName ( const char * *name* );**
Sets the **queue name**, padding with blanks to 48 characters.

**ImqString triggerData ( ) const ;**
Returns a copy of the **trigger data**.

**void setTriggerData ( const char * *data* );**
Sets the **trigger data**.

**ImqString userData ( ) const ;**
Returns a copy of the **user data**.

**void setUserData ( const char * *data* );**
Sets the **user data**.

## Object data (protected)

**MQTM *omqtm***
The MQTM data structure.

## Reason codes

- MQRC_NULL_POINTER
- MQRC_INCONSISTENT_FORMAT
- MQRC_ENCODING_ERROR
- MQRC_STRUC_ID_ERROR

# ImqWorkHeader C++ class

This class encapsulates specific features of the MQWIH data structure.

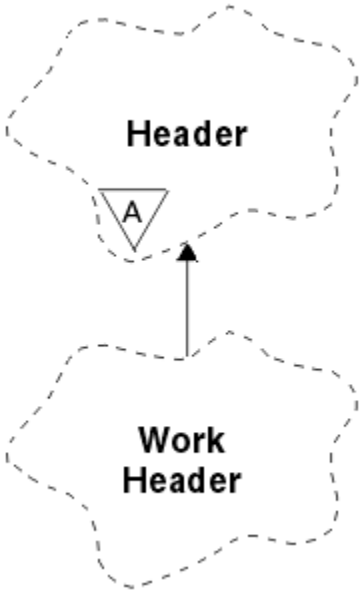


*Figure 69. ImqWorkHeader class*

Objects of this class are used by applications putting messages to the queue managed by the z/OS Workload Manager.


- "Object attributes" on page 1945
- "Constructors" on page 1945
- "Overloaded ImqItem methods" on page 1946
- "Object methods (public)" on page 1946
- "Object data (protected)" on page 1946
- "Reason codes" on page 1946


## Object attributes

**message token**
Message token for the z/OS Workload Manager, of length MQ_MSG_TOKEN_LENGTH. The initial value is MQMTOK_NONE.

**service name**
The 32-character name of a process. The name is initially blanks.

**service step**
The 8-character name of a step within the process. The name is initially blanks.

## Constructors

**ImqWorkHeader( );**
The default constructor.

**ImqWorkHeader( const ImqWorkHeader & *header* );**
The copy constructor.

## Overloaded ImqItem methods

**virtual ImqBoolean copyOut( ImqMessage &*msg* );**
Inserts an MQWIH data structure into the beginning of the message buffer, moving the existing message data further along, and sets the *msg* **format** to MQFMT_WORK_INFO_HEADER.

See the parent class method description for more details.

**virtual ImqBoolean pasteIn( ImqMessage &*msg* );**
Reads an MQWIH data structure from the message buffer.

To be successful, the encoding of the *msg* object must be MQENC_NATIVE. Retrieve messages with MQGMO_CONVERT to MQENC_NATIVE.

The ImqMessage format must be MQFMT_WORK_INFO_HEADER.

See the parent class method description for more details.

## Object methods (public)

**void operator = ( const ImqWorkHeader &*header* );**
Copies instance data from *header*, replacing the existing instance data.

**ImqBinary messageToken ( ) const;**
Returns the **message token**.

**ImqBoolean setMessageToken( const ImqBinary &*token* );**
Sets the **message token**. The data length of *token* must be either zero or MQ_MSG_TOKEN_LENGTH. It returns TRUE if successful.

**void setMessageToken( const MQBYTE16 *token* = 0 );**
Sets the **message token**. *token* can be zero, which is the same as specifying MQMTOK_NONE. If *token* is nonzero, it must address MQ_MSG_TOKEN_LENGTH bytes of binary data.

When using predefined values such as MQMTOK_NONE, you might need make a cast to ensure a signature match; for example, (MQBYTE *)MQMTOK_NONE.

**ImqString serviceName ( ) const;**
Returns the **service name**, including trailing blanks.

**void setServiceName( const char * *name* );**
Sets the **service name**.

**ImqString serviceStep ( ) const;**
Returns the **service step**, including trailing blanks.

**void setServiceStep( const char * *step* );**
Sets the **service step**.

## Object data (protected)

**MQWIH omqwih**
The MQWIH data structure.

## Reason codes

- MQRC_BINARY_DATA_LENGTH_ERROR

# Properties of IBM MQ classes for JMS objects

All objects in IBM MQ classes for JMS have properties. Different properties apply to different object types. Different properties have different allowable values, and symbolic property values differ between the administration tool and program code.

IBM MQ classes for JMS provides facilities to set and query the properties of objects using the IBM MQ JMS administration tool, IBM MQ Explorer, or in an application. Many of the properties are relevant only to a specific subset of the object types.

For information on how you use the IBM MQ JMS administration tool, see Configuring JMS objects using the administration tool.

Table 677 on page 1947 gives a brief description of each property and shows for each property which object types it applies to. The object types are identified using keywords; see Configuring JMS objects using the administration tool for an explanation of these objects.

Numbers refer to notes at the end of the table. See also "Dependencies between properties of IBM MQ classes for JMS objects" on page 1950.

A property consists of a name-value pair in the format:

```
PROPERTY_NAME(property_value)
```

The topics in this section list, for each property, the name of the property and a brief description, and shows the valid property values used in the administration tool. and the set method that is used to set the value of the property in an application. The topics also show the valid property values for each property and the mapping between symbolic property values used in the tool and their programmable equivalents.

Property names are not case-sensitive, and are restricted to the set of recognized names shown in these topics.

*Table 677. Property names and applicable object types*

| **Property** | **Short form** | **Object type** | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **CF** | **QCF** | **TCF** | **Q** | **T** | **XACF** | **XAQCF** | **XATCF** |
| "APPLICATIONNAME" on page 1952 | APPNAME | Y | Y | Y | | | Y | Y | Y |
| "ASYNCEXCEPTION" on page 1952 | AEX | Y | Y | Y | | | Y | Y | Y |
| "BROKERCCDURSUBQ" on page 1953 [1] | CCDSUB | | | | | Y | | | |
| "BROKERCCSUBQ" on page 1954 [1] | CCSUB | Y | | Y | | | Y | | Y |
| "BROKERCONQ" on page 1954 [1] | BCON | Y | | Y | | | Y | | Y |
| "BROKERDURSUBQ" on page 1955 [1] | BDSUB | | | | | Y | | | |
| "BROKERPUBQ" on page 1955 [1] | BPUB | Y | | Y | | Y | Y | | Y |
| "BROKERPUBQMGR" on page 1956 [1] | BPQM | | | | | Y | | | |
| "BROKERQMGR" on page 1956 [1] | BQM | Y | | Y | | | Y | | Y |
| "BROKERSUBQ" on page 1956 [1] | BSUB | Y | | Y | | | Y | | Y |
| "BROKERVER" on page 1957 [1] | BVER | Y [2] | | Y [2] | | Y | Y | | Y |
| "CCDTURL" on page 1958 [3] | CCDT | Y | Y | Y | | | Y | Y | Y |
| "CCSID" on page 1958 | CCS | Y | Y | Y | Y | Y | Y | Y | Y |
| "CHANNEL" on page 1959 [3] | CHAN | Y | Y | Y | | | Y | Y | Y |

*Table 677. Property names and applicable object types (continued)*

| Property | Short form | Object type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | CF | QCF | TCF | Q | T | XACF | XAQCF | XATCF |
| "CLEANUP" on page 1959 [1] | CL | Y | | Y | | | Y | | Y |
| "CLEANUPINT" on page 1960 [1] | CLINT | Y | | Y | | | Y | | Y |
| "CONNECTIONNAMELIST" on page 1960 | CNLIST | Y | Y | Y | | | | | |
| "CLIENTRECONNECTOPTIONS" on page 1960 | CROPT | Y | Y | Y | | | | | |
| "CLIENTRECONNECTTIMEOUT" on page 1961 | CRT | Y | Y | Y | | | | | |
| "CLIENTID" on page 1962 | CID | Y [2] | Y | Y [2] | | | Y | Y | Y |
| "CLONESUPP" on page 1962 | CLS | Y | | Y | | | Y | | Y |
| "COMPHDR" on page 1963 | HC | Y | | Y | | | Y | | Y |
| "COMPMSG" on page 1963 | MC | Y | Y | Y | | | Y | Y | Y |
| "CONNOPT" on page 1964 | CNOPT | Y | Y | Y | | | Y | Y | Y |
| "CONNTAG" on page 1965 | CNTAG | Y | Y | Y | | | Y | Y | Y |
| "DESCRIPTION" on page 1965 | DESC | Y [2] | Y | Y [2] | Y | Y | Y | Y | Y |
| "DIRECTAUTH" on page 1966 | DAUTH | Y [2] | | Y [2] | | | | | |
| "ENCODING" on page 1966 | ENC | | | | Y | Y | | | |
| "EXPIRY" on page 1967 | EXP | | | | Y | Y | | | |
| "FAILIFQUIESCE" on page 1967 | FIQ | Y | Y | Y | Y | Y | Y | Y | Y |
| "HOSTNAME" on page 1968 | HOST | Y [2] | Y | Y [2] | | | Y | Y | Y |
| "LOCALADDRESS" on page 1969 | LA | Y [2] | Y | Y [2] | | | Y | Y | Y |
| "MAPNAMESTYLE" on page 1969 | MNST | Y | Y | Y | | | Y | Y | Y |
| "MAXBUFFSIZE" on page 1970 | MBSZ | Y [2] | | Y [2] | | | | | |
| "MDREAD" on page 1970 | MDR | | | | Y | Y | | | |
| "MDWRITE" on page 1971 | MDW | | | | Y | Y | | | |
| "MDMSGCTX" on page 1971 | MDCTX | | | | Y | Y | | | |
| "MSGBATCHSZ" on page 1972 [1] | MBS | Y | Y | Y | | | Y | Y | Y |
| "MSGBODY" on page 1972 | MBODY | | | | Y | Y | | | |
| "MSGRETENTION" on page 1973 | MRET | Y | Y | | | | Y | Y | |
| "MSGSELECTION" on page 1973 [1] | MSEL | Y | | Y | | | Y | | Y |
| "MULTICAST" on page 1974 | MCAST | Y [2] | | Y [2] | | Y | | | |
| "OPTIMISTICPUBLICATION" on page 1975 [1] | OPTPUB | Y | | Y | | | | | |
| "OUTCOMENOTIFICATION" on page 1975 [1] | NOTIFY | Y | | Y | | | | | |

*Table 677. Property names and applicable object types (continued)*

| Property | Short form | Object type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | CF | QCF | TCF | Q | T | XACF | XAQCF | XATCF |
| "PERSISTENCE" on page 1976 | PER | | | | Y | Y | | | |
| "POLLINGINT" on page 1976 [1] | PINT | Y | Y | Y | | | Y | Y | Y |
| "PORT" on page 1977 | PORT | Y [2] | Y | Y [2] | | | Y | Y | Y |
| "PRIORITY" on page 1977 | PRI | | | | Y | Y | | | |
| "PROCESSDURATION" on page 1978 [1] | PROCDUR | Y | | Y | | | | | |
| "PROVIDERVERSION" on page 1978 | PVER | Y | Y | Y | | | Y | Y | Y |
| "PROXYHOSTNAME" on page 1981 | PHOST | Y [2] | | Y [2] | | | | | |
| "PROXYPORT" on page 1981 | PPORT | Y [2] | | Y [2] | | | | | |
| "PUBACKINT" on page 1982 [1] | PAI | Y | | Y | | | Y | | Y |
| "PUTASYNCALLOWED" on page 1982 | PAALD | | | | Y | Y | | | |
| "QMANAGER" on page 1983 | QMGR | Y | Y | Y | Y | | Y | Y | Y |
| "QUEUE" on page 1983 | QU | | | | Y | | | | |
| "READAHEADALLOWED" on page 1984 | RAALD | | | | Y | Y | | | |
| "READAHEADCLOSEPOLICY" on page 1984 | RACP | | | | Y | Y | | | |
| "RECEIVECCSID" on page 1985 | RCCS | | | | Y | Y | | | |
| "RECEIVECONVERSION" on page 1985 | RCNV | | | | Y | Y | | | |
| "RECEIVEISOLATION" on page 1986 [1] | RCVISOL | Y | | Y | | | | | |
| "RECEXIT" on page 1986 | RCX | Y | Y | Y | | | Y | Y | Y |
| "RECEXITINIT" on page 1987 | RCXI | Y | Y | Y | | | Y | Y | Y |
| "REPLYTOSTYLE" on page 1987 | RTOST | | | | Y | Y | | | |
| "RESCANINT" on page 1988 [1] | RINT | Y | Y | | | | Y | Y | |
| "SECEXIT" on page 1988 | SCX | Y | Y | Y | | | Y | Y | Y |
| "SECEXITINIT" on page 1989 | SCXI | Y | Y | Y | | | Y | Y | Y |
| "SENDCHECKCOUNT" on page 1989 | SCC | Y | Y | Y | | | Y | Y | Y |
| "SENDEXIT" on page 1990 | SDX | Y | Y | Y | | | Y | Y | Y |
| "SENDEXITINIT" on page 1990 | SDXI | Y | Y | Y | | | Y | Y | Y |
| "SHARECONVALLOWED" on page 1991 | SCALD | Y | Y | Y | | | Y | Y | Y |
| "SPARSESUBS" on page 1991 [1] | SSUBS | Y | | Y | | | | | |
| "SSLCIPHERSUITE" on page 1992 | SCPHS | Y | Y | Y | | | Y | Y | Y |
| "SSLCRL" on page 1992 | SCRL | Y | Y | Y | | | Y | Y | Y |

*Table 677. Property names and applicable object types (continued)*

| Property | Short form | Object type | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | CF | QCF | TCF | Q | T | XACF | XAQCF | XATCF |
| "SSLFIPSREQUIRED" on page 1993 | SFIPS | Y | Y | Y | | | Y | Y | Y |
| "SSLPEERNAME" on page 1993 | SPEER | Y | Y | Y | | | Y | Y | Y |
| "SSLRESETCOUNT" on page 1994 | SRC | Y | Y | Y | | | Y | Y | Y |
| "STATREFRESHINT" on page 1994 [1] | SRI | Y | | Y | | | Y | | Y |
| "SUBSTORE" on page 1994 [1] | SS | Y | | Y | | | Y | | Y |
| "SYNCPOINTALLGETS" on page 1995 | SPAG | Y | Y | Y | | | Y | Y | Y |
| "TARGCLIENT" on page 1996 | TC | | | | Y | Y | | | |
| "TARGCLIENTMATCHING" on page 1996 | TCM | Y | Y | | | | Y | Y | |
| "TEMPMODEL" on page 1997 | TM | Y | Y | | | | Y | Y | |
| "TEMPQPREFIX" on page 1997 | TQP | Y | Y | | | | Y | Y | |
| "TEMPTOPICPREFIX" on page 1998 | TTP | Y | | Y | | | Y | | Y |
| "TOPIC" on page 1998 | TOP | | | | | Y | | | |
| "TRANSPORT" on page 1998 | TRAN | Y [2] | Y | Y [2] | | | Y | Y | Y |
| "WILDCARDFORMAT" on page 1999 | WCFMT | Y | | Y | | | Y | | Y |

**Note:**

1. This property can be used with Version 7.0 of IBM MQ classes for JMS but has no effect for an application connected to a Version 7.0 queue manager unless the PROVIDERVERSION property of the connection factory is set to a version number less than 7.
2. Only the BROKERVER, CLIENTID, DESCRIPTION, DIRECTAUTH, HOSTNAME, LOCALADDRESS, MAXBUFFSIZE, MULTICAST, PORT, PROXYHOSTNAME, PROXYPORT, and TRANSPORT properties are supported for a ConnectionFactory or TopicConnectionFactory object when using a real-time connection to a broker.
3. The CCDTURL and CHANNEL properties of an object must not both be set at the same time.

## Dependencies between properties of IBM MQ classes for JMS objects

The validity of some properties is dependent on the particular values of other properties.

This dependency can occur in the following groups of properties:

- Client properties
- Properties for a real-time connection to a broker
- Exit initialization strings

**Client properties**

For a connection to a queue manager, the following properties are relevant only if TRANSPORT has the value CLIENT:

- HOSTNAME
- PORT
- CHANNEL

- LOCALADDRESS
- CCDTURL
- CCSID
- COMPHDR
- COMPMSG
- RECEXIT
- RECEXITINIT
- SECEXIT
- SECEXITINIT
- SENDEXIT
- SENDEXITINIT
- SHARECONVALLOWED
- SSLCIPHERSUITE
- SSLCRL
- SSLFIPSREQUIRED
- SSLPEERNAME
- SSLRESETCOUNT
- APPLICATIONNAME

You cannot set values for these properties by using the administration tool if TRANSPORT has the value BIND.

If TRANSPORT has the value CLIENT, the default value of the BROKERVER property is V1 and the default value of the PORT property is 1414. If you set the value of BROKERVER or PORT explicitly, a later change to the value of TRANSPORT does not override your choices.

**Properties for a real-time connection to a broker**

Only the following properties are relevant if TRANSPORT has the value DIRECT or DIRECTHTTP:

- BROKERVER
- CLIENTID
- DESCRIPTION
- DIRECTAUTH
- HOSTNAME
- LOCALADDRESS
- MAXBUFFSIZE
- MULTICAST (supported only for DIRECT)
- PORT
- PROXYHOSTNAME (supported only for DIRECT)
- PROXYPORT (supported only for DIRECT)

If TRANSPORT has the value DIRECT or DIRECTHTTP, the default value of the BROKERVER property is V2, and the default value of the PORT property is 1506. If you set the value of BROKERVER or PORT explicitly, a later change to the value of TRANSPORT does not override your choices.

**Exit initialization strings**

Do not set any of the exit initialization strings without supplying the corresponding exit name. The exit initialization properties are:

- RECEXITINIT
- SECEXITINIT

- SENDEXITINIT

For example, specifying `RECEXITINIT(myString)` without specifying `RECEXIT(some.exit.classname)` causes an error.

**Related reference**

"TRANSPORT" on page 1998
The nature of a connection to a queue manager or broker.

# APPLICATIONNAME

An application can set a name that identifies its connection to the queue manager. This application name is shown by the **DISPLAY CONN MQSC/PCF** command (where the field is called **APPLTAG** ) or in the IBM MQ Explorer **Application Connections** display (where the field is called **App name** ).

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: APPLICATIONNAME

JMS administration tool short name: APPNAME

## Programmatic access

Setters/getters

- MQConnectionFactory.setAppName()
- MQConnectionFactory.getAppName()

## Values

Any valid string that is no longer than 28 characters. Longer names are adjusted to fit by removing leading package names, if necessary. For example, if the invoking class is `com.example.MainApp`, the full name is used, but if the invoking class is `com.example.dictionaryAndThesaurus.multilingual.mainApp`, the name `multilingual.mainApp` is used, because it is the longest combination of class name and rightmost package name that fits into the available length.

If the class name itself is more than 28 characters long, it is truncated to fit. For example, `com.example.mainApplicationForSecondTestCase` becomes `mainApplicationForSecondTest`.

# ASYNCEXCEPTION

This property determines whether IBM MQ classes for JMS informs an ExceptionListener only when a connection is broken, or when any exception occurs asynchronously to a JMS API call. This applies to all Connections created from this ConnectionFactory that have an ExceptionListener registered.

## Applicable objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: ASYNCEXCEPTION

JMS administration tool short name: AEX

## Programmatic access

Setters/Getters

- MQConnectionFactory.setAsyncExceptions()
- MQConnectionFactory.getAsyncExceptions()

### Values

**ASYNC_EXCEPTIONS_ALL**

Any exception detected asynchronously, outside the scope of a synchronous API call, and all connection broken exceptions are sent to the ExceptionListener.

| Environment | Value |
|---|---|
| JMS Administration Tool | ALL |
| Programmatic | WMQCONSTANTS.ASYNC_EXCEPTIONS_ALL = -1 |
| IBM MQ Explorer | All |

**ASYNC_EXCEPTIONS_CONNECTIONBROKEN**

Only exceptions indicating a broken connection are sent to the ExceptionListener. Any other exceptions occurring during asynchronous processing are not reported to the ExceptionListener, and hence the application is not informed of these exceptions. V 8.0.0.2 This is the default value from IBM MQ 8.0.0, Fix Pack 2 (see JMS: Exception listener changes in Version 8.0).

| Environment | Value |
|---|---|
| JMS Administration Tool | CONNECTIONBROKEN |
| Programmatic | WMQCONSTANTS.ASYNC_EXCEPTIONS_CONNECTIONBROKEN = 1 |
| MQ Explorer | Connection Broken |

The following additional constant is defined:

- V 8.0.0.2 From Version 8.0.0, Fix Pack 2: WMQCONSTANTS.ASYNC_EXCEPTIONS_DEFAULT = ASYNC_EXCEPTIONS_CONNECTIONBROKEN
- Before Version 8.0.0, Fix Pack 2: WMQCONSTANTS.ASYNC_EXCEPTIONS_DEFAULT = ASYNC_EXCEPTIONS_ALL

**Related concepts**

Exceptions in IBM MQ classes for JMS

## BROKERCCDURSUBQ

The name of the queue from which durable subscription messages are retrieved for a ConnectionConsumer.

### Applicable objects

Topic

JMS administration tool long name: BROKERCCDURSUBQ

JMS administration tool short name: CCDSUB

### Programmatic access

Setters/getters

- MQTopic.setBrokerCCDurSubQueue()
- MQTopic.getBrokerCCDurSubQueue()

### Values

**SYSTEM.JMS.D.CC.SUBSCRIBER.QUEUE**
This is the default value.

**Any valid string**

## BROKERCCSUBQ

The name of the queue from which non-durable subscription messages are retrieved for a ConnectionConsumer.

### Applicable objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERCCSUBQ

JMS administration tool short name: CCSUB

### Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerCCSubQueue()
- MQConnectionFactory.getBrokerCCSubQueue()

### Values

**SYSTEM.JMS.ND.CC.SUBSCRIBER.QUEUE**
This is the default value.

**Any valid string**

## BROKERCONQ

The control queue name of the broker.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERCONQ

JMS administration tool short name: BCON

### Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerControlQueue()
- MQConnectionFactory.getBrokerControlQueue()

### Values

**SYSTEM.BROKER.CONTROL.QUEUE**
This is the default value.

**Any valid string**

# BROKERDURSUBQ

When the IBM MQ classes for JMS are being used in IBM MQ messaging provider migration mode, this property specifies the name of the queue from which durable subscription messages are retrieved.

## Applicable objects

Topic

JMS administration tool long name: BROKERDURSUBQ

JMS administration tool short name: BDSUB

## Programmatic access

Setters/getters

- MQTopic.setBrokerDurSubQueue()
- MQTopic.getBrokerDurSubQueue()

## Values

**SYSTEM.JMS.D.SUBSCRIBER.QUEUE**
This is the default value.

**Any valid string**
Starting with SYSTEM.JMS.D

**Related concepts**
Rules for selecting the IBM MQ messaging provider mode

# BROKERPUBQ

The name of the queue where published messages are sent (the stream queue).

## Applicable Objects

ConnectionFactory, TopicConnectionFactory, Topic, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERPUBQ

JMS administration tool short name: BPUB

## Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerPubQueue
- MQConnectionFactory.getBrokerPubQueue

## Values

**SYSTEM.BROKER.DEFAULT.STREAM**
This is the default value.

**Any valid string**

## BROKERPUBQMGR

The name of the queue manager that owns the queue where messages published on the topic are sent.

### Applicable Objects

Topic

JMS administration tool long name: BROKERPUBQMGR

JMS administration tool short name: BPQM

### Programmatic access

Setters/getters

- MQTopic.setBrokerPubQueueManager()
- MQTopic.getBrokerPubQueueManager()

### Values

**null**
This is the default value.

**Any valid string**

## BROKERQMGR

The name of the queue manager on which the broker is running.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERQMGR

JMS administration tool short name: BQM

### Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerQueueManager()
- MQConnectionFactory.getBrokerQueueManager()

### Values

**null**
This is the default value.

**Any valid string**

## BROKERSUBQ

When the IBM MQ classes for JMS are being used in IBM MQ messaging provider migration mode, this property specifies the name of the queue from which non-durable subscription messages are retrieved.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERSUBQ

JMS administration tool short name: BSUB

### Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerSubQueue()
- MQConnectionFactory.getBrokerSubQueue()

### Values

**SYSTEM.JMS.ND.SUBSCRIBER.QUEUE**
This is the default value.

**Any valid string**
Starting with SYSTEM.JMS.ND

**Related concepts**

Rules for selecting the IBM MQ messaging provider mode

## BROKERVER

The version of the broker being used.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, Topic, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: BROKERVER

JMS administration tool short name: BVER

### Programmatic access

Setters/getters

- MQConnectionFactory.setBrokerVersion()
- MQConnectionFactory.getBrokerVersion()

### Values

**V1**
To use an IBM MQ Publish/Subscribe broker, or to use a broker of IBM MQ Integrator, WebSphere Event Broker, WebSphere Business Integration Event Broker, or WebSphere Business Integration Message Broker in compatibility mode. This is the default value if TRANSPORT is set to BIND or CLIENT.

**V2**
To use a broker of IBM MQ Integrator, WebSphere Event Broker, WebSphere Business Integration Event Broker, or WebSphere Business Integration Message Broker in native mode. This is the default value if TRANSPORT is set to DIRECT or DIRECTHTTP.

**unspecified**
After the broker has migrated from V6 to V7, set this property so that RFH2 headers are no longer used. After migration this property is no longer relevant.

# CCDTURL

A Uniform Resource Locator (URL) that identifies the name and location of the file containing the client channel definition table and specifies how the file can be accessed.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CCDTURL

JMS administration tool short name: CCDT

## Programmatic access

Setters/getters

- MQConnectionFactory.setCCDTURL()
- MQConnectionFactory.getCCDTURL()

## Values

**null**
This is the default value.

**A Uniform Resource Locator (URL)**

# CCSID

The coded character set ID to be used for a connection or destination.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, Queue, Topic, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CCSID

JMS administration tool short name: CCS

## Programmatic access

Setters/getters

- MQConnectionFactory.setCCSID()
- MQConnectionFactory.getCCSID()

## Values

**819**
This is the default value for a connection factory.

**1208**
This is the default value for a destination.

**Any positive integer**

# CHANNEL

The name of the client connection channel being used.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CHANNEL

JMS administration tool short name: CHAN

## Programmatic access

Setters/getters

- MQConnectionFactory.setChannel()
- MQConnectionFactory.getChannel()

## Values

**SYSTEM.DEF.SVRCONN**
This is the default value.

**Any valid string**

# CLEANUP

Cleanup Level for BROKER or MIGRATE Subscription Stores.

## Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CLEANUP

JMS administration tool short name: CL

## Programmatic access

Setters/getters

- MQConnectionFactory.setCleanupLevel()
- MQConnectionFactory.getCleanupLevel()

## Values

**SAFE**
Use safe cleanup. This is the default value.

**ASPROP**
Use safe, strong, or no cleanup according to a property set on the Java command line.

**NONE**
Use no cleanup.

**STRONG**
Use strong cleanup.

## CLEANUPINT

The interval, in milliseconds, between background executions of the publish/subscribe cleanup utility.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CLEANUPINT

JMS administration tool short name: CLINT

### Programmatic access

Setters/getters

- MQConnectionFactory.setCleanupInterval()
- MQConnectionFactory.getCleanupInterval()

### Values

**3600000**
This is the default value.

**Any positive integer**

## CONNECTIONNAMELIST

List of TCP/IP connection names. The list is tried in order, once per each reconnection retry attempt.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory

JMS administration tool long name: CONNECTIONNAMELIST

JMS administration tool short name: CNLIST

### Programmatic access

Setters/getters

- MQConnectionFactory.setconnectionNameList()
- MQConnectionFactory.getconnectionNameList()

### Values

Comma separated list of HOSTNAME(PORT). HOSTNAME can be either a DNS name or IP address.

PORT defaults to 1414.

## CLIENTRECONNECTOPTIONS

Options governing reconnection.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory

JMS administration tool long name: CLIENTRECONNECTOPTIONS

JMS administration tool short name: CROPT

### Programmatic access

Setters/getters

- MQConnectionFactory.setClientReconnectOptions()
- MQConnectionFactory.getClientReconnectOptions()

### Values

**QMGR**

The application can reconnect, but only to the queue manager to which it originally connected.

Use this value if an application can be reconnected, but there is an affinity between the IBM MQ classes for JMS application, and the queue manager to which it first established a connection.

Choose this value if you want an application to automatically reconnect to the standby instance of a highly available queue manager.

To use this value programmatically, use the constant WMQConstants.WMQ_CLIENT_RECONNECT_Q_MGR.

**ANY**

The application can reconnect to any queue manager.

Use the reconnect option only if there is no affinity between the IBM MQ classes for JMS application and the queue manager with which it initially established a connection.

To use this value from a program, use the constant WMQConstants.WMQ_CLIENT_RECONNECT.

**DISABLED**

The application will not be reconnected.

To use this value programmatically, use the constant WMQConstants.WMQ_CLIENT_RECONNECT_DISABLED.

**ASDEF**

Whether the application will reconnect automatically depends on the value of the IBM MQ channel attribute DefReconnect.

To use this value from a program, use the constant WMQConstants.WMQ_CLIENT_RECONNECT_AS_DEF.

## CLIENTRECONNECTTIMEOUT

Time before reconnection retries cease.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory

JMS administration tool long name: CLIENTRECONNECTTIMEOUT

JMS administration tool short name: CRT

### Programmatic access

Setters/getters

- MQConnectionFactory.setClientReconnectTimeout()
- MQConnectionFactory.setClientReconnectTimeout()

### Values

Interval in seconds. Default 1800 (30 minutes).

## CLIENTID

The client identifier is used to uniquely identify the application connection for durable subscriptions.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CLIENTID

JMS administration tool short name: CID

### Programmatic access

Setters/getters

- MQConnectionFactory.setClientId()
- MQConnectionFactory.getClientId()

### Values

**null**
This is the default value.

**Any valid string**

## CLONESUPP

Whether two or more instances of the same durable topic subscriber can run simultaneously.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CLONESUPP

JMS administration tool short name: CLS

### Programmatic access

Setters/getters

- MQConnectionFactory.setCloneSupport()
- MQConnectionFactory.getCloneSupport()

### Values

**DISABLED**
Only one instance of a durable topic subscriber can run at a time. This is the default value.

**ENABLED**
Two or more instances of the same durable topic subscriber can run simultaneously, but each instance must run in a separate Java virtual machine (JVM).

## COMPHDR

A list of the techniques that can be used for compressing header data on a connection.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: COMPHDR

JMS administration tool short name: HC

### Programmatic access

Setters/getters

- MQConnectionFactory.setHdrCompList()
- MQConnectionFactory.getHdrCompList()

### Values

**NONE**
This is the default value.

**SYSTEM**
RLE message header compression is performed.

## COMPMSG

A list of the techniques that can be used for compressing message data on a connection.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: COMPMSG

JMS administration tool short name: MC

### Programmatic access

Setters/getters

- MQConnectionFactory.setMsgCompList()
- MQConnectionFactory.getMsgCompList()

### Values

**NONE**
This is the default value.

**A list of one or more of the following values separated by blank characters:**
RLE ZLIBFAST ZLIBHIGH

# CONNOPT

Controls how IBM MQ classes for JMS applications that use the bindings transport connect to the queue manager.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory.

JMS administration tool long name: CONNOPT

JMS administration tool short name: CNOPT

## Programmatic access

Setters/getters

- MQConnectionFactory.setMQConnectionOptions()
- MQConnectionFactory.getMQConnectionOptions()

## Values

**STANDARD**
The nature of the binding between the application and the queue manager depends on the value of the *DefaultBindType* attribute of the queue manager. The STANDARD value maps to the IBM MQ *ConnectOption* MQCNO_STANDARD_BINDING.

**SHARED**
The application and the local queue manager agent run in separate units of execution but share some resources. This value maps to the IBM MQ *ConnectOption* MQCNO_SHARED_BINDING.

**ISOLATED**
The application and the local queue manager agent run in separate units of execution and share no resources. The ISOLATED value maps to the IBM MQ *ConnectOption* MQCNO_ISOLATED_BINDING.

**FASTPATH**
The application and the local queue manager agent run in the same unit of execution. This value maps to the IBM MQ *ConnectOption* MQCNO_FASTPATH_BINDING.

**SERIALQM**
The application requests exclusive use of the connection tag within the scope of the queue manager. This value maps to the IBM MQ *ConnectOption* MQCNO_SERIALIZE_CONN_TAG_Q_MGR.

**SERIALQSG**
The application requests exclusive use of the connection tag within the scope of the queue sharing group to which the queue manager belongs. The SERIALQSG value maps to the IBM MQ *ConnectOption* MQCNO_SERIALIZE_CONN_TAG_QSG.

**RESTRICTQM**
The application requests shared use of the connection tag, but there are restrictions on the shared use of the connection tag within the scope of the queue manager. This value maps to the IBM MQ *ConnectOption* MQCNO_RESTRICT_CONN_TAG_Q_MGR.

**RESTRICTQSG**
The application requests shared use of the connection tag, but there are restrictions on the shared use of the connection tag within the scope of the queue sharing group to which the queue manager belongs. This value maps to the IBM MQ *ConnectOption* MQCNO_RESTRICT_CONN_TAG_QSG.

For further information on IBM MQ connection options, see Connecting to a queue manager using the MQCONNX call.

# CONNTAG

A tag that the queue manager associates with the resources updated by the application within a unit of work while the application is connected to the queue manager.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: CONNTAG

JMS administration tool short name: CNTAG

## Programmatic access

Setters/getters

- MQConnectionFactory.setConnTag()
- MQConnectionFactory.getConnTag()

## Values

**A byte array of 128 elements, where each element is 0**
This is the default value.

**Any string**
The value is truncated if it is longer than 128 bytes.

# DESCRIPTION

A description of the stored object.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, Queue, Topic, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: DESCRIPTION

JMS administration tool short name: DESC

## Programmatic access

Setters/getters

- MQConnectionFactory.setDescription()
- MQConnectionFactory.getDescription()

## Values

**null**
This is the default value.

**Any valid string**

# DIRECTAUTH

Whether SSL authentication is used on a real-time connection to a broker.

## Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: DIRECTAUTH

JMS administration tool short name: DAUTH

## Programmatic access

Setters/getters

- MQConnectionFactory.setDirectAuth()
- MQConnectionFactory.getDirectAuth()

## Values

**BASIC**
No authentication, username authentication, or password authentication. This is the default value.

**CERTIFICATE**
Public key certificate authentication.

# ENCODING

How numeric data in the body of a message is represented when the message is sent to this destination. The property specifies the representation of binary integers, packed decimal integers, and floating point numbers.

## Applicable Objects

Queue, Topic

JMS administration tool long name: ENCODING

JMS administration tool short name: ENC

## Programmatic access

Setters/getters

- MQDestination.setEncoding()
- MQDestination.getEncoding()

## Values

**ENCODING property**

The valid values that the ENCODING property can take are constructed from the three sub-properties:

**integer encoding**
Either normal or reversed

**decimal encoding**
Either normal or reversed

**floating-point encoding**
IEEE normal, IEEE reversed, or z/OS

The ENCODING property is expressed as a three-character string with the following syntax:

```
{N|R}{N|R}{N|R|3}
```

In this string:

- N denotes normal
- R denotes reversed
- 3 denotes z/OS
- The first character represents *integer encoding*
- The second character represents *decimal encoding*
- The third character represents *floating-point encoding*

This provides a set of twelve possible values for the ENCODING property.

There is an additional value, the string NATIVE, which sets appropriate encoding values for the Java platform.

The following examples show valid combinations for ENCODING:

```
ENCODING(NNR)
ENCODING(NATIVE)
ENCODING(RR3)
```

# EXPIRY

The time after which messages at a destination expire.

## Applicable Objects

Queue, Topic

JMS administration tool long name: EXPIRY

JMS administration tool short name: EXP

## Programmatic access

Setters/getters

- MQDestination.setExpiry()
- MQDestination.getExpiry()

## Values

**APP**
Expiry can be defined by the JMS application. This is the default value.

**UNLIM**
No expiry occurs.

**0**
No expiry occurs.

**Any positive integer representing expiry in milliseconds.**

# FAILIFQUIESCE

This property determines whether calls to certain methods fail if either the queue manager is in a quiescing state, or an application is connecting to a queue manager using the CLIENT transport and the

channel that the application is using has been put into a quiescing state, for example, by using the **STOP CHANNEL** or **STOP CHANNEL MODE(QUIESCE)** MQSC command.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, Queue, Topic, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: FAILIFQUIESCE

JMS administration tool short name: FIQ

### Programmatic access

Setters/getters

- MQConnectionFactory.setFailIfQuiesce()
- MQConnectionFactory.getFailIfQuiesce()

### Values

**YES**
Calls to certain methods fail if either the queue manager is in a quiescing state, or the channel being used to connect to a queue manager is quiescing. If an application detects either of these conditions, the application can complete its immediate task and close the connection, allowing the queue manager or channel instance to stop. This is the default value.

**NO**
No method call fails because either the queue manager, or the channel being used to connect to a queue manager, is in a quiescing state. If you specify this value, an application cannot detect that the queue manager or channel is quiescing. The application might continue to perform operations against the queue manager, and therefore prevent the queue manager from stopping.

## HOSTNAME

For a connection to a queue manager, the host name or IP address of the system on which the queue manager is running or, for a real-time connection to a broker, the host name or IP address of the system on which the broker is running.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: HOSTNAME

JMS administration tool short name: HOST

### Programmatic access

Setters/getters

- MQConnectionFactory.setHostName()
- MQConnectionFactory.getHostName()

### Values

**localhost**
This is the default value.

**Any valid string**

# LOCALADDRESS

For a connection to a queue manager, this property specifies either the local network interface to be used, or the local port, or range of local ports, to be used.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: LOCALADDRESS

JMS administration tool short name: LA

## Programmatic access

Setters/getters

- MQConnectionFactory.setLocalAddress()
- MQConnectionFactory.getLocalAddress()

## Values

**"" (empty string)**
This is the default value.

**A string in the format [ip-addr][(low-port[,high-port])]**
Here are some examples:

`192.0.2.0`

The channel binds to address 192.0.2.0 locally.

`192.0.2.0(1000)`

The channel binds to address 192.0.2.0 locally and uses port 1000.

`192.0.2.0(1000,2000)`

The channel binds to address 192.0.2.0 locally and uses a port in the range 1000 to 2000.

`(1000)`

The channel binds to port 1000 locally.

`(1000,2000)`

The channel binds to a port in the range 1000 to 2000 locally.

You can specify a host name instead of an IP address. For a real-time connection to a broker, this property is relevant only when multicast is used, and the value of the property must not contain a port number, or a range of port numbers. The only valid values of the property in this case are null, an IP address, or a host name.

# MAPNAMESTYLE

Allows compatibility style to be used for MapMessage element names.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: MAPNAMESTYLE

JMS administration tool short name: MNST

### Programmatic access

Setters/getters

- MQConnectionFactory.setMapNameStyle()
- MQConnectionFactory.getMapNameStyle()

### Values

**STANDARD**
The standard com.ibm.jms.JMSMapMessage element naming format is to be used. This is the default value and allows non-legal Java identifiers to be used as the element name.

**COMPATIBLE**
The older com.ibm.jms.JMSMapMessage element naming format is to be used. Only legal Java identifiers can be used as the element name. This is needed only if map messages are being sent to an application that is using a version of IBM MQ classes for JMS earlier than Version 5.3.

## MAXBUFFSIZE

The maximum number of received messages that can be stored in an internal message buffer while waiting to be processed by the application. This property applies only when TRANSPORT has the value DIRECT or DIRECTHTTP.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: MAXBUFFSIZE

JMS administration tool short name: MBSZ

### Programmatic access

Setters/getters

- MQConnectionFactory.setMaxBufferSize()
- MQConnectionFactory.getMaxBufferSize()

### Values

**1000**
This is the default value.

**Any positive integer**

## MDREAD

This property determines whether a JMS application can extract the values of MQMD fields.

### Applicable Objects

JMS administration tool long name: MDREAD

JMS administration tool short name: MDR

### Programmatic access

Setters/getters

- MQDestination.setMQMDReadEnabled()
- MQDestination.getMQMDReadEnabled()

### Values

**NO**

When sending messages, the JMS_IBM_MQMD* properties on a sent message are not updated to reflect the updated field values in the MQMD. When receiving messages, none of the JMS_IBM_MQMD* properties are available on a received message, even if the sender had set some or all of them. This is the default value for administrative tools.

For programs, use False.

**Yes**

When sending messages, all of the JMS_IBM_MQMD* properties on a sent message are updated to reflect the updated field values in the MQMD, including the properties that the sender did not set explicitly. When receiving messages, all of the JMS_IBM_MQMD* properties are available on a received message, including the properties that the sender did not set explicitly.

For programs, use True.

## MDWRITE

This property determines whether a JMS application can set the values of MQMD fields.

### Applicable Objects

Queue, Topic

JMS administration tool long name: MDWRITE

JMS administration tool short name: MDR

### Programmatic access

Setters/getters

- MQDestination.setMQMDWriteEnabled()
- MQDestination.getMQMDWriteEnabled()

### Values

**NO**

All JMS_IBM_MQMD* properties are ignored and their values are not copied into the underlying MQMD structure. This is the default value for administrative tools.

For programs, use False.

**YES**

JMS_IBM_MQMD* properties are processed. Their values are copied into the underlying MQMD structure.

For programs, use True.

## MDMSGCTX

What level of message context is to be set by the JMS application. The application must be running with appropriate context authority for this property to take effect.

### Applicable Objects

JMS administration tool long name: MDMSGCTX

JMS administration tool short name: MDCTX

### Programmatic access

Setters/getters

- MQDestination.setMQMDMessageContext()
- MQDestination.getMQMDMessageContext()

### Values

**DEFAULT**
The MQOPEN API call and the MQPMO structure specify no explicit message context options. This is the default value for administrative tools.

For programs, use WMQ_MDCTX_DEFAULT.

**SET_IDENTITY_CONTEXT**
The MQOPEN API call specifies the message context option MQOO_SET_IDENTITY_CONTEXT and the MQPMO structure specifies MQPMO_SET_IDENTITY_CONTEXT.

For programs, use WMQ_MDCTX_SET_IDENTITY_CONTEXT.

**SET_ALL_CONTEXT**
The MQOPEN API call specifies the message context option MQOO_SET_ALL_CONTEXT and the MQPMO structure specifies MQPMO_SET_ALL_CONTEXT.

For programs, use WMQ_MDCTX_SET_ALL_CONTEXT.

## MSGBATCHSZ

The maximum number of messages to be taken from a queue in one packet when using asynchronous message delivery.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: MAXBUFFSIZE

JMS administration tool short name: MBSZ

### Programmatic access

Setters/getters

- MQConnectionFactory.setMsgBatchSize()
- MQConnectionFactory.getMsgBatchSize()

### Values

**10**
This is the default value.

**Any positive integer**

## MSGBODY

Determines whether a JMS application accesses the MQRFH2 of an IBM MQ message as part of the message payload.

### Applicable Objects

Queue, Topic

JMS administration tool long name: WMQ_MESSAGE_BODY

JMS administration tool short name: MBODY

### Programmatic access

Setters/getters

- MQConnectionFactory.setMessageBodyStyle()
- MQConnectionFactory.getMessageBodyStyle()

### Values

**UNSPECIFIED**
When sending, IBM MQ classes for JMS does or does not generate and include an MQRFH2 header, depending on the value of WMQ_TARGET_CLIENT. When receiving, acts as value JMS.

**JMS**
When sending, IBM MQ classes for JMS automatically generates an MQRFH2 header and includes it in the IBM MQ message.

When receiving, IBM MQ classes for JMS set the JMS message properties according to values in the MQRFH2 (if present); it does not present the MQRFH2 as part of the JMS message body.

**MQ**
When sending, IBM MQ classes for JMS does not generate an MQRFH2.

When receiving, IBM MQ classes for JMS presents the MQRFH2 as part of the JMS message body.

## MSGRETENTION

Whether the connection consumer keeps undelivered messages on the input queue.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory,

JMS administration tool long name: MSGRETENTION

JMS administration tool short name: MRET

### Programmatic access

Setters/getters

- MQConnectionFactory.setMessageRetention()
- MQConnectionFactory.getMessageRetention()

### Values

**Yes**
Undelivered messages remain on the input queue. This is the default value.

**No**
Undelivered messages are dealt with according to their disposition options.

## MSGSELECTION

Determines whether message selection is done by the IBM MQ classes for JMS or by the broker. If TRANSPORT has the value DIRECT, message selection is always done by the broker and the value of

MSGSELECTION is ignored. Message selection by the broker is not supported when BROKERVER has the value V1.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: MSGSELECTION

JMS administration tool short name: MSEL

### Programmatic access

Setters/getters

- MQConnectionFactory.setMessageSelection()
- MQConnectionFactory.getMessageSelection()

### Values

**CLIENT**
Message selection is done by IBM MQ classes for JMS. This is the default value.

**BROKER**
Message selection is done by the broker.

## MULTICAST

To enable multicast on a real-time connection to a broker and, if enabled, to specify the precise way in which multicast is used to deliver messages from the broker to a message consumer. The property has no effect on how a message producer sends messages to a broker.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, Topic

JMS administration tool long name: MULTICAST

JMS administration tool short name: MCAST

### Programmatic access

Setters/getters

- MQConnectionFactory.setMulticast()
- MQConnectionFactory.getMulticast()

### Values

**DISABLED**
Messages are not delivered to a message consumer using multicast transport. This is the default value for ConnectionFactory and TopicConnectionFactory objects.

**ASCF**
Messages are delivered to a message consumer according to the multicast setting for the connection factory associated with the message consumer. The multicast setting for the connection factory is noted at the time that the message consumer is created. This value is valid only for Topic objects, and is the default value for Topic objects.

**ENABLED**
If the topic is configured for multicast in the broker, messages are delivered to a message consumer using multicast transport. A reliable quality of service is used if the topic is configured for reliable multicast.

**RELIABLE**
If the topic is configured for reliable multicast in the broker, messages are delivered to the message consumer using multicast transport with a reliable quality of service. If the topic is not configured for reliable multicast, you cannot create a message consumer for the topic.

**NOTR**
If the topic is configured for multicast in the broker, messages are delivered to the message consumer using multicast transport. A reliable quality of service is not used even if the topic is configured for reliable multicast.

## OPTIMISTICPUBLICATION

This property determines whether IBM MQ classes for JMS returns control immediately to a publisher that has published a message, or whether it returns control only after it has completed all the processing associated with the call and can report the outcome to the publisher.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: OPTIMISTICPUBLICATION

JMS administration tool short name: OPTPUB

### Programmatic access

Setters/getters

- MQConnectionFactory.setOptimisticPublication()
- MQConnectionFactory.getOptimisticPublication()

### Values

**NO**
When a publisher publishes a message, IBM MQ classes for JMS do not return control to the publisher until it has completed all the processing associated with the call and can report the outcome to the publisher. This is the default value.

**YES**
When a publisher publishes a message, IBM MQ classes for JMS returns control to the publisher immediately, before it has completed all the processing associated with the call and can report the outcome to the publisher. IBM MQ classes for JMS reports the outcome only when the publisher commits the message.

## OUTCOMENOTIFICATION

This property determines whether IBM MQ classes for JMS return control immediately to a subscriber that has just acknowledged or committed a message, or whether it returns control only after it has completed all the processing associated with the call and can report the outcome to the subscriber.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: OUTCOMENOTIFICATION

JMS administration tool short name: NOTIFY

### Programmatic access

Setters/getters

- MQConnectionFactory.setOutcomeNotification()
- MQConnectionFactory.getOutcomeNotification()

### Values

**YES**
When a subscriber acknowledges or commits a message, IBM MQ classes for JMS do not return control to the subscriber until it has completed all the processing associated with the call and can report the outcome to the subscriber. This is the default value.

**NO**
When a subscriber acknowledges or commits a message, IBM MQ classes for JMS returns control to the subscriber immediately, before it has completed all the processing associated with the call and can report the outcome to the subscriber.

## PERSISTENCE

The persistence of messages sent to a destination.

### Applicable Objects

Queue, Topic

JMS administration tool long name: PERSISTENCE

JMS administration tool short name: PER

### Programmatic access

Setters/getters

- MQDestination.setPersistence()
- MQDestination.getPersistence()

### Values

**APP**
Persistence is defined by the JMS application. This is the default value.

**QDEF**
Persistence takes the value of the queue default.

**PERS**
Messages are persistent.

**NON**
Messages are nonpersistent.

**HIGH**
See JMS persistent messages for further information on the use of this value.

## POLLINGINT

If each message listener within a session has no suitable message on its queue, this is the maximum interval, in milliseconds, that elapses before each message listener tries again to get a message from its queue. If it frequently happens that no suitable message is available for any of the message listeners in a session, consider increasing the value of this property. This property is relevant only if TRANSPORT has the value BIND or CLIENT.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: POLLINGINT

JMS administration tool short name: PINT

### Programmatic access

Setters/getters

- MQConnectionFactory.setPollingInterval()
- MQConnectionFactory.getPollingInterval()

### Values

**5000**
This is the default value.

**Any positive integer**

## PORT

For a connection to a queue manager, the number of the port on which the queue manager is listening or, for a real-time connection to a broker, the number of the port on which the broker is listening for real-time connections.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: PORT

JMS administration tool short name: PORT

### Programmatic access

Setters/getters

- MQConnectionFactory.setPort()
- MQConnectionFactory.getPort()

### Values

**1414**
This is the default value if TRANSPORT is set to CLIENT.

**1506**
This is the default value if TRANSPORT is set to DIRECT or DIRECTHTTP.

**Any positive integer**

## PRIORITY

The priority for messages sent to a destination.

### Applicable Objects

Queue, Topic

JMS administration tool long name: PRIORITY

JMS administration tool short name: PRI

### Programmatic access

Setters/getters

- MQDestination.setPriority()
- MQDestination.getPriority()

### Values

**APP**
Priority is defined by the JMS application. This is the default value.

**QDEF**
Priority takes the value of the queue default.

**Any integer in the range 0-9**
Lowest to highest.

## PROCESSDURATION

This property determines whether a subscriber guarantees to process quickly any message it receives before returning control to IBM MQ classes for JMS.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: PROCESSDURATION

JMS administration tool short name: PROCDUR

### Programmatic access

Setters/getters

- MQConnectionFactory.setProcessDuration()
- MQConnectionFactory.getProcessDuration()

### Values

**UNKNOWN**
A subscriber can give no guarantee about how quickly it can process any message it receives. This is the default value.

**SHORT**
A subscriber guarantees to process quickly any message it receives before returning control to IBM MQ classes for JMS.

## PROVIDERVERSION

This property differentiates between the three IBM MQ messaging modes of operation: IBM MQ messaging provider normal mode, IBM MQ messaging provider normal mode with restrictions, and IBM MQ messaging provider migration mode.

The IBM MQ messaging provider normal mode uses all the features of an IBM MQ queue manager to implement JMS. This mode is optimized to use the JMS 2.0 API and functionality. The IBM MQ messaging provider normal mode with restrictions uses the JMS 2.0 API, but not the new features such as shared subscriptions, delayed delivery, or asynchronous send.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnection Factory, XATopicConnectionFactory

JMS administration tool long name: PROVIDERVERSION

JMS administration tool short name: PVER

## Programmatic access

Setters/getters

- MQConnectionFactory.setProviderVersion()
- MQConnectionFactory.getProviderVersion()

## Values

You can set the **PROVIDERVERSION** property to any of the values 8 (normal mode), 7 (normal mode with restrictions), 6 (migration mode), or `unspecified` (the default value). The value that you specify for the **PROVIDERVERSION** property must be a string. If you are specifying an option of 8, 7 or 6, you can do this in any of the following formats:

- V.R.M.F
- V.R.M
- V.R
- V

where V, R, M and F are integer values greater than or equal to zero. The extra R, M and F values are optional and are available for you to use in case fine grained control is needed. For example, if you wanted to use a **PROVIDERVERSION** level of 7, you could set **PROVIDERVERSION**=7, `7.0`, `7.0.0` or `7.0.0.0`.

**8 - Normal mode**
The JMS application uses the IBM MQ messaging provider normal mode. Normal mode uses all the features of a IBM MQ queue manager to implement JMS. This mode is optimized to use the JMS 2.0 API and functionality.

If you are connecting to a queue manager with a command level of 800, then all of the JMS 2.0 API and features, such as asynchronous send, delayed delivery, or shared subscription, can be used.

If the queue manager specified in the connection factory settings is not a Version 8.0.0 queue manager, the `createConnection` method fails with an exception `JMSFMQ0003`.

The IBM MQ messaging provider normal mode uses the sharing conversations feature and the number of conversations that can be shared is controlled by the **SHARECNV()** property on the server connection channel. If this property is set to `0`, you cannot use IBM MQ messaging provider normal mode and the `createConnection` method fails with an exception `JMSCC5007`.

**7 - Normal mode with restrictions**
The JMS application uses the IBM MQ messaging provider normal mode with restrictions. This mode uses the JMS 2.0 API, but not the new features such as shared subscriptions, delayed delivery, or asynchronous send.

If you set **PROVIDERVERSION** to 7 only the IBM MQ messaging provider normal with restrictions mode of operation is available. If the queue manager specified in the connection factory settings is not a Version 7.0.1, or later, queue manager, the `createConnection` method fails with exception `JMSFCC5008`.

If you are connecting using normal mode with restrictions, to a queue manager with a command level between 700 and 800 then you can use the JMS 2.0 API, but not the asynchronous send, delayed delivery, or shared subscription features.

The IBM MQ messaging provider normal mode with restrictions uses the sharing conversations feature and the number of conversations that can be shared is controlled by the **SHARECNV()** property on the server connection channel. If this property is set to `0`, you cannot use IBM MQ messaging provider normal mode with restrictions and the `createConnection` method fails with an exception `JMSCC5007`.

**6 - Migration mode**
The JMS application uses the IBM MQ messaging provider migration mode.

The IBM MQ classes for JMS use the features and algorithms supplied with IBM WebSphere MQ 6.0. If you want to connect to WebSphere Message Broker Version 6.0 or 6.1 using IBM WebSphere MQ Enterprise Transport Version 6.0, you must use this mode. You can connect to a IBM MQ 8.0 queue manager using this mode, but none of the new features of a IBM MQ classes for JMS queue manager are used, for example, read ahead or streaming.

If you have a IBM MQ 8.0 client connecting to a IBM MQ 8.0 queue manager, then the message selection is done by the queue manager rather than on the client system.

If IBM MQ messaging provider migration mode is specified and you attempt to use any of the JMS 2.0 API, the API method call fails with the exception `JMSCC5007`.

**`unspecified` (default)**
The **PROVIDERVERSION** property is set to *unspecified* by default.

A connection factory that was created with a previous version of IBM MQ classes for JMS in JNDI takes this value when the connection factory is used with the new version of IBM MQ classes for JMS. The following algorithm is used to determine which mode of operation is used. This algorithm is used when the `createConnection` method is called and uses other aspects of the connection factory to determine if IBM MQ messaging provider normal mode, normal mode with restrictions, or IBM MQ messaging provider migration mode is required.

1. First, an attempt to use IBM MQ messaging provider normal mode is made.
2. If the queue manager connected is not IBM MQ 8.0, or later, an attempt to use IBM MQ messaging provider normal mode with restrictions is made.
3. If the queue manager connected is not IBM WebSphere MQ 7.0.1, or later, the connection is closed and IBM MQ messaging provider migration mode is used instead.
4. If the **SHARECNV** property on the server connection channel is set to 0, the connection is closed and IBM MQ messaging provider migration mode is used instead.
5. If **BROKERVER** is set to V1 or the default *unspecified* value, IBM MQ messaging provider normal mode continues to be used, and therefore any publish/subscribe operations use the new IBM WebSphere MQ 7.0.1, or later, features.

   See ALTER QMGR for information about the PSMODE parameter of the ALTER QMGR command for further information on compatibility.
6. If **BROKERVER** is set to V2 the action taken depends on the value of **BROKERQMGR** :
   - If the **BROKERQMGR** is `blank`:

     If the queue specified by the **BROKERCONQ** property can be opened for output (that is, `MQOPEN` for output succeeds) and **PSMODE** on the queue manager is set to `COMPAT` or `DISABLED`, then IBM MQ messaging provider migration mode is used.
   - If the queue specified by the **BROKERCONQ** property cannot be opened for output, or the **PSMODE** attribute is set to `ENABLED`:

     IBM MQ messaging provider normal mode is used.
   - If **BROKERQMGR** is `non-blank` :

     IBM MQ messaging provider migration mode is used.

If you cannot change the connection factory that you are using, you can use the `com.ibm.msg.client.wmq.overrideProviderVersion` property to override any setting on the

connection factory. This override applies to all connection factories in the JVM but the actual connection factory objects are not modified.

**Related concepts**

Rules for selecting the IBM MQ messaging provider mode

**Related tasks**

Configuring the JMS **PROVIDERVERSION** property

# PROXYHOSTNAME

The host name or IP address of the system on which the proxy server is running when using a real-time connection to a broker through a proxy server.

## Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: PROXYHOSTNAME

JMS administration tool short name: PHOST

## Programmatic access

Setters/getters

- MQConnectionFactory.setProxyHostName()
- MQConnectionFactory.getProxyHostName()

## Values

**null**
The host name of the proxy server. This is the default value.

# PROXYPORT

The number of the port on which the proxy server is listening when using a real-time connection to a broker through a proxy server.

## Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: PROXYPORT

JMS administration tool short name: PPORT

## Programmatic access

Setters/getters

MQConnectionFactory.setProxyPort()

MQConnectionFactory.getProxyPort()

## Values

**443**
The port number of the proxy server. This is the default value.

## PUBACKINT

The number of messages published by a publisher before IBM MQ classes for JMS requests an acknowledgment from the broker.

When you lower the value of this property, IBM MQ classes for JMS requests acknowledgments more often, therefore the performance of the publisher decreases. When you raise the value, IBM MQ classes for JMS take a longer time to throw an exception if the broker fails. This property is relevant only if TRANSPORT has the value BIND or CLIENT.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: PROXYPORT

JMS administration tool short name: PPORT

### Programmatic access

Setters/getters

MQConnectionFactory.setPubAckInterval()

MQConnectionFactory.getPubAckInterval()

### Values

**25**
Any positive integer may be the default value.

## PUTASYNCALLOWED

This property determines whether message producers are allowed to use asynchronous puts to send messages to this destination.

### Applicable Objects

Queue, Topic

JMS administration tool long name: PUTASYNCALLOWED

JMS administration tool short name: PAALD

### Programmatic access

Setters/getters

MQDestination.setPutAsyncAllowed()

MQDestination.getPutAsyncAllowed()

### Values

**AS_DEST**
Determine whether asynchronous puts are allowed by referring to the queue or topic definition. This is the default value.

**AS_Q_DEF**
Determine whether asynchronous puts are allowed by referring to the queue definition.

**AS_TOPIC_DEF**
Determine whether asynchronous puts are allowed by referring to the topic definition.

**NO**
Asynchronous puts are not allowed.

**YES**
Asynchronous puts are allowed.

# QMANAGER

The name of the queue manager to connect to.

However, if your application uses a client channel definition table to connect to a queue manager, see Using a client channel definition table with IBM MQ classes for JMS.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, Queue, XAConnectionFactory, XAQueueConnection Factory, XATopicConnectionFactory

JMS administration tool long name: QMANAGER

JMS administration tool short name: QMGR

## Programmatic access

Setters/getters

- MQConnectionFactory.setQueueManager()
- MQConnectionFactory.getQueueManager()

## Values

**" " (empty string)**
Any string can be the default value.

# QUEUE

The name of the JMS queue destination. This matches the name of the queue used by the queue manager.

## Applicable Objects

Queue

JMS administration tool long name: QUEUE

JMS administration tool short name: QU

## Values

**Any string**
Any valid IBM MQ queue name.

**Related concepts**
Rules for naming IBM MQ objects>

# READAHEADALLOWED

This property determines whether message consumers and queue browsers are allowed to use read ahead to get nonpersistent messages from this destination into an internal buffer before receiving them.

## Applicable Objects

Queue, Topic

JMS administration tool long name: READAHEADALLOWED

JMS administration tool short name: RAALD

## Programmatic access

Setters/getters

- MQDestination.setReadAheadAllowed()
- MQDestination.getReadAheadAllowed()

## Values

**AS_DEST**
Determine whether read ahead is allowed by referring to the queue or topic definition. This is the default value in administrative tools.

Use WMQConstants.WMQ_READ_AHEAD_ALLOWED_AS_DEST in programs.

**AS_Q_DEF**
Determine whether read ahead is allowed by referring to the queue definition.

Use WMQConstants.WMQ_READ_AHEAD_ALLOWED_AS_Q_DEF in programs.

**AS_TOPIC_DEF**
Determine whether read ahead is allowed by referring to the topic definition.

Use WMQConstants.WMQ_READ_AHEAD_ALLOWED_AS_TOPIC_DEF in programs.

**NO**
Read ahead is not allowed.

Use WMQConstants.WMQ_READ_AHEAD_ALLOWED_DISABLED in programs.

**YES**
Read ahead is allowed.

Use WMQConstants.WMQ_READ_AHEAD_ALLOWED_ENABLED in programs.

# READAHEADCLOSEPOLICY

For messages being delivered to an asynchronous message listener, what happens to messages in the internal read ahead buffer when the message consumer is closed.

## Applicable Objects

Queue, Topic

JMS administration tool long name: READAHEADCLOSEPOLICY

JMS administration tool short name: RACP

## Programmatic access

Setters/getters

- MQDestination.setReadAheadClosePolicy()

- MQDestination.getReadAheadClosePolicy()

### Values

**DELIVER_ALL**
All messages in the internal read ahead buffer are delivered to the message listener of the application before returning. This is the default value in administrative tools.

Use WMQConstants.WMQ_READ_AHEAD_DELIVERALL in programs.

**DELIVER_CURRENT**
Only the current message listener invocation completes before returning, potentially leaving messages in the internal read ahead buffer, which are then discarded.

Use WMQConstants.WMQ_READ_AHEAD_DELIVERCURRENT in programs.

## RECEIVECCSID

Destination property that sets the target CCSID for queue manager message conversion. The value is ignored unless RECEIVECONVERSION is set to `WMQ_RECEIVE_CONVERSION_QMGR`

### Applicable Objects

Queue, Topic

JMS administration tool long name: RECEIVECCSID

JMS administration tool short name: RCCS

### Programmatic access

**Setters/Getters**

- `MQDestination.setReceiveCCSID`
- `MQDestination.getReceiveCCSID`

### Values

**WMQConstants.WMQ_RECEIVE_CCSID_JVM_DEFAULT**
**0** - Use JVM `Charset.defaultCharset`

**1208**
UTF-8

***CCSID***
Supported coded character set identifier.

## RECEIVECONVERSION

Destination property that determines if data conversion is going to be performed by the queue manager.

### Applicable Objects

Queue, Topic

JMS administration tool long name: RECEIVECONVERSION

JMS administration tool short name: RCNV

### Programmatic access

**Setters/Getters**

- `MQDestination.setReceiveConversion`

- MQDestination.getReceiveConversion

### Values

**WMQConstants.WMQ_RECEIVE_CONVERSION_CLIENT_MSG**
1 - Only perform data conversion on the JMS client. The default value from up to V7.0, and from, and including, 7.0.1.5.

**WMQConstants.WMQ_RECEIVE_CONVERSION_QMGR**
2 - Perform data conversion on the queue manager before sending a message to the client. The default (and only) value from V7.0 to V7.0.1.4 inclusive, except if APAR IC72897 is applied.

## RECEIVEISOLATION

This property determines whether a subscriber might receive messages that have not been committed on the subscriber queue.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: RECEIVEISOLATION

JMS administration tool short name: RCVISOL

### Values

**COMMITTED**
A subscriber receives only those messages on the subscriber queue that have been committed. This is the default value in administrative tools.

Use WMQConstants.WMQ_RCVISOL_COMMITTED in programs.

**UNCOMMITTED**
A subscriber can receive messages that have not been committed on the subscriber queue.

Use WMQConstants.WMQ_RCVISOL_UNCOMMITTED in programs.

## RECEXIT

Identifies a channel receive exit, or a sequence of receive exits to be run in succession.

Additional configuration might be required in order for the IBM MQ classes for JMS to locate receive exits. For more information, see Configuring the IBM MQ classes for JMS to use channel exits.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: RECEXIT

JMS administration tool short name: RCX

### Programmatic access

Setters/getters

- MQConnectionFactory.setReceiveExit()
- MQConnectionFactory.getReceiveExit()

### Values

**null**
A string comprising one or more items separated by commas, where each item is either:

- The name of a class that implements the WMQReceiveExit interface (for a channel receive exit written in Java ).
- A string in the format *libraryName(entryPointName)* (for a channel receive exit not written in Java ).

This is the default value.

## RECEXITINIT

The user data that is passed to channel receive exits when they are called.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: RECEXITINIT

JMS administration tool short name: RCXI

### Programmatic access

Setters/getters

- MQConnectionFactory.setReceiveExitInit()
- MQConnectionFactory.getReceiveExitInit()

### Values

**null**
A string comprising one or more items of user data separated by commas. This is the default value.

## REPLYTOSTYLE

Determines how the JMSReplyTo field in a received message is constructed.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: REPLYTOSTYLE

JMS administration tool short name: RTOST

### Programmatic access

Setters/getters

- MQConnectionFactory.setReplyToStyle()
- MQConnectionFactory.getReplyToStyle()

### Values

**DEFAULT**
Equivalent to `MQMD`.

**RFH2**
Use the value supplied in the RFH2 header. If a JMSReplyTo value has been set in the sending application, use that value.

**MQMD**
Use the MQMD supplied value. This behavior is equivalent to the default behavior of IBM WebSphere MQ 6.0.2.4 and 6.0.2.5.

If the JMSReplyTo value set by the sending application does not contain a queue manager name, the receiving queue manager inserts its own name in the MQMD. If you set this parameter to `MQMD`, the reply-to queue you use is on the receiving queue manager. If you set this parameter to RFH2, the reply-to queue you use is on the queue manager specified in the RFH2 of the sent message as originally set by the sending application.

If the JMSReplyTo value set by the sending application contains a queue manager name, the value of this parameter is unimportant because both the MQMD and RFH2 contain the same value.

# RESCANINT

When a message consumer in the point-to-point domain uses a message selector to select which messages it wants to receive, IBM MQ classes for JMS search the IBM MQ queue for suitable messages in the sequence determined by the `MsgDeliverySequence` attribute of the queue.

After IBM MQ classes for JMS find a suitable message and deliver it to the consumer, IBM MQ classes for JMS resume the search for the next suitable message from its current position in the queue. IBM MQ classes for JMS continue to search the queue in this way until it reaches the end of the queue, or until the interval of time in milliseconds, as determined by the value of this property, has expired. In each case, IBM MQ classes for JMS return to the beginning of the queue to continue the search, and a new time interval commences.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory

JMS administration tool long name: RESCANINT

JMS administration tool short name: RINT

## Programmatic access

Setters/getters

- MQConnectionFactory.setRescanInterval()
- MQConnectionFactory.getRescanInterval()

## Values

**5000**
Any positive integer can be the default value.

# SECEXIT

Identifies a channel security exit.

Additional configuration might be required in order for the IBM MQ classes for JMS to locate security exits. For more information, see Configuring the IBM MQ classes for JMS to use channel exits.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SECEXIT

JMS administration tool short name: SXC

### Programmatic access

Setters/getters

- MQConnectionFactory.setSecurityExit()
- MQConnectionFactory.getSecurityExit()

### Values

**null**
The name of a class that implements the WMQSecurityExit interface (for a channel security exit written in Java ).

A string in the format *libraryName(entryPointName)* (for a channel security exit not written in Java ).

## SECEXITINIT

The user data that is passed to a channel security exit when it is called.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SECEXITINIT

JMS administration tool short name: SCXI

### Programmatic access

Setters/getters

- MQConnectionFactory.setSecurityExitInit()
- MQConnectionFactory.getSecurityExitInit()

### Values

**null**
Any string can be the default value.

## SENDCHECKCOUNT

The number of send calls to allow between checking for asynchronous put errors, within a single non-transacted JMS session.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SENDCHECKCOUNT

JMS administration tool short name: SCC

### Programmatic access

Setters/getters

- MQConnectionFactory.setSendCheckCount()
- MQConnectionFactory.getSendCheckCount()

### Values

**null**
Any string can be the default value.

## SENDEXIT

Identifies a channel send exit, or a sequence of send exits to be run in succession.

Additional configuration might be required in order for the IBM MQ classes for JMS to locate send exits. For more information, see Configuring the IBM MQ classes for JMS to use channel exits.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SENDEXIT

JMS administration tool short name: SDX

### Programmatic access

Setters/getters

- MQConnectionFactory.setSendExit()
- MQConnectionFactory.getSendExit()

### Values

**null**
Any string comprising one or more items separated by commas, where each item is either:

- The name of a class that implements the WMQSendExit interface (for a channel send exit written in Java ).
- A string in the format *libraryName(entryPointName)* (for a channel send exit not written in Java ).
-

This is the default value.

## SENDEXITINIT

The user data that is passed to channel send exits when they are called.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SENDEXITINIT

JMS administration tool short name: SDXI

### Programmatic access

Setters/getters

- MQConnectionFactory.setSendExitInit()

- MQConnectionFactory.getSendExitInit()

### Values

**null**
Any string comprising one or more items of user data separated by commas can be the default value.

## SHARECONVALLOWED

This property determines whether a client connection can share its socket with other top-level JMS connections from the same process to the same queue manager, if the channel definitions match.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SHARECONVALLOWED

JMS administration tool short name: SCALD

### Programmatic access

Setters/getters

- MQConnectionFactory.setShareConvAllowed()
- MQConnectionFactory.getShareConvAllowed()

### Values

**YES**
This is the default value for administrative tools.

For programs, use WMQConstants.WMQ_SHARE_CONV_ALLOWED_YES.

**NO**
This value is for administrative tools.

For programs, use WMQConstants.WMQ_SHARE_CONV_ALLOWED_NO.

## SPARSESUBS

Controls the message retrieval policy of a TopicSubscriber object.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory

JMS administration tool long name: SPARSESUBS

JMS administration tool short name: SSUBS

### Programmatic access

Setters/getters

- MQConnectionFactory.setSparseSubscriptions()
- MQConnectionFactory.getSparseSubscriptions()

### Values

**NO**
Subscriptions receive frequent matching messages. This is the default value for administrative tools.

For programs, use false.

**YES**
Subscriptions receive infrequent matching messages. This value requires that the subscription queue can be opened for browse.

For programs, use true.

# SSLCIPHERSUITE

The CipherSuite to use for an SSL connection.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SSLCIPHERSUITE

JMS administration tool short name: SCPHS

## Programmatic access

Setters/getters

- MQConnectionFactory.setSSLCipherSuite()
- MQConnectionFactory.getSSLCipherSuite()

## Values

**null**
This is the default value. For more information, see SSL properties of JMS objects.

# SSLCRL

CRL servers to check for SSL certificate revocation.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SSLCRL

JMS administration tool short name: SCRL

## Programmatic access

Setters/getters

- MQConnectionFactory.setSSLCertStores()
- MQConnectionFactory.getSSLCertStores()

## Values

**null**
Space-separated list of LDAP URLs. This is the default value. For more information, see SSL properties of JMS objects.

# SSLFIPSREQUIRED

This property determines whether an SSL connection must use a CipherSuite that is supported by the IBM Java JSSE FIPS provider (IBMJSSEFIPS).

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SSLFIPSREQUIRED

JMS administration tool short name: SFIPS

## Programmatic access

Setters/getters

- MQConnectionFactory.setSSLFipsRequired()
- MQConnectionFactory.getSSLFipsRequired()

## Values

**NO**
An SSL connection can use any CipherSuite that is not supported by the IBM Java JSSE FIPS provider (IBMJSSEFIPS).

This is the default value. In programs, use false.

**YES**
An SSL connection must use a CipherSuite that is supported by IBMJSSEFIPS.

In programs, use true.

# SSLPEERNAME

For SSL, a *distinguished name* skeleton that must match that provided by the queue manager.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SSLPEERNAME

JMS administration tool short name: SPEER

## Programmatic access

Setters/getters

- MQConnectionFactory.setSSLPeerName()
- MQConnectionFactory.getSSLPeerName()

## Values

**null**
This is the default value. For more information, see SSL properties of JMS objects.

## SSLRESETCOUNT

For SSL, the total number of bytes sent and received by a connection before the secret key that is used for encryption is renegotiated.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SSLRESETCOUNT

JMS administration tool short name: SRC

### Programmatic access

Setters/getters

- MQConnectionFactory.setSSLResetCount()
- MQConnectionFactory.getSSLResetCount()

### Values

**0**
Zero, or any positive integer less than or equal to 999, 999, 999. This is the default value. For more information, see SSL properties of JMS objects.

## STATREFRESHINT

The interval, in milliseconds, between refreshes of the long running transaction that detects when a subscriber loses its connection to the queue manager.

This property is relevant only if SUBSTORE has the value QUEUE.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: STATREFRESHINT

JMS administration tool short name: SRI

### Programmatic access

Setters/getters

- MQConnectionFactory.setStatusRefreshInterval()
- MQConnectionFactory.getStatusRefreshInterval()

### Values

**60000**
Any positive integer can be the default value. For more information, see SSL properties of JMS objects.

## SUBSTORE

Where IBM MQ classes for JMS stores persistent data relating to active subscriptions.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SUBSTORE

JMS administration tool short name: SS

### Programmatic access

Setters/getters

- MQConnectionFactory.setSubscriptionStore()
- MQConnectionFactory.getSubscriptionStore()

### Values

**BROKER**
Use the broker-based subscription store to hold details of subscriptions. This is the default value for administrative tools.

For programs, use WMQConstants.WMQ_SUBSTORE_BROKER.

**MIGRATE**
Transfer subscription information from the queue-based subscription store to the broker-based subscription store.

For programs, use WMQConstants.WMQ_SUBSTORE_MIGRATE.

**QUEUE**
Use the queue-based subscription store to hold details of subscriptions.

For programs, use WMQConstants.WMQ_SUBSTORE_QUEUE.

## SYNCPOINTALLGETS

This property determines whether all gets are to be performed under syncpoint.

### Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: SYNCPOINTALLGETS

JMS administration tool short name: SPAG

### Programmatic access

Setters/getters

- MQConnectionFactory.setSyncpointAllGets()
- MQConnectionFactory.getSyncpointAllGets()

### Values

**No**
This is the default value.

**Yes**

# TARGCLIENT

This property determines whether the IBM MQ RFH2 format is used to exchange information with target applications.

## Applicable Objects

Queue, Topic

JMS administration tool long name: TARGCLIENT

JMS administration tool short name: TC

## Programmatic access

Setters/getters

- MQDestination.setTargetClient()
- MQDestination.getTargetClient()

## Values

**JMS**
The target of the message is a JMS application. This is the default value for administrative tools.

For programs, use WMQConstants.WMQ_CLIENT_JMS_COMPLIANT.

**MQ**
The target of the message is a non-JMS IBM MQ application.

For programs, use WMQConstants.WMQ_CLIENT_NONJMS_MQ.

# TARGCLIENTMATCHING

This property determines whether a reply message, sent to the queue identified by the JMSReplyTo header field of an incoming message, has an MQRFH2 header only if the incoming message has an MQRFH2 header.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory

JMS administration tool long name: TARGCLIENTMATCHING

JMS administration tool short name: TCM

## Programmatic access

Setters/getters

- MQConnectionFactory.setTargetClientMatching()
- MQConnectionFactory.getTargetClientMatching()

## Values

**YES**
If an incoming message does not have an MQRFH2 header, the TARGCLIENT property of the Queue object derived from the JMSReplyTo header field of the message is sent to MQ. If the message does have an MQRFH2 header, the TARGCLIENT property is set to JMS instead. This is the default value for administrative tools.

For programs, use true.

**NO**
The TARGCLIENT property of the Queue object derived from the JMSReplyTo header field of an incoming message is always set to JMS.

For programs, use false.

# TEMPMODEL

The name of the model queue from which JMS temporary queues are created.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory

JMS administration tool long name: TEMPMODEL

JMS administration tool short name: TM

## Programmatic access

Setters/getters

- MQConnectionFactory.setTemporaryModel()
- MQConnectionFactory.getTemporaryModel()

## Values

**SYSTEM.DEFAULT.MODEL.QUEUE**
Any string can be the default value.

# TEMPQPREFIX

The prefix that is used to form the name of an IBM MQ dynamic queue.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory

JMS administration tool long name: TEMPQPREFIX

JMS administration tool short name: TQP

## Programmatic access

Setters/getters

- MQConnectionFactory.setTempQPrefix()
- MQConnectionFactory.getTempQPrefix()

## Values

**" " (empty string)**
The prefix used is `CSQ.*` on z/OS and `AMQ.*` on all other platforms. These are the default values.

***queue prefix***
The queue prefix is any string that conforms to the rules for forming contents of the *DynamicQName* field in an IBM MQ object descriptor (structure MQOD), but the last non-blank character must be an asterisk.

# TEMPTOPICPREFIX

When creating temporary topics, JMS generates a topic string of the form ''TEMP */TEMPTOPICPREFIX/ unique_id* '', or if this property is left with the default value, just ''TEMP */unique_id* ''. Specifying a non-empty TEMPTOPICPREFIX allows specific model queues to be defined for creating the managed queues for subscribers to temporary topics created under this connection.

## Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: TEMPTOPICPREFIX

JMS administration tool short name: TTP

## Programmatic access

Setters/getters

- MQConnectionFactory.setTempTopicPrefix()
- MQConnectionFactory.getTempTopicPrefix()

## Values

Any non-null string consisting only of valid characters for an IBM MQ topic string. The default value is '' '' (empty string).

# TOPIC

The name of the JMS topic destination, this value is used by the queue manager as the topic string of a publication or subscription.

## Applicable Objects

Topic

JMS administration tool long name: TOPIC

JMS administration tool short name: TOP

## Values

**Any string**

A string that forms a valid IBM MQ topic string. When using IBM MQ as a messaging provider with WebSphere Application Server, specify a value that matches the name by which the topic is known for administrative purposes within WebSphere Application Server.

**Related concepts**

Topic strings

# TRANSPORT

The nature of a connection to a queue manager or broker.

## Applicable Objects

ConnectionFactory, QueueConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XAQueueConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: TRANSPORT

JMS administration tool short name: TRAN

### Programmatic access

Setters/getters

- MQConnectionFactory.setTransportType()
- MQConnectionFactory.getTransportType()

### Values

**BIND**
For a connection to a queue manager in bindings mode. This is the default value for administrative tools.

For programs, use WMQConstants.WMQ_CM_BINDINGS.

**CLIENT**
For a connection to a queue manager in client mode.

For programs, use WMQConstants.WMQ_CM_CLIENT.

**DIRECT**
For a real-time connection to a broker not using HTTP tunnelling.

For programs, use WMQConstants.WMQ_CM_DIRECT_TCPIP.

**DIRECTHTTP**
For a real-time connection to a broker using HTTP tunnelling. Only HTTP 1.0 is supported.

For programs, use WMQConstants.WMQ_CM_DIRECT_HTTP.

**Related concepts**
“Dependencies between properties of IBM MQ classes for JMS objects” on page 1950
The validity of some properties is dependent on the particular values of other properties.

## WILDCARDFORMAT

This property determines which version of wildcard syntax is to be used.

### Applicable Objects

ConnectionFactory, TopicConnectionFactory, XAConnectionFactory, XATopicConnectionFactory

JMS administration tool long name: WILDCARDFORMAT

JMS administration tool short name: WCFMT

### Programmatic access

Setters/getters

- MQConnectionFactory.setWildCardFormat()
- MQConnectionFactory.getWildCardFormat()

### Values

**TOPIC_ONLY**
Recognizes topic level wildcards only, as used in broker version 2. This is the default value for administrative tools.

For programs, use WMQConstants.WMQ_WILDCARD_TOPIC_ONLY.

**CHAR_ONLY**
Recognizes character wildcards only, as used in broker version 1.

For programs, use WMQConstants.WMQ_WILDCARD_CHAR_ONLY.

## The ENCODING property

The ENCODING property comprises three sub-properties, in twelve possible combinations.

The valid values that the ENCODING property can take are constructed from the three sub-properties:

**integer encoding**
Either normal or reversed

**decimal encoding**
Either normal or reversed

**floating-point encoding**
IEEE normal, IEEE reversed, or z/OS

The ENCODING property is expressed as a three-character string with the following syntax:

```
{N|R}{N|R}{N|R|3}
```

In this string:

- N denotes normal
- R denotes reversed
- 3 denotes z/OS
- The first character represents *integer encoding*
- The second character represents *decimal encoding*
- The third character represents *floating-point encoding*

This provides a set of twelve possible values for the ENCODING property.

There is an additional value, the string NATIVE, which sets appropriate encoding values for the Java platform.

The following examples show valid combinations for ENCODING:

```
ENCODING(NNR)
ENCODING(NATIVE)
ENCODING(RR3)
```

## SSL properties of JMS objects

Enable Secure Sockets Layer (SSL) encryption using the SSLCIPHERSUITE property. You can then change the characteristics of the SSL encryption using several other properties.

When you specify TRANSPORT(CLIENT), you can enable Secure Sockets Layer (SSL) encrypted communication using the SSLCIPHERSUITE property. Set this property to a valid CipherSuite provided by your JSSE provider; it must match the CipherSpec named on the SVRCONN channel named by the CHANNEL property.

However, CipherSpecs (as specified on the SVRCONN channel) and CipherSuites (as specified on ConnectionFactory objects) use different naming schemes to represent the same SSL encryption algorithms. If a recognized CipherSpec name is specified on the SSLCIPHERSUITE property, JMSAdmin issues a warning and maps the CipherSpec to its equivalent CipherSuite. See SSL/TLS CipherSpecs and CipherSuites in IBM MQ classes for JMS for a list of CipherSpecs recognized by IBM MQ and JMSAdmin.

If you require a connection to use a CipherSuite that is supported by the IBM Java JSSE FIPS provider (IBMJSSEFIPS), set the SSLFIPSREQUIRED property of the connection factory to YES. The default value of this property is NO, which means that a connection can use any supported CipherSuite. The property is ignored if SSLCIPHERSUITE is not set.

The SSLPEERNAME matches the format of the SSLPEER parameter, which can be set on channel definitions. It is a list of attribute name and value pairs separated by commas or semicolons. For example:

```
SSLPEERNAME(CN=QMGR.*, OU=IBM, OU=WEBSPHERE)
```

The set of names and values makes up a *distinguished name*. For more details about distinguished names and their use with IBM MQ, see Security.

The example given checks the identifying certificate presented by the server at connect-time. For the connection to succeed, the certificate must have a Common Name beginning QMGR., and must have at least two Organizational Unit names, the first of which is IBM and the second WEBSPHERE. Checking is not case-sensitive.

If SSLPEERNAME is not set, no such checking is performed. SSLPEERNAME is ignored if SSLCIPHERSUITE is not set.

The SSLCRL property specifies zero or more CRL (Certificate Revocation List) servers. Use of this property requires a JVM at Java 2 v1.4. This is a space-delimited list of entries of the form:

```
ldap:// hostname:[ port ]
```

optionally followed by a single /. If *port* is omitted, the default LDAP port of 389 is assumed. At connect-time, the SSL certificate presented by the server is checked against the specified CRL servers. See Security for more about CRL security.

If SSLCRL is not set, no such checking is performed. SSLCRL is ignored if SSLCIPHERSUITE is not set.

The SSLRESETCOUNT property represents the total number of bytes sent and received by a connection before the secret key that is used for encryption is renegotiated. The number of bytes sent is the number before encryption, and the number of bytes received is the number after decryption. The number of bytes also includes control information sent and received by IBM MQ classes for JMS.

For example, to configure a ConnectionFactory object that can be used to create a connection over an SSL enabled MQI channel with a secret key that is renegotiated after 4 MB of data have flowed, issue the following command to JMSAdmin:

```
ALTER CF(my.cf) SSLRESETCOUNT(4194304)
```

If the value of SSLRESETCOUNT is zero, which is the default value, the secret key is never renegotiated. The SSLRESETCOUNT property is ignored if SSLCIPHERSUITE is not set.

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