WebSphere MQ

Application Programming Reference

Version 7.0

SC34-6940-00

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Note
Before using this information and the product it supports, be sure to read the general information under notices at the back of this book.

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This edition of the book applies to the following products:

- IBM WebSphere MQ, Version 7.0
- IBM WebSphere MQ for z/OS, Version 7.0

and to any subsequent releases and modifications until otherwise indicated in new editions.

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Chapter 1. Data type descriptions

Introduction

This chapter introduces the data types used in the MQI, and gives you some guidance on using them in the supported programming languages.

Elementary data types

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):

- MQBOOL - Boolean
- MQBYTE – Byte
- MQBYTEn – String of n bytes
- MQCHAR – Single-byte character
- MQCHARn – String of n single-byte characters
- MQFLOAT32 – 32-bit floating-point number
- MQFLOAT64 – 64-bit floating-point number
- MQHCONN – Connection handle
- MQINT8 – 8-bit integer
- MQINT16 – 16-bit integer
- MQINT32 – 32-bit integer
- MQINT64 – 64-bit integer
- MQHOBJ – Object handle
- MQLONG – Long integer
- MQPID – Process Id
- MQPTR – Pointer
- MQTID – Thread Id
- MQUINT8 – 8-bit unsigned integer
- MQUINT16 – 16-bit unsigned integer
- MQUINT32 – 32-bit unsigned integer
- MQUINT64 – 64-bit unsigned integer
- MQULONG – unsigned long integer
- PMQACH – A pointer to a data structure of type MQACH
- PMQAIR – A pointer to a data structure of type MQAIR
- PMQAXC – A pointer to a data structure of type MQAXC
- PMQAXP – A pointer to a data structure of type MQAXP
- PMQBO – A pointer to a data structure of type MQBO
- PMQBOOL – A pointer to a data type of MQBOOL
- PMQBYTE – A pointer to data of type MQBYTE
- PMQBYTEn – A pointer to a data type of MQBYTEn, where n can be 8, 16, 24, 32, 40, 128

- PMQCHARn – A pointer to a data type of MQCHARn, where n can be 4, 8, 12, 20, 28, 32, 48, 64, 128, 256, 264
- PMQCIH – A pointer to a data structure of type MQCIH
- PMQCNO – A pointer to a data structure of type MQCNO
- PMQDLH – A pointer to a data structure of type MQDLH
- PMQFLOAT32 – A pointer to a data type of MQFLOAT32
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- PMQIIH – A pointer to a data structure of type MQIIH
- PMQINT8 – A pointer to a data type of MQINT8
- PMQINT16 – A pointer to a data type of MQINT16
- PMQINT32 – A pointer to a data type of MQINT32
- PMQINT64 – A pointer to a data type of MQINT64
- PMQLONG – A pointer to a data type of MQLONG
- PMQMD – A pointer to structure of type MQMD
- PMQMD1 – A pointer to a data structure of type MQMD1
- PMQMDE – A pointer to a data structure of type MQMDE
- PMQOD – A pointer to a data structure of type MQOD
- PMQPMO – A pointer to a data structure of type MQPMO
- PMQPTR – A pointer to a data type of MQPTR
- PMQRFH – A pointer to a data structure of type MQRFH
- PMQRFH2 – A pointer to a data structure of type MQRFH2
- PMQRMH – A pointer to a data structure of type MQRMH
- PMQTM – A pointer to a data structure of type MQTM
- PMQTMC2 – A pointer to a data structure of type MQTMC2
- PMQUINT8 – A pointer to a data type of MQUINT8
- PMQUINT16 – A pointer to a data type of MQUINT16
- PMQUINT32 – A pointer to a data type of MQUINT32
- PMQUINT64 – A pointer to a data type of MQUINT64
- PMQULONG – A pointer to a data type of MQULONG
- PMQVOID – A pointer
- PMQWIH – A pointer to a data structure of type MQWIH
- PMQXQH – A pointer to a data structure of type MQXQH

These are described in detail below, followed by examples showing how to declare the elementary data types in the supported programming languages.

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

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.

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.

An array of MQBYTE is sometimes used to represent an area of main storage whose nature 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.

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.

MQBYTEn

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.

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.

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.

Named constants are available that define the lengths of byte string fields; see Chapter 5, "MQ constants," on page 659.

MQCHAR

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.

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 122 for further details.

MQCHARn

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.

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.

Named constants are available that define the lengths of character string fields; see Chapter 5, "MQ constants," on page 659.

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.

The use of MQFLOAT32 in C on z/OS® requires the use of the FLOAT(IEEE) compiler flag.

The use of MQFLOAT32 in COBOL is limited to compilers that support floating-point numbers in IEEE format. This may require the use of the FLOAT(NATIVE) compiler flag.

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 a 8-byte boundary.

The use of MQFLOAT64 in C on z/OS requires the use of the FLOAT(IEEE) compiler flag.

The use of MQFLOAT64 in COBOL is limited to compilers that support floating-point numbers in IEEE format. This may require the use of the FLOAT(NATIVE) compiler flag.

MQHCONN

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.

Note: Applications must test variables of this type for equality only.

MQHMSG

Message handle elementary data type

Purpose: 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

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.

Note: Applications must test variables of this type for equality only.

MQINT8

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

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

See the definition of MQLONG.

MQINT64

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. A 64-bit integer must be aligned on an 8-byte boundary.

MQLONG

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.

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

The MQ process identifier.

This is the same identifier used in MQ trace and FFST™ dumps, but might be different from the operating system process identifier.

MQPTR

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 i5/OS®, and an 8-byte boundary on other platforms.

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

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

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

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

See the definition of MQULONG.

MQUINT64

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.

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

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.

For COBOL, the valid range is limited to 0 through +999 999 999. An MQULONG must be aligned on a 4-byte boundary.

PMQBOOL

A pointer to data of type MQBOOL.

PMQCHAR

A pointer to data of type MQCHAR.

PMQFLOAT32

A pointer to data of type MQFLOAT32.

PMQFLOAT64

A pointer to data of type MQFLOAT64.

PMQINT8

A pointer to data of type MQINT8.

PMQINT16

A pointer to data of type MQINT16.

PMQINT32

A pointer to data of type MQINT32.

PMQINT64

A pointer to data of type MQINT64.

PMQLONG – A pointer to data of type MQLONG

A pointer to data of type MQLONG.

PMQMD – A pointer to structure of type MQMD

A pointer to structure of type MQMD.

PMQUINT8

A pointer to data of type MQUINT8.

PMQUINT16

A pointer to data of type MQUINT16.

PMQUINT32

A pointer to data of type MQUINT32.

PMQUINT64

A pointer to data of type MQUINT64.

PMQULONG – A pointer to data of type MQULONG

A pointer to data of type MQULONG.

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];`

Data type	Representation
MQCHAR48	`typedef MQCHAR MQCHAR48[48];`
MQCHAR64	`typedef MQCHAR MQCHAR64[64];`
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:
	`typedef long;`
	
	On 32-bit AIX®, Solaris, and HP-UX:
	`typedef int64_t;`
	
	On i5/OS, Linux®, and z/OS:
	`typedef long long;`
	
	On Windows®:
	`typedef _int64;`

MQLONG	On i5/OS:
	`typedef long MQLONG;`
	
	other platforms:
	`if defined(MQ_64_BIT)`
	` typedef int MQLONG;`
	`else`
	` 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:
	`typedef unsigned long;`
	
	On 32-bit AIX, Solaris, and HP-UX:
	`typedef uint64_t;`
	
	On i5/OS, Linux, and z/OS:
	`typedef unsigned long long;`
	
	On Windows:
	`typedef unsigned _int64;`

Data type	Representation

MQULONG	On i5/OS:
	`typedef unsigned long MQULONG;`
	
	other platforms:
	`if defined(MQ_64_BIT)`
	`  typedef unsigned int MQULONG;`
	`else`
	`  typedef unsigned long MQULONG;`

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];`
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;`
PMQLONG	`typedef MQLONG MQPOINTER PMQLONG;`

Data type	Representation
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;`
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 17 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)`

Data type	Representation
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)
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)

Data type	Representation
MQCHAR12	char(12)
MQCHAR20	char(20)
MQCHAR28	char(28)
MQCHAR32	char(32)
MQCHAR48	char(48)
MQCHAR64	char(64)
MQCHAR128	char(128)
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
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

Data type	Representation
MQCHAR64	DS CL64
MQCHAR128	DS CL128
MQCHAR256	DS CL256
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 chapters.

Summary

The following tables summarize the structure data types used in the MQI.

Table 1. Structure data types used on MQI calls (or exit functions):

Structure	Description	Calls where used
MQACH	API exit chain header	
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
MQCNO	Connect options	MQCONNX
MQGMO	Get-message options	MQGET
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

Table 1. Structure data types used on MQI calls (or exit functions): (continued)

Structure	Description	Calls where used
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 2. Structure data types used in message data:

Structure	Description
MQCIH	CICS® information 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 Chapter 9, "Data conversion," on page 675, 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 i5/OS, 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 i5/OS, 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 i5/OS, 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 above 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 3.

Table 3. 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

To improve the portability of applications, code the name of the header file in lowercase on the **#include** preprocessor directive:

```
#include "cmqc.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 datatypes:

```
#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 whose 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, the array form is recommended 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 usually created in main storage obtained dynamically using the **calloc** or **malloc** functions. To initialize the fields in such structures, the following technique is recommended:

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 whose size 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 4. Not all the files listed are available in all environments.

Table 4. COBOL COPY files

File (with initial values)	File (without initial values)	Contents
CMQAIRV	CMQAIRL	Authentication information record
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

Table 4. COBOL COPY files (continued)

File (with initial values)	File (without initial values)	Contents
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

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 i5/OS.

In this book, 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 177 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 book, 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-quote character as the string delimiter (’). In some environments you might need to specify an appropriate compiler option to cause the compiler to accept the single quote as the string delimiter in place of the double quote.

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 above 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 will exist; this consumes main storage unnecessarily. Avoid this 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 later sections in this book show how to invoke the calls and declare parameters. In some cases, the parameters are tables or character strings whose size 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 5.

Table 5. 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
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 (see below).

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 book 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 (see below).

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 quotes.

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

The later sections in this book show how to invoke the calls and declare parameters. In some cases, the parameters are arrays or character strings whose size 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.

MQAIR – Authentication information record

The following table summarizes the fields in the structure.

Table 6. 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

Overview for MQAIR

Availability: AIX, HP-UX, Solaris, Linux and Windows clients.

Purpose: The MQAIR structure allows an application running as a WebSphere® 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively.

Fields for MQAIR

The MQAIR structure contains the following fields; the fields are described in **alphabetic 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 must be:

MQAIT_CRL_LDAP
Certificate revocation using LDAP server.

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.

  Using *LDAPUserNamePtr* is recommended 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).

  Using *LDAPUserNameOffset* is recommended 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 datatype, this field is declared as a byte string of the appropriate length.

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 value must be:

MQAIR_VERSION_1
: Version-1 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 7. Initial values of fields in MQAIR for MQAIR

Field name	Name of constant	Value of constant
StrucId	MQAIR_STRUC_ID	'AIRb'
Version	MQAIR_CURRENT_VERSION	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

Notes:

1. The symbol b represents a single blank character.
2. In the C programming language, the macro variable MQAIR_DEFAULT contains the values listed above. 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 */
};
```

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).
```

PL/I declaration

```
dcl
 1 MQAIR based,
  3 StrucId            char(4),       /* Structure identifier */
  3 Version            fixed bin(31), /* Structure version number */
  3 AuthInfoType       fixed bin(31), /* Type of authentication
                                         information */
  3 AuthInfoConnName   char(264),     /* Connection name of CRL LDAP
                                         server */
  3 LDAPUserNamePtr    pointer,       /* Address of LDAP user name */
  3 LDAPUserNameOffset fixed bin(31), /* Offset of LDAP user name from
                                         start of MQAIR structure */
  3 LDAPUserNameLength fixed bin(31), /* Length of LDAP user name */
  3 LDAPPassword       char(32);      /* Password to access LDAP
                                         server */
```

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 8. 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 **alphabetic 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 9. 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 listed above. 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 */
```

System/390 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 10. 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, i5/OS, Solaris, Linux, Windows; not available for WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 **alphabetic order**:

Options (MQLONG)

The value must be:

MQBO_NONE
No options specified.

This is always an input field. The initial value of this field is MQBO_NONE.

StrucId (MQCHAR4)

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.

This is always an input field. The initial value of this field is MQBO_STRUC_ID.

Version (MQLONG)

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.

This is always an input field. The initial value of this field is MQBO_VERSION_1.

Initial values and language declarations for MQBO

Table 11. Initial values of fields in MQBO for MQBO

Field name	Name of constant	Value of constant
StrucId	MQBO_STRUC_ID	'BObb'
Version	MQBO_VERSION_1	1
Options	MQBO_NONE	0

Notes:

1. The symbol b represents a single blank character.
2. In the C programming language, the macro variable MQBO_DEFAULT contains the values listed above. 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 12. 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

Overview for MQCBC

Availability: AIX, HP-UX, i5/OS, Solaris, Linux, Windows, z/OS, plus WebSphere MQ 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_1.

Character set and encoding: Data in MQCBC will 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. However, if the application is running as an MQ 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)

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.

CallbackArea (MQPTR)

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 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)

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 *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 The exception handler function has been invoked without a message when: 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:

- An MQCTL call is issued with a value for the *Operation* field of MQOP_STOP, 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 (*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.

This is an input field. MQCBCT_MSG_REMOVED and MQCBCT_MSG_NOT_REMOVED are applicable only to message consumer functions.

CompCode (MQLONG)

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:

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)

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.

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. Callback context structure - DataLength field

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. Callback context structure - Flags field

The following option is defined:

MQCBCF_BUFF_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)

Callback context structure - Hobj 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 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)

Callback context structure - Reason field

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.
Callback context structure - State field

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 This reason code represents a normal call with no additional reason information	None; this is the normal operation.	0
MQCS_SUSPENDED_TEMPORARY 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

State	Queue manager action	Value of constant
MQCS_SUSPENDED_USER_ACTION 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 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 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)

Callback context structure - StrucId field

This 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)

Callback context structure - Version field

This 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.

Initial values and language declarations for MQCBC

Callback context structure - Initial values

Table 13. Initial values of fields in MQCBC

Field name	Name of constant	Value of constant
StrucId	MQCBC_STRUC_ID	'CBC␣'
Version	MQCBC_VERSION_1	1
CallType	None	0

Table 13. Initial values of fields in MQCBC (continued)

Field name	Name of constant	Value of constant
Hobj	MQHO_UNUSABLE_HOBJ	-1
CallbackArea	None	Null pointer or null bytes
ConnectionArea	None	Null pointer or null bytes
CompCode	MQCC_OK	0
Reason	MQRC_NONE	0
State	MQCS_NONE	0
DataLength	None	0
BufferLength	None	0
Flags	None	0

Notes:

1. The symbol ƀ represents a single blank character.
2. In the C programming language, the macro variable MQCBC_DEFAULT contains the values listed above. Use it in the following way to provide initial values for the fields in the structure:

   ```
   MQCBC MyCBC = {MQCBC_DEFAULT};
   ```

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 */

  };
```

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.
```

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 */
```

MQCBD – Callback descriptor

The following table summarizes the fields in the structure. Structure specifying the callback function.

Table 14. 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, i5/OS, Solaris, Linux, Windows, z/OS, and WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 (MQCB_FUNCTION)

Callback descriptor structure - CallbackFunction field

The callback function is invoked as a function call.

Use this field to specify a pointer to the call back 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 not set, the call fails with the reason code MQRC_CALLBACK_ROUTINE_ERROR.

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 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.

CallbackName (MQCHAR128)

Callback descriptor structure - CallbackName field

The call back 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:

i5/OS 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 WebSphere MQ if the program is to use WebSphere 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

Any one, or all, of the following can be specified. If more than one option is required the values 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).

Combinations that are not valid are noted; any other combinations are valid.

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.

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 15. Initial values of fields in MQCBD

Field name	Name of constant	Value of constant
StrucId	MQCBD_STRUC_ID	'CBDb'
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 b 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 listed above. 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, i5/OS, Windows, plus WebSphere MQ 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.

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 **alphabetic 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. This is defined by MQ to indicate that it should be changed by the queue manager to the true character set identifier of the queue manager, or the MQ client if running as an MQ client application. This is in exactly the same way as MQCCSI_Q_MGR behaves. As a result, the value 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 by the appropriate means for your application's programming language.

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 (seven 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 exampe x'01' x'00 x'00' x'30' would be two valid Unicode characters and would 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	-1

Field name	Name of constant	Value of constant
VSLength	None	0
VSCCSID	MQCCSI_APPL	-3
Note: In the C programming language, the macro variable MQCHARV_DEFAULT contains the values listed above. It can be used in the following way to provide initial values for the fields in the structure: `MQCHARV MyVarStr = {MQCHARV_DEFAULT};`		

C declaration for MQCHARV

```
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 */
```

System/390 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 16. 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
AbendCode	Abend code	AbendCode

Table 16. Fields in MQCIH (continued)

Field	Description	Topic
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

Availability: AIX, HP-UX, z/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 WebSphere 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 18 on page 65, 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 17 shows which fields are set for different values of *ReturnCode*.

Table 17. 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 MQCRC_BRIDGE_TIMEOUT	MQ call name	MQ *CompCode*	MQ *Reason*	–
MQCRC_CICS_EXEC_ERROR MQCRC_SECURITY_ERROR MQCRC_PROGRAM_NOT_AVAILABLE MQCRC_TRANSID_NOT_AVAILABLE	CICS EIBFN	CICS EIBRESP	CICS EIBRESP2	–
MQCRC_BRIDGE_ABEND MQCRC_APPLICATION_ABEND	–	–	–	CICS ABCODE

Fields for MQCIH

The MQCIH structure contains the following fields; the fields are described in **alphabetic order**:

AbendCode (MQCHAR4)

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.

This 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.

ADSDescriptor (MQLONG)

This 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)

This is the initial value of the AID key when the transaction is started. It is a 1-byte value, left justified.

This 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 4 blanks.

Authenticator (MQCHAR8)

This is a 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)

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 MQ_CANCEL_CODE_LENGTH. The initial value of this field is 4 blanks.

CodedCharSetId (MQLONG)
This is a reserved field; its value is not significant. The initial value of this field is 0.

CompCode (MQLONG)

The value returned in this field depends on *ReturnCode*; see Table 17 on page 55.

This is a response field. The initial value of this field is MQCC_OK

ConversationalTask (MQLONG)
This is an indicator specifying whether to allow the task to issue requests for more information, or to abend the task.

The value must be one of the following:

MQCCT_YES
Task is conversational.

MQCCT_NO
Task is not conversational.

This is a request field used only for 3270 transactions. The initial value of this field is MQCCT_NO.

CursorPosition (MQLONG)
This is the initial cursor position when the transaction is started. Subsequently, 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 *Version* is less than MQCIH_VERSION_2.

Encoding (MQLONG)
This is a reserved field; its value is not significant. The initial value of this field is 0.

ErrorOffset (MQLONG)
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 *Version* is less than MQCIH_VERSION_2.

Facility (MQBYTE8)
This is an 8-byte bridge facility token.

A bridge facility token allows 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 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; this has the same value as MQCFAC_NONE, but is an array of characters instead of a string.

This 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)

This 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; for other transaction types specify zero.

This is a request field used only for 3270 transactions. The initial value of this field is 0.

FacilityLike (MQCHAR4)

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 *FacilityLike* 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 MQ_FACILITY_LIKE_LENGTH. The initial value of this field is 4 blanks.

Flags (MQLONG)

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 bridge's processing time

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. This causes CICS to take a syncpoint 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.

This is a request field. The initial value of this field is MQCIH_NONE.

Format (MQCHAR8)

This is the 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 *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 CSQCBDCO 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 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)

The value returned in this field depends on *ReturnCode*; see Table 17 on page 55. The following values are possible when *Function* contains an 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 have the same values as the corresponding MQCFUNC_* constants, but are arrays of characters instead of strings.

This is a response field. The length of this field is given by MQ_FUNCTION_LENGTH. The initial value of this field is MQCFUNC_NONE.

GetWaitInterval (MQLONG)

This field applies only when *UOWControl* has the value MQCUOWC_FIRST. 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. You can use the following special values:

MQCGWI_DEFAULT
Default wait interval.

This causes the CICS bridge to wait for the period of time specified when the bridge was started.

MQWI_UNLIMITED
Unlimited wait interval.

This is a request field. The initial value of this field is MQCGWI_DEFAULT.

InputItem (MQLONG)

This 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 indicates the type of object that the bridge tries to link. The value must be one of the following:

MQCLT_PROGRAM
DPL program.

MQCLT_TRANSACTION
3270 transaction.

This is a request field. The initial value of this field is MQCLT_PROGRAM.

NextTransactionId (MQCHAR4)

This 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 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 4 blanks.

OutputDataLength (MQLONG)

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 *OutputDataLength*, the DATALENGTH option of the LINK command is used; this allows 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.

This is a request field used only for DPL programs. The initial value of this field MQCODL_AS_INPUT.

Reason (MQLONG)

The value returned in this field depends on *ReturnCode*; see Table 17 on page 55.

This is a response field. The initial value of this field is MQRC_NONE.

RemoteSysId (MQCHAR4)

This is 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 WebSphere MQ Request queue
- Be accessible by the CICS ISC links from the bridge monitor's CICS system

RemoteTransId (MQCHAR4)

This 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)

This is the MQ format name of the reply message that is sent in response to the current message. The rules for coding this are the same as those for the *Format* field in MQMD.

This 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 is a reserved field. The value must be 8 blanks.

Reserved2 (MQCHAR8)

This is a reserved field. The value must be 8 blanks.

Reserved3 (MQCHAR8)

This is a reserved field. The value must be 8 blanks.

Reserved4 (MQLONG)

This is a reserved field. The value must be 0. This field is not present if *Version* is less than MQCIH_VERSION_2.

ReturnCode (MQLONG)

This is the return code from the CICS bridge describing the outcome of the processing performed by the bridge. The *Function*, *CompCode*, *Reason*, and *AbendCode* fields might contain additional information (see Table 17 on page 55). 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.

This is a response field. The initial value of this field is MQCRC_OK.

StartCode (MQCHAR4)

This 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 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 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)

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.

This is a request field. The initial value of this field is MQCIH_STRUC_ID.

StrucLength (MQLONG)

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.

This is a request field. The initial value of this field is MQCIH_LENGTH_2.

TaskEndStatus (MQLONG)

This shows the status of the user transaction at end of task. 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 will be 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.

This is a response field used only for 3270 transactions. The initial value of this field is MQCTES_NOSYNC.

TransactionId (MQCHAR4)

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 whose initial program is CSQCBP00. This field applies only when *UOWControl* has the value MQCUOWC_FIRST or MQCUOWC_ONLY.

This is a request field. The length of this field is given by MQ_TRANSACTION_ID_LENGTH. The initial value of this field is 4 blanks.

UOWControl (MQLONG)

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 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).

This is a request field. The initial value of this field is MQCUOWC_ONLY.

Version (MQLONG)

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.

This is a request field. The initial value of this field is MQCIH_VERSION_2.

Initial values and language declarations for MQCIH

Table 18. Initial values of fields in MQCIH for MQCIH

Field name	Name of constant	Value of constant
StrucId	MQCIH_STRUC_ID	'CIHb'
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

Table 18. Initial values of fields in MQCIH for MQCIH (continued)

Field name	Name of constant	Value of constant
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
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 listed above. 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 */
```

System/390 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 options

The following table summarizes the fields in the structure.

Table 19. 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, i5/OS, Solaris, Linux, Windows, z/OS and WebSphere 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 **alphabetic order**:

Options (MQLONG)

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 will be 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 will be 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 specifies that the default level of validation of property names should occur.

The default level of validation is equivalent to that specified by MQCMHO_VALIDATE.

In a future release an administrative option may be defined which will change the level of validation that will occur when MQCMHO_DEFAULT_VALIDATION is defined.

This is the default value.

MQCMHO_NO_VALIDATION

No validation on the property name will occur. See the description of MQCMHO_VALIDATE.

Default option: If none of the options described above 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 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 MQCMHO_DEFAULT_VALIDATION.

StrucId (MQCHAR4)

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.

This is always an input field. The initial value of this field is MQCMHO_STRUC_ID.

Version (MQLONG)

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.

This is always an input field. The initial value of this field is MQCMHO_VERSION_1.

Initial values and language declarations for MQCMHO

Table 20. 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

Notes:

1. In the C programming language, the macro variable MQCMHO_DEFAULT contains the values listed above. 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 */
```

System/390 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 21. Fields in MQCNO

Field	Description	Topic
StrucId	Structure identifier	StrucId
Version	Structure version number	Version

Table 21. Fields in MQCNO (continued)

Field	Description	Topic
Options	Options that control the action of MQCONNX	Options
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	ConnnectionId
SecurityParmsOffset	Security parameters	SecurityParmsOffset
SecurityParmsPtr	Security parameters	SecurityParmsPtr

Overview for MQCNO

Availability: All versions except MQCNO_VERSION_4: AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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.

See the *WebSphere MQ Application Programming Guide* for details of using shared handles within a global unit of work and the effect that this has on, for example, XA transactions.

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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as a WebSphere MQ 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 **alphabetic order**:

ClientConnOffset (MQLONG)

This 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.

Use *ClientConnOffset* only when the application issuing the MQCONNX call is running as a WebSphere MQ client. For information on how to use this field, see the description of the *ClientConnPtr* field.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQCNO_VERSION_2.

ClientConnPtr (MQPTR)

Use *ClientConnOffset* and *ClientConnPtr* only when the application issuing the MQCONNX call is running as a WebSphere MQ 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 a WebSphere MQ 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 a WebSphere MQ client, *ClientConnOffset* and *ClientConnPtr* are ignored.

If the application provides an MQCD structure, set the fields listed below 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. Refer to *WebSphere MQ Intercommunications* 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.
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.

Field in MQCD	Value
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 those 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.

Once the MQCONNX call has completed, the MQCD structure is not referenced again.

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_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)

This output parameter is a unique 24-byte identifier that allows MQ to reliably identify an application. An application can use this identifier for correlation in PUT and GET calls.

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 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 *WebSphere MQ Programmable Command Formats and Administration Interface* and *WebSphere MQ Script (MQSC) Command Reference* for more information on using these commands.

The initial value of this field is 24 null bytes in all programming languages.

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)

This 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. See the descriptions of the MQCNO_*_CONN_TAG_* options for further details. 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 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.

This is an input field. The length of this field is given by MQ_CONN_TAG_LENGTH. The initial value of this field is MQCT_NONE. 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 further 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 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 queue manager in the *MQIAccounting* field of their queue definition.

If none of these flags is defined, the accounting for the connection is as defined in the Queue Manager attributes.

Binding options: The following options control the type of 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 (generally, 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 looks for the *DefaultBindType* attribute in the *Connection* stanza in the qm.ini file (or the equivalent Windows registry entry) 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.

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 normal 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 may be of advantage in situations where the use of multiple processes is a significant performance overhead compared to 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:

- **Use of the MQCNO_FASTPATH_BINDING option compromises the integrity of the queue manager, because it permits a rogue application to alter or corrupt messages and other data areas belonging to the queue manager. Use it *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. Refer to the *WebSphere MQ Application Programming Guide* for more information.
- 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 MQCNO_FASTPATH_BINDING in the environments indicated:

- On i5/OS, the job must run under a user profile that belongs to the `QMQMADM` group. Also, the program must not terminate abnormally, otherwise unpredictable results may occur.
- On UNIX systems, the `mqm` user identifier and the `mqm` group identifier must be the effective user identifier and group identifier respectively. 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 WebSphere 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.
- On Windows, fastpath binding is not supported for 64-bit applications.

For more information about the implications of using trusted applications, see the *WebSphere MQ Application Programming Guide*.

This option is supported in the following environments: AIX, HP-UX, , i5/OS, Solaris, Linux, Windows. On z/OS the option is accepted but ignored.

MQCNO_SHARED_BINDING
The application and the local queue manager agent (the component that manages queuing operations) run in separate units of execution (generally, in separate processes). This arrangement maintains the integrity of the queue manager, that is, it protects the queue manager from errant programs. However, 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
The application and the local queue manager agent (the component that manages queuing operations) run in separate units of execution (generally, in separate processes). This 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.

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.

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`, `STANDARD`; if it has some other value, it is ignored. The value of the environment variable is case sensitive.

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: The following options control the use of the connection tag *ConnTag*. You can specify only one of these options.

- These options are supported only when connecting to a z/OS queue manager.

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 use of 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 provided that 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.

- On z/OS, applications must run within the same MVS™ address space in order 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 that:

- The requesting application is running in the same processing scope as the existing user of the tag.
- The requesting application 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.

- On z/OS, applications must run within the same MVS address space in order 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 is specified, *ConnTag* is not used. These options are not valid if *Version* is less than MQCNO_VERSION_3.

Handle-sharing options: The following options control the sharing of handles between different threads (units of parallel processing) within the same process. You can specify only one of these options.

- These options are supported in the following environments: AIX, HP-UX, i5/OS, Solaris, Linux, Windows.

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 nonshared handle:

- Each MQCONN or MQCONNX call that specifies MQCNO_HANDLE_SHARE_NONE returns a new nonshared handle on the first call, and the same nonshared 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 shareability as the connection handle specified on the MQOPEN call that created the object handle. Also, units of work inherit the same shareability 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 specify no 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.

Default option: If you require none of the options described above, you can use the following option:

MQCNO_NONE
No options specified.

Use MQCNO_NONE to aid program documentation. It is not intended that this option be used with any other MQCNO_* option, but as its value is zero, such use cannot be detected.

This is always an input field. The initial value of this field is MQCNO_NONE.

Sharing conversation 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 and the connection must be the only conversation on that channel instance.

You might use MQCNO_NO_CONV_SHARING in situations where conversations are very 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_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
The channel definition structure in the MQCNO should only be used for output to return the channel name used on a successful MQCONNX call.

If a valid channel definition structure is not provided then the call will fail 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
The MQCONNX call should 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 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 then the call will fail with reason code MQRC_Q_MGR_NAME_ERROR.

If a valid channel definition structure is not provided then the call will fail with the reason code MQRC_CD_ERROR.

If the application is not running as a client the option is ignored.

SecurityParmsOffset (MQLONG)

This is the offset in bytes of the MQSCP structure from the start of the MQCNO structure. The offset can be positive or negative.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQCNO_VERSION_5.

The MQCSP structure is defined in "MQCSP – Security parameters" on page 88.

SecurityParmsPtr (PMQCSP)

The address of the MQSCP structure, used to specify a user ID and password for authentication by the authorization service.

This is an input field. The initial value of this field 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 88.

SSLConfigOffset (MQLONG)

This is the offset in bytes of an MQSCO structure from the start of the MQCNO structure. The offset can be positive or negative.

Use *SSLConfigOffset* only when the application issuing the MQCONNX call is running as a WebSphere MQ client. For information on how to use this field, see the description of the *SSLConfigPtr* field.

This is an input field. The initial value of this field is 0. This field is ignored if *Version* is less than MQCNO_VERSION_4.

SSLConfigPtr (PMQSCO)

Use *SSLConfigPtr* and *SSLConfigOffset* only when the application issuing the MQCONNX call is running as a WebSphere MQ client and the channel protocol is TCP/IP. If the application is not running as a WebSphere 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 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 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_4.

Note: On platforms where the programming language does not support the pointer datatype, this field is declared as a byte string of the appropriate length.

StrucId (MQCHAR4)

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 has the same value as MQCNO_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 MQCNO_STRUC_ID.

Version (MQLONG)

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.

This is always an input field. The initial value of this field is MQCNO_VERSION_1.

Initial values and language declarations for MQCNO

Table 22. Initial values of fields in MQCNO for MQCNO

Field name	Name of constant	Value of constant
StrucId	MQCNO_STRUC_ID	'CNOb'
Version	MQCNO_VERSION_1	1
Options	MQCNO_NONE	0
ClientConnOffset	None	0
ClientConnPtr	None	Null pointer or null bytes
ConnTag	MQCT_NONE	Nulls
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 b represents a single blank character.
2. In the C programming language, the macro variable MQCNO_DEFAULT contains the values listed above. 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 */
```

System/390 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.

Table 23. 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 i5/OS	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 i5/OS	Reserved2
CSPPasswordPtr	Address of password	CSPPasswordPtr
CSPPasswordOffset	Offset of password	CSPPasswordOffset
CSPPasswordLength	Length of password	CSPPasswordLength

Overview for MQCSP

Availability: All WebSphere 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.

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 **alphabetic order**:

AuthenticationType (MQLONG)

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.

This is an input field. The initial value of this field is MQCSP_AUTH_NONE.

CSPPasswordLength (MQLONG)

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 MQRC_NOT_AUTHORIZED.

This 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.

CSPUserIdLength (MQLONG)

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 MQRC_NOT_AUTHORIZED.

This 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.

Reserved1 (MQBYTE4)
A reserved field, required for pointer alignment on i5/OS.

This is an input field. The initial value of this field is all null.

Reserved2 (MQBYTE8)
A reserved field, required for pointer alignment on i5/OS.

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 24. Initial values of fields in MQCSP for MQCSP

Field name	Name of constant	Value of constant
StrucId	MQCSP_STRUC_ID	'CSP'
Version	MQCSP_CURRENT_VERSION	1
AuthenticationType	None	MQCSP_AUTH_NONE
Reserved1	None	Null string or blanks

Table 24. Initial values of fields in MQCSP for MQCSP (continued)

Field name	Name of constant	Value of constant
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

Notes:

1. The symbol ƀ represents a single blank character.
2. In the C programming language, the macro variable MQCSP_DEFAULT contains the values listed above. 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 i5/OS pointer
                                    alignment */
  MQPTR      CSPUserIdPtr;       /* Address of user ID */
  MQLONG     CSPUserIdOffset;    /* Offset of user ID */
  MQLONG     CSPUserIdLength;    /* Length of user ID */
  MQBYTE8    Reserved2;          /* Required for i5/OS 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 i5/OS 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 i5/OS 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 i5/OS 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 i5/OS 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 i5/OS 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 i5/OS 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 25. 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, i5/OS, Solaris, Linux, Windows, z/OS, and WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 from the ConnectionArea field in the MQCBC structure, which is a parameter on the MQCB call.

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 MQCTLO.

MQCTLO_FAIL_IF_QUIESCING
Force the MQCTLO 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.

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 (MQCHAR)

This is a reserved field. The initial value of this field is a blank character.

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 26. 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

Table 26. Initial values of fields in MQCTLO (continued)

Field name	Name of constant	Value of constant
Notes: 1. In the C programming language, the macro variable MQCTLO_DEFAULT contains the values listed above. 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 */
  MQCHAR    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 27. 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

Table 27. Fields in MQDH (continued)

Field	Description	Topic
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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE for the C programming language, respectively.

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 above, 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 575). 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 **alphabetic 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 28. Initial values of fields in MQDH for MQDH

Field name	Name of constant	Value of constant
StrucId	MQDH_STRUC_ID	'DHbb'
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

Table 28. Initial values of fields in MQDH for MQDH (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 MQDH_DEFAULT contains the values listed above. 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 29. 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

Table 29. Fields in MQDLH (continued)

Field	Description	Topic
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 WebSphere 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 in the header structure that precedes MQDLH, or by those fields 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.

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 above 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 **alphabetic order**:

CodedCharSetId (MQLONG)

This is the character set identifier of the data that follows 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ clients connected to these systems.

The initial value of this field is MQCCSI_UNDEFINED.

DestQMgrName (MQCHAR48)

This 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)

This 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)

This 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)

This 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 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.

PutApplName (MQCHAR28)

This 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. See also the description of the *PutApplName* field in "MQMD – Message descriptor" on page 177.

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)

This 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 177 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)

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 8 blank characters in other programming languages.

PutTime (MQCHAR8)

This is 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 below)

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.

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.

Reason (MQLONG)

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 177 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
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 359).

On z/OS, the CKTI CICS transaction is an example of an application that processes trigger messages.

MQFB_APPL_TYPE_ERROR
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 359).

On z/OS, the CKTI CICS transaction is an example of an application that processes trigger messages.

MQFB_BIND_OPEN_CLUSRCVR_DEL
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
The message is not a repository message.

MQFB_STOPPED_BY_CHAD_EXIT
The message was stopped by channel auto-definition exit.

MQFB_STOPPED_BY_MSG_EXIT
The message was stopped by channel message exit.

MQFB_TM_ERROR
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
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.

The initial value of this field is MQRC_NONE.

StrucId (MQCHAR4)

This 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)

This 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 30. 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

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 listed above. 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 */
```

System/390 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 31. Fields in MQDMHO

Field	Description	Topic
StrucId	Structure identifier	StrucId
Version	Structure version number	Version
Options	Options	Options

Overview for MQDMHO

Availability: All WebSphere MQ systems and WebSphere 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 **alphabetic 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 32. 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 listed above. 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 */
```

System/390 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 33. 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 WebSphere MQ systems and WebSphere 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 **alphabetic 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_NEXT
Deletes the next property that matches the specified name, continuing the search from the property cursor. If this is the first MQDLTMP call for the specified name, the first property that matches the specified name is deleted.

If the property under the cursor has been deleted, MQINQMP deletes the next matching property following the one that has been deleted.

If a property is added that matches the specified name while iteration is in progress, the property might be deleted during the completion of the iteration. The property will be deleted once the iteration is restarted with MQDMPO_DEL_FIRST.

MQDMPO_DEL_PROP_UNDER_CURSOR
Deletes the property pointed to by the property cursor; that is the property 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, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQGET or MQPUT call respectively.

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 already

been deleted, the call fails with completion code MQCC_FAILED and reason MQRC_PROPERTY_NOT_AVAILABLE.

If none of the options described above is required, the following option can be used:

MQDPMO_NONE
No options specified.

This 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 34. 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

Table 34. Initial values of fields in MQDPMO (continued)

Field name	Name of constant	Value of constant
Notes: 1. In the C programming language, the macro variable MQDMPO_DEFAULT contains the values listed above. 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 */
```

System/390 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 35. Fields in MQEPH

Field	Description	Topic
StrucId	Structure identifier	StrucId

Table 35. Fields in MQEPH (continued)

Field	Description	Topic
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 WebSphere 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE for the C programming language, respectively.

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 **alphabetic 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 the following values:

Table 36. Initial values of fields in MQDH

Field name	Name of constant	Value of constant
Type	MQCFT_NONE	0
StrucLength	MQCFH_STRUC_LENGH	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

Table 36. Initial values of fields in MQDH (continued)

Field name	Name of constant	Value of constant
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 37. Initial values of fields in MQEPH for MQEPH

Field name	Name of constant	Value of constant
StrucId	MQEPH_STRUC_ID	'EPHb'
Version	MQEPH_VERSION_1	1
StrucLength	MQEPH_STRUC_LENGTH_FIXED	68
Encoding	None	0

Table 37. Initial values of fields in MQEPH for MQEPH (continued)

Field name	Name of constant	Value of constant
CodedCharSetId	MQCCSI_UNDEFINED	0
Format	MQFMT_NONE	Blanks
Flags	MQEPH_NONE	0
PCFHeader	Names and values as defined in Table 36 on page 118	0

Notes:

1. The symbol ␣ represents a single blank character.
2. In the C programming language, the macro variable MQEPH_DEFAULT contains the values listed above. 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 */
```

System/390 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 38. 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 38. 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 WebSphere 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, but this version is not supported in all environments (see above). If you need to port applications between several environments, ensure that the required version of MQGMO is supported across all environments. The minimum version required for each field is given 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 **alphabetic 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 above 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.

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.

- This option is supported on z/OS only.

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 prior to each MQGET call. Avoid the need to reset *MsgId* and *CorrelId* by setting *Version* to MQGMO_VERSION_2, and *MatchOptions* to MQMO_NONE.

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 Work Load 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)

These options control the action of MQGET. You can specify none or more of the options described below. If you need more than one the values 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).

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*.

If MQGET requests are inhibited, or MQGET requests become inhibited while waiting, the wait is canceled and 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 this option with the MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT options.

If several applications are waiting on the same shared queue, the applications that are activated when a suitable message arrives are described below.

Note: In the description below, a *browse* MQGET call is one that specifies one of the browse options, but *not* MQGMO_LOCK; an MQGET call specifying the MQGMO_LOCK 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 of 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 *MsgId* or *CorrelId* (or both).
2. General get-wait requests that can be satisfied by any message.

Note the following points:

- Within the first category, no additional priority is given to more specific get-wait requests, for example those 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 respectively.
  - If you are using a version-2 or later MQGMO, set the *MatchOptions* field to MQMO_NONE.

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. This is the opposite of the MQGMO_WAIT option, and 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 to allow applications

to proceed with other work while waiting for a message to arrive, and also (if suitable operating system facilities are available) 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.

If a currently available message satisfies the criteria specified in the message descriptor, or if a parameter error or other synchronous error is detected, the call completes in the same way as if this option had not been specified.

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 output fields in the message descriptor and the output parameters of the MQGET call are not set, other than the *CompCode* and *Reason* parameters (which are set to MQCC_WARNING and MQRC_SIGNAL_REQUEST_ACCEPTED respectively). When a suitable message arrives subsequently, 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, the application can use this technique to wait for a message arriving on any one of several queues.

If a nonzero *WaitInterval* is specified, after this time the signal is delivered. The queue manager can also cancel the wait, in which case the signal is delivered.

If more than one MQGET call has set a signal for the same message, the order in which applications are activated is the same as that described for MQGMO_WAIT.

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.

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

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.

Syncpoint 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.

If neither this option nor MQGMO_NO_SYNCPOINT is specified, the inclusion of the get request in unit-of-work protocols is determined by the environment:

- 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 (see above for details).
- If the message is not persistent, the queue manager processes the call as though the application had specified MQGMO_NO_SYNCPOINT (see below for details).

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, i5/OS, Solaris, and Linux, plus WebSphere MQ clients connected to these systems.

MQGMO_NO_SYNCPOINT
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 you specify MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT.

If you specify neither this option nor MQGMO_SYNCPOINT, the inclusion of the get request in unit-of-work protocols is determined by the environment:

- 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.

When an application requests the backout of a unit of work containing a get request, a message that was retrieved using this option is not restored to its previous state. (Other resource updates, however, are still backed out.) Instead, the message is treated as if it had been retrieved by a get request *without* this option, in a new unit of work started by the backout request.

This is useful if the application retrieves a message, but only after some resources have been changed does it become 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, so that the same sequence of events occurs when the message is next retrieved. However, if you specify this option on the original MQGET call, backing out the unit of work backs out the updates to the other resources, but treats the message as if it had been retrieved under a new unit of work. The application can perform appropriate error handling (such as sending a report message to the sender of the original message, or placing the original message on the dead-letter queue), and 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. When the unit of work is backed out, the first (marked) message is moved to the new unit of work, while the second and later messages in the group are reinstated on the queue. However, that group is no longer eligible for retrieval by an application using MQGMO_LOGICAL_ORDER, because the first message in the group is no longer on the queue. This prevents a second instance of the application inadvertently processing messages in that group. However, the first instance of the application can retrieve the second and later messages into the new unit of work using the MQGMO_LOGICAL_ORDER option as normal.

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 terminate.

This option has an effect only if the unit of work containing the get request is terminated by the application backing it out. (Such requests use calls or commands that depend on the environment.) This option has no effect if the unit of work containing the get request is backed out for any other reason (for example, because the transaction or system abends). In this situation, any message retrieved using this option is reinstated on the queue in the same way as messages retrieved without this option.

Note:

1. If you have not applied IMS APAR PN60855, an IMS MPP or BMP application that backs out a unit of work containing a message retrieved with the MQGMO_MARK_SKIP_BACKOUT option must issue an MQ call (any MQ call will do) before committing or backing out the new unit of work.
2. A CICS application that backs out a unit of work containing a message retrieved with the MQGMO_MARK_SKIP_BACKOUT option must issue an MQ call (any MQ call will do) before committing or backing out the new unit of work.

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 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

This option is supported only on z/OS.

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.

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. If the message is removed from the queue before the next MQGET call with MQGMO_BROWSE_NEXT is issued, the browse cursor remains at the position in the queue that the message occupied, even though that position is now empty.

The MQGMO_MSG_UNDER_CURSOR option can subsequently 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 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. When you specify MQGMO_BROWSE_FIRST, you can switch between logical order and physical order, but subsequent MQGET calls using MQGMO_BROWSE_NEXT must browse the queue in the same order as the most-recent call that specified MQGMO_BROWSE_FIRST 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 you specify MQGMO_BROWSE_FIRST, 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 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 remains the same as it was before the call.

This option 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.

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.

After a queue has been opened for browse, the first browse call using the handle has the same effect whether it specifies the MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT option.

If the message is 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 575 for details).

If the queue has a *MsgDeliverySequence* of MQMDS_PRIORITY, 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 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 subsequently 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.

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. When you specify MQGMO_BROWSE_FIRST, you can switch

between logical order and physical order, but subsequent MQGET calls using MQGMO_BROWSE_NEXT must 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 (or logical message not in a group) when MQGMO_LOGICAL_ORDER is not specified. For example, if 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 (to find the first message of the next group) returns the first message in the group already browsed. This can happen immediately, or a number of MQGET calls later (if there are intervening groups).

To avoid the possibility of an infinite loop, open 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 MQMO_* 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 MQGMO_BROWSE_NEXT 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:

- 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_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.

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, 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 MQGMO_MSG_UNDER_CURSOR option can subsequently 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 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 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 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. 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 can 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 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 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:

- 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.

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

After a successful call to MQGET that specifies this option, the message that is returned, or that is identified by the *MsgToken* that is returned, is considered, by the object handle used in the call, to be marked. The message is not removed from the queue.

This option is valid only if one of the following options is also specified:

- 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

The message remains in this state until one of the following 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. This is true even if the MQGET is subsequently rolled-back.
- The message expires.

MQGMO_MARK_BROWSE_CO_OP

After a successful call to MQGET that specifies this option, the message that is returned, or that is identified by the *MsgToken* that is returned, is considered by any object handle that is part of the cooperating set of handles, to be marked for the cooperating set of handles.

The message is not considered to be marked for each individual handle in the set at a handle level. That is, this option is not exactly equivalent to

each handle in the cooperating set browsing the message with MQGMO_MARK_BROWSE_HANDLE, but all handles in the set can determine that the message has been marked. The message is not removed from the queue.

This option is valid only if the object handle used was returned by a successful call to MQOPEN that specified the MQOO_CO_OP option and one of the following MQGMO options is also specified:

- 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 considered to be in this state, that is, with MQGMO_MARK_BROWSE_CO_OP, 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 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. This is true even if the MQGET is subsequently rolled-back.
- The message expires.

MQGMO_UNMARKED_BROWSE_MSG
A call to MQGET that specifies this option does not return a message that is considered, by the handle that is used, to be marked. If the handle that is used was returned by a successful call to MQOPEN, with the option MQOO_CO_OP, the call also does not return a message that is considered to be marked for the cooperating set of handles with MQGMO_MARK_BROWSE_CO_OP.

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 located is no longer considered by all other 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 by any open handle that considered it to be marked at handle level before this call.

This call is valid only using an open handle that was returned from a successful call to MQOPEN with the option MQOO_CO_OP, and succeeds even if the message is not considered to be marked by the cooperating set of handles.

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

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.

This 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, but this can be a logical message or a physical message:

- If you specify MQGMO_COMPLETE_MSG, all the message segments that comprise the logical message are locked to the queue handle (provided that they are all 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, and 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:

- Issuing another MQGET call for this handle, specifying either MQGMO_BROWSE_FIRST or MQGMO_BROWSE_NEXT (with or without MQGMO_LOCK); the message is unlocked if the call completes with MQCC_OK or MQCC_WARNING, but 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 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 MQGMO_BROWSE_MSG_UNDER_CURSOR (without MQGMO_LOCK); the message is unlocked if the call completes with MQCC_OK or MQCC_WARNING, but 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 for this handle (either explicitly, or implicitly by the application ending).

No special open option is required to specify this option, other than MQOO_BROWSE, which is needed to specify the accompanying browse option.

This option is not valid with any of the following options:

- MQGMO_MARK_SKIP_BACKOUT
- MQGMO_SYNCPOINT
- MQGMO_SYNCPOINT_IF_PERSISTENT
- MQGMO_UNLOCK

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 this option (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 with as much of the message as the buffer can hold, issue a warning completion code, and complete 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, before the data 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 Chapter 9, "Data conversion," on page 675 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 conversion fails (but the MQGET call otherwise completes without error), the message data is returned unconverted, and 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 177 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
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 (*MsgId* 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 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 nonnull 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 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, 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
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 different 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 will be more than n physical messages in the group.

MQGMO_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 MQGMO_LOGICAL_ORDER 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 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. Thus it is perfectly safe to specify MQGMO_LOGICAL_ORDER 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 *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 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 MQMF_SEGMENT flag is returned by the MQGET call, and that 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, 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 *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 122 for further details.

Table 39 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. This applies 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 prior to the call.

Cur log msg
Indicates whether a current logical message exists prior to 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 39. MQGET options relating to messages in groups and segments of logical messages

Options you specify	Group and log-msg status prior to 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*

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 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 122 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 40 on page 147 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 40. 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 above).

- 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 CFLEVEL(4).
- On AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 sre the same for all segments in the logical message; usually 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 CFLEVEL(4).

- On AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 CFLEVEL(4).
- On AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 comprise 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 CFLEVEL(4).
- On AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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.

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 backward compatibility 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 above 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 0. This field is ignored if *Version* is less than MQPMO_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 below. 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)

This 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 the following environments: AIX, HP-UX, z/OS, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ clients connected to these systems.

MQGMO_VERSION_3
Version-3 get-message options structure.

This version is supported in the following environments: AIX, HP-UX, z/OS, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ clients connected to these systems.

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; see the *MsgId* field described in "MQMD – Message descriptor" on page 177 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 250 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 41. Initial values of fields in MQGMO for MQGMO

Field name	Name of constant	Value of constant
StrucId	MQGMO_STRUC_ID	`'GMOb'`
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	`'b'`
SegmentStatus	MQSS_NOT_A_SEGMENT	`'b'`
Segmentation	MQSEG_INHIBITED	`'b'`
Reserved1	None	`'b'`
MsgToken	MQMTOK_NONE	Nulls
ReturnedLength	MQRL_UNDEFINED	`-1`
Reserved2	None	`'b'`

Table 41. Initial values of fields in MQGMO for MQGMO (continued)

Field name	Name of constant	Value of constant
MsgHandle	MQHM_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 MQGMO_DEFAULT contains the values listed above. 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 */
  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 */
  MQBYTE16  MsgToken;        /* Message token */
  MQLONG    ReturnedLength;  /* Length of message data returned
                                (bytes) */
  MQLONG    Reserved2;       /* Reserved */
  MQHMSG    MsgHandle;       /* Message handle */
};
```

- 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(19) 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.

System/390 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 42. 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

Table 42. Fields in MQIIH (continued)

Field	Description	Topic
Authenticator	RACF™ password or passticket	Authenticator
TranInstanceId	Transaction instance identifier	TranInstanceId
TranState	Transaction state	TranState
CommitMode	Commit mode	CommitMode
SecurityScope	Security scope	SecurityScope
Reserved	Reserved	Reserved

Overview for MQIIH

Availability: All WebSphere MQ systems and WebSphere 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 WebSphere 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.

  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. 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 **alphabetic 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 may 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.

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 mpde 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.

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.

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 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.

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 rules for coding this 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.

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. See the *WebSphere MQ Application Programming Guide* for further details.

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 43. Initial values of fields in MQIIH for MQIIH

Field name	Name of constant	Value of constant
StrucId	MQIIH_STRUC_ID	'IIHb'
Version	MQIIH_VERSION_1	1
StrucLength	MQIIH_LENGTH_1	84
Encoding	None	0
CodedCharSetId	None	0
Format	MQFMT_NONE	Blanks
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	'b'
CommitMode	MQICM_COMMIT_THEN_SEND	'0'
SecurityScope	MQISS_CHECK	'C'
Reserved	None	'b'

Table 43. Initial values of fields in MQIIH for MQIIH (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 MQIIH_DEFAULT contains the values listed above. 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 */
```

System/390 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 44. 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 enquired 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 WebSphere MQ systems and WebSphere 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 **alphabetic order**:

Options (MQLONG)

Inquire message property options structure - Options field

The following options control the action of MQINQMP. You can specify one or more of these options, and if you need more than one, the values 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).

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, WebSphere MQ returns reason code MQRC_PROP_NUMBER_FORMAT_ERROR.
- If an application attempts a conversion that is not supported, WebSphere 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; WebSphere 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.

  WebSphere 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.

WebSphere 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.

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 45. Initial values of fields in MQIPMO

Field name	Name of constant	Value of constant
StrucId	MQIMPO_STRUC_ID	'IMPO'

Table 45. Initial values of fields in MQIPMO (continued)

Field name	Name of constant	Value of constant
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 listed above. 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 */
```

System/390 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 46. 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
MsgFlags	Message flags	MQMD - MsgFlags field
OriginalLength	Length of original message	OriginalLength

Overview for MQMD

Availability: All WebSphere MQ systems, plus WebSphere MQ 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 of 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, respectively. However, if the application is running as an MQ 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 generally 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 below.

- 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 50 on page 240.

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 380 for details.

Message context: Certain fields in MQMD contain the message context. There are two types of message context: *identity context* and *origin context*. Usually:

- 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 usually have the meanings described above, 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; t 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 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).

In the descriptions below, the context fields are described as though they are used as described above. For more information about message context, see the *WebSphere MQ Application Programming Guide*.

Fields for MQMD

The MQMD structure contains the following fields; the fields are described in **alphabetic order**:

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 178; also see the *WebSphere MQ Application Programming Guide*.

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 i5/OS, 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
  i5/OS 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 on message context, see the *WebSphere MQ Application Programming Guide*.

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"Options (MQLONG)" on page 273 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 178; also see the *WebSphere MQ Application Programming Guide*.

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 on message context, see the *WebSphere MQ Application Programming Guide*.

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 since 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 178; also see the *WebSphere MQ Application Programming Guide*.

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.

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 575.

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 specifies the character set identifier of character data in the message.

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 616 for details of this attribute.

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 whose identifier 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 116.

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)

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 [1] 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 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

1. A correlation identifier generated by the queue manager consists of a 4-byte product identifier (AMQb or CSQb in either ASCII or EBCDIC, where b represents a blank), followed by a product-specific implementation of a unique string. In WebSphere 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 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.

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.

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 Chapter 7, "Machine encodings," on page 665 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.

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 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. 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).

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 *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.
2. Because a message whose expiry time 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 WebSphere 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.

Explicit request
Issue the REFRESH QMGR TYPE(EXPIRY) command, specifying the queue or queues that you want scanned.

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 below (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 will go into STOPPED state.

MQFB_CHANNEL_FAIL_RETRY
A channel ended abnormally and will go into RETRY state.

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 MQFB_IMS_ERROR (300), and places the result in the *Feedback* field of the reply message. This results in the feedback code having a value in the range MQFB_IMS_FIRST (301) through MQFB_IMS_LAST (399) when an IMS-OTMA error has occurred.

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 big 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 one 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 WebSphere MQ error log on the system on which the IMS bridge resides for more information about the error.

MQFB_IMS_FIRST
IMS-generated feedback codes occupy 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.

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 abended. 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 in conjunction 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.

MQ reason codes: For exception report messages, *Feedback* contains an 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:

- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

.

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 queue manager's character set can 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 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. Refer to *WebSphere MQ Programmable Command Formats and Administration Interface* 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 102 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 95 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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; refer to the *WebSphere MQ Programmable Command Formats and Administration Interface* book for more information about this structure, and to the *WebSphere MQ Monitoring* book 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.

Specfy the MQGMO_CONVERT option on the MQGET call to convert messages that have format MQFMT_IMS.

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 235 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. Refer to the *WebSphere MQ Programmable Command Formats and Administration Interface* book 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 309

page 309 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 359 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 380 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 Table 59 on page 278. 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 39 on page 145. 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)

These are flags that specify attributes of the message, or control its processing. The flags 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 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 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 122 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 (see below), 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 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 (see below). The queue manager never splits MQFMT_STRING messages into segments that are smaller than 16 bytes (other than the last segment).
- The queue manger 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 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 as it thinks fit; you cannot assume that the queue manager splits a message in a particular way.

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 be 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 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 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 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 this is the case, 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.

Table 59 on page 278 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.

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 Chapter 8, "Report options and message flags," on page 669.

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 the message is retained then the message identifier returned on the MQPUT is the message identifier of the retained message, otherwise this message identifier will not represent any message. The value of the *MsgId* field in the MQMD is unchanged on return from the call if MQMI_NONE or MQPMO_NEW_MSG_ID was specified.

See the description of MQPMO_RETAIN in "Options (MQLONG)" on page 273 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

2. A *MsgId* generated by the queue manager consists of a 4-byte product identifier (AMQb or CSQb in either ASCII or EBCDIC, where b represents a blank), followed by a product-specific implementation of a unique string. In WebSphere 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.

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)

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 39 on page 145 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 Table 59 on page 278. 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 39 on page 145. 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 Table 59 on page 278. 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 39 on page 145. 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. For more information about message context, see "Overview for MQMD" on page 178; also see the *WebSphere MQ Application Programming Guide*.

The format of the *PutApplName* depends on the value of *PutApplType*.

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:

- 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.
- On 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 i5/OS, the queue manager uses the fully-qualified job name.
- On UNIX systems, the queue manager uses:
  - For a CICS application, the CICS transaction name
  - For a non-CICS application, at least the rightmost 14 characters of the fully-qualified name of the executable, if this is available to the queue manager, and blanks otherwise.

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.

This is an output field for the MQGET call. 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)

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 178; also see the *WebSphere MQ Application Programming Guide*.

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).

MQAT_BROKER
Broker.

MQAT_CICS
CICS transaction.

MQAT_CICS_BRIDGE
CICS bridge.

MQAT_CICS_VSE
CICS/VSE® transaction.

MQAT_DOS
WebSphere MQ 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
Compaq NonStop Kernel application.

MQAT_OS2
OS/2® or Presentation Manager application.

MQAT_OS390
OS/390® application (same value as MQAT_ZOS).

MQAT_OS400
i5/OS application.

MQAT_QMGR
Queue manager.

MQAT_UNIX
UNIX application.

MQAT_VMS
Digital OpenVMS 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 i5/OS, it is set to MQAT_OS400; the queue manager never uses MQAT_CICS on i5/OS.

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 178; also see the *WebSphere MQ Application Programming Guide*.

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 178; also see the *WebSphere MQ Application Programming Guide*.

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 below)

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

manger 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; see below) 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 616).

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. For more information about names, see the *WebSphere MQ Application Programming Guide*.

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)

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), or
- Combined 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 below 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.

  Refer to the *WebSphere MQ Intercommunications* book 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 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 below 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 below 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.

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 below 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 below 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 below 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 below 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 below 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

An exception report message is generated, if one was requested by the sender.

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

An exception report message is generated, if one was requested by the sender.
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 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 Chapter 8, "Report options and message flags," on page 669 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. The *PutAuthority* 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 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.

Field in MQMD	Value used
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 671.

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 178; also see the *WebSphere MQ Application Programming Guide*.

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 i5/OS, 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 userid 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 since 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 WebSphere MQ V6.0 and later environments, plus WebSphere MQ 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 47. Initial values of fields in MQMD for MQMD

Field name	Name of constant	Value of constant
StrucId	MQMD_STRUC_ID	'MDbb'
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

Notes:

1. The symbol b 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 MQMD_DEFAULT contains the values listed above. 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 */
```

System/390 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 48. 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 WebSphere MQ systems, plus WebSphere 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

These are described below.

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 50 on page 240.

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 49.

Table 49. 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

Table 49. Queue-manager action when MQMDE specified on MQPUT or MQPUT1 for MQMDE (continued)

MQMD version	Values of version-2 fields	Values of corresponding fields in MQMDE	Action taken by queue manager
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 49 on page 236 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 the *WebSphere MQ Intercommunications* manual for further information).

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 **alphabetic 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 177 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 177 for 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 177. The initial value of this field is MQGI_NONE.

MsgFlags (MQLONG)

See the *MsgFlags* field described in "MQMD – Message descriptor" on page 177. The initial value of this field is MQMF_NONE.

MsgSeqNumber (MQLONG)

See the *MsgSeqNumber* field described in "MQMD – Message descriptor" on page 177. The initial value of this field is 1.

Offset (MQLONG)

See the *Offset* field described in "MQMD – Message descriptor" on page 177. The initial value of this field is 0.

OriginalLength (MQLONG)

See the *OriginalLength* field described in "MQMD – Message descriptor" on page 177. 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 50. Initial values of fields in MQMDE for MQMDE

Field name	Name of constant	Value of constant
StrucId	MQMDE_STRUC_ID	'MDEb'
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 b represents a single blank character.
2. In the C programming language, the macro variable MQMDE_DEFAULT contains the values listed above. 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 */
```

System/390 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 51. 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 WebSphere MQ systems and WebSphere MQ 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 **alphabetic 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 value. If required values 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).

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 52. 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 listed above. 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 */
```

System/390 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
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 WebSphere MQ systems, plus WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 **alphabetic 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 alternate 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 alternate user identifier; all 12 characters of the alternate 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* (see above), except that an asterisk is also valid (see below). A name that is completely blank (or one in which only blanks appear 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 appear 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 whose full name 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_2.

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_2.

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 i5/OS, 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 *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 above). 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* muat 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; see the description of the *ObjectRecOffset* field above for details. 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)

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, as per the description of how to use the MQCHARV structure, then 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.

ObjectType (MQLONG)

The type of object being named in the object descriptor. Possible values are:

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 344.

If the object identified by the *ObjectName* field cannot be found, the call will fail with reason code MQRC_UNKNOWN_OBJECT_NAME even if there is a string specified in *ObjectString*.

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)

This is the long object name after the queue manager resolves the name provided in *ObjectName*. This field is only returned for certain types of objects, topics and queue aliases which 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 length is shorter than the full ResObjectString then it will be truncated and will return as many of the rightmost characters as can fit in the provided length.

If *ResObjectString* is specified incorrectly, as per the description of how to use the MQCHARV structure then the call will fail 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 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*; see the description of *ObjectRecOffset* above for details of how to do this. 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; see the description of the *ResponseRecOffset* field above for details. 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_SELECTION_INVALID_FOR_TYPE.

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_2.

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 WebSphere 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	'ODbb'
Version	MQOD_VERSION_1	1
ObjectType	MQOT_Q	1
ObjectName	None	Null string or blanks
ObjectQMgrName	None	Null string or blanks

Field name	Name of constant	Value of constant
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
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 listed above. 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 */
```

System/390 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 53. Fields in MQOR

Field	Description	Topic
ObjectName	Object name	ObjectName
ObjectQMgrName	Object queue manager name	ObjectQMgrName

Overview for MQOR

Availability: AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. 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 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 **alphabetic 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 54. 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 listed above. 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 55. 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, i5/OS, Solaris, Linux, Windows, z/OS and WebSphere MQ 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 **alphabetic order**:

Context (MQLONG)

This describes what message context the property belongs to.

When a queue manager receives a message containing a WebSphere 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 WebSphere MQ Version 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 WebSphere MQ-defined properties; WebSphere MQ sets the appropriate value.

When a queue manager receives a message containing a WebSphere 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, and if you need more than one, the values 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).

MQCOPY_FORWARD
This property iscopied 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 described above is required, use the following option:

MQCOPY_NONE
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 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 WebSphere MQ-defined properties; support for all other properties is optional.

The field is automatically set to the correct value when the WebSphere 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 a WebSphere MQ-defined property that the queue manager recognizes as being incorrect. the queue manager corrects the value of the *Support* field.

When setting a WebSphere 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 a WebSphere 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 WebSphere MQ-defined properties.

If a WebSphere MQ Version 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 WebSphere MQ-defined.

MQPD_SUPPORT_REQUIRED
Support for the property is required. The message is rejected by a queue manager that does not support the WebSphere 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 WebSphere 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 56. 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 listed above. 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 */
```

System/390 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.

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
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	Action	Action
PubLevel	Level of subscription targeted by the publication	PubLevel

Overview for MQPMO

Availability: All WebSphere MQ systems, plus WebSphere 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, but this version is not supported in all environments (see above). Applications that you want to port between several environments must ensure that the required version of MQPMO 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 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 **alphabetic 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 that gets put to the queue will be dependent on the action being taken.

Note that the set/pass by context mechanism will take effect after the behaviours described below have been taken.

If an invalid action value is specified, the call fails with the reason code MQRC_ACTION_ERROR.

Any one of the following can be specified:

MQACTP_NEW

A new message is being put that is unrelated to any other. The message that gets put will be composed from the following:

- The message descriptor is taken from the MQPUT/MQPUT1 parameter as-is, if specified, or, if not, the original message handle modified by the new message

handle – any descriptor fields explicitly set on the new message handle will take precedence over those in the original message handle.

- All other properties are taken from the original message handle modified by the new message handle.
- Message data is taken from the MQPUT/MQPUT1 *Buffer* parameter.

MQACTP_FORWARD

A previously retrieved message is being forwarded. The original message handle specifies the message that was previously retrieved. This may have been modified, or modifications to the message descriptor or preferably other properties in the original message can be specified in the new message handle. The message that gets put will be composed from the following:

- The message descriptor is taken from the MQPUT/MQPUT1 parameter as-is, if specified, or, if not, the original message handle modified by the new message handle – any descriptor fields explicitly set on the new message handle will take precedence over those in the original message handle. If MQPMO_NEW_MSG_ID or MQPMO_NEW_CORREL_ID are specified, then these will be honoured.
- Each property which has the property descriptor *CopyOptions* value MQCOPY_FORWARD set are taken from the original message handle and put into the forwarded message, first subject to modification by the new message handle, that is, all additional properties in the new message handle are added, and any altered values are taken from the new message handle, unless the new handle contains a property with a null value, in which case they are effectively removed from the forward messages.
- The message data to be forwarded is taken from the MQPUT/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. This may have been modified, or modifications to the message descriptor or other properties in the original message can be specified in the new message handle. The message that gets put will be composed from the following:

- The message descriptor is taken directly from the MQPUT or MQPUT1 parameter, if specified and MQPMO_MD_FOR_OUTPUT_ONLY is not specified, or, if not, the original message handle is transformed in the following ways:

Table 57. 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

Table 57. Reply message handle transformation (continued)

Field in MQMD	Value used
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_PASS_CORREL_ID is set: Copied from the CorrelId field of the input message otherwise Copied from the MsgId field of the input message
BackoutCount	0
ReplyToQ	Blanks
ReplyToQMgr	Blanks
GroupId	MQGI_NONE
MsgSeqNumber	1
Offset	0
MsgFlags	MQMF_NONE
OriginalLength	MQOL_UNDEFINED

- The message descriptor is then modified by the new message handle – any descriptor fields explicitly set on the new message handle will take precedence over those in the transformed original message handle.
- Each property which has the property descriptor *CopyOptions* value MQCOPY_REPLY set are taken from the original message handle and put into the reply message, first subject to modification by the new message handle, that is, all additional properties in the new message handle are added, and any altered values are taken from the new message handle, unless the new handle contains a property with a null value, in which case they are effectively removed from the forward messages.
- 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. This may have been modified, or modifications to the message descriptor or other properties in the original message can be specified in the new message handle. The message that gets put will be composed from the following:

- The message descriptor is taken directly from the MQPUT or MQPUT1 parameter, if specified, or, if not, the original message handle is transformed in the following ways:

Table 58. Report 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_REPORT
Expiry	If MQRO_PASS_DISCARD_AND_EXPIRY is set: Copied from the input message otherwise MQEI_UNLIMITED
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_PASS_CORREL_ID is set: Copied from the CorrelId field of the input message otherwise Copied from the MsgId field of the input message
BackoutCount	0
ReplyToQ	Blanks
ReplyToQMgr	Blanks
OriginalLength	Set to the *BufferLength*

- The message descriptor is then modified by the new message handle – any descriptor fields explicitly set on the new message handle will take precedence over those in the transformed original message handle.
- The chosen *Feedback* field in MQMD should represent the report that is to be generated. A *Feedback* value of MQFB_NONE will cause the MQPUT or MQPUT1 call to be rejected with MQRC_FEEDBACK_ERROR.
- Each property which has the property descriptor *CopyOptions* value MQCOPY_REPORT set are taken from the original message handle and put into the report message, first subject to modification by the new message handle, that is, all additional properties in the new message handle are added, and any altered values are taken from the new message handle, unless the new handle contains a property with a null value, in which case they are effectively removed from the forward messages.
- The report message data will be generated from that specified in the MQPUT/MQPUT1 *Buffer* parameter according to the MQRO_*_WITH_DATA/FULL_DATA report options where these apply, otherwise the report will contain all of the specified *Buffer*.

This is an input field. The initial value of this field is MQACTP_NEW. This field is ignored if *Version* is less than MQPMO_VERSION_3.

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 *only* if the *CompCode* parameter on the MQPUT 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 not set if *Version* is less than MQPMO_VERSION_2.

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_2.

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 will 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.

Options (MQLONG)

Scope option.

You can specify any or none of the following options. If more than one option is required, the values you specify for the options can be used in the following ways:

- The values can be added together. Do not add the same constant more than once.

- The values can be combined using the bitwise OR operation, if the programming language supports bitwise 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. This 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 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, this 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 call for more details.

For information about how retained publications interact with subscription levels, see *WebSphere Publish/Subscribe User's Guide*.

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.

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 neither this option nor MQPMO_NO_SYNCPOINT is specified, the inclusion of the put request in unit-of-work protocols is determined by the environment:

- 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 neither this option nor MQPMO_SYNCPOINT is specified, the inclusion of the put request in unit-of-work protocols is determined by the environment:

- 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.

This 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 prior to 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.

This 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.

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 (*MsgId* 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 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 nonnull 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 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 (MQGI_NONE), 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.

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:

- Put the segments in each logical message in the order of increasing segment offset, starting from 0, with no gaps.

- Put all 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 the logical messages in one message group before putting logical messages in the next message group.

The above 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 on each MQPUT call, because the queue manager does this. Specifically, it means that the application does not need to set the *GroupId*, *MsgSeqNumber*, and *Offset* fields in MQMD, becauses the queue manager sets these to the appropriate values. The application needs to set only the *MsgFlags* 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.

After a message group or logical message has been started, subsequent MQPUT calls must specify the appropriate MQMF_* flags in *MsgFlags* in MQMD. If the application tries to put a message that is not in a group when there is an unterminated message group, or put a message that is not a segment when there is an unterminated logical message, the call fails with reason code MQRC_INCOMPLETE_GROUP or MQRC_INCOMPLETE_MSG, 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 MQMF_LAST_MSG_IN_GROUP or MQMF_LAST_SEGMENT as appropriate, before reissuing the MQPUT call to put the message that is not in the group or not a segment.

Table 59 on page 278 shows the combinations of options and flags that are valid, and the values of the *GroupId*, *MsgSeqNumber*, and *Offset* 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; Either means Yes or No:

LOG ORD
: Whether the MQPMO_LOGICAL_ORDER option is specified on the call.

MIG
: Whether the MQMF_MSG_IN_GROUP or MQMF_LAST_MSG_IN_GROUP option is specified on the call.

SEG
: Whether the MQMF_SEGMENT or MQMF_LAST_SEGMENT option is specified on the call.

SEG OK
: Whether the MQMF_SEGMENTATION_ALLOWED option is specified on the call.

Cur grp
: Whether a current message group exists prior to the call.

Cur log msg
: Whether a current logical message exists prior to 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.

Table 59. MQPUT options relating to messages in groups and segments of logical messages

Options you specify				Group and log-msg status prior to call		Values the queue manager uses		
LOG ORD	**MIG**	**SEG**	**SEG OK**	**Cur grp**	**Cur log msg**	*GroupId*	*MsgSeqNumber*	*Offset*
Yes	No	No	No	No	No	MQGI_NONE	1	0
Yes	No	No	Yes	No	No	New group id	1	0
Yes	No	Yes	Either	No	No	New group id	1	0
Yes	No	Yes	Either	No	Yes	Previous group id	1	Previous offset + previous segment length
Yes	Yes	Either	Either	No	No	New group id	1	0
Yes	Yes	Either	Either	Yes	No	Previous group id	Previous sequence number + 1	0
Yes	Yes	Yes	Either	Yes	Yes	Previous group id	Previous sequence number	Previous offset + previous segment length
No	No	No	No	Either	Either	MQGI_NONE	1	0
No	No	No	Yes	Either	Either	New group id if MQGI_NONE, else value in field	1	0
No	No	Yes	Either	Either	Either	New group id if MQGI_NONE, else value in field	1	Value in field
No	Yes	No	Either	Either	Either	New group id if MQGI_NONE, else value in field	Value in field	0
No	Yes	Yes	Either	Either	Either	New group id if MQGI_NONE, else value in field	Value in field	Value in field

Notes:

- MQPMO_LOGICAL_ORDER is not valid on the MQPUT1 call.
- For the *MsgId* field, the queue manager generates a new message identifier if MQPMO_NEW_MSG_ID or MQMI_NONE is specified, and uses the value in the field otherwise.
- For the *CorrelId* field, the queue manager generates a new correlation identifier if MQPMO_NEW_CORREL_ID is specified, and uses the value in the field otherwise.

When you specify MQPMO_LOGICAL_ORDER, the queue manager requires that all messages in a group and segments in a logical message are put with the same value in the *Persistence* 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 MQRC_INCONSISTENT_PERSISTENCE.

The MQPMO_LOGICAL_ORDER 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 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 that consists 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 MQRC_INCONSISTENT_UOW.

When MQPMO_LOGICAL_ORDER is specified, the MQMD supplied on the MQPUT call must not be less than MQMD_VERSION_2. If this condition is not satisfied, the call fails with reason code MQRC_WRONG_MD_VERSION.

If MQPMO_LOGICAL_ORDER 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 application's responsibility to ensure that the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* fields have appropriate values.

Use this technique 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*, *MsgFlags*, and *Persistence* fields to the appropriate values, and then issue the MQPUT call with MQPMO_SYNCPOINT or MQPMO_NO_SYNCPOINT set as desired, but *without* specifying MQPMO_LOGICAL_ORDER. If this call is successful, the queue manager retains the group and segment information, and subsequent MQPUT calls using that queue handle can specify MQPMO_LOGICAL_ORDER 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 can mix MQPUT calls that specify MQPMO_LOGICAL_ORDER with MQPUT calls that do not, but note the following points:

- If MQPMO_LOGICAL_ORDER 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 MQPMO_LOGICAL_ORDER is *not* specified, 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 60 on page 280 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_PERSISTENCE

– MQRC_INCONSISTENT_UOW

Note: The queue manager does not check the group and segment information for the MQPUT1 call.

Table 60. Outcome when MQPUT or MQCLOSE call is not consistent with group and segment information

Current call is	Previous call was MQPUT with MQPMO_LOGICAL_ORDER	Previous call was MQPUT without MQPMO_LOGICAL_ORDER
MQPUT with MQPMO_LOGICAL_ORDER	MQCC_FAILED	MQCC_FAILED
MQPUT without MQPMO_LOGICAL_ORDER	MQCC_WARNING	MQCC_OK
MQCLOSE with an unterminated group or logical message	MQCC_WARNING	MQCC_OK

For applications that put messages and segments in logical order, specify MQPMO_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 MQPMO_LOGICAL_ORDER option, and this can be achieved by not specifying that option. If this is done, the application must ensure that the *GroupId*, *MsgSeqNumber*, *Offset*, and *MsgFlags* 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 MQPMO_LOGICAL_ORDER. There are two reasons for this:

- If the messages are retrieved and put in order, specifying MQPMO_LOGICAL_ORDER assigns a new group identifier 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 specifying neither MQPMO_LOGICAL_ORDER nor the corresponding MQGMO_LOGICAL_ORDER on the MQGET 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.

Applications that generate report messages for messages in groups or segments of logical messages must also not specify MQPMO_LOGICAL_ORDER when putting the report message.

MQPMO_LOGICAL_ORDER can be specified with any of the other MQPMO_* options.

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 on message context, see the *WebSphere MQ Application Programming Guide*.

This is the default action 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 above for values). For more information on message context, see the *WebSphere MQ Application Programming Guide*.

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 on message context, see *WebSphere MQ Application Programming Guide*.

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 above for values). For more information on message context, see the *WebSphere MQ Application Programming Guide*.

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 on message context, see the *WebSphere MQ Application Programming Guide*.

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 should only be used for output to return the message descriptor of the message that was actually put. The message descriptor fields associated with the *NewMsgHandle* and/or *OriginalMsgHandle* fields of the MQPMO structure should 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 neither MQPMO_ASYNC_RESPONSE nor MQPMO_SYNC_RESPONSE is 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 fields specified above 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 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 should check both CompCode & 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 may not 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 is provided to ensure 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 DEFPRESP value from the queue definition is not used. 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.

MQPMO_RESPONSE_AS_TOPIC_DEF
This 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
This 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 this *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 detail on this, see 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.

This 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 may 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 will receive this publication. This value must be in the range zero to 9; zero is the lowest level.

For information, see *WebSphere Publish/Subscribe User's Guide*.

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 245.

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; see the description of the *PutMsgRecOffset* field above for details. 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* below).

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 245. 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; see the description of the *ResponseRecOffset* field above for details. 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_2.

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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ clients connected to these systems.

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 61. Initial values of fields in MQPMO

Field name	Name of constant	Value of constant
StrucId	MQPMO_STRUC_ID	'PMOb'
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
NewMsgHandle	MQHM_NONE	0
Action	MQACTP_NEW	0
PubLevel	None	9

Notes:

1. The symbol b 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 listed above. 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(19) BINARY.
**    New message handle
   15 MQPMO-NEWMSGHANDLE      PIC S9(19) 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 */
```

System/390 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 62. Fields in MQPMR

Field	Description	Topic
MsgId	Message identifier	MsgId
CorrelId	Correlation identifier	CorrelId
GroupId	Group identifier	GroupId

Table 62. Fields in MQPMR (continued)

Field	Description	Topic
Feedback	Feedback or reason code	Feedback
AccountingToken	Accounting token	AccountingToken

Overview for MQPMR

Availability: AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. 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 **alphabetic order**:

AccountingToken (MQBYTE32)

This is the accounting token to be used for the message sent to the queue whose name 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 177 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 whose name 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 whose name 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)

This is the group identifier to be used for the message sent to the queue whose name 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 Table 59 on page 278, 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 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 whose name 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 below 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

Overview for MQRFH

Availability: All WebSphere MQ systems, plus WebSphere MQ 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 **alphabetic 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 the double-quote character; all characters between the open double-quote and the matching close double-quote 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*; see below). 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-quote characters, the name or value must be enclosed in double quotes, and each double quote 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 63. Initial values of fields in MQRFH for MQRFH

Field name	Name of constant	Value of constant
StrucId	MQRFH_STRUC_ID	'RFHb'
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 b represents a single blank character.
2. In the C programming language, the macro variable MQRFH_DEFAULT contains the values listed above. 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 */
```

System/390 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

Overview for MQRFH2

Availability: All WebSphere MQ systems, plus WebSphere MQ 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 datatypes.

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.

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 these fields to the requested character set and encoding.
- *NameValueData* is in the character set given by the *NameValueCCSID* field. Only certain 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 **alphabetic 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 following value must 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 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)

This is a variable-length character string containing data encoded using an XML-like syntax. The length in bytes of this string is given by the *NameValueLength* field that precedes the *NameValueData* field; this 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
```

Note:

1. Because these fields are optional, they are omitted from the declarations of the structure that are provided for the various programming languages supported.
2. For further information on the method of terminating the following *NameValue* fields, see topic NameValueString

NameValueData is *not* converted to the character set specified on the MQGET call when 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.

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 whose name is the name of the folder:

```
<folder> property1 property2 ... </folder>
```

Optionally, the `content='properties'` element can be included in the folder start tag. This indicates that the content of the folder is to be treated as message properties. This element must only be used with user-defined folders and not IBM-defined folders, for example, `<wmq>` or `<jms>`.

For example:

```
<com.ourcompany content='properties'>  ... </com.ourcompany>
```

Characters following the folder end tag, up to the length defined by *NameValueLength*, 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:

- Specify the delimiter characters (<, =, ", /, and >) exactly as shown.
- `name` is the user-specified name of the property; see below for more information about names.
- `datatype` is an optional user-specified data type of the property; see below for valid data types.
- `value` is the user-specified value of the property; see below for more information about values.
- Blanks are significant between the > character that precedes a value, and the < character that follows the value, and at least one blank must precede `dt=`. Elsewhere you can code blanks 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, you can group them together by enclosing them within XML start and end tags whose name is the name of the group:

```
<folder> <group> property1 property2 ... </group> </folder>
```

Groups can be nested within other groups, without limit, and a given group can occur more than once within a folder. A folder can also contain some properties in groups and other properties not in groups.

Names of properties, groups, and folders: The 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 name space. 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 name space 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 *NameValueData* field must 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 (see below).
`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.
`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 wish to imply a particular precision.

Data type	Used for
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 below. 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
&	&amp;	Mandatory
<	&lt;	Mandatory
>	&gt;	Optional
"	&quot;	Optional
'	&apos;	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>
```

NameValueLength (MQLONG)

This specifies the length in bytes of the data in the *NameValueData* field. To avoid problems with data conversion of the data (if any) that *follows* 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 may 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 64. Initial values of fields in MQRFH2 for MQRFH2

Field name	Name of constant	Value of constant
StrucId	MQRFH_STRUC_ID	'RFHb'
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
NameValueCCSID	None	1208

Notes:

1. The symbol b represents a single blank character.
2. In the C programming language, the macro variable MQRFH2_DEFAULT contains the values listed above. 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 */
```

System/390 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 65. 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
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

Table 65. Fields in MQRMH (continued)

Field	Description	Topic
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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 **alphabetic 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 described above.

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 66. Initial values of fields in MQRMH for MQRMH

Field name	Name of constant	Value of constant
StrucId	MQRMH_STRUC_ID	'RMHb'
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 b represents a single blank character.
2. In the C programming language, the macro variable MQRMH_DEFAULT contains the values listed above. 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 */
```

System/390 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 67. 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. 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 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 **alphabetic order**:

CompCode (MQLONG)

This is the completion code resulting from the open or put operation for the queue whose name 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 whose name 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 68. 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 listed above. 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 69. Fields in MQSCO

Field	Description	Topic
StrucId	Structure identifier	StrucId
Version	Structure version number	Version
KeyRepository	Location of key repository	KeyRepository
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 remaining fields are ignored if *Version* is less than MQSCO_VERSION_2.		
KeyResetCount	SSL secret key reset count	KeyResetCount
Fips Required	Use FIPS-certified cryptographic algorithms in WebSphere MQ	"FipsRequired (MQLONG)" on page 323

Overview for MQSCO

Availability: AIX, HP-UX, Solaris, Linux and Windows clients.

Purpose: The MQSCO structure (in conjunction with the SSL fields in the MQCD structure) allows an application running as a WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively.

Fields for MQSCO

The MQSCO structure contains the following fields; the fields are described in **alphabetic 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 25. 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.

  Using *AuthInfoRecPtr* is recommended 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).

  Using *AuthInfoRecOffset* is recommended 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 datatype, this field is declared as a byte string of the appropriate length.

CryptoHardware (MQCHAR256)

This field gives configuration details for cryptographic hardware connected to the client system. Set the field to one of the following strings, or leave it blank or null:

```
GSK_ACCELERATOR_RAINBOW_CS_OFF
GSK_ACCELERATOR_RAINBOW_CS_ON
GSK_ACCELERATOR_NCIPHER_NF_OFF
GSK_ACCELERATOR_NCIPHER_NF_ON
GSK_PKCS11=<the PKCS #11 driver path and filename>;<the PKCS #11
token label>;<the PKCS #11 token password>;<symmetric cipher setting>;
```

Note:

1. The strings containing `RAINBOW` enable or disable the Rainbow Cryptoswift cryptographic hardware.
2. The strings containing `NCIPHER` enable or disable the nCipher nFast cryptographic hardware.
3. In order to use cryptographic hardware which conforms to the PKCS11 interface, for example, the IBM 4960 or IBM 4963, the PKCS11 driver path, PKCS11 token label, and PKCS11 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 filename is the name of the shared library. An example of the value required for the PKCS #11 path and filename 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, re-configure it with this lowercase label.
4. If the field is blank or null, it indicates that no cryptographic hardware configuration is required.

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.

FipsRequired (MQLONG)

WebSphere MQ can be configured with cryptographic hardware so that the cryptography modules used are those provided by the hardware product; these can either be FIPS-certified, or not, 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 WebSphere MQ-provided software.

When WebSphere 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 WebSphere MQ platforms:
  - TLS_RSA_WITH_3DES_EDE_CBC_SHA
  - FIPS_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
  - FIPS_WITH_3DES_EDE_CBC_SHA
  - TLS_RSA_WITH_AES_128_CBC_SHA
  - TLS_RSA_WITH_AES_256_CBC_SHA

KeyRepository (MQCHAR256)

This field is relevant only for WebSphere MQ 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 *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 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 *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 a WebSphere MQ 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 conversation before the secret key is renegotiated. The number of bytes includes control information sent by the MCA.

If you specify an SSL/TLS secret key reset count between 1 byte and 32Kb, SSL/TLS channels will use a secret key reset count of 32Kb. This is to avoid the overhead of excessive key resets which would occur for small SSL/TLS secret key reset values.

This is an input field. The value is a number between 0 and 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.

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_2

Initial values and language declarations for MQSCO

Table 70. Initial values of fields in MQSCO

Field name	Name of constant	Value of constant
StrucId	MQSCO_STRUC_ID	'SCOb'
Version	MQSCO_CURRENT_VERSION	1
KeyRepository	None	Null string or blanks
CryptoHardware	None	Null string or blanks
AuthInfoRecCount	None	0
AuthInfoRecOffset	None	0

Table 70. Initial values of fields in MQSCO (continued)

Field name	Name of constant	Value of constant
AuthInfoRecPtr	None	Null pointer or null bytes

Notes:

1. The symbol ␣ represents a single blank character.
2. In the C programming language, the macro variable MQSCO_DEFAULT contains the values listed above. 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 */
};
```

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.
```

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 */
```

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'
End Type
```

MQSD - Subscription descriptor

The following table summarizes the fields in the structure.

Field	Description	Topic
StrucId	Structure identifier	StrucId
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, i5/OS, Solaris, Linux, Windows, z/OS, plus WebSphere MQ 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.

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 make use of 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 will be sent, by providing an object handle as an output from the MQSUB call. For more information, see “Hobj (MQHOBJ) - Input/output” on page 564.

The queue manager also undertakes to clean up un-retrieved messages from the managed destination when the subscription is removed, 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 should 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 246 in the MQOD data type for more information.

AlternateUserId

If you specify MQSO_ALTERNATE_USER_AUTHORITY, 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 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 alternate user identifier; all 12 characters of the alternate 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 i5/OS, 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 344.

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 344.

The maximum length of *ObjectString* is 10240.

If *ObjectString* is not specified correctly, as described in MQCHARV, or if the maximum length is exceeded, 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. I they are provided they must resolve to the same full topic name or the call fails with MQRC_TOPIC_NOT_ALTERABLE.

Options (MQLONG)

You must specify at least one of the following options: These options control the action of the MQSUB call.

- MQSO_ALTER
- MQSO_RESUME
- MQSO_CREATE

The values you specify for the options can be used in the following ways:

- The values can be added together. Do not add the same constant more than once
- The values can be combined using the bitwise OR operation, if the programming language supports bitwise 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 doesn't exist. This combination fails if the subscription already exists.
MQSO_RESUME	Resumes an existing subscription. This combination fails if no subscription exists.
MQSO_CREATE + MQSO_RESUME	Creates a subscription if one doesn't exist and resumes a matching one, if it does exist. This combination is useful when it is used in an application that will be run a number of times.
MQSO_CREATE + 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 doesn't 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 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. In other words, 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* already 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 subscription's attributes

and they will be 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 userid of the subscription is the userid that created the subscription, or if it has been subsequently altered by a different userid, it is the userid of the most recent successful alteration. If an AlternateUserId is used, and use of alternate user IDs is allowed for that user, the alternate userid will be recorded as the userid that created the subscription instead of the userid under which the subscription was made.

If a matching subscription exists that was created without the MQSO_ANY_USERID option, and the userid 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 by another application, the call fails with MQRC_SUBSCRIPTION_IN_USE. If it is currently in use by the same connection the call will not fail and a handle to the subscription will be returned.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call will fail 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 table below. If you try to alter an attribute that can not be changed, or to alter a subscription that has set the MQSO_IMMUTABLE option, the call fails with the reason code shown in the table below.

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 userid of the subscription is the userid that created the subscription, or if it has been subsequently altered by a different userid, it is the userid 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 userid

will be recorded as the userid that created the subscription instead of the userid under which the subscription was made.

If a matching subscription exists that was created without the option MQSO_ANY_USERID and the userid 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 by another application, the call fails with MQRC_SUBSCRIPTION_IN_USE. If it is currently in use by the same connection the call will not fail and a handle to the subscription will be returned.

If the subscription named in SubName is not a valid subscription to resume or alter from an application, the call will fail with MQRC_INVALID_SUBSCRIPTION.

The following table shows the ability of MQSO_ALTER to alter attribute values in MQSD and MQSUB.

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)	MQRC_GROUPING_NOT_ALTERABLE if you try to alter MQSO_GROUP_SUB
MQSD	Publication options	Yes (see note 2)	None
MQSD	Wildcard options	No	MQRC_TOPIC_NOT_ALTERABLE
MQSD	Other options	No (see note 3)	None
MQSD	ObjectName	No	MQRC_TOPIC_NOT_ALTERABLE
MQSD	AlternateUserId	No (see note 4)	None
MQSD	AlternateSecurityId	No (see note 4)	None
MQSD	SubExpiry	Yes	None
MQSD	ObjectString	No	MQRC_TOPIC_NOT_ALTERABLE
MQSD	SubName	No (see note 5)	None
MQSD	SubUserData	Yes	None
MQSD	SubCorrelId	Yes (see note 6)	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)	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 application's 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 application's connection to the queue manager is closed, if it has not already been 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 will 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.

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 will be 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 will be 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 will fail 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 will cause the call will 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 userid. 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 will cause 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 userid as the original subscription itself.

If an MQSUB call refers to an existing subscription with MQSO_ANY_USERID set, and the userid differs from the original subscription, the call succeeds only if the new userid 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 userid 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 userid to alter the subscription. If the subscription has not been altered, it is the userid 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 userid of the subscription is now fixed at this new user id. The call succeeds only if the new userid 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 have originated from the same application if the connection handles are the same. On return from an MQSUB call using MQSO_RESUME this option will be 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 that have been 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 will not be set even if the subscription was created using this option.

If this option is not used, previously retained messages will be 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 will fail.

This option is not valid in combination with MQSO_PUBLICATIONS_ON_REQUEST.

MQSO_PUBLICATIONS_ON_REQUEST
Setting this option indicates that the subscriber will request information specifically when required. The queue manager will not to send unsolicited messages to the subscriber. The retained publication (or possibly multiple publications if a wildcard is specified in the topic) will be sent to the subscriber each time a MQSUBRQ call is made using the Hsub handle from a previous MQSUB call. No publications will be sent as a result of the MQSUB call using this option. On return from an MQSUB call using MQSO_RESUME this option will be set if appropriate.

This option is not valid in combination with MQSO_NEW_PUBLICATIONS_ONLY.

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 will be set.

MQSO_WILDCARD_CHAR

Wildcards only operate on characters within the topic string.

The behavior defined by MQSO_WILDCARD_CHAR is shown in the table below.

Special Character	Behaviour
/	No significance, just another character
*	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 WebSphere 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 behaviour 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	Behaviour
/	Topic level separator
#	Wildcard: multiple topic level
+	Wildcard: single topic level

Special Character	Behaviour
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
```

Note: This use of wildcards supplies the meaning provided in WebSphere Message Brokers 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 MQSO_RESUME these options will be unchanged. See "AlternateUserId" on page 328 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_CORRELID

The subscription is to use the correlation identifier supplied in the *SubCorrelId* field. If this option is not specified, a correlation identifier will be automatically created by the queue manager at subscription time and will be returned to the application in the *SubCorrelId* field. See "SubCorrelId (MQBYTE24)" on page 341 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 will 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.

Field in MQMD	Value used
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 had supplied identity context information, default context information will be 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 will be generated for the new user id now owning the subscription and any subsequent publications will be 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 the *Application Programming Guide*. For more information about the *AccountingToken* field in the MQMD, see "AccountingToken (MQBYTE32)" on page 179

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 will be 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 181

If the option MQSO_SET_IDENTITY_CONTEXT is not specified, the *ApplIdentityData* which will be 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 210.

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 210.

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* will not be returned, but the length will be returned in ResObjectString.VSLength. If the length is shorter than the full ResObjectString then it will be truncated and will return as many of the rightmost characters as can fit in the provided length.

If *ResObjectString* is specified incorrectly, as per the description of how to use the MQCHARV structure then the call will fail 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.

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)

All publications sent to match this subscription will contain this correlation identifier in the message descriptor. If multiple subscriptions get their publications from the same queue, 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 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.

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 altering an existing subscription using the MQSO_ALTER option, and this field is an input field, then the subscription correlation id 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 id cannot be changed.

On return from an MQSUB call using MQSO_RESUME, this field is set to the current correlation id for the subscription.

SubExpiry (MQLONG)

This is the period of 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 *Expiry* field in the MQMD of the publications sent to this subscriber.

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 will be 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 will only be 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.

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 *WebSphere Publish/Subscribe User's Guide*.

If altering an existing subscription using the MQSO_ALTER option, then the SubLevel cannot be changed.

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 requried 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

The full topic name is given by the concatenation of two parts. A part exists if the first character of the field is neither a blank nor a null character:

1. The value of the TOPICSTR parameter of the topic object named in *ObjectName*
2. *ObjectString*, if the *VSLength* provided for that variable length string is non-zero

If one of these parts exist it is used unchanged as the topic name.

If neither part exists the call fails with reason code MQRC_UNKNOWN_OBJECT_NAME.

If both parts exist, they are concatenated in the order they are listed above. A '/' character is inserted between them in the resultant combined topic if one is required.

The following table shows examples of topic string concatenation:

TOPICSTR	ObjectString	Concatenation result	Comment
/Football	Scores	/Football/Scores	We add a '/' at the concatenation point
/Football/	Scores	/Football/Scores	
/Football	/Scores	/Football/Scores	
/Football/	/Scores	/Football/Scores	We remove a '/' at the concatenation point

Notes:

1. The '/' character is considered to be a special character providing structure to the full topic name. You are recommended not to use the '/' character for any other reason as the structure of the topic tree will not be as you expect. This means that the topic '/Football' is not the same as the topic 'Football'. However, topic '/Football' is the same as the topic '/Football/'.

2. A full topic name with two repeated '/' characters is not valid.
3. If the full topic name is not valid, the call fails with reason code MQRC_TOPIC_STRING_ERROR.
4. Wildcard characters, +, #, * and ? are special characters. You are recommended not to use these characters in your topic strings when publishing. They are not considered invalid however, you should take care to understand the behaviour when using them.
   - Publishing on a topic string with # or + mixed in with other characters (including themselves) within a topic level can be subscribed on, with either wildcard scheme.
   - Publishing on a topic string with # or + as the only character between two '/' characters will produce a topic string that cannot be subscribed on explicitly by an application using the wildcard scheme MQSO_WILDCARD_TOPIC. This will result in the application getting more publications than expected.
   - Publishing on a topic string containing either * or ? anywhere will produce a topic string that cannot be subscribed on explicitly by an application using the wildcard scheme MQSO_WILDCARD_CHAR. This will result in the application getting more publications than expected.

Initial values and language declarations for MQSD

Field name	Name of constant	Value of constant
StrucId	MQSD_STRUC_ID	'SDbb'
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
Selection String	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 listed above. 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 */
```

System/390 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 71. 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 WebSphere MQ systems and WebSphere 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 **alphabetic 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, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQGET or MQPUT call respectively.

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, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQGET or MQPUT call respectively

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, or when the message handle is specified in the *MsgHandle* field of the MQGMO or MQPMO structure on an MQGET or MQPUT call respectively.

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.

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 72. 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 listed above. 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 */
```

System/390 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

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, i5/OS, Solaris, Linux, Windows, z/OS plus WebSphere MQ 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 and encoding of the local queue manager; these are given by the *CodedCharSetId* queue-manager attribute and MQENC_NATIVE, respectively. However, if the application is running as an MQ 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 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.

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 above 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	'SROb'
Version	MQSRO_VERSION_1	1
Options	MQSRO_NONE	0
NumPubs	None	0

Notes:

1. The symbol b represents a single blank character.
2. In the C programming language, the macro variable MQSRO_DEFAULT contains the values listed above. 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 */
```

System/390 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 73. 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
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

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 561.

Fields for MQSTS

The MQSTS structure contains the following fields; the fields are described in **alphabetic order**:

CompCode (MQLONG)

This is the completion code resulting from a previous asynchronous put operation on the object specified in ObjectName.

This is always an output field. The initial value of this field is MQCC_OK.

PutFailureCount (MQLONG)

This is a count of the number of asynchronous put operations that completed with a completion code of MQCC_FAILED.

This is always an output field. The initial value of this field is 0.

ObjectName (MQCHAR48)

This is the name of the object used in the put operation, the failure of which is reported in the *CompCode* and *Reason* fields.

This is always an output 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 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).

This is always an output field. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

ObjectType (MQLONG)

The type of object being named in *ObjectName*. Possible values are:

MQOT_ALIAS_Q
Alias queue.

MQOT_LOCAL_Q
Local queue.

MQOT_MODEL_Q
Model queue.

MQOT_Q
Queue.

MQOT_REMOTE_Q
Remote queue.

MQOT_TOPIC
Topic.

This is always an output field. The initial value of this field is MQOT_Q.

Reason (MQLONG)

This is the reason code resulting from a previous asynchronous put operation on the object specified in ObjectName.

This is always an output field. The initial value of this field is MQRC_NONE.

ResolvedObjectName (MQCHAR48)

This is the name of the object named in *ObjectName* 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*.

This is always an output field. The initial value of this field is the null string in C, and 48 blank characters in other programming languages.

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 *ResolvedObjectName*. *ResolvedQMgrName* can be the name of the local queue manager.

This is always an output field. 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:

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.

This is always an input field. The initial value of this field is MQSTS_STRUC_ID.

PutSuccessCount (MQLONG)

This is the a count of the number of asynchronous put operations that completed with a completion code of MQCC_OK.

This is always an output field. The initial value of this field is 0.

Version (MQLONG)

This is the structure version number. The value must be:

MQSTS_VERSION_1
Version 1 status reporting structure.

The following constant specifies the version number of the current version:

MQSTS_CURRENT_VERSION
Current version of status reporting structure.

This is always an input field. The initial value of this field is MQSTS_VERSION_1.

PutWarningCount (MQLONG)

This is a count of the number of asynchronous put operations that completed with a completion code of MQCC_WARNING.

This is always an output field. The initial value of this field is 0.

Initial values and language declarations for MQSTS

Table 74. Initial values of fields in MQSTS

Field name	Name of constant	Value of constant
StrucId	MQSTS_STRUC_ID	'STSb'
Version	MQSTS_CURRENT_VERSION	MQSTS_VERSION_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

Notes:

1. The symbol b 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 listed above. 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 */
};
```

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
          15  MQSTS-COMPCODE            PIC S9(9) BINARY.
         ** Reason Code
```

```
 15  MQSTS-REASON              PIC S9(9) BINARY.
** Put success count
 15  MQSTS-PUTSUCCESSCOUNT     PIC S9(9) BINARY.
** Put Warning count
 15  MQSTS-PUTWARNINGCOUNT     PIC S9(9) BINARY.
** Put Failure count
 15  MQSTS-PUTFAILURECOUNT     PIC S9(9) BINARY.
** Object type
 15  MQSTS-OBJECTTYPE          PIC S9(9) BINARY.
** Object name
 15  MQSTS-OBJECTNAME          PIC X(48).
** Object queue manager name
 15  MQSTS-OBJECTQMGRNAME      PIC X(48).
** Resolved object name
 15  MQSTS-RESOLVEDOBJECTNAME  PIC X(48).
** Resolved object queue manager name
 15  MQSTS-RESOLVEDQMGRNAME    PIC X(48).
```

PL/I declaration (z/OS only)

```
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 */
```

System/390 assembler declaration (z/OS only)

```
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
```

MQTM – Trigger message

The following table summarizes the fields in the structure.

Table 75. 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

Table 75. Fields in MQTM (continued)

Field	Description	Topic
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 WebSphere MQ Trigger Monitor Interface (TMI), which is one of the WebSphere 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 367.

- 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 i5/OS, the trigger-monitor application provided with WebSphere MQ passes an MQTMC2 structure to the started application.

For information about using triggers, see the *WebSphere MQ Application Programming Guide*.

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

Field in MQMD	Value used
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 **alphabetic 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 611 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 WebSphere 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 i5/OS, 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 611 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
WebSphere MQ 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
Compaq NonStop Kernel application.

MQAT_OS2
OS/2 or Presentation Manager application.

MQAT_OS390
OS/390 application (same value as MQAT_ZOS).

MQAT_OS400
i5/OS application.

MQAT_RRS_BATCH
RRS batch application.

MQAT_UNIX
UNIX application.

MQAT_UNKNOWN
Application of unknown type.

MQAT_USER
User-defined application type.

MQAT_VMS
Digital OpenVMS 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.

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 611 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 575 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 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 575 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 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 575 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 611 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 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 76. Initial values of fields in MQTM for MQTM

Field name	Name of constant	Value of constant
StrucId	MQTM_STRUC_ID	'TMbb'
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

Table 76. Initial values of fields in MQTM for MQTM (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 MQTM_DEFAULT contains the values listed above. 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 */
```

System/390 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 77. 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 WebSphere MQ Trigger Monitor Interface (TMI), which is one of the WebSphere 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 i5/OS, the trigger monitor application provided with WebSphere MQ passes an MQTMC2 structure to the started application.

Fields for MQTMC2

The MQTMC2 structure contains the following fields; the fields are described in **alphabetic order**:

AppId (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 78. 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

Table 78. Initial values of fields in MQTMC2 for MQTMC2 (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 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 */
```

System/390 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 79. Fields in MQWIH

Field	Description	Topic
StrucId	Structure identifier	StrucId
Version	Structure version number	Version
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

Availability: All WebSphere MQ systems, plus WebSphere 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 **alphabetic 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 80. Initial values of fields in MQWIH for MQWIH

Field name	Name of constant	Value of constant
StrucId	MQWIH_STRUC_ID	'WIHb'
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 b represents a single blank character.
2. In the C programming language, the macro variable MQWIH_DEFAULT contains the values listed above. 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 */
```

System/390 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 81. 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

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 on this exit, see the *WebSphere MQ Application Programming Guide*.

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 **alphabetic 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_MQBACK
The MQBACK call.

MQXC_MQCLOSE
The MQCLOSE call.

MQXC_MQCMIT
The MQCMIT 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.

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
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 */
```

System/390 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 82. 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 WebSphere MQ systems and WebSphere 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 MQXQH 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, respectively.

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 (see below for details).

  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; see below for details).

  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 below. 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 below)
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 (see above).
CorrelId	The *MsgId* from the embedded message descriptor.
BackoutCount	0
ReplyToQ	Copied from the embedded message descriptor.
ReplyToQMgr	Copied from the embedded message descriptor.
UserIdentifier	Copied from the embedded message descriptor.
AccountingToken	Copied from the embedded message descriptor.
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, with the exception of 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.

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, respectively. 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 **alphabetic 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 83. Initial values of fields in MQXQH for MQXQH

Field name	Name of constant	Value of constant
StrucId	MQXQH_STRUC_ID	'XQHb'
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 47 on page 231	–

Notes:

1. The symbol b 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 listed above. 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 */
```

System/390 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
```

Chapter 2. Function calls

Call descriptions

This part of the book describes the MQI calls:

- MQBACK – Back out
- MQBEGIN – Begin unit of work
- MQBUFMH – Convert buffer into message handle
- MQCB – Manage callback
- MQCB_FUNCTION – Callback function
- MQCLOSE – Close object
- MQCMIT – Commit
- MQCONN – Connect to queue manager
- MQCONNX – Connect to queue manager with options
- MQCRTMH – Create message handle
- MQCTL – Control callback
- MQDISC – Disconnect from queue manager
- MQDLTMH – Delete message handle
- MQDLTMP – Delete message property
- MQGET – Get message
- MQINQ – Inquire about object attributes
- MQINQMP – Inquire message property
- MQMHBUF – Convert message handle into buffer
- MQOPEN – Open object
- MQPUT – Put message
- MQPUT1 – Put one message
- MQSET – Set object attributes
- MQSETMP – Set message handle property
- MQSTAT – Retrieve status information
- MQSUB – Register subscription
- MQSUBRQ – Subscription request

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 Chapter 9, "Data conversion," on page 675.

Conventions used in the call descriptions

For each call, this chapter 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.

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 1.

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. You will find more information about each completion and reason code in Chapter 4, "Return codes," on page 657.

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 like this: MQIA_*. See Chapter 5, “MQ constants,” on page 659 for the value of a constant.

Arrays

In some calls, parameters are arrays of character strings whose size 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 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 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 z/OS, this call is used only by batch programs (including IMS batch DL/I programs).
- On i5/OS, this call is not supported for applications running in compatibility mode.

Syntax for MQBACK

Parameters for MQBACK

The MQBACK 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.

CompCode (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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.

See Chapter 4, "Return codes," on page 657 for more details.

Usage notes for MQBACK

Usage notes for MQBACK.

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 395.
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 i5/OS, 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 453 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 in the event that 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 268, and the MQGMO_LOGICAL_ORDER option described in "MQGMO – Get-message options" on page 122.

   The remaining usage notes apply only when the queue manager coordinates the units of work:

6.

7. 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 429 for information about the scope of connection handles.
8. Only messages that were put or retrieved as part of the current unit of work are affected by this call.
9. 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.

Language invocations for MQBACK

The MQBACK call is supported in the programming languages shown below.

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 */
```

System/390 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.

- This call is supported in the following environments: AIX, HP-UX, i5/OS, Solaris, Linux, Windows.

Syntax for MQBEGIN

Parameters for MQBEGIN

The MQBEGIN 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.

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 73 for more information about shared and nonshared handles.

BeginOptions (MQBO) – input/output

These are options that control the action of MQBEGIN, as described in see "MQBO – Begin options" on page 31.

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 (MQLONG) – output

This is the completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_WARNING
Warning (partial completion).

MQCC_FAILED
Call failed.

Reason (MQLONG) – output

This is 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_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 on these reason codes, see
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

.

Usage notes for MQBEGIN

Consider these points when using MQBEGIN.

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**: 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, 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**: This is 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**: 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 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 453 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 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's configuration file.
6. On i5/OS, 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 i5/OS `COMMIT` and `ROLLBACK` operations apply to MQ resources as well as to resources belonging to other participating resource managers.

Language invocations for MQBEGIN

The MQBEGIN call is supported in the programming languages shown below.

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 for MQBUFMH

MQBUFMH *(Hconn, Hmsg, BufMsgHOpts, MsgDesc, Buffer, BufferLength, DataLength, CompCode, Reason)*

Parameters for MQBUFMH

The MQBUFMH call has the following parameters.

Hconn (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 (MQHMSG) – input

This is the message handle for which a buffer is required. The value was returned by a previous MQCRTMH call.

BufMsgHOpts (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 29 for details.

MsgDesc (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 (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 (MQBYTExBufferLength) - input/output

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 (MQLONG) - output

DataLength is the length, in bytes, of the buffer which might have the properties removed.

CompCode (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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.

Usage notes for MQBUFMH

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.

Language invocations for MQBUFMH

The MQBUFMH call is supported in the programming languages shown below.

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(19) 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 */
```

System/390 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

Manage callback function

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 function pointer) that is called by WebSphere MQ when certain events occur.

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 call back 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, with reason MQRC_CALLBACK_FAILED if a callback function does not end normally.

Syntax for MQCB

Message callback function - syntax

```
MQCB (Hconn, Operation, CallbackDesc, Hobj, MsgDesc,
      GetMsgOpts, CompCode, Reason)
```

Parameters for MQCB

The MQCB call has the following parameters. Manage callback function - parameters

Hconn (MQHCONN) – 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 z/OS for CICS applications, and on i5/OS 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.

Operation (MQLONG) – input

Manage callback function - Operation 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 together (do not add the same constant more than once), or
- Combined using the bitwise OR operation (if the programming language supports bit operations).

Combinations that are not valid are noted; all other combinations are valid.

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 whilst 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 in conjunction 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 whilst 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 whilst suspended, and any events missed while in the suspended state are not provided to the operation when it is resumed.

CallbackDesc (MQCBD) – input

Manage callback function -CallbackDesc 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 for details of the structure.

Callback descriptor is required only for the MQCB_REGISTER option; if the descriptor is not required, the parameter address passed can be null.

Hobj (MQHOBJ) – 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 (MQCBT_EVENT_HANDLER) and should be specified as MQHO_NONE.

If this *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 (MQMD) – input

Manage callback function -MsgDesc 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 MQGMO_CONVERT option.

See MQMD for details.

MsgDesc is used only 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 (MQGMO) – input

Manage callback function - GetMsgOpts parameter

Options that control how the message consumer gets messages.

All options have the meaning as described in "MQGMO – Get-message options" on page 122, 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 invoked for messages and events

MQGMO_WAIT with a zero WaitInterval
The MQRC_NO_MSGS_AVAILABLE code is only passed to the consumer when there are no messages and

- the consumer has just 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.

MQGMO_WAIT and a positive WaitInterval
The user is invoked after the specified wait interval with reason code MQRC_NO_MSGS_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.

o MQGMO_WAIT and WaitInterval of MQWI_UNLIMITED
This specifies an infinite wait before returning MQRC_NO_MSGS_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 options are not required the parameter address passed can be null, this is similar to 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 (MQLONG) – output

Manage callback function - CompCode parameter

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_WARNING
Warning (partial completion).

MQCC_FAILED
Call failed.

Reason (MQLONG) – output

Manage callback function - Reason parameter

The reason codes listed below 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 deregister, 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_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') 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.

Usage notes for MQCB

MQCB function call - 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 afterwards.

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.

This to 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 have 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.

Ensure that your application performs thread-based initialization and cleanup in the START and STOP callbacks. You can do nonthread-based initialization and cleaup 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(MQOP_START_WAIT). This has the effect of 'donating' the thread to 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 MQRC_CALL_IN_PROGRESS.

There are special cases, however, when the application needs to issue a further MQI call before the previous call has completed. For example, the consumer can be invoked during an MQBC call with MQOP_REGISTER.

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 means you can issue, for example, an MQOPEN call, in the consumer function when called with a CallType type of MQCBCT_REGISTER. Any MQI call, with the exception of MQDISC, is allowed.

Related reference

"Message consumer callback sequence" on page 411

Language invocations for MQCB

Manage callback function - Language invocations

The MQCB call is supported in the following programming languages.

C invocation

MQCB function call - C language 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 MQCBDV;   /* Callback Descriptor */
dcl Hobj         fixed bin(31); /* Object Handle */
dcl MsgDesc      like MQMDV;    /* Message Descriptor */
dcl GetMsgOpts   like MQGMOV;   /* Get Message Options */
dcl CompCode     fixed bin(31); /* Completion code */
dcl Reason       fixed bin(31); /* Reason code qualifying CompCode */
```

MQCB_FUNCTION – Callback function

Programs invoked by CICS LINK or CICS START retrieve parameters using CICS services through named objects known as channel containers. Callback function for CICS environments

Note: This call definition is provided solely to describe the parameters that are passed to the callback function. No entry point called MQCB_FUNCTION is actually 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.

The container names used are the parameter names shown in the following table.

Table 84. Parameter names used by MQCB_FUNCTION call

Name	Data type	Input/Output	Description
MsgDesc	MQMD	Input	This structure describes the attributes of the message retrieved. See "MQMD – Message descriptor" on page 177 for details of this structure. The version of MQMD passed is the latest version of the MQMD supported. When a version 4 MQGMO is used to request a message handle, the MsgDesc container is passed as nulls This is an input to message consumers, it is not used by event handlers.
GetMsgOpts	MQGMO	Input	Options used to control the actions of the message consumer. It also contains additional information about the message returned. See "MQGMO – Get-message options" on page 122 for details of this structure. The version of MQGMO passed is the latest version of the MQGMO supported. This is an input to message consumers, it is not used by event handlers.
Buffer	MQBYTExBufferLength	Input	This is the area containing the message data. This is an input to message consumers, it is not used by event handlers.
Context	MQCBC	Input and Output	This structure provides context information to the callback functions. see "MQCBC – Callback context" on page 34 for details of this structure.

Syntax for MQCB_FUNCTION

Callback function - syntax

MQCB_FUNCTION *(Hconn, MsgDesc, GetMsgOpts, Buffer, Context)*

Parameters for MQCB_FUNCTION

The MQCB_FUNCTION call has the following parameters. Callback function - parameters

Hconn (MQHCONN) – input

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.

MsgDesc (MQMD) – input

Callback function -MsgDesc parameter

This structure describes the attributes of the message retrieved.

See "MQMD – Message descriptor" on page 177 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 null MQMD was provided on the MQCB call.

This is an input field to the message consumer function; it is not relevant to an exception handler function.

GetMsgOpts (MQGMO) – input

Callback function -GetMsgOpts parameter

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 same version as passed on the MQCB call that defined the consumer function.

This is an input field to the message consumer function; it is not relevant to an exception handler function.

Buffer (MQBYTExBufferLength) – input

Callback function - Buffer parameter

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 exception handler function.

Context – input/output

Callback function -Context parameter

This structure provides context information to the callback functions. See "MQCBC – Callback context" on page 34 for details.

Usage notes for MQCB_FUNCTION

Callback function - Usage notes

1. Be aware that if your callback routines use services that could delay or block the thread, for example, MQGET with wait, this 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 syncpoint.

3. Callback routines can issue an MQDISC call; no further MQI calls are allowed on that connection handle upon return from the MQISC call. However, in some environments, the actual disconnection from the queue manager might not happen until return from the callback function. The reason code from the MQDISC call indicates whether any pending transaction was successfully committed.
4. A callback routine should not, in general, rely on being invoked from the same thread each time. If this is required, use the MQCTLO_THREAD_AFFINITY when the connection is started.
5. When callback routine receives a nonzero reason code, it must take appropriate action.

Language invocations for MQCB_FUNCTION

The MQCB_FUNCTION call is supported in the programming languages shown below. Callback function - Language invocations

C invocation

MQCB_FUNCTION function call - C language invocation

```
MQCB_FUNCTION (Hconn, MsgDesc, GetMsgOpts, Buffer, &Context);
```

Declare the parameters as follows:

```
MQHCONN  Hconn;         /* Connection handle */
MQMD     MsgDesc        /* Message descriptor attributes */
MQGMO    GetMsgOpts     /* Message options */
MQBYTE   Buffer[n];     /* Area to contain the message data */
MQCBC    Context        /* Context information */
```

COBOL invocation

```
CALL 'MQCB_FUNCTION' USING HCONN, MSGDESC, GETMSGOPTS,
                     BUFFER, CONTEXT.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN    PIC S9(9) BINARY.
**   Message Descriptor
 01  MSGDESC.
     COPY CMQMDV.
**   Get Message Options
 01  GETMSGOPTS.
     COPY CMQGMOV.
**   Message Buffer
 01  BUFFER   PIC X(n)
**   Consumer Context
 01  CONTEXT
     COPY CMQCBCV.
```

PL/I invocation

```
call MQCB_FUNTION(Hconn, MsgDesc, GetMsgOpts, Buffer, Context)
```

Declare the parameters as follows:

```
dcl Hconn        fixed bin(31); /* Connection handle */
dcl MsgDesc      like MQMD;     /* Message Descriptor */
dcl GetMsgOpts   like MQGMO;    /* Get Message Options */
dcl Buffer       pointer;       /* Pointer to message */
dcl Context like MQCBC;         /* Callback Context */
```

MQCLOSE – Close object

The MQCLOSE call relinquishes access to an object, and is the inverse of the MQOPEN and MQSUB calls.

Syntax for MQCLOSE

MQCLOSE *(Hconn, Hobj, Options, CompCode, Reason)*

Parameters for MQCLOSE

The MQCLOSE 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.

On z/OS for CICS applications, and on i5/OS 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 (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 (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 whose *DefinitionType* attribute has the value MQQDT_PERMANENT_DYNAMIC (see the *DefinitionType* attribute described in "Attributes for queues" on page 575). 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 will clean up any un-retrieved publications when the associated subscription has also been removed. That is done using the MQCO_REMOVE_SUB

option on the *Hsub* parameter returned on an MQSUB call. Note that MQCO_REMOVE_SUB is the default behaviour 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 MQCO_REMOVE_SUB first and then process messages off the queue until there are none left.

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 MQCLOSE usage notes 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
Temporary dynamic queue (call issued by creator of queue)	Deleted	Deleted	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
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 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 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 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 un-retrieved publications will be removed.

MQCO_REMOVE_SUB 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 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 will return with a warning of MQRC_READ_AHEAD_MSGS 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 MQCO_QUIESCE 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 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 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 MQCBC ConsumerFlags field is set to MQCBCF_READA_BUFFER_EMPTY.

Default option: If you require none of the options described above, 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 MQCLOSE usage notes for further details.

CompCode (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 (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.

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_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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQCLOSE

Consider these points when using MQCLOSE.

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 were 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 is triggered, performing a rollback before closing the queue can cause a trigger message to be issued. For details, see *WebSphere MQ Application Programming Guide*.
   - If the queue was opened with the MQOO_BROWSE option, the browse cursor is destroyed. If the queue is subsequently 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 such time as 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 above, 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 i5/OS, 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.

Language invocations for MQCLOSE

The MQCLOSE call is supported in the programming languages shown below.

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 */
```

System/390 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 syncpoint, and that all 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 z/OS, the call is used only by batch programs (including IMS batch DL/I programs).
- On i5/OS, this call is not supported for applications running in compatibility mode.

Syntax for MQCMIT

MQCMIT *(Hconn, CompCode, Reason)*

Parameters for MQCMIT

The MQCMIT 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.

CompCode (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 (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_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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQCMIT

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 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 395.
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 MQ resources. However, if the unit of work affects both 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 i5/OS, 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 in the event that 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 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.

Language invocations for MQCMIT

The MQCMIT call is supported in the programming languages shown below.

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 */
```

System/390 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 i5/OS, 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 i5/OS 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. This is the recommended style of programming.

Syntax for MQCONN

MQCONN *(QMgrName, Hconn, CompCode, Reason)*

Parameters for MQCONN

The MQCONN call has the following parameters.

QMgrName (MQCHAR48) – input

Queue manager names can contain certain characters, and there are other restrictions on their formation. You can use special values of QMgrName to indicate a default queue manager, a queue-sharing group, or a choice of queue managers.

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 i5/OS, 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.

The name specified for *QMgrName* must be the name of a *connectable* queue manager.

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; blanks are recommended.

- 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 on page 436).
- For z/OS batch and TSO, only queue managers that reside on the same system as the application are connectable (see usage note 6 on page 436).

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 usual 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, and TSO environments.

MQ client applications: For MQ 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.

MQ client applications are not supported in z/OS, but z/OS can act as an MQ server, to which MQ client applications can connect.

MQ 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 usual 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 those 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.

Queue-manager groups are not supported on z/OS.

The length of this parameter is given by MQ_Q_MGR_NAME_LENGTH.

Hconn (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.

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 85 on page 433 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.

The scope of nonshared handles on various platforms is shown in Table 85.

Table 85. Scope of nonshared handles on various platforms

Platform	Scope of nonshared handle
z/OS	• CICS: the CICS task • IMS: the task, up to the next syncpoint (excluding subtasks of the task) • z/OS batch and TSO: the task (excluding subtasks of the task)
i5/OS	Job
UNIX systems	Thread
16-bit Windows applications	Process
32-bit Windows applications	Thread

On z/OS for CICS applications, and on i5/OS for applications running in compatibility mode, the value returned is:

MQHC_DEF_HCONN
Default connection handle.

CompCode (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 (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_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_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 already exists.

MQRC_ENVIRONMENT_ERROR
(2012, X'7DC') Call not valid in environment.

MQRC_HCONN_ERROR
(2018, X'7E2') Connection handle not valid.

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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQCONN

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 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 MQ calls, the application must use the MQDISC call to disconnect from the queue manager.
5. On z/OS:
   - Batch, TSO, and IMS applications must issue the MQCONN call to use the other 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 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.
6. 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.

   For more information on using these macros, see the *WebSphere MQ for z/OS System Setup Guide*.
7. On i5/OS, 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 run-time 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 MQ calls.

These three interfaces do not include capabilities that were introduced in MQSeries 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 MQ calls in single-threaded applications, and for all MQ calls in multi-threaded applications, is provided through the service programs LIBMQM and LIBMQM_R.

8. On i5/OS, 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.

Language invocations for MQCONN

The MQCONN call is supported in the programming languages shown below.

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 */
```

System/390 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 MQ calls.

The MQCONNX call is similar to 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 WebSphere MQ systems, and WebSphere MQ clients connected to these systems.
- On i5/OS, this call is not supported for applications running in compatibility mode.

Syntax for MQCONNX

MQCONNX *(QMgrName, ConnectOpts, Hconn, CompCode, Reason)*

Parameters for MQCONNX

The MQCONNX call has the following parameters.

QMgrName (MQCHAR48) – input

See the *QMgrName* parameter described in "MQCONN – Connect queue manager" on page 429 for details.

ConnectOpts (MQCNO) – input/output

See "MQCNO – Connect options" on page 73 for details.

Hconn (MQHCONN) – output

See the *Hconn* parameter described in "MQCONN – Connect queue manager" on page 429 for details. This parameter forms one part of a unique identifier that allows WebSphere MQ to reliably identify an application if you disconnect it from the queue manager. It is given a 24 byte connection identifier and the value of *Hconn* is formed by taking the last eight bytes of the identifier and converting it to its 16 character hexadecimal equivalent.

Note: You can specify *Hconn* only, for connections associated with queue managers that MQSC is being run against.

CompCode (MQLONG) – output

See the *CompCode* parameter described in "MQCONN – Connect queue manager" on page 429 for details.

Reason (MQLONG) – output

The reason code qualifying *CompCode*

See the *Reason* parameter for MQCONN, described in "Reason (MQLONG) – output" on page 433 for details of possible reason codes.

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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQCONNX

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 a WebSphere MQ client, and you want to specify the parameters of the client-connection channel, use the MQCONNXAny call in place of MQCONNX, so that the application can specify an MQCNOCD structure on the call in place of an MQCNO structure.

  The MQCONNXAny call has the same parameters as the MQCONNX call, except that the *ConnectOpts* parameter is declared as being of type Any, allowing either an MQCNO structure or an MQCNOCD structure to be specified as the parameter. However, this means that the *ConnectOpts* parameter cannot be checked to ensure that it is the correct data type.

Language invocations for MQCONNX

The MQCONNX call is supported in the programming languages shown below.

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 */
```

System/390 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 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 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 for MQCRTMH

MQCRTMH *(Hconn, CrtMsgHOpts, Hmsg, CompCode, Reason)*

Parameters for MQCRTMH

The MQCRTMH 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. If the connection to the queue manager ceases to be valid and no WebSphere 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; WebSphere 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.

On z/OS for CICS applications, and on i5/OS 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

CrtMsgHOpts (MQCMHO) – input

The options that control the action of MQCRTMH. See MQCMHO for details.

Hmsg (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 will reset 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 WebSphere MQ call at a time. If the handle is in use when a second WebSphere MQ call attempts to use the same message handle, the second WebSphere 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 (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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.

See Chapter 4, "Return codes," on page 657 for more details.

Usage notes for MQCRTMH

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 395.
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 i5/OS, 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 453 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 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 in the event that 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 268, and the MQGMO_LOGICAL_ORDER option described in "MQGMO – Get-message options" on page 122.

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 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 429 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.

Language invocations for MQCRTMH

The MQCRTMH call is supported in the programming languages shown below.

C invocation

```
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 invocation

```
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(19) BINARY.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

PL/I invocation

```
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 */
```

System/390 assembler invocation

```
        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 callback

The MQCTL call performs controlling actions on the object handles opened for a connection.

Syntax for MQCTL

Control callback function - syntax

MQCTL *(Hconn, Operation, ControlOpts, CompCode, Reason)*

Parameters for MQCTL

The MQCTL call has the following parameters. Control callback function - parameters

Hconn (MQHCONN) – input

Control 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 z/OS for CICS applications, and on i5/OS 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.

Operation (MQLONG) – input

Control callback function - Operation parameter

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 - This performs MQCTL with Operation MQOP_STOP before disconnection the HConn.

MQRC_HCONN_ASYNC_ACTIVE is returned if a WebSphere 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 has the effect of stopping the conversation as soon as possible. It is possible, therefore, for a WebSphere MQ API call being issued on the main thread to receive the return code MQRC_HCONN_ASYNC_ACTIVE for a while, followed by the return code MQRC_CONNECTION_BROKEN 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 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 WebSphere 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; at this point 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 period of time, consider closing the queue and reopening it when consumption should 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.

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 will block.

ControlOpts (MQCTLO) – input

Control callback function - ControlOpts parameter

Options that control the action of MQCTL

See MQCTLO for details of the structure.

CompCode (MQLONG) – output

Control callback function -CompCode parameter

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_WARNING
Warning (partial completion).

MQCC_FAILED
Call failed.

Reason (MQLONG) – output

Control callback function - Reason parameter

The reason codes listed below 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_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_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 (32bit/64bit) or is not a valid dll.

MQRC_MODULE_NOT_FOUND
(2495, X'9BF') Module not found in the search path or not authorised 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.

Usage notes for MQCTL

Control callback function - Usage notes

1. Callback routines must check the responses from all services they invoke, and if the routine detects a condition that can not be resolved, it must issue an MQCB MQOP_DEREGISTER command to prevent repeated calls to the callback routine.
2. 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).

Language invocations for MQCTL

Control call backs function - Language invocations

The MQCTL call is supported in the programming languages shown below.

C invocation

MQCTL function call - C language 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, CICS applications do not need to issue this call to disconnect from the queue manager, but might need to issue it to end the use of a connection tag.
- On i5/OS, applications running in compatibility mode do not need to issue this call. See “MQCONN – Connect queue manager” on page 429 for more information.

Syntax for MQDISC

Parameters for MQDISC

The MQDISC call has the following parameters.

Hconn (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 i5/OS 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 (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 (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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQDISC

Consider these points when using MQDISC.

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, the actions described under (a) above occur.
      - In all other cases, the actions described under (c) below occur.

      Because of the differences between environments, ensure that applications that you want to port 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 i5/OS, applications running in compatibility mode do not have to issue this call; see the MQCONN call for more details.

Language invocations for MQDISC

The MQDISC call is supported in the programming languages shown below.

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 for MQDLTMH

MQDLTMH *(Hconn, Hmsg, DltMsgHOpts, CompCode, Reason)*

Parameters for MQDLTMH

The MQDLTMH call has the following parameters:

Hconn (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 (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 MQ call is in progress that was passed the same message handle.

DltMsgHOpts (MQDMHO) – input

See MQDMHO for details.

CompCode (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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.

See Chapter 4, "Return codes," on page 657 for more details.

Usage notes for MQDLTMH

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 395.
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 i5/OS, 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 453 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 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 in the event that 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 268, and the MQGMO_LOGICAL_ORDER option described in "MQGMO – Get-message options" on page 122.

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 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 429 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.

Language invocations for MQDLTMH

The call is supported in the programming languages shown below.

C invocation

Parameters used for the C invocation of MQDLTMH.

```
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

Parameters used for the COBOL invocation of MQDLTMH.

```
     CALL 'MQDLTMH' USING HCONN, HMSG, DLTMSGOPTS, COMPCODE, REASON.
```

Declare the parameters as follows:

```
**   Connection handle
 01  HCONN     PIC S9(9) BINARY.
**   Message handle
 01  HMSG    PIC S9(19) BINARY.
**   Options that control the action of MQDLTMH
 01  DLTMSGHOPTS.
     COPY CMQDMHOV.
**   Completion code
 01  COMPCODE  PIC S9(9) BINARY.
**   Reason code qualifying COMPCODE
 01  REASON    PIC S9(9) BINARY.
```

PL/I invocation

Parameters used for the PL/I invocation of MQDLTMH.

```
call MQDLTMH (Hconn, Hmsg, DltMsgHOpts, CompCode, Reason);
```

Declare the parameters as follows:

```
dcl Hconn       fixed bin(31);  /* Connection handle */
dcl Hmsg        fixed bin(63);  /* Message handle */
dcl DltMsgHOpts like MQDMHO;    /* Options that control the action of MQDLTMH */
dcl CompCode    fixed bin(31);  /* Completion code */
dcl Reason      fixed bin(31);  /* Reason code qualifying CompCode */
```

System/390 assembler invocation

Parameters used for the System/390 assembler invocation of MQDLTMH.

```
        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 for MQDLTMP

MQDLTMP *(Hconn, Hmsg, DltPropOpts, Name, CompCode, Reason)*

Parameters for MQDLTMP

The MQDLTMP call has the following parameters.

Hconn (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 (MQHMSG) - input

This is the message handle containing the property to be deleted. The value was returned by a previous MQCRTMH call.

DltPropOps (MQDMPO) - Input

See the MQDMPO data type for details.

Name (MQCHARV) - input

The name of the property to delete. See the *Application Programming Guide* for further information on property names.

Wildcards are not allowed in the property name.

CompCode (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 (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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Language invocations for MQDLTMP

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(19) 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 */
```

System/390 assembler invocation

Parameters used for the System/390 assembler invocation of MQDLTMP.

```
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 for MQGET

MQGET *(Hconn, Hobj, MsgDesc, GetMsgOpts, BufferLength, Buffer, DataLength, CompCode, Reason)*

Parameters for MQGET

The MQGET 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.

On z/OS for CICS applications, and on i5/OS 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.

Hobj (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 503 for details):

- MQOO_INPUT_SHARED
- MQOO_INPUT_EXCLUSIVE
- MQOO_INPUT_AS_Q_DEF
- MQOO_BROWSE

MsgDesc (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 177 for details.

If *BufferLength* is less than the message length, *MsgDesc* is filled by the queue manager, whether or not 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 provided that 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 MQGMO_PROPERTIES_FORCE_MQRFH2 is specified, or MQGMO_PROPERTIES_AS_Q_DEF is specified and the *PropertyControl* queue attribute is MQPROP_FORCE_MQRFH2, the call fails with reason code MQRC_MD_ERROR.

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 (MQGMO) – input/output

See "MQGMO – Get-message options" on page 122 for details.

BufferLength (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 575.

Buffer (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 should be suitable for most messages (including messages containing 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 or not 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 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 122 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, respectively).

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 (MQLONG) – output

This is the length in bytes of the application data *in the message*. If this 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 filled in by the queue manager, whether or not 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 somewhat bigger than the value returned by the queue manager for *DataLength*.
- The value returned by the data-conversion exit, for application-defined formats.

CompCode (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 (MQLONG) – output

Reason codes that can be returned from an MQGET call.

The reason codes listed below 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 of the message data, the exit decides what value is returned for the *Reason* parameter. As a result, values other than those documented below 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 big for buffer.

MQRC_CONVERTED_STRING_TOO_BIG
(2190, X'88E') Converted string too big 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_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') 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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQGET

Guidance information for the MQGET call.

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.

   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. If the application issuing the MQGET call is running as an MQ client, the message retrieved can be lost if, while processing the MQGET call, the MQ client terminates abnormally or the client connection is severed. This arises because the surrogate that is running on the queue-manager's platform and that issues the MQGET call on the client's behalf 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.

   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.

   In principle, the same situation can arise with applications that are running on the queue-manager's platform, but in this case the window during which a message can be lost is very small. However, as with MQ clients, you can eliminate the risk 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 MQRC_NO_MSG_AVAILABLE. 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 provided that 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, provided that:
   - 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 provided that 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

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 the *WebSphere MQ Application Programming Guide*.
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 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 MQ.

  See Chapter 9, "Data conversion," on page 675 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 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 Chapter 9, "Data conversion," on page 675.

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. In previous versions of WebSphere MQ it was possible for MQGET to fail with reason code MQRC_CONVERTED_MSG_TO_BIG, however, even when a buffer was not specified. In WebSphere 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 (WebSphere MQ classes for Java)

   Note: For all clients, if the value of *sharingConversations* is zero, the channel operates as it did before WebSphere MQ Version 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 Implications of sharing conversations.
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, provided that 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 86. 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] CorrelId[c]	Encoding CodedCharSetId	GroupId MsgSeqNumber Offset
MQGET MQGMO options	MQGMO MQGMO_NO_WAIT MQGMO_FAIL_IF_QUIESCING MQGMO_BROWSE_FIRST MQGMO_BROWSE_NEXT MQGMO_BROWSE_MESSAGE_UNDER_CURSOR	MQGMO_SYNCPOINT_IF_PERSISTENT MQGMO_NO_SYNCOPOINT MQGMO_ACCEPT_TRUNCATED_MSG MQGMO_CONVERT MQGMO_LOGICAL_ORDER MQGMO_COMPLETE_MSG MQGMO_ALL_MSGS_AVAILABLE MQGMO_ALL_SEGMENTS_AVAILABLE	MQGMO_SET_SIGNAL MQGMO_SYNCPOINT MQGMO_MARK_SKIP_BACKOUT MQGMO_MSG_UNDER_CURSOR[d] MQGMO_LOCK MQGMO_UNLOCK
MQGET MQGMO values			MsgToken[e]
MQGET values		BufferLength	

    a. If these options are altered between MQGET calls an MQRC_*_CHANGED reason code will be returned.
    b. If these options are specified on the first MQGET call then read ahead will be disabled. If these options are specified on subsequent MQGET calls a reason code MQRC_OPTIONS_ERROR will be returned.
    c. The client application needs to be aware that if the MsgId and CorrelID value are altered between MQGET calls messages with the previous values might have already been sent to the client and will remain in the client read ahead buffer until consumed (or automatically purged).
    d. Read ahead is not enabled when both MQOO_BROWSE and one of the MQOO_INPUT_* options are specified.
    e. As a MsgToken cannot be specified when the MatchOptions MQMO_MATCH_MSG_TOKEN can not be used.
13. Applications can destructively get uncommitted messages only if those messages were 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.

Language invocations for MQGET

The MQGET call is supported in the programming languages shown below.

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 */
```

System/390 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
- Topic
- Namelist
- Process definition
- Queue manager

Syntax for MQINQ

MQINQ *(Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs, CharAttrLength, CharAttrs, CompCode, Reason)*

Parameters for MQINQ

The MQINQ 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.

On z/OS for CICS applications, and on i5/OS 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.

Hobj (MQHOBJ) – input

This handle represents the object (of any type) whose attributes are required. The handle must have been returned by a previous MQOPEN call that specified the MQOO_INQUIRE option.

SelectorCount (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 (MQLONGxSelectorCount) – input

This is an array of *SelectorCount* attribute selectors; each selector identifies an attribute (integer or character) whose value 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 type or types other than that 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 for MQINQ" on page 489 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 will accept.
2. If all of 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 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 given in parentheses.

The tables that follow list the selectors, by object, in alphabetic order, as follows:

- Table 87 MQINQ attribute selectors for queues
- Table 88 on page 481 MQINQ attribute selectors for namelists
- Table 89 on page 482 MQINQ attribute selectors for process definitions
- Table 90 on page 482 MQINQ attribute selectors for the queue manager

All selectors are supported on all WebSphere 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 87. MQINQ attribute selectors for queues

Selector	Description	Note
MQCA_ALTERATION_DATE	Date of most-recent alteration (MQ_DATE_LENGTH)	
MQCA_ALTERATION_TIME	Time of most-recent alteration (MQ_TIME_LENGTH)	
MQCA_BACKOUT_REQ_Q_NAME	Excessive backout requeue name (MQ_Q_NAME_LENGTH)	
MQCA_BASE_Q_NAME	Name of queue that alias resolves to (MQ_Q_NAME_LENGTH)	
MQCA_CF_STRUC_NAME	Coupling-facility structure name (MQ_CF_STRUC_NAME_LENGTH)	z/OS
MQCA_CLUSTER_NAME	Cluster name (MQ_CLUSTER_NAME_LENGTH)	
MQCA_CLUSTER_NAMELIST	Cluster namelist (MQ_NAMELIST_NAME_LENGTH)	
MQCA_CREATION_DATE	Queue creation date (MQ_CREATION_DATE_LENGTH)	
MQCA_CREATION_TIME	Queue creation time (MQ_CREATION_TIME_LENGTH)	
MQCA_INITIATION_Q_NAME	Initiation queue name (MQ_Q_NAME_LENGTH)	
MQCA_PROCESS_NAME	Name of process definition (MQ_PROCESS_NAME_LENGTH)	
MQCA_Q_DESC	Queue description (MQ_Q_DESC_LENGTH)	
MQCA_Q_NAME	Queue name (MQ_Q_NAME_LENGTH)	
MQCA_REMOTE_Q_MGR_NAME	Name of remote queue manager (MQ_Q_MGR_NAME_LENGTH)	
MQCA_REMOTE_Q_NAME	Name of remote queue as known on remote queue manager (MQ_Q_NAME_LENGTH)	
MQCA_STORAGE_CLASS	Name of storage class (MQ_STORAGE_CLASS_LENGTH)	z/OS
MQCA_TRIGGER_DATA	Trigger data (MQ_TRIGGER_DATA_LENGTH)	
MQCA_XMIT_Q_NAME	Transmission queue name (MQ_Q_NAME_LENGTH)	
MQIA_ACCOUNTING_Q	Controls collection of accounting data for queue	Not z/OS
MQIA_BACKOUT_THRESHOLD	Backout threshold	
MQIA_CLWL_Q_PRIORITY	Priority of queue	
MQIA_CLWL_Q_RANK	Rank of queue	
MQIA_CLWL_USEQ	Use remote queues	
MQIA_CURRENT_Q_DEPTH	Number of messages on queue	
MQIA_DEF_BIND	Default binding	

Table 87. MQINQ attribute selectors for queues (continued)

Selector	Description	Note
MQIA_DEF_INPUT_OPEN_OPTION	Default open-for-input option	
MQIA_DEF_PERSISTENCE	Default message persistence	
MQIA_DEF_PRIORITY	Default message priority	
MQIA_DEFINITION_TYPE	Queue definition type	
MQIA_DIST_LISTS	Distribution list support	Not z/OS
MQIA_HARDEN_GET_BACKOUT	Whether to harden backout count	
MQIA_INDEX_TYPE	Type of index maintained for queue	z/OS
MQIA_INHIBIT_GET	Whether get operations are allowed	
MQIA_INHIBIT_PUT	Whether put operations are allowed	
MQIA_MAX_MSG_LENGTH	Maximum message length	
MQIA_MAX_Q_DEPTH	Maximum number of messages allowed on queue	
MQIA_MSG_DELIVERY_SEQUENCE	Whether message priority is relevant	
MQIA_NPM_CLASS	Level of reliability for nonpersistent messages	
MQIA_OPEN_INPUT_COUNT	Number of MQOPEN calls that have the queue open for input	
MQIA_OPEN_OUTPUT_COUNT	Number of MQOPEN calls that have the queue open for output	
MQIA_PROPERTY_CONTROL	Property control attribute	
MQIA_Q_DEPTH_HIGH_EVENT	Control attribute for queue depth high events	Not z/OS
MQIA_Q_DEPTH_HIGH_LIMIT	High limit for queue depth	Not z/OS
MQIA_Q_DEPTH_LOW_EVENT	Control attribute for queue depth low events	Not z/OS
MQIA_Q_DEPTH_LOW_LIMIT	Low limit for queue depth	Not z/OS
MQIA_Q_DEPTH_MAX_EVENT	Control attribute for queue depth max events	Not z/OS
MQIA_Q_SERVICE_INTERVAL	Limit for queue service interval	Not z/OS
MQIA_Q_SERVICE_INTERVAL_EVENT	Control attribute for queue service interval events	Not z/OS
MQIA_Q_TYPE	Queue type	
MQIA_QSG_DISP	Queue-sharing group disposition	z/OS
MQIA_RETENTION_INTERVAL	Queue retention interval	
MQIA_SCOPE	Queue definition scope	Not z/OS
MQIA_SHAREABILITY	Whether queue can be shared for input	
MQIA_STATISTICS_Q	Controls collection of statistics data for queue	Not z/OS
MQIA_TRIGGER_CONTROL	Trigger control	
MQIA_TRIGGER_DEPTH	Trigger depth	
MQIA_TRIGGER_MSG_PRIORITY	Threshold message priority for triggers	
MQIA_TRIGGER_TYPE	Trigger type	
MQIA_USAGE	Usage	

Table 88. MQINQ attribute selectors for namelists

Selector	Description	Note
MQCA_ALTERATION_DATE	Date of most-recent alteration (MQ_DATE_LENGTH)	
MQCA_ALTERATION_TIME	Time of most-recent alteration (MQ_TIME_LENGTH)	

Table 88. MQINQ attribute selectors for namelists (continued)

Selector	Description	Note
MQCA_NAMELIST_DESC	Namelist description (MQ_NAMELIST_DESC_LENGTH)	
MQCA_NAMELIST_NAME	Name of namelist object (MQ_NAMELIST_NAME_LENGTH)	
MQIA_NAMELIST_TYPE	Namelist type	z/OS
MQCA_NAMES	Names in the namelist (MQ_Q_NAME_LENGTH × Number of names in the list)	
MQIA_NAME_COUNT	Number of names in the namelist	
MQIA_QSG_DISP	Queue-sharing group disposition	z/OS

Table 89. MQINQ attribute selectors for process definitions

Selector	Description	Note
MQCA_ALTERATION_DATE	Date of most-recent alteration (MQ_DATE_LENGTH)	
MQCA_ALTERATION_TIME	Time of most-recent alteration (MQ_TIME_LENGTH)	
MQCA_APPL_ID	Application identifier (MQ_PROCESS_APPL_ID_LENGTH)	
MQCA_ENV_DATA	Environment data (MQ_PROCESS_ENV_DATA_LENGTH)	
MQCA_PROCESS_DESC	Description of process definition (MQ_PROCESS_DESC_LENGTH)	
MQCA_PROCESS_NAME	Name of process definition (MQ_PROCESS_NAME_LENGTH)	
MQCA_USER_DATA	User data (MQ_PROCESS_USER_DATA_LENGTH)	
MQIA_APPL_TYPE	Application type	
MQIA_QSG_DISP	Queue-sharing group disposition	z/OS

Table 90. MQINQ attribute selectors for the queue manager

Selector	Description	Note
MQCA_ALTERATION_DATE	Date of most-recent alteration (MQ_DATE_LENGTH)	
MQCA_ALTERATION_TIME	Time of most-recent alteration (MQ_TIME_LENGTH)	
MQCA_CHANNEL_AUTO_DEF_EXIT	Automatic channel definition exit name (MQ_EXIT_NAME_LENGTH)	
MQCA_CHINIT_SERVICE_PARM	Reserved for use by IBM	
MQCA_CLUSTER_WORKLOAD_DATA	Data passed to cluster workload exit (MQ_EXIT_DATA_LENGTH)	
MQCA_CLUSTER_WORKLOAD_EXIT	Name of cluster workload exit (MQ_EXIT_NAME_LENGTH)	
MQCA_COMMAND_INPUT_Q_NAME	System command input queue name (MQ_Q_NAME_LENGTH)	
MQCA_DEAD_LETTER_Q_NAME	Name of dead-letter queue (MQ_Q_NAME_LENGTH)	

Table 90. MQINQ attribute selectors for the queue manager (continued)

Selector	Description	Note
MQCA_DEF_XMIT_Q_NAME	Default transmission queue name (MQ_Q_NAME_LENGTH)	
MQCA_DNS_GROUP	Name of the group for the TCP listener that handles inbound transmissions for the queue-sharing group to join when using Workload Manager Dynamic Domain Name Services support	z/OS
MQCA_IGQ_USER_ID	Intra-group queuing user identifier (MQ_USER_ID_LENGTH)	z/OS
MQCA_LU_GROUP_NAME	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	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	z/OS
MQCA_LU62_ARM_SUFFIX	Suffix of the SYS1.PARMLIB member APPCPMxx, that nominates the LUADD for this channel initiator	z/OS
MQCA_PARENT	Name of a hierarchically connected queue manager that is nominated as the parent of this queue manager	
MQCA_Q_MGR_DESC	Queue manager description (MQ_Q_MGR_DESC_LENGTH)	
MQCA_Q_MGR_IDENTIFIER	Queue-manager identifier (MQ_Q_MGR_IDENTIFIER_LENGTH)	
MQCA_Q_MGR_NAME	Name of local queue manager (MQ_Q_MGR_NAME_LENGTH)	
MQCA_QSG_NAME	Queue-sharing group name (MQ_QSG_NAME_LENGTH)	z/OS
MQCA_REPOSITORY_NAME	Name of cluster for which queue manager provides repository services (MQ_Q_MGR_NAME_LENGTH)	
MQCA_REPOSITORY_NAMELIST	Name of namelist object containing names of clusters for which queue manager provides repository services (MQ_NAMELIST_NAME_LENGTH)	
MQIA_ACCOUNTING_CONN_OVERRIDE	Override accounting settings	Not z/OS
MQIA_ACCOUNTING_INTERVAL	How often to write intermediate accounting records	Not z/OS
MQIA_ACCOUNTING_MQI	Controls collection of accounting information for MQI data	Not z/OS
MQIA_ACCOUNTING_Q	Controls collection of accounting information for queues	Not z/OS
MQIA_ACTIVE_CHANNELS	Maximum number of channels that can be active at any one time	z/OS
MQIA_ADOPTNEWMCA_CHECK	Elements checked 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	z/OS

Table 90. MQINQ attribute selectors for the queue manager (continued)

Selector	Description	Note
MQIA_ADOPTNEWMCA_INTERVAL	Amount of time, in seconds, that the new channel waits for the orphaned channel to end	Not z/OS
MQIA_ADOPTNEWMCA_TYPE	Whether to restart an orphaned instance of an MCA of a given channel type automatically when a new inbound channel request matching the AdoptNewMCACheck parameters is detected	z/OS
MQIA_AUTHORITY_EVENT	Control attribute for authority events	Not z/OS
MQIA_BRIDGE_EVENT	Control attribute for IMS bridge events	z/OS
MQIA_CHANNEL_AUTO_DEF	Control attribute for automatic channel definition	Not z/OS
MQIA_CHANNEL_AUTO_DEF_EVENT	Control attribute for automatic channel definition events	Not z/OS
MQIA_CHANNEL_EVENT	Control attribute for channel events	
MQIA_CHINIT_ADAPTERS	Number of adapter subtasks to use for processing WebSphere MQ calls	z/OS
MQIA_CHINIT_DISPATCHERS	Number of dispatchers to use for the channel initiator	z/OS
MQIA_CHINIT_TRACE_AUTO_START	Whether to start channel initiator trace automatically	z/OS
MQIA_CHINIT_TRACE_TABLE_SIZE	Size of the channel initiator's trace data space (in MB)	z/OS
MQIA_CLUSTER_WORKLOAD_LENGTH	Cluster workload length.	
MQIA_CLWL_MRU_CHANNELS	Number of most recently used channels for cluster workload balancing	
MQIA_CLWL_USEQ	Use remote queues	
MQIA_CODED_CHAR_SET_ID	Coded character set identifier	
MQIA_COMMAND_EVENT	Control attribute for command events	
MQIA_COMMAND_LEVEL	Command level supported by queue manager	
MQIA_CONFIGURATION_EVENT	Control attribute for configuration events	Not z/OS
MQIA_DIST_LISTS	Distribution list support	Not z/OS
MQIA_DNS_WLM	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	Interval between scans for expired messages	z/OS
MQIA_IGQ_PUT_AUTHORITY	Intra-group queuing put authority	z/OS
MQIA_INHIBIT_EVENT	Control attribute for inhibit events	Not z/OS
MQIA_INTRA_GROUP_QUEUING	Intra-group queuing support	z/OS
MQIA_LISTENER_TIMER	Time interval (in seconds) between WebSphere MQ attempts to restart the listener if there has been an APPC or TCP/IP failure	z/OS
MQIA_LOCAL_EVENT	Control attribute for local events	Not z/OS
MQIA_LOGGER_EVENT	Control attribute for inhibit events	Not z/OS

Table 90. MQINQ attribute selectors for the queue manager (continued)

Selector	Description	Note
MQIA_LU62_CHANNELS	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	Time interval (in milliseconds) after which the queue manager can automatically remove a mark from browse messages	
MQIA_MAX_CHANNELS	Maximum number of channels that can be current (including server-connection channels with connected clients)	z/OS
MQIA_MAX_HANDLES	Maximum number of handles	
MQIA_MAX_MSG_LENGTH	Maximum message length	
MQIA_MAX_PRIORITY	Maximum priority	
MQIA_MAX_UNCOMMITTED_MSGS	Maximum number of uncommitted messages within a unit of work	
MQIA_OUTBOUND_PORT_MAX	With MQIA_OUTBOUND_PORT_MIN, defines range of port numbers to use when binding outgoing channels	z/OS
MQIA_OUTBOUND_PORT_MIN	With MQIA_OUTBOUND_PORT_MAX, defines range of port numbers to use when binding outgoing channels	z/OS
MQIA_PERFORMANCE_EVENT	Control attribute for performance events	Not z/OS
MQIA_PLATFORM	Platform on which the queue manager resides	
MQIA_PUBSUB_MAXMSG_RETRY_COUNT	The number of retries when processing (under syncpoint) a failed command message	
MQIA_PUBSUB_NP_MSG	Whether to discard (or keep) an undelivered input message	
MQIA_PUBSUB_NP_RESP	Controls the behavior of undelivered response messages	
MQIA_PUBSUB_SYNC_PT	Whether only persistent (or all) messages should be processed under syncpoint	
MQIA_RECEIVE_TIMEOUT	Approximately how long a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state. This is the numeric value qualified by MQIA_RECEIVE_TIMEOUT_TYPE.	z/OS
MQIA_RECEIVE_TIMEOUT_MIN	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	Approximately how long a TCP/IP channel waits to receive data, including heartbeats, from its partner, before returning to the inactive state. This is the qualifier applied to MQIA_RECEIVE_TIMEOUT.	z/OS
MQIA_REMOTE_EVENT	Control attribute for remote events	Not z/OS
MQIA_SECURITY_CASE	Case of security profiles	z/OS
MQIA_SSL_EVENT	Control attribute for channel events	
MQIA_SSL_FIPS_REQUIRED	Use only FIPS-certified algorithms for cryptography	

Table 90. MQINQ attribute selectors for the queue manager (continued)

Selector	Description	Note
MQIA_SSL_RESET_COUNT	SSL key reset count	
MQIA_START_STOP_EVENT	Control attribute for start stop events	Not z/OS
MQIA_STATISTICS_AUTO_CLUSSDR	Controls collection of statistics monitoring information for cluster sender channels	Not z/OS
MQIA_STATISTICS_CHANNEL	Controls collection of statistics data for channels	Not z/OS
MQIA_STATISTICS_INTERVAL	How often to write statistics monitoring data	Not z/OS
MQIA_STATISTICS_MQI	Controls collection of statistics monitoring information for queue manager	Not z/OS
MQIA_STATISTICS_Q	Controls collection of statistics data for queues	Not z/OS
MQIA_SYNCPOINT	Syncpoint availability	
MQIA_TCP_CHANNELS	Maximum number of channels that can be current, or clients that can be connected, using the TCP/IP transmission protocol	z/OS
MQIA_TCP_KEEP_ALIVE	Whether to use the TCP KEEPALIVE facility to check that the other end of the connection is still available	z/OS
MQIA_TCP_NAME	Name of the TCP/IP system that you are using	z/OS
MQIA_TCP_STACK_TYPE	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	Controls recording of trace-route information	z/OS
MQIA_TREE_LIFE_TIME	Lifetime of unused non-administrative topics	
MQIA_TRIGGER_INTERVAL	Trigger interval	

IntAttrCount (MQLONG) – input

This is the number of elements in the *IntAttrs* array. Zero is a valid value.

If this is at least the number of MQIA_* selectors in the *Selectors* parameter, all integer attributes requested are returned.

IntAttrs (MQLONGxIntAttrCount) – 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 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 System/390 assembler might be null.

CharAttrLength (MQLONG) – input

This is the length in bytes of the *CharAttrs* parameter.

This must be at least the sum of the lengths of the requested character attributes (see *Selectors*). Zero is a valid value.

CharAttrs (MQCHARxCharAttrLength) – 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. If the buffer is larger than that needed to contain all 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 does not apply to that type of queue, a character string consisting entirely of asterisks (*) 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 System/390 assembler might be null.

CompCode (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 (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
(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 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 big.

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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQINQ

The attributes of the dynamic queue (with certain exceptions) are the same as those of the model queue at the time that the dynamic queue is created.

1. The values returned are a snapshot of the selected attributes. There is no guarantee that the attributes will not change 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.

   If you subsequently 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 92 on page 576 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 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:
   - 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 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 attributes listed below 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

  If the cluster queue is opened with no fixed binding (that is, MQOO_BIND_NOT_FIXED specified on the MQOPEN call, or MQOO_BIND_AS_Q_DEF specified when the *DefBind* attribute has the value MQBND_BIND_NOT_FIXED), successive MQINQ calls for the queue might inquire different instances of the cluster queue, although usually all the instances have the same attribute values.
- An alias queue object can be defined for a cluster. Since 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 simply 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.

For more information about cluster queues, refer to *WebSphere MQ Queue Manager Clusters*.

5. If you want to inquire a number of attributes, and subsequently set some of them using the MQSET call, you might want to position the attributes to be set at the beginning of the selector arrays, 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 *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. For more information about object attributes, see:
   - "Attributes for queues" on page 575
   - "Attributes for namelists" on page 608
   - "Attributes for process definitions" on page 611
   - "Attributes for the queue manager" on page 616

Language invocations for MQINQ

The MQINQ call is supported in the programming languages shown below.

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 */
```

System/390 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 for MQINQMP

MQINQMP *(Hconn, Hmsg, InqPropOpts, Name, PropDesc, Type, ValueLength, Value, DataLength, CompCode, Reason)*

Parameters for MQINQMP

The MQINQMP call has the following parameters.

Hconn (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 (MQHMSG) - input

This is the message handle to be inquired. The value was returned by a previous MQCRTMH call.

InqPropOps (MQIMPO) - Input

See the MQIMPO data type for details.

Name (MQCHARV) - input

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 '%' at the end of the property name. The wildcard matches zero or more characters, including the '.' 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 filled in on return from MQINQMP with the same 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 with the MQ property name e.g. "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 all properties that begin 'usr', respectively:

MQPROP_INQUIRE_ALL
Inquire on all properties of the message.

MQPRP_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 the *WebSphere MQ Application Programming Guide* for further information about the use of property names.

PropDesc (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 (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 (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 (MQBYTExValueLength) - 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 may 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 the parameter address passed by programs written in C or System/390 assembler can be null.

DataLength (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 may 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 (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 (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_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 big 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 big 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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Language invocations for MQINQMP

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 */
MQDIMPO 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(19) 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 */
```

System/390 assembler invocation

Parameters used for the System/390 assembler invocation of MQINQMP.

```
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 converts a message handle into a buffer and is the inverse of the MQBUFMH call.

Syntax for MQMHBUF

MQMHBUF *(Hconn, Hmsg, MsgHBufOpts, Name, MsgDesc, BufferLength, Buffer, DataLength, CompCode, Reason)*

Parameters for MQMHBUF

The MQMHBUF call has the following parameters.

Hconn (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 (MQHMSG) – input

This is the message handle for which a buffer is required.

The value was returned by a previous MQCRTMH call.

MsgHBufOpts (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 242 for details.

Name (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.

Wildcards

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', respectively:

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 the *WebSphere MQ Application Programming Guide* for further information about the use of property names.

MsgDesc (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 (MQLONG) - input

BufferLength is the length of the Buffer area, in bytes.

Buffer (MQBYTExBufferLength) - output

Buffer defines the area to contain the message properties. You should 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 (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 (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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.

Usage notes for MQMHBUF

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.

Language invocations for MQMHBUF

The MQMHBUF call is supported in the programming languages shown below.

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 */
```

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(19) 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 */
```

System/390 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 for MQOPEN

MQOPEN *(Hconn, ObjDesc, Options, Hobj, CompCode, Reason)*

Parameters for MQOPEN

The MQOPEN 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.

On z/OS for CICS applications, and on i5/OS 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.

ObjDesc (MQOD) – input/output

This is a structure that identifies the object to be opened; see "MQOD – Object descriptor" on page 245 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 575). For information about the close options applicable to dynamic queues, see the description of the MQCLOSE call.

Options (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

See below for details of these options; other options can be specified as required. If more than one option is required, the values 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).

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 (note 1)	Local and Model	Remote	Nonlocal Cluster	Distri-bution 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_BROWSE	Yes	Yes	No	No	No	No
MQOO_OUTPUT	Yes	Yes	Yes	Yes	Yes	Yes
MQOO_INQUIRE	Yes	Yes	Note 2	Yes	No	No
MQOO_SET	Yes	Yes	Note 2	No	No	No
MQOO_BIND_ON_OPEN (note 3)	Yes	Yes	Yes	Yes	Yes	No
MQOO_BIND_NOT_FIXED (note 3)	Yes	Yes	Yes	Yes	Yes	No
MQOO_BIND_AS_Q_DEF (note 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	Note 4
MQOO_PASS_ALL_CONTEXT	Yes	Yes	Yes	Yes	Yes	Yes
MQOO_SET_IDENTITY_CONTEXT	Yes	Yes	Yes	Yes	Yes	Note 4
MQOO_SET_ALL_CONTEXT	Yes	Yes	Yes	Yes	Yes	Yes
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

Option	Alias (note 1)	Local and Model	Remote	Nonlocal Cluster	Distri-bution list	Topic

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. 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 575 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 will 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 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 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_OUTPUT
Open queue to put 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 MQQA_PUT_INHIBITED (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.

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 a particular instance of the cluster queue:

MQOO_BIND_ON_OPEN
The local queue manager binds the queue handle to a particular 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 a particular 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 subsequently 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 usually 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_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 or MQBND_BIND_NOT_FIXED.

MQOO_BIND_AS_Q_DEF is the default if neither MQOO_BIND_ON_OPEN nor MQOO_BIND_NOT_FIXED is specified.

MQOO_BIND_AS_Q_DEF aids program documentation. It is not intended that this option be 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 the *WebSphere MQ Application Programming Guide*.

This context information can be passed to a message that is subsequently 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 268.

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 the *WebSphere MQ Application Programming Guide*.

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 the *WebSphere MQ Application Programming Guide*.

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 the *WebSphere MQ Application Programming Guide*.

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 the *WebSphere MQ Application Programming Guide*.

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.

Other options: The following options control authorization checking, what happens when the queue manager is quiescing, and whether to resolve the local queue name:

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 failsif 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 the *WebSphere MQ Clients* book.

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 will be 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.

Read ahead options: 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 topics and local, alias and model queues. They are not valid for remote queues, distribution lists 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 a WebSphere 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.

Hobj (MQHOBJ) – output

This handle represents the access that has been established to the object. It must be specified on subsequent 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 that of the connection handle specified on the call. See MQCONN - Hconn parameter for information about handle scope.

CompCode (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 (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 already 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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQOPEN

General 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 503.

     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

Refer to *WebSphere MQ Queue Manager Clusters* 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 subsequently 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 367 for further details.

6. On i5/OS, 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.

Read ahead options

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 will not be thrown if a read ahead options are specified with the MQOO_ INQUIRE or MQOO_SET options.
2. Read ahead will not be 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 a WebSphere 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 above, 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, refer to *WebSphere MQ Queue Manager Clusters*.

Distribution lists

The following notes apply to the use of distribution lists.

Distribution lists are supported in the following environments: AIX, HP-UX, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 and reason code are set to MQCC_OK and MQRC_NONE respectively; 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 245 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 scecurity check for the topic as if the topic object had been used directly.

If the object being opened is a topic object, whether by means of *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 may 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 subsequently 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 on security checking, see the *WebSphere MQ for z/OS System Setup Guide*.

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 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 this is the case, *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 described above 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 command.

Language invocations for MQOPEN

The MQOPEN call is supported in the programming languages shown below.

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 */
```

System/390 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 for MQPUT

MQPUT *(Hconn, Hobj, MsgDesc, PutMsgOpts, BufferLength, Buffer, CompCode, Reason)*

Parameters for MQPUT

The MQPUT 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.

On z/OS for CICS applications, and on i5/OS 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.

Hobj (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 (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 177 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 235 for more details.

The application does not need to provide an MQMD structure provided that 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.

PutMsgOpts (MQPMO) – input/output

See "MQPMO – Put-message options" on page 268 for details.

BufferLength (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 above 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 (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 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 (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 (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_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_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_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_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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQPUT

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 behaviour is dependant on the setting of the PMSGDLV or NPMSGDLV attributes on the TOPIC. Note that 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 were delivered, the MQPUT will return 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.

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 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, thereby 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 provided that the conditions detailed below 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, provided that 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 i5/OS, 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ 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 big 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 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 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 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 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.

Language invocations for MQPUT

The MQPUT call is supported in the programming languages shown below.

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 */
```

System/390 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 for MQPUT1

MQPUT1 *(Hconn, ObjDesc, MsgDesc, PutMsgOpts, BufferLength, Buffer, CompCode, Reason)*

Parameters for MQPUT1

The MQPUT1 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.

On z/OS for CICS applications, and on i5/OS 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.

ObjDesc (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 245 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 (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 177 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 235 for more details.

The application does not need to provide an MQMD structure provided that 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 (MQPMO) – input/output

See "MQPMO – Put-message options" on page 268 for details.

BufferLength (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 the description of the *BufferLength* parameter of the MQPUT call for further details.

Buffer (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 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 (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 (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 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_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_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') 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_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_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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQPUT1

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 provided that 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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 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.

Language invocations for MQPUT1

The MQPUT1 call is supported in the programming languages shown below.

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 */
```

System/390 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 for MQSET

MQSET *(Hconn, Hobj, SelectorCount, Selectors, IntAttrCount, IntAttrs, CharAttrLength, CharAttrs, CompCode, Reason)*

Parameters for MQSET

The MQSET 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.

On z/OS for CICS applications, and on i5/OS 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.

Hobj (MQHOBJ) – input

This handle represents the queue object whose attributes are to be set. The handle was returned by a previous MQOPEN call that specified the MQOO_SET option.

SelectorCount (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 (MQLONGxSelectorCount) – input

This is an array of *SelectorCount* attribute selectors; each selector identifies an attribute (integer or character) whose value 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; these values are listed below.

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 given 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 given in parentheses.

Table 91. 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, i5/OS, Solaris, Linux, Windows, plus WebSphere MQ clients connected to these systems.

IntAttrCount (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 (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 (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 (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 (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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 big.

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 on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQSET

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 478 for details.

   Note: Not all attributes whose values 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.
6. Changes to attributes resulting from use of the MQSET call do not affect the values of the *AlterationDate* and *AlterationTime* attributes.
7. For more information about object attributes, see:
   - "Attributes for queues" on page 575
   - "Attributes for namelists" on page 608
   - "Attributes for process definitions" on page 611
   - "Attributes for the queue manager" on page 616

Language invocations for MQSET

The MQSET call is supported in the programming languages shown below.

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 */
```

System/390 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

Call that sets a property of a message handle.

The MQSETMP call sets or modifies a property of a message handle.

Syntax for MQSETMP

MQSETMP call syntax and list of parameters

Parameters for MQSETMP

List of valid parameters for the MQSETMP call.

The MQSETMP call has the following parameters:

Hconn (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 (MQHMSG) – input/output

This is the message handle to be modified. The value was returned by a previous MQCRTMH call.

SetPropsOpts (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 (MQCHARV) – input

This is the name of the property to set.

See the *WebSphere MQ Application Programming Guide* for further information about the use of property names.

PropDesc (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 (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 (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 (MQBYTE x *ValueLength*) – 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 (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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.

See Chapter 4, "Return codes," on page 657 for more details.

Usage notes for MQSETMP

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 395.
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 i5/OS, 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 453 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 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 in the event that 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 268, and the MQGMO_LOGICAL_ORDER option described in "MQGMO – Get-message options" on page 122.

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 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 429 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.

Language invocations for MQSETMP

The MQSETMP call is supported in the programming languages shown below. List of languages supporting the MQSETMP call

C invocation

Parameters used for the C invocation of MQSETMP.

```
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

Parameters used for the COBOL invocation of MQSETMP.

```
     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(19) 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

Parameters used for the PL/I invocation of MQSETMP.

```
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 */
```

System/390 assembler invocation

Parameters used for the System/390 assembler invocation of MQSETMP.

```
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 for MQSTAT

MQSTAT (Hconn, Type, Stat, CompCode, Reason)

Parameters for MQSTAT

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.

On z/OS for CICS applications, and on i5/OS 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.

Type (MQLONG) – input

Type of status information being requested. The only valid value is:

MQSTAT_TYPE_ASYNC_ERROR
Return information about previous asynchronous put operations.

Stat (MQSTS) – input/output

Status information structure. See "MQSTS – Status reporting structure" on page 355 for details.

CompCode (MQLONG) – output

The completion code; it is one of the following:

MQCC_OK
Successful completion.

MQCC_FAILED
Call failed.

Reason (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_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
(2424, X'978') Error with MQSTS structure

MQRC_UNEXPECTED_ERROR
(2195, X'893') Unexpected error occurred.

For detailed information on these codes, see:
- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS

- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Usage notes for MQSTAT

1. A call to MQSTAT specifying a type of MQSTAT_TYPE_ASYNC_ERROR returns information about previous asynchronous MQPUT and MQPUT1 operations. The MQSTAT structure passed on the 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 via three counter fields; PutSuccessCount, PutWarningCount & PutFailureCount. These counters are incremented by the queue manager each time an asynchronous operation is processed successfully, has a warning or fails, respectively (note that for accounting purposes a put to a distribution list counts once per destination queue rather than once per distribution list). A counter will not be 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.

Language invocations for MQSTAT

The MQSTAT call is supported in the programming languages shown below.

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 (z/OS only)

```
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

The MQSUB call registers the applications subscription to a particular topic.

Syntax for MQSUB

MQSUB *(Hconn, SubDesc, Hobj, Hsub, CompCode, Reason)*

Parameters for MQSUB

The MQSUB 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.

On z/OS for CICS applications, and on i5/OS 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.

SubDesc (MQSD) - input/output

This is a structure that identifies the object whose use is being registered by the application. See “MQSD - Subscription descriptor” on page 327 for more information.

Hobj (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 providing 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 this is the case, 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 will then return 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 respectively.

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 may 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 summarises the use of this parameter with various subscription options:

Objects	*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.
MQSO_ALTER	A valid object handle	Alters an existing subscription, whether it was managed or not, so that it now uses a specific queue.

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. The scope of the object handle returned is the same as that of the connection handle specified on the call. See "Hconn (MQHCONN) – output" on page 432 for information about handle scope. An MQCLOSE of the *Hobj* handle has no effect on the *Hsub* handle.

Hsub (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 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 has no effect on 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 MQ call other than MQCLOSE or MQSUB. Passing this handle to any other MQ call results in MQRC_HOBJ_ERROR.

CompCode (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 (MQLONG) - output

The reason code qualifying *CompCode*

The reason code can be as follows:

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_FUNCTION_NOT_SUPPORTED
2298 (X'08FA') The function requested is not available in the current environment.

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_HOBJ_ERROR
2019 (X'07E3') Object handle Hobj not valid

MQRC_Q_MGR_QUIESCING
2161 (X'0871') Queue manager quiescing

MQRC_UNKNOWN_OBJECT_NAME
2085 (X'0825') Object identified cannot be found

MQRC_SD_ERROR
2424 (X'0978') Subscription descriptor (MQSD) not valid

MQRC_SUB_NAME_ERROR
2440 (X'0988') SubName field not valid

MQRC_OBJECT_STRING_ERROR
2441 (X'0989') Objectstring field not valid

MQRC_TOPIC_STRING_ERROR
2425 (X'0979') Topic string is not valid

MQRC_SUB_USER_DATA_ERROR
2431 (X'097F') SubUserData field not valid

MQRC_SUB_ALREADY_EXISTS
2432 (X'0980') Subscription already exists

MQRC_IDENTITY_MISMATCH
2434 (X'0982') Subscription name matches existing subscription

MQRC_DURABILITY_NOT_ALLOWED
2436 (X'0984') An MQSUB call using the MQSO_DURABLE option failed

Usage notes for MQSUB

1. 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 327.
2. 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 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.
3. 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 should not attempt to directly open this queue.
4. Subscriptions can be grouped together 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 together 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.
5. 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	None of these options are set on return from the MQSUB call. If you subsequently 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, with the exception of MQSO_NEW_PUBLICATIONS_ONLY which is only applicable to MQSO_CREATE.

MQSD output from MQSUB

Field name in MQSD	Special considerations
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.
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 will be set to the original expiry of the subscription and not the remaining expiry time. If you subsequently reuse the MQSD in an MQSUB call using the MQSO_ALTER 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 MQSO_RESUME option, if a buffer is provided, and also a positive buffer length in *VSBufSize*. If no buffer is provided only the length 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 you subsequently 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 will made to the field.
SubCorrelId and PubAccountingToken	If you do not use MQSO_SET_CORREL_ID, then the *SubCorrelId* will be generated by the queue manager. If you do not use MQSO_SET_IDENTITY_CONTEXT, then the *PubAccountingToken* will be generated by the queue manager. These fields will be returned in the MQSD from an MQSUB call using the MQSO_RESUME option. If they are generated by the queue manager, the generated value will be returned on an MQSUB call using the MQSO_CREATE or MQSO_ALTER 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.

Language invocations for MQSUB

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 */
```

System/390 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

The MQSUBRQ call makes a request on a subscription.

Syntax for MQSUBRQ

MQSUBRQ *(Hconn, Hsub, Action, SubRqOpts, CompCode, Reason)*

Parameters for MQSUBRQ

The MQSUBRQ 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.

On z/OS for CICS applications, and on i5/OS 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.

Hsub (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 (MQLONG) - Input

This parameter controls the particular action that is being requested on the subscription. One (and only one) of the following must be specified:

MQSR_ACTION_PUBLICATION

This action requests an update publication be sent for the specified topic. This is normally used 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 will be indicated by the MQIsRetained message property of that publication.

Since the topic in the existing subscription represented by the Hsub parameter may contain wildcards, the subscriber might receive multiple retained publications.

SubRqOpts (MQSRO) - Input/output

These options control the action of MQSUBRQ, see "MQSRO - Subscription request options" on page 352 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 (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 (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.

Usage notes for MQSUBRQ

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 may 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 should be sent somewhere else, the subscription must first be altered using the MQSUB call with the MQSO_ALTER option.

Language invocations for MQSUBRQ

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 */
```

System/390 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
```

Chapter 3. Attributes of objects

Attributes for queues

Types of queue: The queue manager supports the following types of queue definition:

Local queue
This is a physical queue that stores messages and can be one of the following:

Local queue manager queue
The queue exists on the local queue manager (private in z/OS parlance).

Shared queue (z/OS only)
This is a physical queue that stores messages. 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
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 MQQT_CLUSTER.

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 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 *WebSphere MQ Intercommunications*.

- 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 *WebSphere MQ Intercommunications*.

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 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 92 and subsequent tables.

Table 92 summarizes the attributes that are specific to queues. The attributes are described in alphabetic order.

Note: The names of the attributes shown in this book 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 the *WebSphere MQ Script (MQSC) Command Reference* for details.

Table 92. 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	Topic
AlterationDate	Date when definition was last changed	X		X	X		AlterationDate
AlterationTime	Time when definition was last changed	X		X	X		AlterationTime
BackoutRequeueQName	Excessive backout requeue queue name	X	X				BackoutRequeueQName
BackoutThreshold	Backout threshold	X	X				BackoutThreshold
BaseQName	Queue name to which alias resolves			X			BaseQName
CFStrucName	Coupling-facility structure name	X	X				CFStrucName

Table 92. Attributes for queues (continued). 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	Topic
ClusterName	Name of cluster to which queue belongs	X		X	X	X	ClusterName
ClusterNamelist	Name of namelist object containing names of clusters to which queue belongs	X		X	X		ClusterNamelist
CLWLQueuePriority	Cluster workload queue priority	X		X	X	X	CLWLQueuePriority
CLWLQueueRank	Cluster workload queue rank	X		X	X	X	CLWLQueueRank
CLWLUseQ	Use remote queue	X					CLWLUseQ
CreationDate	Date that the queue was created	X					CreationDate
CreationTime	Time that the queue was created	X					CreationTime
CurrentQDepth	Current queue depth	X					CurrentQDepth
DefBind	Default binding	X		X	X	X	DefBind
DefinitionType	Queue definition type	X	X				DefinitionType attribute
DefInputOpenOption	Default input open option	X	X				DefInputOpenOption
DefPersistence	Default message persistence	X	X	X	X	X	DefPersistence
DefPriority	Default message priority	X	X	X	X	X	DefPriority
DefPResp	Default put response	X	X	X	X	X	
DistLists	Distribution list support	X	X				DistLists
HardenGetBackout	Whether to maintain an accurate backout count	X	X				HardenGetBackout
IndexType	Index type	X	X				IndexType
InhibitGet	Whether get operations for the queue are allowed	X	X	X			InhibitGet
InhibitPut	Whether put operations for the queue are allowed	X	X	X	X	X	InhibitPut
InitiationQName	Name of initiation queue	X	X				InitiationQName
MaxMsgLength	Maximum message length in bytes	X	X				MaxMsgLength
MaxQDepth	Maximum queue depth	X	X				MaxQDepth
MsgDeliverySequence	Message delivery sequence	X	X				MsgDeliverySequence attribute
NonPersistentMessageClass	Reliability goal for non persistent messages	X	X				NonPersistentMessage Class
OpenInputCount	Number of opens for input	X					OpenInputCount

Table 92. Attributes for queues (continued). 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	Topic
OpenOutputCount	Number of opens for output	X					OpenOutputCount
ProcessName	Process name	X	X				ProcessName
QDepthHighEvent	Whether Queue Depth High events are generated	X	X				QDepthHighEvent attribute
QDepthHighLimit	High limit for queue depth	X	X				QDepthHighLimit
QDepthLowEvent	Whether Queue Depth Low events are generated	X	X				QDepthLowEvent attribute
QDepthLowLimit	Low limit for queue depth	X	X				QDepthLowLimit attribute
QDepthMaxEvent	Whether Queue Full events are generated	X	X				QDepthMaxEvent
QDesc	Queue description	X	X	X	X	X	QDesc
QName	Queue name	X		X	X	X	QName
QServiceInterval	Target for queue service interval	X	X				QServiceInterval
QServiceIntervalEvent	Whether Service Interval High or Service Interval OK events are generated	X	X				QServiceIntervalEvent attribute
QSGDisp	Queue-sharing group disposition	X		X	X		QSGDisp attribute
QueueAccounting	Queue accounting data collection	X	X	X	X	X	QueueAccounting
QueueMonitoring	Online monitoring data for queues	X	X				QueueMonitoring
QueueStatistics	Queue statistics data collection	X	X	X	X	X	QueueStatistics
QType	Queue type	X		X	X	X	QType
RemoteQMgrName	Name of remote queue manager				X		RemoteQMgrName
RemoteQName	Name of remote queue				X		RemoteQName
RetentionInterval	Retention interval	X	X				RetentionInterval
Scope	Whether an entry for the queue also exists in a cell directory	X		X	X		Scope
Shareability	Queue shareability	X	X				Shareability
StorageClass	Storage class for queue	X	X				StorageClass
TriggerControl	Trigger control	X	X				TriggerControl
TriggerData	Trigger data	X	X				TriggerData
TriggerDepth	Trigger depth	X	X				TriggerDepth
TriggerMsgPriority	Threshold message priority for triggers	X	X				TriggerMsgPriority
TriggerType	Trigger type	X	X				TriggerType
Usage	Queue usage	X	X				Usage attribute

Table 92. Attributes for queues (continued). 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	Topic
XmitQName	Transmission queue name				X		XmitQName

Attribute descriptions for queues

A queue object has the attributes described below.

Unless otherwise indicated, attributes are supported on all WebSphere MQ systems, plus WebSphere MQ clients connected to these systems.

AlterationDate (MQCHAR12)

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, `1992-09-23bb`, where `bb` represents 2 blank characters).

The values of certain attributes (for example, *CurrentQDepth*) change as the queue manager operates. Changes to these attributes do not affect *AlterationDate*. Also, changes resulting from use of the MQSET call 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)

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*. Also, changes resulting from use of the MQSET call 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			

The Application Server Facilities (ASF) of WebSphere MQ classes for JMS use 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			

The Application Server Facilities (ASF) of WebSphere MQ classes for JMS use 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.

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.

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 between 0 and 9 representing the priority of the queue.

Local	Model	Alias	Remote	Cluster
X		X	X	X

For more information, see *WebSphere MQ Queue Manager Clusters*.

To determine the value of this attribute, use the MQCA_CLWL_Q_PRIORITY selector with the MQINQ call. The length of this attribute is given by MQ_CLWL_Q_PRIORITY_LENGTH.

CLWLQueueRank (MQLONG)

This is the cluster workload queue rank, a value between 0 and 9 representing the rank of the queue.

Local	Model	Alias	Remote	Cluster
X		X	X	X

For more information, see *WebSphere MQ Queue Manager Clusters*.

To determine the value of this attribute, use the MQCA_CLWL_Q_RANK selector with the MQINQ call. The length of this attribute is given by MQ_CLWL_Q_RANK_LENGTH.

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 *WebSphere MQ Queue Manager Clusters*.

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, `1992-09-23bb`, where `bb` represents 2 blank characters).

- On i5/OS, 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 i5/OS, 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.

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.

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 417 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 417 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.

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 a performance overhead, so set the *HardenGetBackout* attribute to MQQA_BACKOUT_HARDENED only if it is essential that the count is accurate.

On i5/OS, 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 usually 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 usually 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 usually retrieves messages using the correlation identifier as the selection criterion on the MQGET call.

MQIT_MSG_TOKEN
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 CFLEVEL(4).

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 usually 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 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.

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 93 and Table 94 on page 591.

Table 93. Recommended 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 recommended	MQIT_NONE or MQIT_MSG_ID required; MQIT_MSG_ID recommended
Correlation identifier	MQIT_CORREL_ID recommended	MQIT_CORREL_ID required
Group identifier	MQIT_GROUP_ID recommended	MQIT_GROUP_ID required
Selection using two identifiers:		
Message identifier plus correlation identifier	MQIT_MSG_ID or MQIT_CORREL_ID recommended	MQIT_MSG_ID or MQIT_CORREL_ID required
Message identifier plus group identifier	MQIT_MSG_ID or MQIT_GROUP_ID recommended	Not supported
Correlation identifier plus group identifier	MQIT_CORREL_ID or MQIT_GROUP_ID recommended	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 recommended	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 94. Recommended 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	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 i5/OS, 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.

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 Monitoring WebSphere MQ.

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 the *WebSphere MQ Monitoring* book.

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 *WebSphere MQ 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

For more information about queue names, see the *WebSphere MQ Application Programming Guide*. All queues defined on a queue manager share the same queue name space. 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 *WebSphere MQ 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 (MQCHAR12)

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.

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_QMGR
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 whose name 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.

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 whose name 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 whose retention interval 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 i5/OS, 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			

The value is one of the following:

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 the *WebSphere MQ Application Programming Guide*.

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 380) 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 whose name 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 alphabetic order.

Namelists are supported on all WebSphere MQ systems, plus WebSphere MQ clients connected to these systems.

Note: The names of the attributes shown in this book 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 the *WebSphere MQ Script (MQSC) Command Reference* for details.

Table 95. Attributes for namelists

Attribute	Description	Topic
AlterationDate	Date when definition was last changed	AlterationDate
AlterationTime	Time when definition was last changed	AlterationTime
NameCount	Number of names in namelist	NameCount
NamelistDesc	Namelist description	NamelistDesc
NamelistName	Namelist name	NamelistName
Names	A list of *NameCount* names	Names
NamelistType	Namelist type	NamelistType
QSGDisp	Queue-sharing group disposition	QSGDisp

Attribute descriptions for namelists

A namelist object has the attributes described below.

Unless otherwise indicated, attributes are supported on all WebSphere MQ systems, plus WebSphere MQ clients connected to these systems.

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 *WebSphere MQ Application Programming Guide*.

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. The value is one of the following:

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 the *WebSphere MQ Application Programming Guide*.

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 alphabetic order.

Note: The names of the attributes shown in this book 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 the *WebSphere MQ Script (MQSC) Command Reference* for details.

Table 96. Attributes for process definitions

Attribute	Description	Topic
AlterationDate	Date when definition was last changed	AlterationDate
AlterationTime	Time when definition was last changed	AlterationTime
ApplId	Application identifier	ApplId
ApplType	Application type	ApplType
EnvData	Environment data	EnvData
ProcessDesc	Process description	ProcessDesc
ProcessName	Process name	ProcessName
QSGDisp	Queue-sharing group disposition	QSGDisp
UserData	User data	UserData

Attribute descriptions for process definitions

A process-definition object has the attributes described below.

Unless otherwise indicated, attributes are supported on all WebSphere MQ systems, plus WebSphere MQ clients connected to these systems.

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 WebSphere 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
WebSphere MQ 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
Compaq NonStop Kernel application.

MQAT_OS2
OS/2 or Presentation Manager application.

MQAT_OS390
OS/390 application (same value as MQAT_ZOS).

MQAT_OS400
i5/OS application.

MQAT_RRS_BATCH
RRS batch application.

MQAT_UNIX
UNIX application.

MQAT_UNKNOWN
Application of unknown type.

MQAT_USER
User application.

MQAT_VMS
Digital OpenVMS 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 WebSphere 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 WebSphere 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)

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 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 WebSphere 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 MQCA_USER_DATA selector with the MQINQ call. The length of this attribute is given by MQ_PROCESS_USER_DATA_LENGTH.

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 alphabetic order.

Note: The names of the attributes shown in this book 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 the *WebSphere MQ Script (MQSC) Command Reference* for details.

Table 97. Attributes for the queue manager

Attribute	Description	Topic
AccountingConnOverride	Override accounting settings.	AccountingConnOverride
AccountingInterval	How often to write intermediate accounting records.	AccountingInterval
AdoptNewMCACheck	Elements checked to determine whether to adopt new MCA.	AdoptNewMCACheck
AdoptNewMCAType	Whether to restart automatically an orphaned instance of an MCA of a given channel type.	AdoptNewMCAType
AlterationDate	Date when definition was last changed	AlterationDate
AlterationTime	Time when definition was last changed	AlterationTime
AuthorityEvent	Controls whether authorization (Not Authorized) events are generated	AuthorityEvent
BridgeEvent	Control attribute for bridge events.	BridgeEvent
ChannelAutoDef	Controls whether automatic channel definition is permitted	ChannelAutoDef
ChannelAutoDefEvent	Controls whether channel automatic-definition events are generated	ChannelAutoDefEvent
ChannelAutoDefExit	Name of user exit for automatic channel definition	ChannelAutoDefExit
ChannelEvent	Control attribute for channel events.	ChannelEvent
ChannelInitiatorControl	Control attribute for channel initiator	ChannelInitiatorControl
ChannelMonitoring	Online monitoring data for channels	ChannelMonitoring
ChannelStatistics	Controls collection of statistics data for channels.	ChannelStatistics
ChinitAdapters	Number of adapter subtasks for processing WebSphere MQ calls.	ChinitAdapters
ChinitDispatchers	Number of dispatchers to use for the channel initiator.	ChinitDispatchers
ChinitServiceParm	Reserved for IBM use.	
ChinitTraceAutoStart	Whether channel initiator trace should start automatically.	ChinitTraceAutoStart
ChinitTraceTableSize	Size of channel initiator's trace data space.	ChinitTraceTableSize

Table 97. Attributes for the queue manager (continued)

Attribute	Description	Topic
ClusterSenderMonitoringDefault	Online monitoring data default for cluster sender channels	ClusterSenderMonitoringDefault
ClusterSenderStatistics	Controls collection of statistics monitoring information for cluster sender channels.	ClusterSenderStatistics
ClusterWorkloadData	User data for cluster workload exit	ClusterWorkloadData
ClusterWorkloadExit	Name of user exit for cluster workload management	ClusterWorkloadExit
ClusterWorkloadLength	Maximum length of message data passed to cluster workload exit	ClusterWorkloadLength
CLWLMRUChannels	Number of most recently used channels for cluster workload balancing	CLWLMRUChannels
CLWLUseQ	Cluster workload use remote queue.	CLWLUseQ
CodedCharSetId	Coded character set identifier	CodedCharSetId
CommandEvent	Control attribute for command events.	CommandEvent
CommandInputQName	Command input queue name	CommandInputQName attribute
CommandLevel	Command level	CommandLevel
CommandServerControl	Control attribute for command server.	CommandServerControl attribute
ConfigurationEvent	Control attribute for configuration events.	Configuration Event attribute
DeadLetterQName	Name of dead-letter queue	DeadLetterQName
DefXmitQName	Default transmission queue name	DefXmitQName
DistLists	Distribution list support	DistLists
DNSGroup	Name of group for TCP listener when using Workload Manager Dynamic Domain Name Services support.	DNSGroup
DNSWLM	Whether TCP listener registers with Workload Manager for Dynamic Domain Name Services.	DNSWLM
ExpiryInterval	Interval between scans for expired messages	ExpiryInterval
IGQPutAuthority	Intra-group queuing put authority	IGQPutAuthority
IGQUserId	Intra-group queuing user identifier	IGQUserId
InhibitEvent	Controls whether inhibit (Inhibit Get and Inhibit Put) events are generated	InhibitEvent
IPAddressVersion	Version of the internet protocol address	IPAddressVersion
IntraGroupQueuing	Intra-group queuing support	IntraGroupQueuing
ListenerTimer	Time interval between attempts to restart listener after APPC or TCP/IP failure.	ListenerTimer
LocalEvent	Controls whether local error events are generated	LocalEvent
LoggerEvent	Controls whether logger events are generated	LoggerEvent
LUGroupName	Generic LU name for LU 6.2 listener that handles inbound transmissions for queue-sharing group.	LUGroupName
LUName	Name of LU to use for outbound LU 6.2 transmissions.	LUName
LU62ARMSuffix	Suffix of SYS1.PARMLIB member APPCPMxx, that nominates LUADD for this channel initiator.	LU62ARMSuffix
LU62Channels	Maximum number of current channels or connected clients that use LU 6.2.	LU62Channels
MaxActiveChannels	Maximum number of channels that can be active at any time.	MaxActiveChannels
MaxChannels	Maximum number of current channels.	MaxChannels
MaxHandles	Maximum number of handles	MaxHandles
MaxMsgLength	Maximum message length in bytes	MaxMsgLength
MaxPriority	Maximum priority	MaxPriority attribute
MaxPropertiesLength	Maximum length of property data in bytes	

Table 97. Attributes for the queue manager (continued)

Attribute	Description	Topic
MaxUncommittedMsgs	Maximum number of uncommitted messages within a unit of work	MaxUncommittedMsgs
MQIAccounting	Controls collection of accounting information for MQI data.	MQIAccounting
MQIStatistics	Controls collection of statistics monitoring information for queue manager.	MQIStatistics
MsgMarkBrowseInterval	Interval after which the queue manager can remove the mark from browsed messages.	MsgMarkBrowseInterval
OutboundPortMax	With *OutboundPortMin*, defines range of port numbers to use when binding outgoing channels.	OutboundPortMin
OutboundPortMin	With *OutboundPortMax*, defines range of port numbers to use when binding outgoing channels.	OutboundPortMin
PerformanceEvent	Controls whether performance-related events are generated	PerformanceEvent
Platform	Platform on which the queue manager is running	Platform
PSNPMSG	Whether to discard (or keep) an undelivered input message	PSNPMSG
PSNPRES	Controls the behavior of undelivered	PSNPRES
PSRTYCNT	The number of retries when processing (under syncpoint) a failed command message	PSRTYCNT
PSSYNCPT	Whether only persistent (or all) messages should be processed under syncpoint	PSSYNCPT
QMgrDesc	Queue manager description	QMgrDesc
QMgrIdentifier	Unique internally-generated identifier of queue manager	QMgrIdentifier
QMgrName	Queue manager name	QMgrName
QSGName	Name of queue-sharing group	QSGName
QPubSub	Whether the queued publish/subscribe interface is running	QPubSub
QueueAccounting	Controls collection of accounting information for queues.	QueueAccounting
QueueMonitoring	Online monitoring data for queues	QueueMonitoring
QueueStatistics	Controls collection of statistics data for queues.	QueueStatistics
ReceiveTimeout	How long TCP/IP channel waits for data before returning to inactive state.	ReceiveTimeout
ReceiveTimeoutMin	Qualifier for *ReceiveTimeout*.	ReceiveTimeoutMin
ReceiveTimeoutType	Minimum time that TCP/IP channel waits for data before returning to inactive state.	ReceiveTimeoutType
RemoteEvent	Controls whether remote error events are generated	RemoteEvent
RepositoryName	Name of cluster for which this queue manager provides repository services	RepositoryName
RepositoryNamelist	Name of namelist object containing names of clusters for which this queue manager provides repository services	RepositoryNamelist
ScyCase	Case of security profiles	ScyCase
SharedQQMgrName	Shared queue queue-manager name	SharedQMgrName
SSLCRLNamelist	Name of namelist object containing names of authentication information objects.	Note 1
SSLCryptoHardware	Cryptographic hardware configuration string.	Note 1
SSLEvent	Control attribute for SSL events.	SSLEvent
SSLFIPSRequired	Use only FIPS-certified algorithms for cryptography.	SSLFIPSRequired
SSLKeyRepository	Location of SSL key repository.	Note 1
SSLKeyResetCount	SSL key reset count.	SSLKeyResetCount

Table 97. Attributes for the queue manager (continued)

Attribute	Description	Topic
SSLTasks	Number of server subtasks for processing SSL calls.	Note 1
StatisticsInterval	How often to write statistics monitoring data.	StatisticsInterval
StartStopEvent	Controls whether start and stop events are generated	StartStopEvent
SyncPoint	Syncpoint availability	SyncPoint
TCPChannels	Maximum number of current channels or connected clients that use TCP/IP.	TCPChannels
TCPKeepAlive	Whether to use TCP KEEPALIVE to check other end of connection.	TCPKeepAlive
TCPName	Name of TCP/IP system that you are using.	TCPName
TCPStackType	How channel initiator can use TCP/IP addresses.	TCPStackType
TraceRouteRecording	Controls recording of trace-route information.	TraceRouteRecording attribute
TriggerInterval	Trigger-message interval	TriggerInterval

Notes:

1. This attribute cannot be inquired using the MQINQ call, and is not described in this book. See WebSphere MQ Programmable Command Formats and Administration Interface for details of this attribute.

Attribute descriptions for the queue manager

The queue-manager object has the attributes described below.

Unless otherwise indicated, attributes are supported on all WebSphere MQ systems, plus WebSphere MQ clients connected to these systems.

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 i5/OS, 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 i5/OS, Unix systems, and Windows.

To determine the value of this attribute, use the MQIA_ACCOUNTING_INTERVAL 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 given channel type when a new inbound channel request matching the AdoptNewMCACheck attribute is detected

The value is one of the following:

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. The value is one of the following:

MQEVR_DISABLED
Event reporting disabled.

MQEVR_ENABLED
Event reporting enabled.

For more information about events, see *WebSphere MQ 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, i5/OS, 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 *WebSphere MQ Monitoring*.

This attribute is supported only on AIX, HP-UX, i5/OS, 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 *WebSphere MQ Intercommunications* for details of the value of this attribute in various environments.

This attribute is supported only on AIX, HP-UX, i5/OS, 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.

The value is one of the following:

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.

The value is one of the following:

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.

ChannelMonitoring (MQLONG)

This 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 STATCHL channel attribute. This is the default value.

MQMON_OFF
Turn monitoring data collection off for channels that specify QMGR in the STATCHL channel attribute.

MQMON_LOW
Turn monitoring data collection on with a low ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

MQMON_MEDIUM
Turn monitoring data collection on with a moderate ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

MQMON_HIGH
Turn monitoring data collection on with a high ratio of data collection for channels specifying QMGR in the STATCHL channel attribute.

To determine the value of this attribute, use the MQIA_MONITORING_CHANNEL selector with the MQINQ call.

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.

This attribute is supported only on i5/OS, UNIX systems, and Windows.

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 WebSphere MQ calls. The value must be between 0 and 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 a small number of channels, you do not have to decrease the value of this parameter from the default value. You are

recommended to 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 WebSphere MQ calls. This is particularly 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 between 0 and 9999, with a default value of 5.

As a guideline, allow one dispatcher for 50 current channels. However, if you have only a small number of 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 are recommended to 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 between zero and 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 impact 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 impact on system performance.

MQMON_HIGH
Unless *ChannelMonitoring* is MQMON_NONE, monitoring is switched on with a high rate of data collection with a likely impact 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.

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, i5/OS, 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 nonblank, 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 decide whether to accept the queue instance selected by the queue manager as the destination for the message, or choose another queue instance.

Note: Both the length and the value of this attribute are environment specific. See *WebSphere MQ Intercommunications* for details of the value of this attribute in various environments.

This attribute is supported only on AIX, HP-UX, i5/OS, 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, i5/OS, 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 between 1 and 999999999. For more information on using this attribute, see *WebSphere MQ Queue Manager Clusters*.

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, including the names of objects, queue creation date and time, and so on. 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. Refer to the *WebSphere MQ for z/OS System Setup Guide* for further information.
- On Windows, the value is the primary CODEPAGE of the user creating the queue manager.
- On i5/OS, 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.

This attribute is supported only on z/OS.

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. Refer to *WebSphere MQ Script (MQSC) Command Reference* for details of MQSC commands and *WebSphere MQ Programmable Command Formats and Administration Interface* 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. Refer to *WebSphere MQ Programmable Command Formats and Administration Interface* for details of 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. The value is one of the following:

MQCMDL_LEVEL_1
Level 1 of system control commands.

This value is returned by the following:

- MQSeries for AIX Version 2 Release 2
- MQSeries for
  - Version 1 Release 1.1
  - Version 1 Release 1.2
  - Version 1 Release 1.3
- MQSeries for OS/2 Version 2 Release 0
- MQSeries for OS/400®
  - Version 2 Release 3
  - Version 3 Release 1
  - Version 3 Release 6
- MQSeries for Windows Version 2 Release 0

MQCMDL_LEVEL_101
MQSeries for Windows Version 2 Release 0.1.

MQCMDL_LEVEL_110
MQSeries for Windows Version 2 Release 1.

MQCMDL_LEVEL_114
MQSeries for Version 1 Release 1.4.

MQCMDL_LEVEL_120
MQSeries for Version 1 Release 2.0.

MQCMDL_LEVEL_200
MQSeries for Windows NT® Version 2 Release 0.

MQCMDL_LEVEL_201
MQSeries for OS/2 Version 2 Release 0.1.

MQCMDL_LEVEL_210
MQSeries for OS/390 Version 2 Release 1.0.

MQCMDL_LEVEL_220
Level 220 of system control commands.

This value is returned by the following:

- MQSeries for AT&T GIS UNIX Version 2 Release 2
- MQSeries for SINIX and DC/OSx Version 2 Release 2
- MQSeries for SunOS Version 2 Release 2
- MQSeries for Tandem NonStop Kernel Version 2 Release 2

MQCMDL_LEVEL_221
Level 221 of system control commands.

This value is returned by the following:

- MQSeries for AIX Version 2 Release 2.1
- MQSeries for Digital OpenVMS Version 2 Release 2.1

MQCMDL_LEVEL_320
Level 320 of system control commands.

This value is returned by the following:

- MQSeries for OS/400
  - Version 3 Release 2
  - Version 3 Release 7

MQCMDL_LEVEL_420
Level 420 of system control commands.

This value is returned by the following:

- MQSeries for i5/OS
  - Version 4 Release 2.0
  - Version 4 Release 2.1

MQCMDL_LEVEL_500
Level 500 of system control commands.

This value is returned by the following:

- MQSeries for AIX Version 5 Release 0
- MQSeries for HP-UX Version 5 Release 0
- MQSeries for OS/2 Version 5 Release 0
- MQSeries for Solaris Version 5 Release 0
- MQSeries for Windows NT Version 5 Release 0

MQCMDL_LEVEL_510
Level 510 of system control commands.

This value is returned by the following:

- MQSeries for AIX Version 5 Release 1

- MQSeries for AS/400® Version 5 Release 1
- MQSeries for HP-UX Version 5 Release 1
- MQSeries for OS/2 Version 5 Release 1
- MQSeries for Compaq OpenVMS Alpha Version 5 Release 1
- MQSeries for Compaq NonStop Kernel Version 5 Release 1
- MQSeries for Compaq Tru64 UNIX Version 5 Release 1
- MQSeries for Solaris Version 5 Release 1
- MQSeries for Windows NT Version 5 Release 1

MQCMDL_LEVEL_520
Level 520 of system control commands.

This value is returned by the following:
- MQSeries for AIX Version 5 Release 2
- MQSeries for AS/400 Version 5 Release 2
- MQSeries for HP-UX Version 5 Release 2
- MQSeries for Linux Version 5 Release 2
- MQSeries for OS/390 Version 5 Release 2
- MQSeries for Sun Solaris Version 5 Release 2
- MQSeries for Windows NT Version 5 Release 2

MQCMDL_LEVEL_530
Level 530 of system control commands.

This value is returned by the following:
- Websphere MQ for AIX Version 5 Release 3
- Websphere MQ for HP-UX Version 5 Release 3
- Websphere MQ for i/Series Version 5 Release 3
- WebSphere MQ for Linux for Intel Version 5 Release 3
- WebSphere MQ for Linux for zSeries® Version 5 Release 3
- Websphere MQ for Solaris Version 5 Release 3
- Websphere MQ for Windows Version 5 Release 3
- Websphere MQ for z/OS Version 5 Release 3

MQCMDL_LEVEL_600
Level 600 of system control commands.

This value is returned by the following:
- Websphere MQ for AIX V6.0
- Websphere MQ for HP-UX V6.0
- Websphere MQ for i/Series V6.0
- WebSphere MQ for Linux V6.0
- Websphere MQ for Solaris V6.0
- Websphere MQ for Windows V6.0
- Websphere MQ for z/OS V6.0

MQCMDL_LEVEL_700
Level 700 of system control commands.

This value is returned by the following:
- Websphere MQ for AIX V7.0
- Websphere MQ for HP-UX V7.0

- Websphere MQ for i5/OS V7.0
- WebSphere MQ for Linux V7.0
- Websphere MQ for Solaris V7.0
- Websphere MQ for Windows V7.0
- Websphere MQ for z/OS V7.0

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 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:

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. This parameter applies to z/OS only.

To determine the value of this attribute, use the MQIA_CONFIGURATION_EVENT selector with the MQINQ call.

The value can be:

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 102 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 WebSphere 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.

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. The value is one of the following:

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 is the name of the group for the TCP listener that handles inbound transmissions for the queue-sharing group to join when using Workload Manager Dynamic Domain Name Services support. The maximum length is 18 characters. If you leave this name blank, the queue-sharing group name is used.

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 specifies whether the TCP listener that handles inbound transmissions for the queue-sharing group registers with Workload Manager for Dynamic Domain Name Services

The value is one of the following:

MQDNSWLM_YES
The listener registers with Workload Manager.

MQDNSWLM_NO
The listener does not register with Workload Manager. This is the default value.

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 *WebSphere MQ 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 hostname that resolves to both an IPv4 and IPv6 address and its *LocalAddress* parameter is not specified.
- The channel's *ConnectionName* and *LocalAddress* are both hostnames that resolve to both IPv4 and IPv6 addresses.

The value can be:

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 WebSphere 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 *WebSphere MQ 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 *WebSphere MQ 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, i5/OS, 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 between 0 and 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 is the maximum number of channels that can be active at any time. The value must be between 1 and 9999, with a default value of 200.

This attribute is supported on z/OS only.

To determine the value of this attribute, use the MQIA_ACTIVE_CHANNELS selector with the MQINQ call.

MaxChannels (MQLONG)

This attribute is supported on z/OS only.

This is the maximum number of channels that can be current (including server-connection channels with connected clients). The value must be between 1 and 9999 and has a default value of 200. It is possible that a system busy serving connections from the network could need a higher number than the default setting. You should determine the value that is right for your environment, ideally by observing the behavior of your system during testing.

To determine the value of this attribute, use the MQIA_MAX_CHANNELS selector with the MQINQ call.

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.

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 needs to 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.

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 i5/OS, 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 i5/OS, UNIX 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 mark 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 value is not less than -1 and not greater than 999 999 999. The default value is 5000. A *MsgMarkBrowseInterval* of -1 represents an unlimited time interval. A *MsgMarkBrowseInterval* of 0 causes the queue manager to unmark the message immediately.

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 between 0 and 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 between 0 and 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. The value is one of the following:

MQEVR_DISABLED
Event reporting disabled.

MQEVR_ENABLED
Event reporting enabled.

For more information about events, see *WebSphere MQ 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).

MQPL_MVS
z/OS (same value as MQPL_ZOS).

MQPL_NSK
Compaq NonStop Kernel.

MQPL_OS2
OS/2.

MQPL_OS390
z/OS (same value as MQPL_ZOS).

MQPL_OS400
i5/OS.

MQPL_UNIX
UNIX systems.

MQPL_VMS
HP OpenVMS.

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.

PSNPMSG (MQLONG)

Whether to discard (or keep) a undelivered input message.

The value is one of the following:

MQUNDELIVERED_DISCARD
Non-persistent input messages may be discarded if they cannot be processed.

MQUNDELIVERED_KEEP
Non-persistent input messages will not be discarded if they cannot be processed. In this situation the QPUBSUB 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.

PSNPRES (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 QPUBSUB 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.

MQUNDELIVERED_KEEP
Non-persistent responses are not placed on the dead letter queue or discarded. Instead, the QPUBSUB 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.

PSRTYCNT (MQLONG)

The number of retries when processing (under syncpoint) a failed command message.

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.

PSSYNCPT (MQLONG)

Whether only persistent (or all) messages should be processed under syncpoint.

The value is one of the following:

MQSYNCPOINT_IFPER
This makes the queued pubsub daemon 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.

MQSYNCPOINT_YES
This makes the queued pubsub daemon receive all messages under syncpoint.

To determine the value of this attribute, use the MQIA_PUBSUB_SYNC_PT 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, i5/OS, Solaris, Linux, Windows, plus WebSphere 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.

QPubSub (MQLONG)

Whether the queued publish/subscribe interface is running and hence getting from SYSTEM.BROKER.CONTROL.QUEUE and the queues listed in SYSTEM.QPUBSUB.QUEUE.NAMELIST.

The value is one of the following:

STOPPED
The queued publish/subscribe interface is not running.

RUNNING
The queued publish/subscribe interface is running and getting from the queues listed above.

To determine the value of this attribute, use the MQIA_QUEUED_PUBSUB selector with the MQINQ call.

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.

The value is one of the following:

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, not to MQI channels.

Use this value as follows:

- To specify that this number is a multiplier, to apply to the negotiated HBINT value, to determine how long a channel waits, set ReceiveTimeoutType to MQRCVTIME_MULTIPLY. Specify a value of 0 or a value in the range 2 to 99.
- To specify that this number is a value, in seconds, to add to the negotiated HBINT value to determine how long a channel waits, set ReceiveTimeoutType to MQRCVTIME_ADD. Specify a value in the range 1 to 999999.
- To specify that this number is a value, in seconds, for the channel to wait, set ReceiveTimeoutType to MQRCVTIME_EQUAL. Specify a value in the range 0 to 999999.

The default value is 0.

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 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 between zero and 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. The value is one of the following:

MQEVR_DISABLED
Event reporting disabled.

MQEVR_ENABLED
Event reporting enabled.

For more information about events, see *WebSphere MQ 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, i5/OS, 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, i5/OS, 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 or not 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:

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.

SSLEvent (MQLONG)

This specifies whether SSL events are generated.

The value is one of the following:

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 WebSphere MQ-provided software. If cryptographic

hardware is configured, the cryptography modules used are those provided by the hardware product; these may or may not be FIPS-certified to a particular level depending on the hardware product in use.

The value is one of the following:

MQSSL_FIPS_NO
Use any CipherSpec supported on the platform in use. This 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 platforms and Windows.

To determine the value of this attribute, use the MQIA_SSL_FIPS_REQUIRED selector with the MQINQ call.

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 between 0 and 999 999 999, with a default value of 0.

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 thechannel 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 *WebSphere MQ 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 between 0 and 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 default TCP/IP system that you are using, depending on the value of TCPStackType. 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 address space specified in TCPName, or can optionally bind to any selected TCP/IP address

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:

MQROUTE_DISABLED
No appending to trace- route messages allowed.

MQROUTE_RECORDING_Q
Put trace- route messages to fixed named queue.

MQROUTE_RECORDING_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 the *WebSphere MQ Application Programming Guide*.

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.

Attributes for authentication information objects

The following table summarizes the attributes that are specific to authentication information objects. The attributes are described in alphabetic order.

Authentication information objects are supported in all WebSphere MQ environments.

Note: The names of the attributes shown in this book 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 the *WebSphere MQ Script (MQSC) Command Reference* for details.

Table 98. Attributes for authentication information objects

Attribute	Description	Topic
AlterationDate	Date when definition was last changed	AlterationDate
AlterationTime	Time when definition was last changed	AlterationTime
AuthInfoConnName	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.	AuthInfoConnName
AuthInfoDesc	Plain-text comment. It provides descriptive information about the authentication information object when an operator issues the DISPLAY AUTHINFO command.	AuthInfoDesc
AuthInfoName	Name of the authentication information object.	AuthInfoName
AuthInfoType	The type of authentication information.	AuthInfoType
LDAPPassword	The password associated with the Distinguished Name of the user who is accessing the LDAP server.	LDAPPassword
LDAPUserName	The Distinguished Name of the user who is accessing the LDAP server.	LDAPUserName

Attribute descriptions for authentication information objects

An authentication information object has the attributes described below.

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.

AlterationTime (MQCHAR8)

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.

AuthInfoConnName (MQCHAR264)

This is the DNS name or IP address of the host on which the LDAP CRL server is running, with an optional port number. This keyword is required.

The syntax for CONNAME is the same as for channels. For example,

`conname('hostname(nnn)')`

where *hostname* is the DNS name or IP address and *nnn* is the port number. If *nnn* is not provided, the default port number 389 is used.

The maximum length for the field is 264 characters on i5/OS, UNIX systems, and Windows and 48 characters on z/OS.

AuthInfoDesc (MQCHAR64)

This provides descriptive information about the authentication information object when an operator issues the DISPLAY AUTHINFO command. It must contain only displayable characters.

The maximum length is 64 characters. In a DBCS installation, it can contain DBCS characters (subject to a maximum length of 64 bytes).

Note: If characters are used that are not in the coded character set identifier (CCSID) for this queue manager, they might be translated incorrectly if the information is sent to another queue manager.

AuthInfoName (MQCHAR48)

This is the name of the authentication information object. It must not be the same as any other authentication information object name currently defined on this queue manager (unless REPLACE or ALTER is specified).

AuthInfoType (MQLONG)

This is the type of authentication information. The value must be CRLLDAP, meaning that Certificate Revocation List checking is done using LDAP servers.

LDAPPassword (MQCHAR32)

This is the password associated with the Distinguished Name of the user who is accessing the LDAP CRL server.

Its maximum size is 32 characters. The default value is blank.

LDAPUserName (MQ_DISTINGUISHED_NAME_LENGTH)

This is the Distinguished Name of the user who is accessing the LDAP CRL server.

The maximum size for the user name is 1024 characters on i5/OS, UNIX systems, and Windows, and 256 characters on z/OS.

If you use asterisks (*) in the user name they are treated as literal characters, and not as wild cards, because LDAPUserName is a specific name and not a string used for matching.

Chapter 4. Return codes

For each WebSphere MQ Message Queue Interface (MQI) and WebSphere 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 a WebSphere MQ API call should 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 these are 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:

- *WebSphere MQ for z/OS Messages and Codes* for WebSphere MQ for z/OS
- *WebSphere MQ Messages* for all other WebSphere MQ platforms

Chapter 5. MQ constants

The constants are listed in *WebSphere MQ Constants*.

Chapter 6. Rules for validating MQI options

This appendix lists the situations that produce an MQRC_OPTIONS_ERROR reason code from an MQCONNX, MQOPEN, MQPUT, MQPUT1, MQGET, or MQCLOSE call.

MQOPEN call

For the options of the MQOPEN call:

- At least *one* of the following must be specified:
  - MQOO_BROWSE
  - MQOO_INPUT_AS_Q_DEF
  - MQOO_INPUT_EXCLUSIVE
  - MQOO_INPUT_SHARED
  - MQOO_INQUIRE
  - MQOO_OUTPUT
  - MQOO_SET
- Only *one* of the following is allowed:
  - MQOO_INPUT_AS_Q_DEF
  - MQOO_INPUT_EXCLUSIVE
  - MQOO_INPUT_SHARED
- Only *one* of the following is allowed:
  - MQOO_BIND_ON_OPEN
  - MQOO_BIND_NOT_FIXED
  - MQOO_BIND_AS_Q_DEF

  Note: The options listed above 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 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
- 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 listed above are mutually exclusive. However, as the value of MQSO_NON_DURABLE is 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
- The combination of MQSO_NEW_PUBLICATIONS_ONLY and MQSO_PUBLICATIONS_ON_REQUEST is not allowed.
- MQSO_NEW_PUBLICATIONS_ONLY is only allowed in combination with MQSO_CREATE.
- Only one of the following is allowed:
  – MQSO_WILDCARD_CHAR
  – MQSO_WILDCARD_TOPIC

Chapter 7. Machine encodings

This appendix describes the structure of the *Encoding* field in the message descriptor (see "MQMD – Message descriptor" on page 177).

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 hat 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

3. The Institute of Electrical and Electronics Engineers

- 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, 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 below.

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. `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 99.

Table 99. Summary of encodings for machine architectures

Machine architecture	Binary integer encoding	Packed-decimal integer encoding	Floating-point encoding
i5/OS	normal	normal	IEEE normal
Intel® x86	reversed	reversed	IEEE reversed
PowerPC®	normal	normal	IEEE normal
System/390	normal	normal	System/390

Chapter 8. Report options and message flags

This appendix describes the *Report* and *MsgFlags* fields that are part of the message descriptor MQMD specified on the MQGET, MQPUT, and MQPUT1 calls (see "MQMD – Message descriptor" on page 177). The appendix describes:

- 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

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 above 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 below.

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 above.

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 above, but replacing the value 8 in the steps above by the value 2.

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 above are returned.

Chapter 9. Data conversion

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 the document *Data Conversion under WebSphere MQ* at http://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."
- 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 676.
- Special considerations for converting report messages; see "Conversion of report messages" on page 681.
- The parameters passed to the data-conversion exit; see "MQ_DATA_CONV_EXIT – Data conversion exit" on page 695.
- A call that can be used from the exit to convert character data between different representations; see "MQXCNVC – Convert characters" on page 689.
- The data-structure parameter that is specific to the exit; see "MQDXP – Data-conversion exit parameter" on page 682.

Conversion processing

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

Completion code	Reason code
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. See below for possible reason codes.

Processing conventions

When converting a built-in format, the queue manager follows the processing conventions described below.

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 (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

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 *prior to 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 above 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, prior to 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 above 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 above).

If the MQGMO_CONVERT option is specified when the report message is retrieved:

- For case 1 above, the data-conversion exit is not invoked (because the report message has no data).
- For case 3 above, the format name correctly implies the length of the message data.
- But for case 2 above, 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 following table summarizes the fields in the structure.

Table 100. 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

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 MQ_DATA_CONV_EXIT 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 MQENC_NATIVE.

Usage: 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.

Fields

The MQDXP structure contains the following fields; the fields are described in alphabetic order:

AppOptions (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 (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 (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 chooses to do 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 recommendations on how the exit should set this field on output.

This is an input/output field to the exit.

DataLength (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 will be *smaller* than the value of *DataLength*. The size of the message actually provided to the exit is always given by the *InBufferLength* parameter of the exit, irrespective of any truncation that may have occurred.

Truncation is indicated by the *Reason* field having the value MQRC_TRUNCATED_MSG_ACCEPTED 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 *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 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 *DataLength* is always greater then zero.

This is an input/output field to the exit.

Encoding (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 should copy this to the *Encoding* field in the message descriptor.

This is an input field to the exit.

ExitOptions (MQLONG)

Reserved.

This is a reserved field; its value is `0`.

ExitResponse (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 (MQHCONN)

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.

Reason (MQLONG)

Reason code qualifying *CompCode*.

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 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 should 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 just fitted the buffer. For this reason, MQRC_TRUNCATED_MSG_ACCEPTED should 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* should 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* should be set to MQCC_WARNING (or left unchanged), and *Reason* set to one of the values listed below, 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 MQGMO_ACCEPT_TRUNCATED_MSG option:

    - If it did specify that option, reason MQRC_TRUNCATED_MSG_ACCEPTED should be returned.
    - If it did not specify that option, the message should be returned unconverted, with reason code MQRC_CONVERTED_MSG_TOO_BIG.

The reason codes listed below 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 wishes 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 big 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 (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 (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 should 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 */
};
```

COBOL declaration (i5/OS 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.

Note:

1. In all environments the call can be used from a batch application as well as from a data-conversion exit.
2. The MQXCNVC call is not available from a client environment.

This call is part of the WebSphere MQ Data Conversion Interface (DCI), which is one of the WebSphere MQframework interfaces.

Syntax

MQXCNVC *(Hconn, Options, SourceCCSID, SourceLength, SourceBuffer, TargetCCSID, TargetLength, TargetBuffer, DataLength, CompCode, Reason)*

Parameters

The MQXCNVC call has the following parameters.

Hconn (MQHCONN) – input

Connection handle.

This handle represents the connection to the queue manager.

In a data-conversion exit, *Hconn* should normally be the handle 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 i5/OS, the following special value can be specified for *Hconn*:

MQHC_DEF_HCONN
Default connection handle.

Options (MQLONG) – input

Options that control the action of MQXCNVC.

Zero or more of the options described below can be specified. If more than one is required, the values 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)

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 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 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, OS/2, i5/OS, 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 will 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 neither added nor 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 big for the target buffer, as much of the string as will fit is placed in the target buffer, and the call completes with MQCC_WARNING and reason code MQRC_CONVERTED_MSG_TOO_BIG. Note that 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, OS/2, i5/OS, Solaris, Linux, Windows.

Encoding options: The options described below 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 whose representation in main storage is not dependent on the integer encoding.

Only one of the MQDCC_SOURCE_* values should 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 above 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 667 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 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 whose representation 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, OS/2, i5/OS, Solaris, Linux, Windows.

Default option: If none of the options described above 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 be used with any other, but as its value is zero, such use cannot be detected.

SourceCCSID (MQLONG) – input

Coded character set identifier of string before conversion.

This is the coded character set identifier of the input string in *SourceBuffer*.

SourceLength (MQLONG) – input

Length of string before conversion.

This is the length in bytes of the input string in *SourceBuffer*; it must be zero or greater.

SourceBuffer (MQCHAR×SourceLength) – input

String to be converted.

This is the buffer containing the string to be converted from one character set to another.

TargetCCSID (MQLONG) – input

Coded character set identifier of string after conversion.

This is the coded character set identifier of the character set to which *SourceBuffer* is to be converted.

TargetLength (MQLONG) – input

Length of output buffer.

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 (MQCHAR×TargetLength) – output

String after conversion.

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 (MQLONG) – output

Length of output string.

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 (MQLONG) – output

Completion code.

It is one of the following:

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'000') No reason to report.

If *CompCode* is MQCC_WARNING:

MQRC_CONVERTED_MSG_TOO_BIG
(2120, X'848') Converted data too big 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 more information on these reason codes, see Chapter 4, "Return codes," on page 657.

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 invocation (i5/OS 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.
```

System/390 assembler invocation

```
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

This call definition describes the parameters that are passed to the data-conversion exit.

No entry point called MQ_DATA_CONV_EXIT is actually provided by the queue manager (see usage note 11 on page 699).

This definition is part of the MQSeries Data Conversion Interface (DCI), which is one of the MQSeries framework interfaces.

Syntax

MQ_DATA_CONV_EXIT *(DataConvExitParms, MsgDesc, InBufferLength, InBuffer, OutBufferLength, OutBuffer)*

Parameters

The MQ_DATA_CONV_EXIT call has the following parameters.

DataConvExitParms (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 682 for details of the fields in this structure.

MsgDesc (MQMD) – input/output

Message descriptor.

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 should 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, OS/2, i5/OS, 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 should change the *Encoding* and *CodedCharSetId* 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 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 (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 prior to conversion, and the length of the buffer provided by the application on the MQGET call.

The value is always greater than zero.

InBuffer (MQBYTE×InBufferLength) – input

Buffer containing the unconverted message.

This contains the message data prior to 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 (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 (MQBYTE×OutBufferLength) – 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, 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 MQGMO_ACCEPT_TRUNCATED_MSG option on the MQGET call.

  In this case, the *Reason* field in the *DataConvExitParms* parameter on input to the exit will have 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 681 for more details).

  In this case, the *Reason* field in the *DataConvExitParms* parameter on input to the exit will have the value MQRC_NONE (if the receiving application provided a buffer that was big 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 will be *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 should 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 respectively.

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 *InBuffer*. If the conversion completes successfully, the exit should leave the *Reason* field in the *DataConvExitParms* parameter unchanged. This has the effect of returning 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 will indicate whether the receiving application specified the MQGMO_ACCEPT_TRUNCATED_MSG option.

4. Generally it is recommended that all of 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 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 *OutBuffer* 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 *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 may 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 *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 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 similar to 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 actually 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 should 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 should 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 invocation (i5/OS 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 invocation

```
         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
```

End of product-sensitive programming interface

Chapter 10. 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 WebSphere 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 Java*. This information supplements the information described in "MQRFH2 – Rules and formatting header 2" on page 301.

Mapping property data types to MQRFH2 data types

Message property types map to the following supported MQRFH2 data types. Table of how message property types map to supported MQRFH2 data types.

Any element without a data type is assumed to be of type "string".

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

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'` as described in*Using Java*. 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

In addition to the folders <jms>, <mcd>, <mqext>, and <usr> that are described in *Using Java*, WebSphere MQ supports the following additional folders:

- <mq>

  This is used and reserved for MQ-defined properties that are used by WebSphere MQ.

- <mq_usr>

  This 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. Also, 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.

WebSphere MQ also supports the following folders that are already in use by WAS/SIB:

- <sib>

  This 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. Your application should not add properties to this folder; if it does, the value is either ignored or removed.

- <sib_usr>

  This 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 WebSphere 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.

  You should not attempt to make properties available to WAS/SIB by using this folder; instead the <usr> folder should be used for that purpose.

- <sib_context>

  This 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 should not add properties to this folder.

- <mqema>

  This folder was used by WAS/SIB instead of the <mqext> folder.

Note that MQRFH2 folder names are case sensitive.

The following folders are reserved, in any mixture of lower or upper case characters:

- Any folder prefixed by mq or wmq; reserved for use by WebSphere 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 WebSphere Message Brokers to convey publish/subscribe command messages to the broker.
- `<pscr>`

  Used by WebSphere Message Brokers 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 WebSphere Message Brokers 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. Note that, for example, a string or an MQCFH ends parsing because they can not 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, provided that they are all in significant headers.

While folders from the significant headers cannot be merged with those 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 folders, except for the `<wmq_usr>` folder, are not parsed for properties.

Mixed content is not allowed in an MQRFH2 folder;, 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 WebSphere MQ-defined properties other than those in the message descriptor; so 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.

Note that WebSphere MQ-defined properties are, however, allowed in message groups.

Generation of MQRFH2 headers

If a queue manager adds one or more properties to a message or an application adds properties to a message using the MQSETMP call, then when a second application gets the message, WebSphere MQ converts the properties to their MQRFH2 representation and includes them in an existing MQRFH2, or into a new MQRFH2 which it generates.

If the message payload contains an MQRFH2 structure directly following the MQMD structure, an MQRFH, or an MQXQH, the MQRFH2 contains at least one message property, and the MQRFH2 has a NameValueCCSID value matching the CCSID of the new properties, then the new properties will be merged into the existing MQRFH2. If the message payload does not contain an MQRFH2, or it does not fulfil these criteria, then a new MQRFH2 will be generated and inserted in the payload (after the MQXQH or MQRFH if present) containing the MQRFH2 representation of the properties to be converted.

If the properties are merged into an existing MQRFH2, then the existing MQRFH2 will be searched for the folders which need to be merged. If a folder does not exist it will added to the end of the existing folders. If the folder does exist then the folder will be searched: any matching existing properties will be overwritten and any new ones will 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 WebSphere 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 a property in the <usr> is the default folder used when no folder is specified for a given property in a selector.

  Such an element name does not cause parsing of the MQRFH2 to fail, but is not accessible to the WebSphere MQ message property APIs.
- Element names in any folder considered to contain message properties must not contain the “.” character (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 WebSphere MQ message property APIs.

In general, MQRFH2 headers that contain valid XML-style data can be parsed by WebSphere MQ without failure, although certain elements of the MQRFH2 are not accessible through the WebSphere MQ message property APIs.

MQRFH2 element name conflicts

Only one value can be attached to a message property, so, if an attempt to access a property leads to a conflict of values one is chosen in preference over another. Overview of conflicts within MQRFH2 element names.

The WebSphere MQ syntax for accessing MQRFH2 elements allows unique identification of an element, provided that a folder contains no elements with the same name. If a folder does contain 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.

Given that a non-message descriptor property can be set either directly in the raw MQRFH2 header, or through "MQSETMP – Set message property" on page 554, this could result in a conflict when the MQGET call is processed where both contain the same property.

Should this happen, 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 results, it is considered to come logically before the message data.

Mapping from property names to MQRFH2 folder and element names

When using any of the APIs defined 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. Overview of the differences between property names and element names in the MQRFH2 header.

Therefore, a mapping has to take place from the property name to the MQRFH2 element, and in the reverse way, taking into account both the folder name that contains the element as well as the element name. Some examples from WebSphere MQ 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, WebSphere 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 a WebSphere 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.

As Root and Body are reserved folder names, you cannot use Root or Body as your folder prefix; for example, Root.Property1 does not access a valid property.

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 allowed.

The JMS header and provider-specific properties that are contained in an MQRFH2 in the <mcd>, <jms>, and <mqext> folders are accessed by a WebSphere MQ application using the short names defined in *Using Java*.

JMS user-defined properties are accessed from the <usr> folder. A WebSphere 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 Chapter 10, "Properties specified as MQRFH2 elements," on page 701 as long as 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 Websphere MQ 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 554 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 WebSphere MQ JMS client prior to Version 7.0. with a MessageFormatException.

As the <usr> folder is the default location for properties of the <Property> syntax, this enables a WebSphere MQ application and a JMS application to access the same user-defined property value using the same name.

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.

Table 101.

Support value	MQRFH2 element attribute	MQRFH2 attribute value
MQPD_SUPPORT_OPTIONAL	sa	optional 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.

Table 102.

Context value	MQRFH2 attribute value
MQPD_NO_CONTEXT	none 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.

Table 103.

CopyOption value	MQRFH2 attribute value
MQPD_COPY_FORWARD	forward
MQPD_COPY_REPLY	reply
MQPD_COPY_REPORT	report
MQPD_COPY_PUBLISH	publish
MQPD_COPY_ALL	all Do not specify this with any other value. When used with another value, this takes precedence over any value except none.

Table 103. (continued)

CopyOption value	MQRFH2 attribute value
MQPD_COPY_DEFAULT	default This is the default value. It is equivalent to specifying the three values MQCOPY_FORWARD, MQCOPY_REPORT and MQCOPY_PUBLISH. Do not specify this with any other value.
MQPD_COPY_NONE	none 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 WebSphere 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 WebSphere 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 554, 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.

Chapter 11. Code page conversion

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 WebSphere MQ for AIX

OVMS
Indicates WebSphere MQ for HP OpenVMS

HP-UX
Indicates WebSphere MQ for HP-UX

Linux Indicates WebSphere MQ for Linux for Intel and WebSphere MQ for Linux for zSeries

NSS Indicates WebSphere MQ for HP NonStop Server

OS/400
Indicates WebSphere MQ for i5/OS

Solaris
Indicates WebSphere MQ for Solaris

Tru64 Indicates MQSeries for Compaq Tru64 UNIX

Windows
Indicates WebSphere MQ for Windows

z/OS Indicates WebSphere 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 **DataConversion** to YES at the source.

Note:

1. Conversion for WebSphere MQ client information takes place in the server, so the server must support conversion from the client CCSID to the server CCSID.
2. The conversion may include support added by CSD/PTF to the latest version of WebSphere MQ. Check the content of the latest service level to see if you need to install a CSD/PTF to enable this conversion.

See Table 104 on page 712 for a cross reference between some of the CCSID numbers and some industry codeset names.

Codeset names and CCSIDs

WebSphere MQ for z/OS provides more conversion than is listed in the language specific tables.

Table 104. 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

A complete list of conversions provided is shown in Table 105 on page 737.

National languages

The languages supported by WebSphere MQ are:

- US English – see topic "US English" on page 713
- German – see topic "German" on page 714
- Danish and Norwegian – see topic "Danish and Norwegian" on page 714
- Finnish and Swedish – see topic "Finnish and Swedish" on page 715
- Italian – see topic "Italian" on page 716
- Spanish – see topic "Spanish" on page 717
- UK English / Gaelic – see topic "UK English /Gaelic" on page 717
- French – see topic "French" on page 718
- Multilingual – see topic "Multilingual" on page 718
- Portuguese – see topic "Portuguese" on page 719
- Icelandic – see topic "Icelandic" on page 719
- Eastern European languages – see topic "Eastern European languages" on page 720
- Cyrillic – see topic "Cyrillic" on page 721
- Estonian – see topic "Estonian" on page 722
- Latvian and Lithuanian – see topic "Latvian and Lithuanian" on page 723
- Ukranian – see topic "Ukrainian" on page 724
- Greek – see topic "Greek" on page 724

- Turkish – see topic “Turkish” on page 725
- Hebrew – see topic “Hebrew” on page 725
- Farsi – see topic “Farsi” on page 727
- Urdu – see topic “Urdu” on page 727
- Thai – see topic “Thai” on page 728
- Lao – see topic “Lao” on page 728
- Vietnamese – see topic “Vietnamese” on page 728
- Japanese Latin SBCS – see topic “Japanese Latin SBCS” on page 729
- Japanese Katakana SBCS – see topic “Japanese Katakana SBCS” on page 730
- Japanese Kanji/ Latin Mixed – see topic “Japanese Kanji/ Latin Mixed” on page 732
- Japanese Kanji/ Katakana Mixed – see topic “Japanese Kanji/ Katakana Mixed” on page 733
- Korean – see topic “Korean” on page 735
- Simplified Chinese – see topic “Simplified Chinese” on page 735
- Traditional Chinese – see topic “Traditional Chinese” on page 736

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
i5/OS, z/OS	37, 924, 1140
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 1252, 5348, 858
OVMS, NSS, Solaris, Linux	819, 923
Tru64	819, 850, 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.

i5/OS

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

i5/OS

Code page:

37 Does not convert to code pages 923, 858, 5348

924 Does not convert to code pages 437, 819, 850, 858, 1051, 1140, 1252, 1275, 5348

1140 Does not convert to code pages 924, 1051, 1275, 5348

DEC-OVMS, SINIX, DC/OSx

Code page:

819 Does not convert to code pages 1252, 1275

NCR

Code page:

819 Does not convert to code pages 1252, 1275

437 Does not convert to code pages 1252, 1275

850 Does not convert to code pages 1252, 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
i5/OS, z/OS	273, 924, 1141
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	277, 924, 1142
AIX	819, 923, 5348

Platform	Native CCSIDs
HP-UX	819, 923, 1051
Windows	850, 858, 865, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	278, 924, 1143
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 865, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	280, 924, 1144
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	284, 924, 1145
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	285, 924, 1146
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	297, 924, 1147
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	500, 924, 1148
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	437, 850, 858, 1252, 5348
OVMS, NSS, SINIX, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS	37, 500, 924, 1140
z/OS	500, 924, 1140
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	850, 858, 860, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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
i5/OS, z/OS	871, 924, 1149
AIX	819, 923, 5348
HP-UX	819, 923, 1051
Windows	850, 858, 861, 1252, 5348
OVMS, NSS, Solaris, Linux, Tru64	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.

i5/OS

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

The typical languages using these CCSIDs include Albanian, Croatian, Czech, Hungarian, Polish, Romanian, Serbian, Slovak, and Slovenian. Details of CCSIDs and CCSID conversion for Eastern European Languages

The following table shows the native CCSIDs for Eastern European languages on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	870, 1153
Windows	852, 1250, 5346, 9044
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64	912
Eastern European Apple client	1282
Romanian Apple client	1285
Croatian Apple client	1284

z/OS

Code page:

870 Does not convert to code pages 1284, 1285

1153 Does not convert to code pages 1250, 1284, 1285

i5/OS

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

OVMS, NSS

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

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

Cyrillic

The typical languages using these CCSIDs include Belarussion, Bulgarian, Macedonian, Russian, and Serbian. Details of CCSIDs and CCSID conversion for Cyrillic

The following table shows the native CCSIDs for Cyrillic on supported platforms:

Platform	Native CCSIDs
z/OS	1025
i5/OS	880, 1025
Windows	855, 866, 1131, 1251, 5347
Solaris	878, 915
AIX, OVMS, HP-UX, Linux, NSS, Tru64	915
Apple client	1283

i5/OS

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

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

Estonian

Details of CCSIDs and CCSID conversion for Estonian

The following table shows the native CCSIDs for Estonian on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	1122, 1157
Windows	902, 922, 1257, 5353, 9449
AIX, HP-UX, Solaris, Linux	902, 922
OVMS, NSS, Tru64	922

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

i5/OS

Code page:

1122 Does not convert to code pages 902, 5353, 9449

1157 Does not convert to code pages 922, 5353, 9449

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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

OVMS, NSS, Tru64

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
i5/OS, z/OS	1112, 1156
Windows	901, 921, 1257, 5353, 9449
AIX, HP-UX, Solaris, Linux	901, 921
OVMS, NSS, Tru64	921

z/OS

Code page:

1112 Does not convert to code pages 901, 1156, 9449

1156 Does not convert to code pages 901, 1156, 9449

i5/OS

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

OVMS, NSS, Tru64

Code page:

921 Does not convert to code pages 901, 1156, 9449

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Ukrainian

Details of CCSIDs and CCSID conversion for Ukrainian

The following table shows the native CCSIDs for Ukranian on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	1123
Windows	1124, 1125, 1251, 5347
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64	1124

i5/OS

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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Greek

Details of CCSIDs and CCSID conversion for Greek

The following table shows the native CCSIDs for Greek on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	875
HP-UX	813 (see note)
Windows	869, 1253, 5349
AIX, OVMS, NCR, NSS, Solaris, Linux, Tru64	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.	

i5/OS

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

All non-client platforms support conversion between their native CCSIDs, the native CCSIDs of the other platforms with the following exceptions.

Turkish

Details of CCSIDs and CCSID conversion for Turkish

The following table shows the native CCSIDs for Turkish on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	1026
HP-UX	920 (see note)
Windows	857, 1254, 5350
AIX, OVMS, NSS, Solaris, Linux, Tru64	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.	

i5/OS

Code page:

1026 Does not convert to code page 5350

All non-client platforms support conversion between their native CCSIDs and the native CCSIDs of the other platforms, with the following exceptions.

Hebrew

The following table shows the native CCSIDs for Hebrew on supported platforms:

Platform	Native CCSIDs
z/OS	424, 803, 4899, 12712
i5/OS	424
AIX	916, 9048
HP-UX	916 (see note)
Windows	1255, 5351
OVMS, NSS, Solaris, Linux, Tru64	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.	

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

i5/OS

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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Arabic

Details of CCSIDs and CCSID conversion for Arabic

The following table shows the native CCSIDs for Arabic on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	420
AIX	1046, 1089
HP-UX	1089 (see note)
Windows	720, 864, 1256, 5352
OVMS, NSS, Solaris, Linux, Tru64	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.	

i5/OS

Code page:

420 Does not convert to code page 5352

OS/2

Code page:

864 Does not convert to code page 720

HP-UX, Solaris, Linux, OVMS, NSS, 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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Farsi

Details of CCSIDs and CCSID conversion for Farsi

The following table shows the native CCSIDs for Farsi on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	1097
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64, Windows	1098 (see note)
Note: The native CCSID for these platforms has not been standardized and may 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
i5/OS, z/OS	918
Windows	868
AIX, HP-UX, OVMS, NSS, Solaris, Linux, Tru64	1006

i5/OS

Code page:

918 Does not convert to code page 1006

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Thai

Details of CCSIDs and CCSID conversion for Thai

The following table shows the native CCSIDs for Thai on supported platforms:

Platform	Native CCSIDs
i5/OS, z/OS	838
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64, Windows	874 (see note)
Note: The native CCSID for these platforms has not been standardized and may 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
i5/OS, z/OS	1132
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64, 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
i5/OS, z/OS	1130
Windows	1258, 5354
AIX, OVMS, HP-UX, NSS, Solaris, Linux, Tru64	1129

i5/OS

Code page:

1130 Does not convert to code pages 1129, 5354

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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
i5/OS, z/OS	1027
AIX	932, 5050, 33722 (see Note 1)
Windows	932, 943 (see Notes 2 and 3)
OVMS, Linux, NSS, Solaris	943, 5050
HP-UX	Not known
Tru64	943, 954, 5050, 33722

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 WebSphere MQ support this CCSID.

   On WebSphere 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. WebSphere MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

z/OS

Code page:

1027 Does not convert to code pages 932, 942, 943, 954, 5050, 33722

i5/OS

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

NSS

Code page:

943 Does not convert to code page 1027

5050 Does not convert to code page 1027

Tru64

Code page:

943 Does not convert to code page 1027

954 Does not convert to code page 1027

5050 Does not convert to code page 1027

33722 Does not convert to code page 1027

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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
i5/OS, z/OS	290
HP-UX	897
AIX	932, 5050, 33722 (see Note 1)
Windows	932, 943 (see Notes 2 and 3)
OVMS, Linux, NSS, Solaris	943, 5050
Tru64	943, 954, 5050, 33722

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 WebSphere MQ support this CCSID.

   On WebSphere 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. WebSphere MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.
4. In addition to the above conversions, the WebSphere 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.

z/OS

Code page:

290 Does not convert to code pages 932, 943, 954, 5050, 33722

i5/OS

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

DEC-OVMS

Code page:

943 Does not convert to code pages 290, 897, 932, 954, 5050, 33722

954 Does not convert to code pages 290, 897, 943

OVMS, NSS

Code page:

943 Does not convert to code pages 290, 897

5050 Does not convert to code pages 290, 897

Tru64

Code page:

943 Does not convert to code pages 290, 897

954 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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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
i5/OS, 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)
OVMS, Linux, NSS, Solaris	943, 5050
Tru64	943, 954, 5050, 33722

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. WebSphere 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 WebSphere MQ support this CCSID.

   On WebSphere 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. WebSphere MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

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

i5/OS

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

OVMS, NSS

Code page:

943 Does not convert to code page 1399

5050 Does not convert to code page 1399

Tru64

Code page:

943 Does not convert to code page 1399

954 Does not convert to code page 1399

5050 Does not convert to code page 1399

33722 Does not convert to code page 1399

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

Japanese Kanji/ Katakana Mixed

Details of CCSIDs and CCSID conversion for Japanese Kanji/Katakana Mixed.

The following table shows the native CCSIDs for Japanese Kanji/ Katakana Mixed on supported platforms:

Platform	Native CCSIDs
z/OS	1390, 5026 (see Note 1)
i5/OS	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)
OVMS, Linux, NSS, Solaris	943, 5050
Tru64	943, 954, 5050, 33722

Platform	Native CCSIDs

Note:

1. CCSID 1390 does not accept lower case characters. 5026 is a CCSID related to code page 930. CCSID 5026 is the CCSID reported on i5/OS 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. WebSphere 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 WebSphere MQ support this CCSID.

   On WebSphere 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. WebSphere MQ does not support code pages based on the JIS X 0213 (JIS2004) standard.

z/OS

Code page:

1390 Does not convert to code pages 954, 5026, 5050, 33722

Does not accept lower case characters.

5026 Does not convert to code pages 954, 1390, 5050, 33722

i5/OS

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

OVMS, NSS

Code page:

943 Does not convert to code page 1390

5050 Does not convert to code page 1390

Tru64

Code page:

943 Does not convert to code page 1390

954 Does not convert to code page 1390

5050 Does not convert to code page 1390

33722 Does not convert to code page 1390

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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, i5/OS	933, 1364
AIX, OVMS, HP-UX, Linux, NSS, Solaris	970
Windows	949, 1363
Tru64	970, 1363

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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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
i5/OS	935, 1388
AIX	1383, 1386
HP-UX	1381 (see Note 1)
Windows	1381, 1386(see Note 2)
OVMS, Linux, NSS, Solaris, Tru64	1383

Platform	Native CCSIDs
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 WebSphere MQ support this CCSID. On WebSphere 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. WebSphere 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 i5/OS, 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).	

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

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

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, i5/OS	937
HP-UX	938, 950, 964 (see Note)
Tru64, Windows	950
AIX, OVMS, NSS, Solaris, Linux	950, 964
Note: Code set `roc15` on HP-UX is represented by CCSID 938.	

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

OVMS, Linux, Solaris

Code page:

964 Does not convert to code page 938

All platforms support conversion between their native CCSIDs and the native CCSIDs of other platforms, with the following exceptions.

z/OS conversion support

Table 105. WebSphere 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 105. WebSphere 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, 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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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, 297, 437, 500, 819, 850, 852, 858, 870-871, 875, 912, 923-924, 1026-1027, 1140-1149, 1200, 1208, 1252, 1254, 4946, 4948, 4971, 5123, 8229, 9044, 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
1103	500
1104	500
1105	500
1106	500

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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
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, 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, 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, 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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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, 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, 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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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	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, 1025-1027, 1040-1043, 1047, 1088, 1112, 1122, 1139, 1200, 1208, 1252, 4386, 4909, 4929, 4932, 4934, 4946, 4948, 4951, 4953, 4960, 4970-4971, 4992, 5012, 8229, 8482, 9025, 9030, 9044, 9049, 9056, 9061, 9066, 13121, 13488, 17248, 17584, 25473, 25479, 25617, 25619, 25664, 28709
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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, 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
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
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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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
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, 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

Table 105. WebSphere MQ for z/OS CCSID conversion support (continued)

CCSID	Converts to and from CCSIDS
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, 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
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 105. WebSphere 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

i5/OS conversion support

A full list of CCSIDs, and conversions supported by i5/OS, can be found in the appropriate i5/OS publication relating to your operating system.

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. WebSphere MQ does not support surrogate pairs. The support for UTF-16 and UTF-8 in WebSphere MQ is therefore limited to those Unicode characters that can be encoded in UCS-2.

Note: WebSphere MQ does not support UCS-2 queue manager CCSIDs so message header data cannot be encoded in UCS-2.

WebSphere MQ AIX support for Unicode

On WebSphere 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

WebSphere MQ HP-UX support for Unicode

On WebSphere 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		

WebSphere MQ for Windows, Solaris, and Linux support for Unicode

On WebSphere MQ for Windows, WebSphere MQ for Solaris, and WebSphere 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, OVMS V5.3, and Solaris only.

i5/OS support for Unicode

For details on UNICODE support refer to the appropriate i5/OS publication relating to your operating system.

WebSphere MQ for z/OS support for Unicode

On WebSphere 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	12712
13121	13218	13488	16684	16804	17248
17584	21427	28709			

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