A52

Time To Get Acquainted With IMS Connect 1.1, Part 1

Gerald Hughes (Jerry)
ghughes@us.ibm.com

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IMS CONNECT DISCUSSION ITEMS

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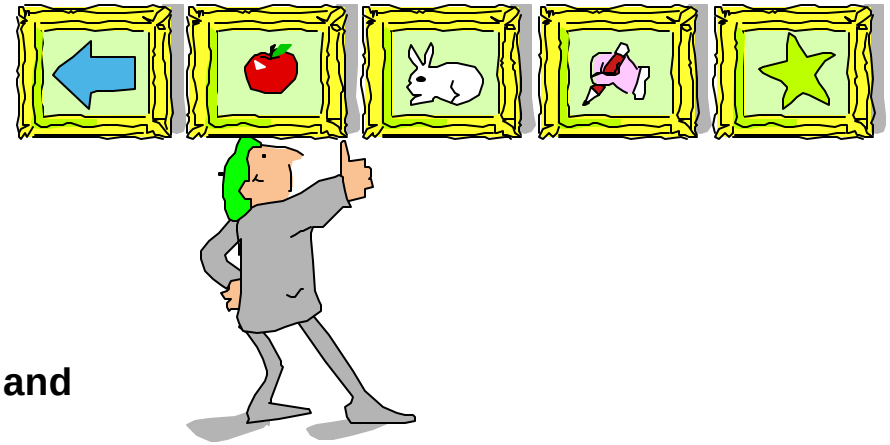
★ WHAT IS IMS CONNECT

- IMS CONNECT supports communications between
  - one or more TCP/IP clients, or
  - LOCAL clients and
  - one or more IMS systems.



- IMS CONNECT uses
  - TCP/IP for communications with
    - remote Clients and
    - IMS Connector For Java Clients or,
    - IMS Connector For Java Client on S390, and
  - PC interface (local) with
    - IMS Connectr For Java Clients on S390 and
  - XCF for communications to IMS OTMA.

- If a single IMS TM system cannot handle the work received from a single IMS CONNECT system, you can balance the workloads across multiple IMS systems.

- If a single IMS CONNECT cannot handle the work received from the clients, you can configure multiple IMS CONNECT to trigger access to a single/multiple IMS systems to balance the workload of TCP/IP Client requests.

- IMS CONNECT also provides a mechanism to manage the TCP/IP Clients and DATASTOREs though the use of commands.

- Provides E-business Access to IMS Applications.

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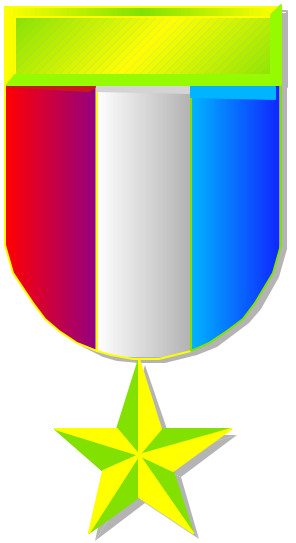
★ BENEFITS OF IMS CONNECT



- Allows the customer to have access to existing and new IMS transactions and thus databases via the intranet/internet
- Allows fast deployment of IMS transactions in the Network Computing Environment
  - Without modifying the IMS transaction
  - Without heavy workstation development effort when used with IMS Connector for JAVA
  - Allows the customer to write their own TCP/IP client applications
- SMP/E installable/maintainable
- User Message Exit and User Init Exit provides extreme power and flexibility

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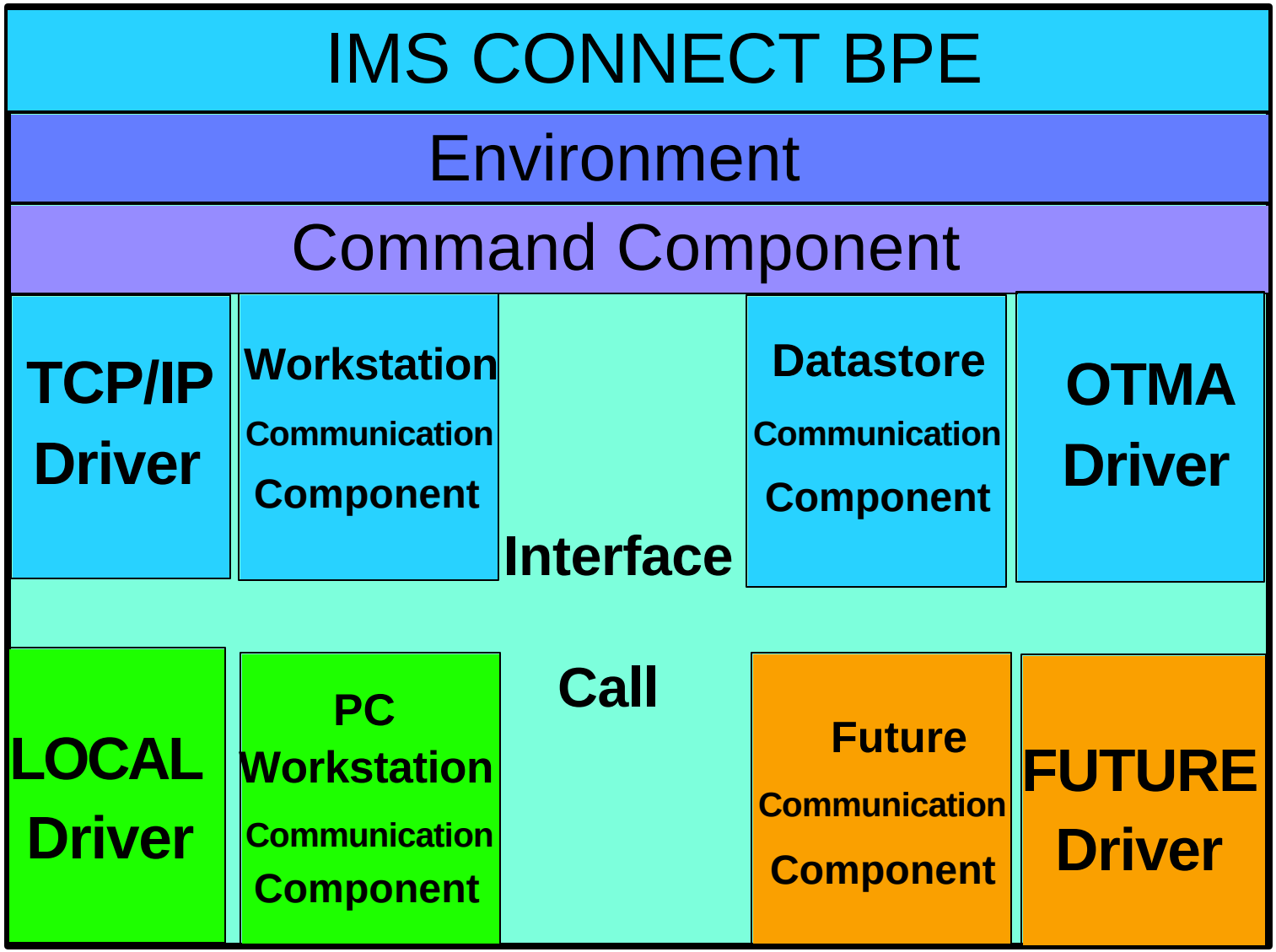
★ IMS CONNECT INTERNAL STRUCTURE



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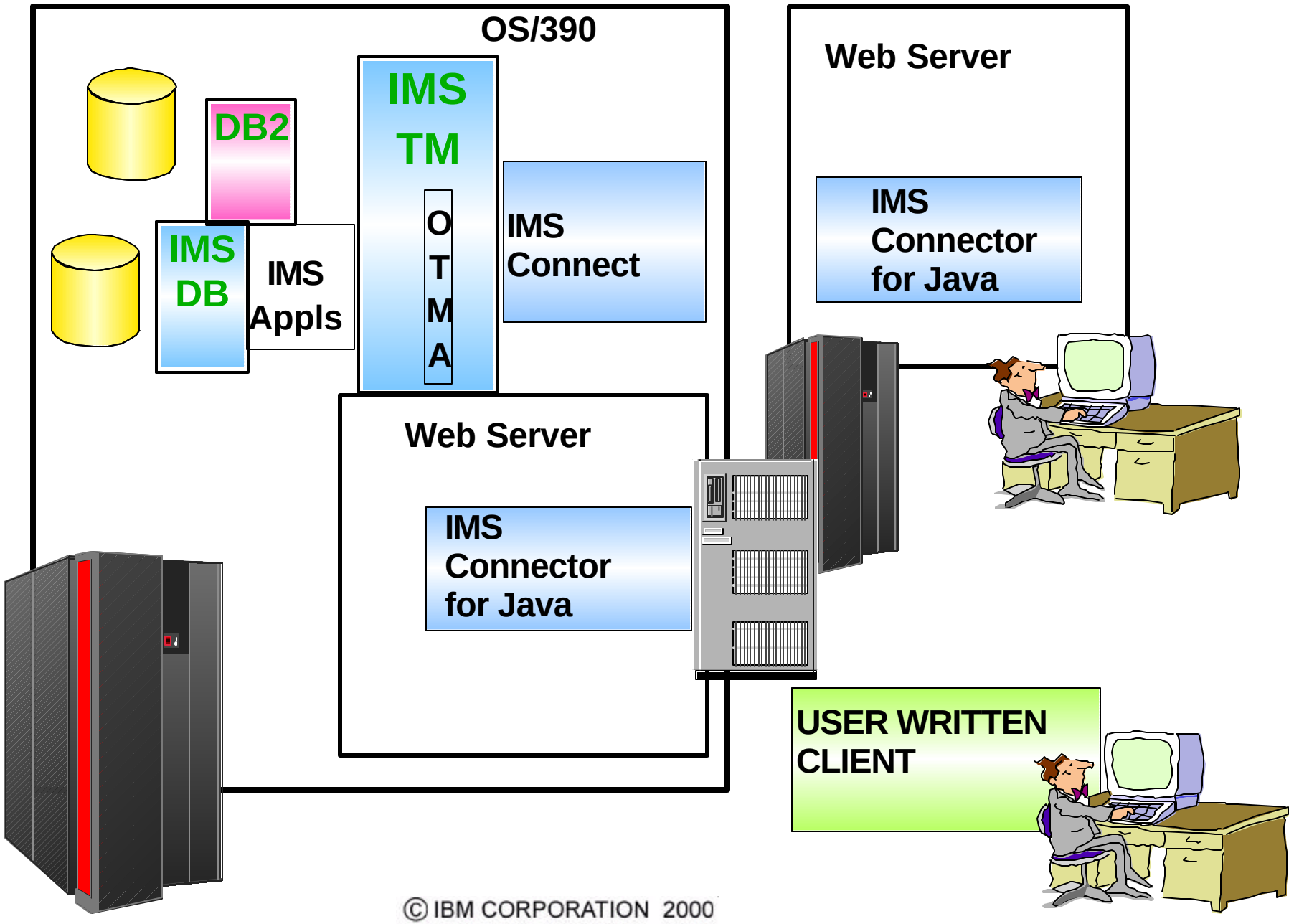
★ IMS CONNECT CONNECTIONS



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★ IMS CONNECT HEADERS

The following structures (headers/trailers) are passed over the TCP/IP Socket to communicate information between IMS Connect, the IMS Connect User Message Exit and the Client.

- **IRM - Sent on input to IMS Connect, to pass required information from the client to IMS Connect and the IMS Connect User Message Exit.**
  Built by the Client., (defined by IMS Connect, User Msg Exit and Client)

- **CSM - Sent on output to Client, to notify Client that the message is good.** ***Built by the User Message Exit, (defined by User Msg Exit and Client)***

- **RSM - Sent on output to Client, to notify Client that an error occurred during the processing of the input or output message. A Return Code and Reason Code is returned in the RSM to identify the error that occurred.**
  Built by the User Message Exit, (defined by User Msg Exit and Client)

- **RMM - Optionally sent on output to the Client, when the previous input to IMS Connect requests that the MFS Modname be returned.**
  Built by the User Message Exit, (defined by User Msg Exit and Client)

Additional detail follows in appendix A

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★ IMS CONNECT CLIENT FUNCTIONS

- CONNECT
- SEND *(requires IRM)*
  - DATA
  - RESUME TPIPE COMMAND FUNCTION
  - SENDONLY COMMAND FUNCTION & DATA
  - ACK
  - NAK
  - DEALLOCATE COMMAND FUNCTION
- READ
  - DATA with RMM and CSM
  - DATA with CSM
  - RESPONSE (RSM)
- DISCONNECT

Additional detail follows in appendix B

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IMS CONNECT ADDITIONAL CLIENT FUNCTIONS

- COMMIT MODE 0 (COMMIT SEND)
- COMMIT MODE 1 (SEND COMMIT)
- SYNCH LEVEL NONE
- SYNCH LEVEL CONFIRM

Additional detail follows in appendix C

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★ EXITS USED BY IMS CONNECT

- USER INITIALIZATION EXIT
- USER MESSAGE EXITS
- OTMA PRE-ROUTING EXIT
- OTMA DESTINATION RESOLUTION EXIT

Additional detail follows in appendix D

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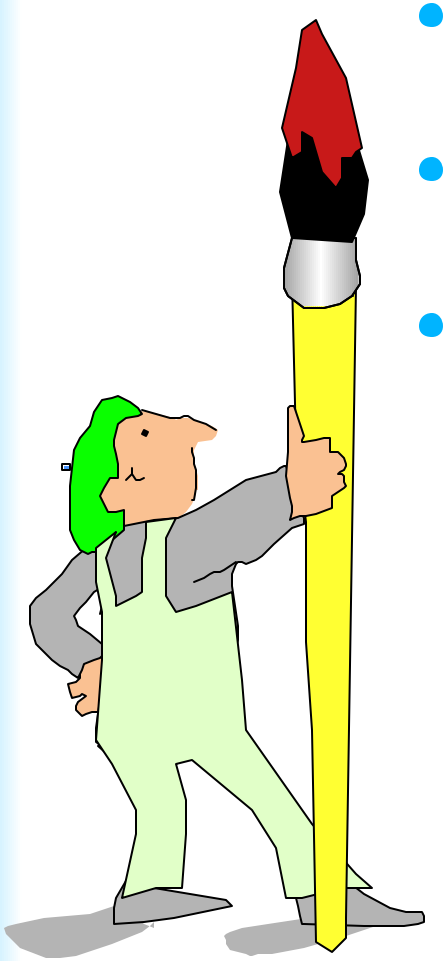
★ SOCKET TYPES



- PERSISTENT SOCKET
- TRANSACTION SOCKET
- NON PERSISTENT SOCKET

  (*NEVER USE NON PERSISTENT SOCKET OPTION)*

Additional detail follows in appendix E

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★ IMS CONNECT COMMANDS

- CLOSEHWS
- OPENDS
- OPENPORT
- RECORDER
- SETRACF
- STOPCLNT
- STOPDS
- VIEWDS
- VIEWPORT
- VIEWHWS

Use the outstanding IMS Connect WTOR Reply ##command,

Additional detail follows in appendix F

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★ IMS CONNECT BPE COMMANDS

- **DISPLAY**
- **UPDATE**

Use the MVS modify command only.

F jobname,command,

Additional detail follows in appendix F

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★ CONFIGURING IMS CONNECT

- **HWS STATEMENT**
- **TCP/IP STATEMENT**
- **DATASTORE STATEMENT**

EXAMPLES OF CONFIGURATION

Create IMS Connect Configuration Paramerer PROCLIB Member (*member_name*)

Specify the IMS Connect PROCLIB member name by coding HWSCFG=*member_name* statement in the IMS Connect address space startup JCL

EXEC HWSHWS00,PARM='HWSCFG=*member_name*,.....'

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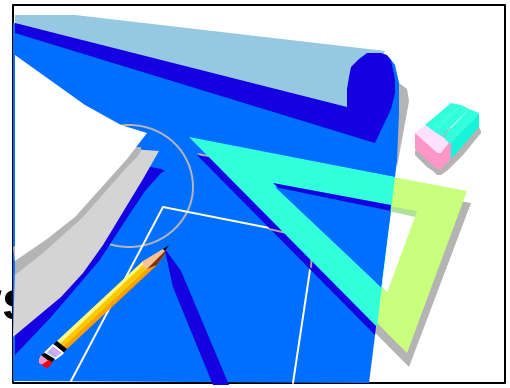
HWS STATEMENT



- HWS: specify only one HWS Statement
- The HWS statement parameters are as follows

  - HWS (ID=hwsname,RACF=char,XIBAREA=value)

  - hwsname: The IMS CONNECT name, which:
    - Consists of alphanumeric character data
    - Begins with an alphabetic character
    - Has a length between 1 and 8 bytes
    - ***(This was used to define the CM1 TPIPE NAME)***

  - char: RACF call option
    - Y=Yes IMS Connect to issue RACF call
    - N=No IMS Connect is not to issue RACF call

  - value: Number of fullwords to be allocated for the XIB for user usage

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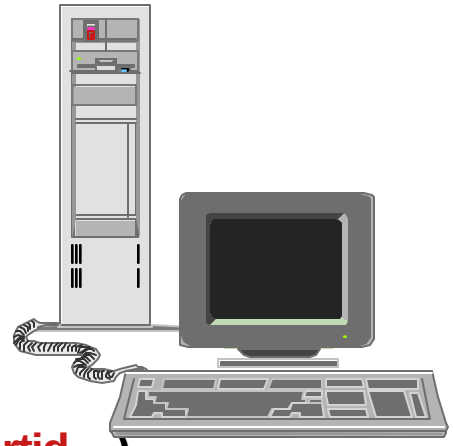
TCP/IP STATEMENT



- TCP/IP: Specify **only one** TCP/IP Statement.
- The TCP/IP statement parameters are as follows.
  - TCP/IP (HOSTNAME=hostname,RACFID=racfid,PORTID=(portid,...), ECB=char,MAXSOC=socvalue,TIMEOUT=tovalue,EXIT=(exitname,...)
  - hostname: An 8-byte character field set to the TCP/IP JOB name.
  - racfid: An 8-byte character field set to the default RACF ID for IMS CONNECT to pass to OTMA for security checking.
  - portid: 1 to 8-byte character fields set to the port number that will bind to the socket. ***(Used to define the CM1 TPIPE name)***
  - char: TCP/IP performance option.
    - N=NO IMS Connect will not enable the TCP/IP performance opt.
    - Y=YES IMS Connect will enable the TCP/IP performance option (Requires TCP/IP 3.7 or later)
  - socvalue: The number of Sockets (per port) that will be allowed to be connected to IMS Connect.
  - tovalue: The timeout value to wait for IMS to respond to a read from IMS Connect and the value to wait for the Client to respond to a read from IMS Connect.
  - exitname: The User Messagd Exits that receive control for messages received from and sent to TCP/IP clients. Exits are 8-byte character names.

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DATASTORE STATEMENT

- DATASTORE: Specify one DATASTORE Statement for each connection to IMS
  - There can be multiple connections to the same IMS copy
  - And connections to multiple IMS's
- The parameters for the DATASTORE statement are as follows:
  - DATASTORE (ID=dsname,GROUP=groupname,MEMBER=memname, TMEMBER=tmembername,DRU=druname)
  - dsname: The DATASTORE name, which:
    - Consists of alphanumeric character data
    - Begins with an alphabetic character
    - Has a length between 1 and 8 bytes

  - groupname: The XCF group name to which IMS OTMA belongs. IMS CONNECT uses this value to join the appropriate XCFgroup. The group name must match the name you define to IMS.
  - membername: The XCF member name that identifies IMS CONNECT in the XCF group.
  - tmembername: The XCF member name that identifies the IMS OTMA to which this IMS Connect is to communicate with in the XCF group.
  - druname: The name of the OTMA DRU exit to be used by OTMA for this IMS Connect.

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★ EXAMPLES OF IMS CONNECT CONFIGURATION STATEMENT

- **EXAMPLE 1**
  HWS (ID=HWS1,RACF=N,XIBAREA=20)
  TCPIP HOSTNAME=TCPIP,RACFID=SAM,PORTID=(9999,LOCAL),MAXSOC=50,TIMEOUT=40,...)
  DATASTORE (ID=IMSA,GROUP=GROUPA,MEMBER=HWSMEM1,TMEMBER=IMSMEMA,...)

- **EXAMPLE 2**
  HWS (ID=HWS2,RACF=N,XIBAREA=25)
  TCPIP HOSTNAME=TCPIP,RACFID=SAM,PORTID=8888,MAXSOC=50,TIMEOUT=40,...)
  DATASTORE (ID=IMSA,GROUP=GROUPA,MEMBER=HWSMEM2,TMEMBER=IMSMEMA,...)
  DATASTORE (ID=IMSB,GROUP=GROUPB,MEMBER=HWSMEM2,TMEMBER=IMSMEMB,...)
  DATASTORE (ID=IMSC,GROUP=GROUPB,MEMBER=HWSMEM2C ,TMEMBER=IMSMEMC,...)

- **EXAMPLE 3**
  HWS (ID=HWS3,RACF=N,XIBAREA=30)
  TCPIP HOSTNAME=TCPIP,RACFID=SAM,PORTID=7777,MAXSOC=50,TIMEOUT=40,...)
  DATASTORE (ID=IMSB,GROUP=GROUPB,MEMBER=HWSMEM3B,TMEMBER=IMSMEMB,...)
  DATASTORE (ID=IMSC,GROUP=GROUPB,MEMBER=HWSMEM3C,TMEMBER=IMSMEMC,...)

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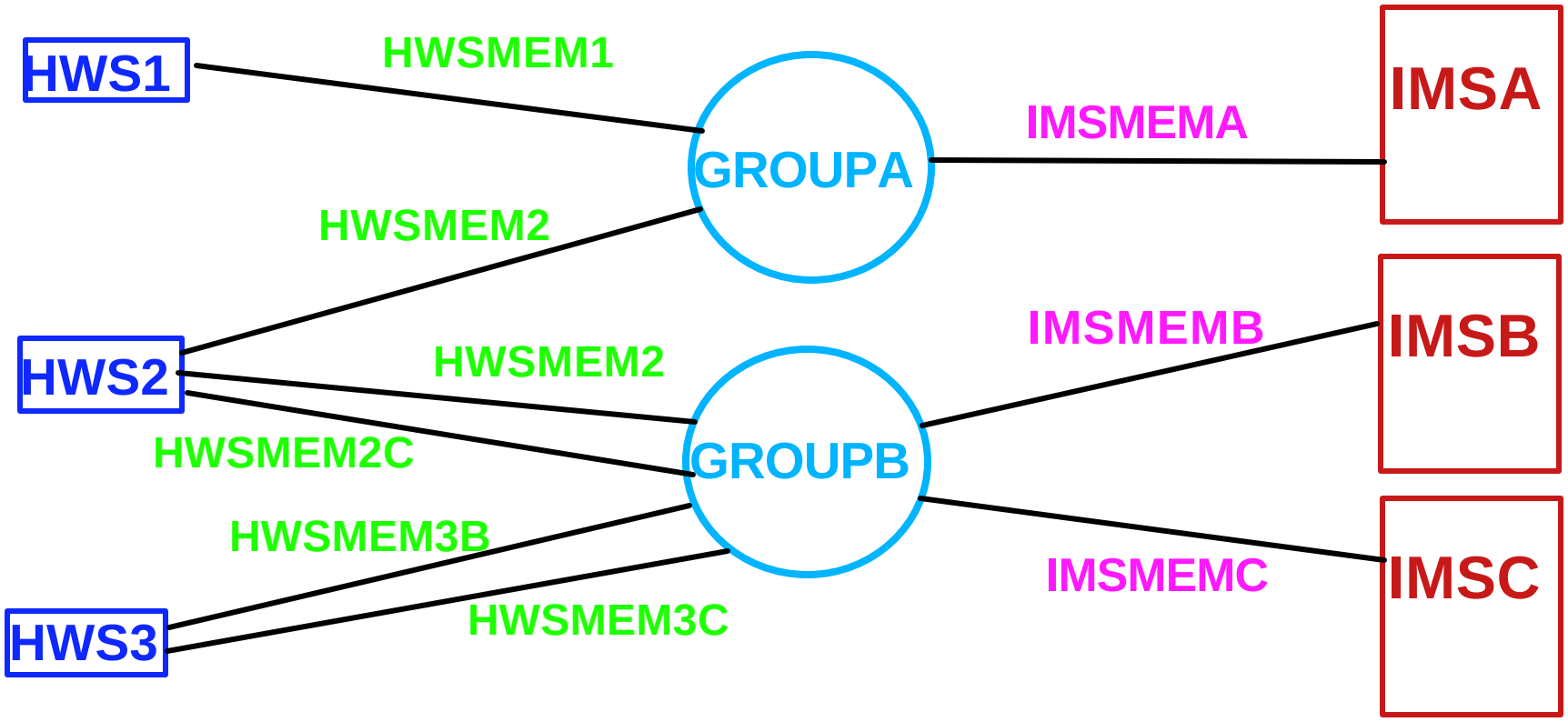
★ IMS CONNECT CONFIGURATION



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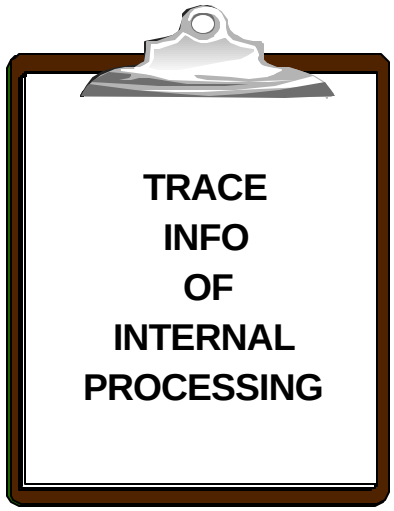
★ IMS CONNECT BPE CONFIGURATION

- Create IMS Connect BPE Configuration Paramerer PROCLIB Member (*member_name*)
- Specify the IMS Connect BPE PROCLIB member name by coding BPECFG=*member_name* statement in the IMS Connect address space startup JCL
  - EXEC HWSHWS00,PARM='.....BPECFG=*member_name*'
- Member parms
  - LANG= defines the language used for IMS Connect messages
    - ENU *U.S. English*
  - TRCLEV= defines the trace level for trace tables, following are the recommended settings:
    - (*,LOW,BPE)
    - ((AWE,HIGH,BPE)
    - (CBS,MEDIUM,BPE)
    - (DISP,HIGH,BPE,PAGES=12)
    - (*,HIGH,HWS,PAGES=12)
    - (CMD,MEDIUM,HWS)
    - (ENVT,MEDIUM,HWS)



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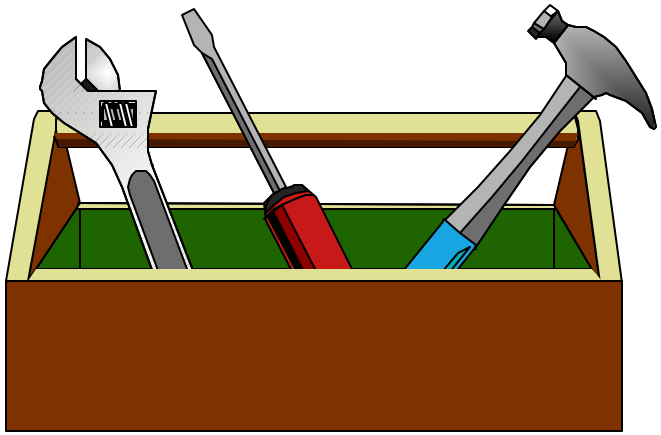
★ FORMATTED DUMP

- FORMATTING OF INTERNAL IMS CONNECT BLOCKS
- PROBLEM RESOLUTION



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★ IMS CONNECT LOCAL SUPPORT

- PROGRAM CALL (PC)
- AVOID TCP/IP FIREWALL PROBLEMS
- PERFORMANCE EQUAL TO TCPIP
- TCP/IP SKILLS NOT ON SYSTEM NOT NEEDED
- SUPPORTS IMS CONNECTOR FOR JAVA ON S/390 ONLY
- SUPPORTS 1 TO N WEBSPHERS
- ONLY 1 LOCAL PORT INTO IMS CONNECT
- 10 TPIPES PER IMS FOR CM1
- IMS CONNECT AND WEBSPHER MUST BE IN SAME LPAR
- THE IMS'S CONNECTED TO LOCAL SUPPORT MUST BE IN THE SAME SYSPLEX, CAN BE ON DIFFERENT LPAR'S

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★ IMS CONNECT UNI-CODE SUPPORT

- SUPPORTS LANGUAGE GROUPS 1, 2 AND 3
- TRANSACTION CODE MUST BE 8 BYTES, LEFT JUSTIFIED AND PADDED WITH BLANKS
- TRANSACTION CODE CAN BE:
  - UNI-CODE
  - EBCDIC
  - ASCII
- THE UNI-CODE DATA IS NOT TRANSFORMED.
- THE IRM AND OTMA HEADERS MUST BE ASCII OR EBCDIC.
- THE UNI-CODE DATA WILL BE SENT TO THE IMS HOST APPLICATION.
- OUTPUT MESSAGE WILL BE SENT TO THE CLIENT AS UNI-CODE.
- IMS ERROR MESSAGES WILL BE SENT TO THE CLIENT AS EITHER ASCII OR EBCDIC BASED ON THE FORMAT OF THE IRM STRUCTURE
- THE IMS HOST APPLICATION MUST BE CAPABLE OF PROCESSING UNI-CODE.
- USER MESSAGE EXIT PROVIDES THE TRANSFORMATION OF THE TRANSACTION CODE.

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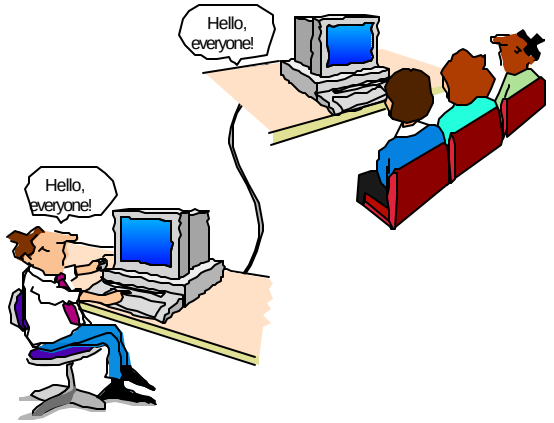
★ ASYNCHRONOUS OUTPUT



- TYPES OF ASYNCHRONOUS OUTPUT
  - ISRT's to Alternate TP PCB.
  - Output that is NAK'd for COMMIT MODE 0.
- NOTIFICATION MECHANISM
  - CSM Flag to notify Client of output, "CSM_FLG1" if set to "CSM_ASY" then ASYNCH output exists for the client.
  - RSM Flag to notify Client of output, "RSM_FLG1" if set to "RSM_ASY" then ASYNCH output exists for the client.
- RETRIEVAL MECHANISM
  - RESUME TPIPE will request retrieval of any data queued in IMS, then the client must issue
  - READ to recieve the Asynchronous output, which must be responded to with
  - A SEND of an ACK or NAK

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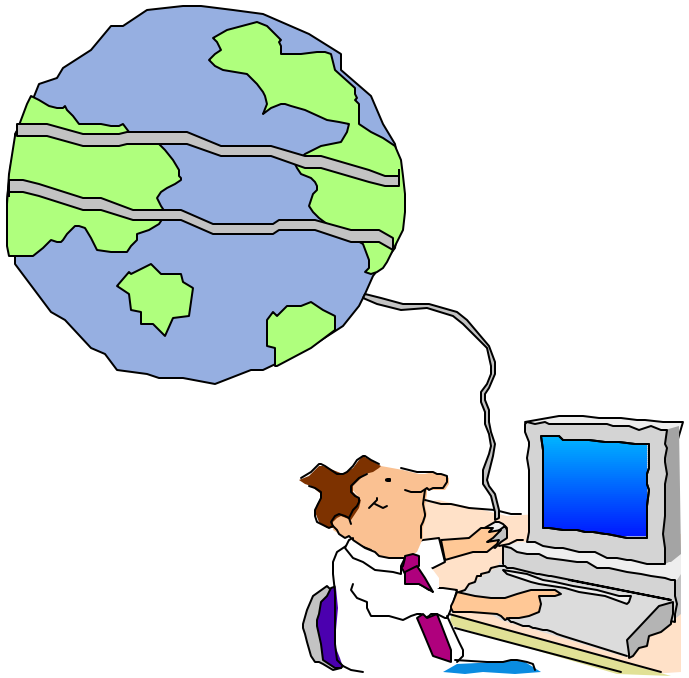
★ USER MESSAGE EXIT ASYNCHRONOUS OPTIONS

- SINGLE
- AUTO
- NOAUTO
- NOOPTION



Additional detail follows in appendix G

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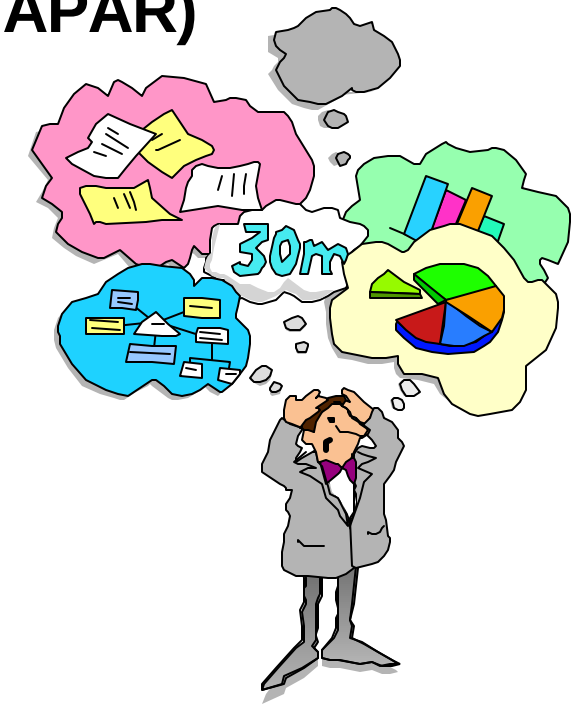
★ MESSAGE STRUCTURES

I. Message sent by Client

II. Message sent to Client, using User Message Exit HWSIMSO0 and HWSSMPL0

III. Message sent to Client, using User Message Exit HWSIMSO1 and HWSSMPL1 (new User Message Exits to be supplied via APAR)



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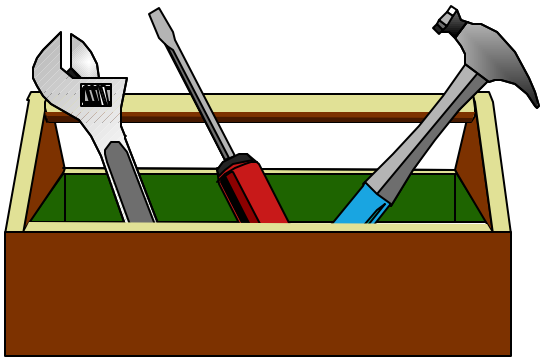
MESSAGE STRUCTURE

MESSAGE STRUCTURE SENT BY CLIENT TO IMS CONNECT

llll IRM..... DATA..... EOM

llll length of entire message
(includes the length of llll, IRM, DATA, and EOM)



IRM llzz IRM DATA
(MSG ID, flag data, lterm override, ...)

DATA llzz Transaction Code Transaction Data
(first input of transaction, contains the Transaction Code and Transaction Data)
OR
llzz Transaction Data (2nd thru nth input of Transaction)

EOM llzz (llzz = X'0004 0000')

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• MESSAGE STRUCTURE

MSG RECEIVED BY CLIENT FROM IMS CONNECT USING HWSSMPL0 and HWSIMSO0

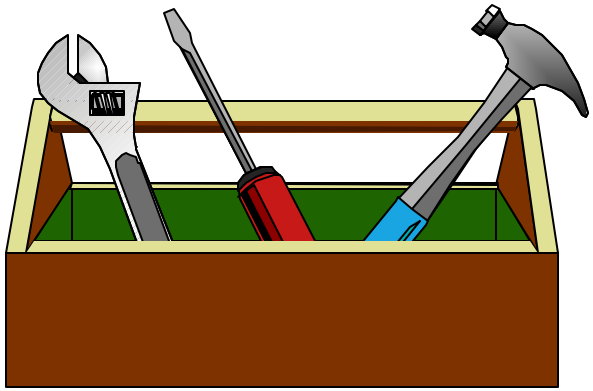
DATA..... CSM

or

RMM DATA..... CSM

or

RSM



DATA llzz Message Data

CSM llzz *CSMOKY* (llzz = X'000C 0000')

RMM llzz *REQMOD* modname (llzz = X'0014 0000')

RSM llzz *REQSTS* rc rs (llzz = X'0014 0000')

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• MESSAGE STRUCTURE

MSG RECEIVED BY CLIENT FROM IMS CONNECT USING HWSSMPL1 and HWSIMSO1

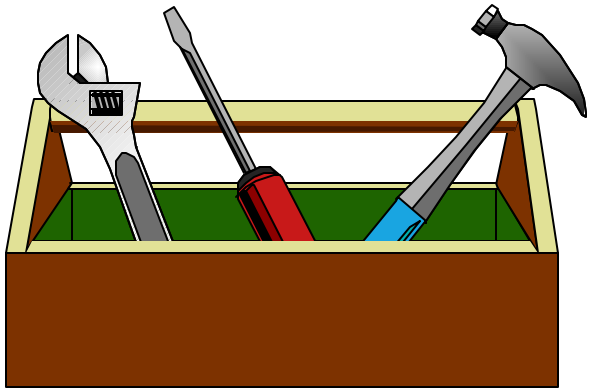
llll DATA..... CSM

or

llll RMM DATA..... CSM

or

llll RSM



llll length of entire message

DATA llzz Transaction Data

CSM llzz *CSMOKY* (llzz = X'000C 0000')

RMM llzz *REQMOD* modname (llzz = X'0014 0000')

RSM llzz *REQSTS* rc rs (llzz = X'0014 0000')

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★ MESSAGE FLOW

CLIENT	IMS CONNECT	USER MSG EXIT	OTMA/IMS

1. connect--------->proc connect
2. send tc/data--->proc msg---------->rebuild/translate msg
   build OTMA hdrs
   proc msg<----------
   send msg---------->proc tran
   receive msg<----------send output
   proc msg---------->rebuild/translate msg
   remove OTMA hdrs
   proc msg<----------
3. read msg<--------send msg
4. *send ack--------->read ack
5. Repeat steps 2 (no tran code) through 4 to conversation completion, if Non-conversation this step is skipped
6. *Read resp<-------send RSM (deallocate commit/abort)
7. Repeat steps 2 through 6 above for next transaction or until you wish to terminate the persistent socket or wish to terminate the connection, if Transaction Socket this step is skipped

8. disconnect------>proc disconnect
   <--------issue disconnect

* = required only if synch level=confirm

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APPENDICE

- APPENCIX HELPFUL HINTS
- APPENDIX A - IMS CONNECT HEADERS
- APPENDIX B - IMS CONNECT CLIENT FUNCTIONS
- APPENDIX C - IMS CONNECT ADDITIONAL CLIENT FUNCTIONS
- APPENDIX D - IMS CONNECT EXITS
- APPENDIX E - SOCKET TYPES
- APPENDIX F - IMS CONNECT COMMANDS
- APPENDIX G - IMS CONNECT BPE COMMANDS
- APPENDIX H - USER MESSAGE EXIT ASYNCHRONOUS OPTIONS

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APPENDIX
Helpful hints

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★ WHY SHOULD THE CUSTOMER DEFINE THE CLIENT ID

- CLIENTID IS USED AS LTERM IN IMS CONNECT
- UNIQUE CLIENTID IS REQUIRED TO BE ABLE TO ISRT TO AN ALTERNATE PCB AND BE ABLE TO DELIVER THE OUTPUT MESSAGE (ASYNCHRONOUS OUTPUT) TO THAT DESTINATION.
- IF PERSISTENT SOCKET THEN A NEW CLIENT ID IS GENERATED BY THE USER MESSAGE EXIT FOR EACH TRANSACTION AND IF NO DISCONNECT THEN THE CONTROL BLOCKS WILL BUILD UP IN IMS CONNECT AND OTMA.
- ONLY A DISCONNECT WILL ELIMINATE THE CLIENTID CONTROL BLOCKS IN IMS CONNECT, AND IT WILL ONLY ELIMINATE THE LAST IMS CONNECT CONTROL BLOCK USED FOR THAT CLIENT.

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★ THINGS TO WATCH OUT FOR

- DO YOU REALLY NEED A TIMEOUT AT THE CLIENT?????
  - ✓ IMS CONNECT TIMER > CLIENT TIMER
    - CAN RESULT IN DUPLICATE CLIENTid's
  - ✓ IMS CONNECT TIMER < CLIENT TIMER
    - CAN RESULT IN ZERO LENGTH READS AT THE CLIENT
  - ✓ TEST SYSTEM THAT REFRESHES THE MPP ON A FIXED TIME (LIKE HOURLY) CAN RESULT IN:
    - CLIENT HANG
    - ZERO LENGTH READS
    - DUPLICATE CLIENTS

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★ TCP/IP TIPS

- TCP/IP "SO_LINGER = Y/N,VALUE=n"
  - SO_LINGER=Y,VALUE=0
    - Immediate return to Client Code
    - Socket Close can bypass data sent and the output will be lost
  - SO_LINGER=N
    - Immediate return to Client Code
    - Socket Close can bypass data sent and the output will be lost
  - SO_LINGER=Y,VALUE=10
    - Return to Client Code when ACK received from host, or wait for 10 sec before sending close.
    - Socket Close will not bypass data sent

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★ TCP/IP TIPS (Continued)

- TCP/IP "TCPNODELAY=ENABLE/DISABLE "
  - TCPNODELAY=ENABLE
    - Data Transmitted per JAVA Write
    - Waits 1 Millisec before Transmission
    - Multiple Writes will result in Multiple Transmissions
  - TCPNODELAY=DISABLE
    - Data Collected from Writes when received from Client
    - Waits till Buffer Full before Transmission
    - Multiple Writes will result in 1 to n Transmissions

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★ TCP/IP & CONNECT TIPS

- **TIMER USAGE IN CONFIG FILE, SO_LINGER VALUES AND CLIENT TIMEOUT SETTING RESULTS**
  - **SO_LINGER=v1,VALUE=v2**
  - **CONFIG FILE TIMEOUT=v3**
  - **Client timeout = v4**

IF v1=(Y or ENABLED or ON) AND
IF v2=0
THEN possible DUPLICATE CLIENT

IF v1=(N or DISABLED or OFF)
THEN possible DUPLICATE CLIENT

IF (v4 + v2) < v3 (if no v4 value use zero)
THEN possible DUPLICATE CLIENT

IF v3 < (v2 + v4)
THEN IMS Connect will disconnect if the v3 timer expires and cause the client READ to complete with a zero length READ

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★ IMS CONNECT APARS

APAR PTF DESCRIPTION

- PQ43033 - UQ50504 - 0C4 IN HWSSUST0. *(FF FROM IMS ITOC)*
- PQ44351 - UQ50529 - FORMATTED DUMP SUPPORT OF 64 BIT MACHINE. *(IN HOUSE)*
- PQ45030 - UQ51332 - RACF FAILURE. *(FF FROM QPP *)*
- PQ45032 - UQ51333 - 0C4 or A78-10. *(FF FROM IMS TOC *)*
- PQ45033 - UQ51335 - OUTPUT BUFFER NOT INCREASED. *(FF FROM QPP *)*
- PQ46000 - UQ51984 - IMS CONNECT BPE BUFFERS FOR FORMATTED DUMP *(IN HOUSE)*
- PQ42980 - UQ51298 - 0C4 IN HWSSTKM$. *(IN HOUSE)*
- PQ45605 - UQ51578 - CLIENT HANGS AT RANDOM. *(FF FROM QPP)*
- PQ45252 - UQ52010 - MESSAGE BUFFER TO SMALL. *(FF FROM IMS TOC)*
- PQ45070 - UQ52011 - RACF PASSWORD EXPIRED NOT CAUGHT. *(FF FROM QPP)*
- PQ45912 - UQ52012 - FORMATTED DUMP SPOOL FUNC NOT WORKING. *(IMS CONNECT 1.1)*
- PQ46193 - UQ52013 - HWSP1450 ISSUED WHEN NO SEC DATA ON ACK. *(IN HOUSE)*
- PQ46194 - UQ52014 - ACTIVATE USER MESSAGE EXIT ASYNCH OPT. *(IN HOUSE)*
- PQ46666 - UQ52628 - IMS CONNECT FORMAT FAILURE. *(IN HOUSE)*
- PQ47345 - UQ53333 - 31 ONLY TYPE STORAGE ADDED TO IMS CONNECT BPE. *(IN HOUSE)*
- PQ47113 - UQ53659 - ASYNCH OUTPUT FROM NON-CLIENT INITIATED TRANS *(IMS CONNECT 1.1)*
- PQ46195 - UQ53629 - ACK/NAK REQUIRED NOTIFICATION IN RSM/CSM. *(NEW FUNCTION)*
- PQ46154 - UQ53532 - TIMING PROBLEM, WITH TERMINATION AND OPENDS. *(IMS CONNECT 1.1)*
- PQ45057 - UQ53771 - LOCAL OPTION SUPPORT. *(NEW FUNCTION)*
- PQ47942 - UQ54396 - REMOVED DEPENDENCE ON TCP/IP TRANSLATE TABLE. *(IMS CONNECT 1.1)*
- PQ47947 - UQ54448 - PROBLEM INTRODUCED BY PQ45252. *(IMS CONNECT 1.1)*
- PQ48182 - UQ55414 - NEW HWSIMSO1 and HWSSMPL1. *(NEW FUNCTION)*
- PQ47906 - UQ55415 - UNI-CODE SUPPORT. *(NEW FUNCTION)*
- PQ50069 - UQ55804 - PRINT FUNCTION OF FORMATTED DUMP NOT WORKING. *(IMS CONNECT 1.1)*
- PQ49779 - UQ55641 - IF STATE DATA < X'48', THEN X'FF' TIMER FAILS. *(IMS CONNECT 1.1)*
- PQ46699 - UQ57286 - TWO RECORDER CLOSE COMMAND IN A ROW FAILURE. *(IMS CONNECT 1.1)*

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★ IMS CONNECT PREREQUISITES

- HARDWARE REQUIREMENTS
  - Host processor capable of running IMS/ESA Version 6.1, 7.1 or later.
- SOFTWARE REQUIREMENTS
  - MVS/System Product Version 4.3, or later.
  - IMS/ESA Version 6.1, 7.1 or later.
  - TCP/IP Version 3.2, 3.4 or later
  - IMS APARS
    - PQ34229
    - PQ34542
    - PQ33929
    - PQ33996

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★ TIMEOUT USAGE

- **TIMEOUT IN IMS CONNECT CONFIGURATION FILE**
  Represents the timeout value that IMS Connect will wait for IMS to return data once the Client data has been passed to IMS. Which represents how long to wait:
  - **in case the IMS application is looping.**
  - **in case the transaction program is stopped.**
  - **in case there is no Dependent Region started.**
  - **before the Client must release the connection**

- **TIMEOUT IN IRM**
  This represents the timeout value that IMS Connect will wait on a Read request to IMS following:
  - **sending the client ACK to IMS**
  - **sending the Client requested RESUME TPIPE**

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APPENDIX A

★ IMS CONNECT HEADERS

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IRM (Input Request Message Prefix)

- Variable Length of IRM (default X'50')
- Reserved 2 bytes
- Msg ID *SAMPLE*
- Reserved word
- Flag5
  - OTMA Hrds built by Client
  - Translation to EBCDIC done by Client
  - Asynch RESUME TPIPE Options
- Timer for Read after ACK/RESUME TPIPE
- Socket type
- Reserved byte
- Client

  THE ABOVE STRUCTURE IS REQUIRED AS DEFINED
- Flag1

  Return MOD Name

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IRM Continued

- Flag2
  - COMMIT Mode
- Flag3
  - Synch Level
- Flag4
  - ACK/NAK/DEALLOCATE/SEND ONLY/RESUME TPIPE
- TRAN Code
- Data Store ID (IMS destination)
- LTERM override
- RACF Data
  - USERID
  - GROUP NAME
  - PASSWORD
- User data that is used by the User Message Exit

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CSM (Output Message Suffix)

As defined and used by: HWSSMPL0, HWSSMPL1, HWSIMSO0, and HWSIMS01

- **Length of CSM X'0C'**
- **ASYNCH output flag**
- **ACK/NAK response required flag**
- **Reserved byte**
- **Msg ID *CSMOKY***

User can modify this structure to map to User Written Message Exit and Client Code

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RSM

As defined and used by: HWSSMPL0, HWSSMPL1, HWSIMSO0, and HWSIMS01

- **Length of RSM X'14'**
- **ASYNCH output flag**
- **ACK/NAK response required flag**
- **Reserved byte**
- **Msg ID *REQSTS***
- **Return Code**
- **Reason Code**

User can modify this structure to map to User Written Message Exit and Client Code

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RMM

As defined and used by: HWSSMPL0, HWSSMPL1, HWSIMSO0, and HWSIMS01

- **Length of RMM X'14'**
- **Reserved 2 bytes**
- **Msg ID *REQMOD***
- **IMS MFS MOD name**

User can modify this structure to map to User Written Message Exit and Client Code

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APPENDIX B

★ IMS CONNECT CLIENT FUNCTIONS

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CONNECT

- CONNECT IS USED TO CONNECT TO IMS CONNECT

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SEND

- SEND IS USED TO SEND DATA TO IMS CONNECT
- SEND IS USED TO SEND COMMAND FUNCTION TO IMS CONNECT
  - RESUME TPIPE (IRM_F4 = IRM_F4_RESUMET)
  - SEND ONLY (IRM_F4 = IRM_F4_SENDONLY)
- SEND
  - ACK (IRM_F4 = IRM_F4_ACK)
  - NAK (IRM_F4 = IRM_F4_NAK)
  - DEALLOCATE (IRM_F4 = IRM_F4_DEALLOC)
- EACH SEND MUST SEND AN ***"IRM"*** STRUCTURE
- THE SEND CAN REQUEST IN THE ***"IRM"***
  (can be overridden or set by User Message Exit)
  - COMMIT MODE
    - SEND COMMIT (COMMIT MODE 1) (IRM_F2 = IRM_F2_CMODE1)
    - COMMIT SENT (COMMIT MODE 0) (IRM_F2 = IRM_F2_CMODE0)
  - SYNCH LEVEL
    - CONFIRM (IRM_F3 = IRM _F3_CONFIRM)
    - NONE (IRM_F3 = IRM_F3_NONE)
  - SOCKET TYPE
    - TRANSACTION SOCKET (IRM_SOCT = IRM_SOCT_TRAN)
    - PERSISTENT SOCKET (IRM_SOCT = IRM_SOCT_PER)
    - NON-PERSISTENT SOCKET (IRM_SOCT= IRM_SOCT_NPER)
  - OTHER FUNCTIONS REQUIRED BY USER MESSAGE EXIT

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– RESUME TPIPE

- RESUME TPIPE ***"VIA A SEND"*** IS USED TO NOTIFY IMS CONNECT ***"HOLD ASYNCH OUTPUT"*** IS TO BE RETRIEVED.

  The IRM and/or exit can be used to control the number of messages that are to be received from IMS Connect.

- TIMER VALUE IN IRM
  - X'00' DEFAULT, WAIT 1/4 SECONDS
  - X'E9' NO TIMER WAIT
  - X'FF' WAIT FOREVER
  - X'01' - X'19' .01 TO .25 SECONDS

- A RECEIVE FROM THE CLIENT MUST FOLLOW THE RESUME TPIPE CALL

- THE IRM FOR RESUME TPIPE MUST HAVE SET;
  - COMMIT MODE ZERO (COMMIT SEND)
  - SYNCHLEVEL CONFIRM
  - TRANSACTION SOCKET

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– RESUME TPIPE (cont)

- TO SUPPORT THE RETRIEVAL OF QUEUED OUTPUT MESSAGES THAT WERE:
  - Inserted TO AN ALTERNATE PCB
    (Results from message switch or program switch)
  - COMMIT MODE 0 DATA NAK'd BY THE CLIENT
    - TCP/IP NETWORK FAILURE
    - NAK SENT BY CLIENT CODE
    - NAK SENT BY IMS CONNECT

- ASYNCHRONOUS OUTPUT RETRIEVAL OPTIONS
  - NO OPTION (IRM_F5 = X'00') DEFAULT, OLD PROCESSING, (=NOAUTO)
  - AUTO (IRM_F5 = IRM_F5_AUTO)
  - NOAUTO (IRM_F5 = IRM_F5_NOAUTO)
  - SINGLE (IRM_F5 = IRM_F5_SINGLE)

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– SENDONLY

- SEND ONLY IS TO SUPPORT NON-RESPONSE TRANSACTIONS
- NO IMS ERROR MESSAGE OF ***"DFS2082 RESPONSE MODE TRANSACTION TERMINATED WITHOUT REPLY."*** SENT TO THE CLIENT

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– ACK

- ACK IS USED TO PROVIDE ***POSITIVE ACKNOWLEDGMENT*** TO MESSAGE
- "SYNCHLEVEL=CONFIRM" SPECIFIED IN THE SEND OF THE TRAN CODE AND DATA OR DATA
- CSM/RSM INDICATES IF ACK/NAK REQUIRED (NEW)
- IRM TIMER VALUE

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– NAK

- NAK IS USED TO PROVIDE ***NEGATIVE ACKNOWLEDGMENT*** TO MESSAGE
- "SYNCHLEVEL=CONFIRM" SPECIFIED IN THE SEND OF TRAN CODE AND DATA OR DATA.
- CSM/RSM INDICATES IF ACK/NAK REQUIRED (NEW)

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– DEALLOCATE

- DEALLOCATE IS USED TO REQUEST THAT IMS CONNECT:
  - TERMINATE THE IMS HOST CONVERSATIONAL APPLICATION (COMMIT MODE 1 SYNCHLEVEL CONFIRM), and
  - TO TERMINATE THE SOCKET CONNECTION,
  - THE CLIENT CODE MUST THEN ISSUE A DISCONNECT

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READ

- READ IS USED TO RECEIVE DATA FROM IMS CONNECT
- READ IS USED TO RECEIVE ERROR RESPONSES (RSM) FROM IMS CONNECT
- READ MUST FOLLOW THE RESUME TPIPE CALL ***"THE RESUME TPIPE IS A SEND FUNCTION"***
- CSM/RSM WILL CONTAIN FLAG TO DENOTE IF ASYNCHRONOUS OUTPUT AVAILABLE FOR THIS CLIENTid

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DISCONNECT

- DISCONNECT IS USED TO DISCONNECT FROM IMS CONNECT

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APPENDIX C

★ IMS CONNECT ADDITIONAL CLIENT FUNCTIONS

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• COMMIT MODE 0

- COMMIT THEN SEND
  - non-conversational transactions supported
  - conversational transactions not supported
  - required for ASYNCH Output Retrieval
- OUTPUT MESSAGES (PURGs) SENT SEPARATELY (Multiple IMS ISRT/ISRT/ISRT/PURG issued by an IMS application are sent as separate messages)
- OUTPUT QUEUED
- SYNCH LEVEL MUST BE FORCED TO ***"CONFIRM"***
- NAK'd OUTPUT MSG's REMAIN ON THE IMS QUEUE
- DB CHANGES COMMITTED
- IF OUTPUT MSG NAK'd, OUTPUT RE-QUEUE'd AND A RESUME TPIPE AND READ REQUIRED TO RETRIEVE THE OUTPUT MESSAGE

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COMMIT MODE 1

- SEND THEN COMMIT
  - non-conversational transactions supported
  - conversational transactions supported
  - ***not supported for ASYNCH Output***
- OUTPUT MESSAGES (PURGs) PACKAGED TOGETHER (Multiple IMS ISRT/ISRT/PURG issued by an IMS application sent as one multi-segment message)
- INPUT MESSAGE IS DELETED AND NOT REPRESENTED TO IMS ON FAILURE
- OUTPUT NOT QUEUED
- SYNCHLEVEL OPTIONS
  - CONFIRM
  - NONE
- OUTPUT MSG TOSSED IF NAK'd
- DB BACKED OUT IF MSG NAK'd

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SYNCH LEVEL = NONE

- NO ACKNOWLEDGMENT REQUIRED FROM CLIENT
- APPLIES TO COMMIT MODE 1 ONLY (SEND THEN COMMIT)

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SYNCH LEVEL = CONFIRM

- ACKNOWLEDGMENT REQUIRED FROM CLIENT
  - ACK
  - NAK
- APPLIES TO COMMIT MODE 1 (Send then Commit)
- APPLIES TO COMMIT MODE 0 (Commit then Send)
- CSM/RSM INDICATES IF ACK/NAK REQUIRED (NEW)

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APPENDIX D

★ IMS CONNECT EXITS

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USER INITIALIZATION EXIT

- RECEIVES CONTROL DURING IMS CONNECT INITIALIZATION AND TERMINATION ONLY
- PERFORM CUSTOMER PROVIDED CUSTOMIZED INITIALIZATION AND TERMINATION
- ***DO NOT ADD TO TCPIP STATEMENT EXIT=***
- SAMPLE EXIT ***SOURCE (ONLY)*** SUPPLIED WITH IMS CONNECT
  - XIB TABLE
    - 6 FULLWORDS FOR IMS CONNECT
    - DEFAULT OF 20 FULLWORDS FOR USER
    - MAX OF 500 FULLWORDS FOR USER
  - FUNCTIONS
    - DATA STORE TABLE (Addr stored in XIB)
    - LOAD TABLES
    - OBTAIN STORAGE

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USER MESSAGE EXIT

- IMS CONNECT PROVIDES "HWSJAVA0, HWSIMSO0 and HWSSMPL0"
  - SAMPLE EXITS ***SOURCE (ONLY)*** SUPPLIED WITH IMS CONNECT FULLY FUNCTIONAL FOR
    - HWSJAVA0
    - HWSSMPL0
- IMS CONNECT WILL PROVIDE TWO NEW EXITS "HWSIMSO1 and HWSSMPL1"
  (APAR to provide this function)
  - SAMPLE EXIT ***SOURCE (ONLY)*** SUPPLIED WITH IMS CONNECT FULLY FUNCTIONAL
  - HWSSMPL1 (*SAMPL1*)
  - Only difference is, output sent to Client has a llll length field preceding the data

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• USER MESSAGE EXIT*(cont.)*

- User Ability to Manage Message input/output
  - IRM (variable length)
  - Commit Mode
    - Commit Mode 1 (Send then Commit)
    - Commit Mode 0 (Commit then Send)
  - Synch Level
    - CONFIRM
    - NONE
  - Translation done by Client or Exit
    - ASCII=>EBCDIC (on input from client)
    - EBCDIC=>ASCII (on output to client)
  - Calling User Security Exit
  - RACF Parms - Userid, Groupid & Password
  - Build input OTMA Headers (variable length)
  - Build/Remove output OTMA Headers
  - Override Data Store name
  - Override Client name
  - Override LTERM name
  - ACK/NAK/DEALOCATE - ASYNCH OUTPUT AVAILABLE
  - RESUME TPIPE and ASYNCH OPTIONS
  - SEND ONLY
  - CSM, RSM and RMM response build
  - TIMEOUT for READ following sending of ACK/RESUME TPIPE

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OTMA PREROUTING EXIT

- ONLY ONE PREROUTING EXIT PER IMS IMAGE.
- USER ABILITY TO
  - SELECT INITIAL DESTINATION FOR THE OUTPUT
  - DETERMINE WHETHER THE MESSAGE SHOULD BE DIRECTED TO AN OTMA CLIENT OR TO AN IMS TM OUTPUT DEVICE.
  - THIS EXIT CANNOT DETERMINE THE FINAL DESTINATION.
- ***NO DFSPRX0 SAMPLE EXIT SUPPLIED WITH IMS CONNECT***
- ***DFSPBxxx MEMBER IN IMS.PROCLIB MUST HAVE OTMAMD=Y*** IS REQUIRED TO CHANGE MEMBER NAME IN THIS EXIT (IMS 6.1 AND HIGHER)

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OTMA DESTINATION RESOLUTION EXIT

- EACH IMS CONNECT CAN HAVE A DIFFERENT DESTINATION RESOLUTION EXIT.
- USER ABILITY TO MANAGE
  - THE SELECTION OF THE FINAL DESTINATION
- SAMPLE EXIT ***SOURCE (ONLY)*** SUPPLIED WITH IMS CONNECT
- SAMPLE EXIT ESTABLISHES ADDRESSABILITY, LIMITED USABLE FUNCTION

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APPENDIX E

★ SOCKET TYPES

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PERSISTENT SOCKET

- CONNECTION LASTS ACROSS MULTIPLE TRANSACTIONS
- SUPPORTS COMMIT MODE 1 ONLY
- SYNCH LEVEL CONFIRM/NONE
- AVAILABLE TO BOTH
  - USER WRITTEN CLIENT CODE and
  - IMS CONNECTOR FOR JAVA

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TRANSACTION SOCKET

- CONNECTION LASTS FOR A SINGLE TRANSACTION
- SUPPORTED FOR COMMIT MODE 1
- SUPPORTED FOR COMMIT MODE 0
- SYNCH LEVEL CONFIRM/NONE
- AVAILABLE TO BOTH
  - USER WRITTEN CLIENT CODE and
  - IMS CONNECTOR FOR JAVA

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• NON-PERSISTENT SOCKET

- ***INTENDED*** FOR ***IMS WEB ONLY***
- ***"SHOULD NOT"*** BE USED BY USER WRITTEN CLIENTS.
- CONNECTION LASTS ACROSS A SINGLE EXCHANGE, ONE INPUT AND ONE OUTPUT
- ***IS NOT*** TRANSACTION BASED
- SUPPORTED FOR COMMIT MODE 1
- SUPPORTED FOR COMMIT MODE 0
- SYNCH LEVEL CONFIRM/NONE

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APPENDIX F

★ IMS CONNECT COMMANDS

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CLOSEHWS

- CLOSEHWS *QUIESCE/FORCE*

  TERMINATES IMS CONNECT

  - *QUIESCE* ***(default)***

    Controlled shutdown of IMS Connect

  - *FORCE*

    Emergency shutdown of IMS Connect

- VALID SEQUENCES:

  - CLOSEHWS QUIESCE
  - CLOSEHWS FORCE
  - CLOSEHWS QUIESCE
    FOLLOWED BY
    CLOSEHWS FORCE

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OPENDS

- **OPENDS *datastore_id***

  STARTS COMMUNICATION BETWEEN IMS CONNECT AND A DATA STORE

  - ***datastore_id***

    Identifies the DATASTORE that you want to connect to.

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OPENPORT

- **OPENPORT *portid***

  REESTABLISHES IMS CONNECT COMMUNICATION WITH TCP/IP TO ALLOW LISTENING ON THE TCP/IP PORT SPECIFIED.

  - ***portid***

    Identifies the port that the client is using for the TCP/IP connection with IMS Connect.

    For LOCAL Option specify "LOCAL"

    (The LOCAL Option is the NON-TCP/IP support for S/390 communication to IMS Connect across address spaces).

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RECORDER

- RECORDER *OPEN/CLOSE*

  OPENS AND CLOSES THE LINE TRACE DATA SET

  - ***OPEN***

    Open the line recorder trace for input and output messages to and from the user message exit.

  - ***CLOSE***

    Close the line recorder trace for input and output messages to and from the user message exit.

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SETRACF

- **SETRACF *ON/OFF***

  SET THE IMS CONNECT RACF REQUEST ON AND OFF

  - ***ON***

    Enable the RACF user identification and verification

  - ***OFF***

    Disable the RACF user identification and verification

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STOPCLNT

- **STOPCLNT *portid clientid***

  IMMEDIATELY TERMINATES COMMUNICATION WITH A CLIENT USING A SPECIFIC TCP/IP PORT.

  - ***portid***

    Identifies the port that the client is using for the TCP/IP connection with IMS Connect.

    For LOCAL Option specify "LOCAL"

  - ***clientid***

    Specifies the name of the client.

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STOPDS

- **STOPDS *datastore_id***

  IMMEDIATELY TERMINATES COMMUNICATION BETWEEN IMS CONNECT AND A DATASTORE

  - ***datastore_id***

    Identifies the DATASTORE that you want to stop.

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STOPPORT

- **STOPPORT *portid***

  IMMEDIATELY TERMINATES LISTENING ON A TCP/IP PORT

  - ***portid***

    Identifies the port that the client is using for the TCP/IP connection with IMS Connect.

    For LOCAL Option specify "LOCAL"

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VIEWDS

- **VIEWDS *datastore_id/ALL***

  DISPLAYS THE CURRENT ACTIVITY OF A DATASTORE

  - ***datastore_id***

    Identifies the DATASTORE that you want to view.

  - ***ALL***

    Will display DATASTORE information for all DATASTORE currently active.

    DATA DISPLAYED IS:

    - **DATASTORE NAME**
    - **DATASTORE STATUS**
    - **XCF GROUP NAME**
    - **IMS CONNECT XCF MEMBER NAME**
    - **IMS OTMA XCF MEMBER NAME**

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VIEWHWS

- **VIEWHWS**

  DISPLAY THE CURRENT ACTIVITY OF IMS CONNECT.

  DATA DISPLAYED IS:

  - **HWS ID**
  - **DATASTORE NAME**
  - **DATASTORE STATUS**
  - **XCF GROUP NAME**
  - **IMS CONNECT XCF MEMBER NAME**
  - **IMS OTMA XCF MEMBER NAME**
  - **PORT ADDRESS**
  - **PORT STATUS**
  - **CLIENTID**
  - **USERID**
  - **TRAN CODE**
  - **CLIENT STATUS**
  - **SECOND CLIENT IN SPECIFIED STATUS**
  - **IP ADDRESS**
  - **CLIENT PORT NUMBER**

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VIEWPORT

- VIEWPORT *portid*

  DISPLAY THE CURRENT ACTIVITY OF SELECTED PORT NUMBER

  - ***portid***

    Identifies the port that the client is using for the TCP/IP connection with IMS Connect.

    For LOCAL Option specify "LOCAL"

    DATA THAT IS DISPLAYED IS:

    - PORT ADDRESS
    - PORT STATUS
    - CLIENTID
    - USERID
    - TRAN CODE
    - CLIENT STATUS
    - SECOND CLIENT IN SPECIFIED STATUS
    - IP ADDRESS
    - CLIENT PORT NUMBER

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APPENDIX G

★ IMS CONNECT BPE COMMANDS

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• DISPLAY

- **DISPLAY TRACE TABLE NAME *table name* OWNER*(owner)***

  DISPLAY THE CURRENT TRACE LEVEL AND NUMBER OF TRACE TABLE PAGES OF SPECIFIED TRACE TABLES.

  - ***table name***

    The IMS Connect tables (CMDT ENVT HWSI HWSW OTMA TCPI)

  - ***owner***

    The owner of the specified tables (HWS BPE)

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• UPDATE

- **UPDATE TRACETABLE NAME *table name* OWNER*(owner)* LEVEL*(level)***

UPDATE THE TRACE LEVEL ATTRIBUTES OF SPECIFIED TRACE TABLES.

table name

The IMS Connect HWS tables (CMDT, ENVT, HWSI, HWSW, OTMA, and TCPI). The IMS Connect BPE tables (AWE, CBS, CMD, DISP, ERR, LAC, MISC, SSRV, STG, and USRX)

- ***owner***

  The owner of the specified tables (HWS BPE)

- ***level***

  Specifies the level setting for the trace table (NONE, ERROR, LOW, MEDIUM, HIGH, or INACT)

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APPENDIX H

★ USER MESSAGE EXIT ASYNCHRONOUS OPTIONS

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SINGLE (RESUME TPIPE)

SET IRM_F5 TO IRM_F5_ONE

1. Client issues CONNECT function
2. Client issues RESUME TPIPE function
3. Client issues RECEIVE function
4. Message received at Client
5. Client issues ACK to IMS Connect
6. Client issues DISCONNECT function

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NOAUTO (RESUME TPIPE)

SET IRM_F5 TO IRM_F5_NOAUTO

1. Client issues CONNECT function
2. Client issues RESUME TPIPE function
3. Client issues RECEIVE function
4. Message received at Client
   - if zero length received, go to event 7
5. Client issues ACK to IMS Connect
6. Client repeats events 3 thru 5
7. Client issue DISCONNECT function

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NO OPTION (RESUME TPIPE)

SET IRM_F5 TO IRM_F5_NOOPT

1. Client issues CONNECT function
2. Client issues RESUME TPIPE function
3. Client issues RECEIVE function
4. Message sent to Client
   - if zero length received, go to event 7
5. Client issues ACK to IMS Connect
6. Client repeats events 3 thru 5
7. Client issues DISCONNECT function.

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AUTO (RESUME TPIPE)

SET IRM_F5 TO IRM_F5_AUTO

1. Client issues CONNECT function
2. Client issues RESUME TPIPE function
3. Client issues RECEIVE function
4. Message received at Client
   - if zero length received, go to event 7
5. Client issues ACK to IMS Connect
6. Client repeats events 3 thru 5
7. Client issues DISCONNECT function

To keep event 3 from getting a zero length received set the IRM_TIMER value to X'FF' to create dedicated output device.

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APPENDIX I

★ USER MESSAGE EXIT ASYNCHRONOUS OPTIONS

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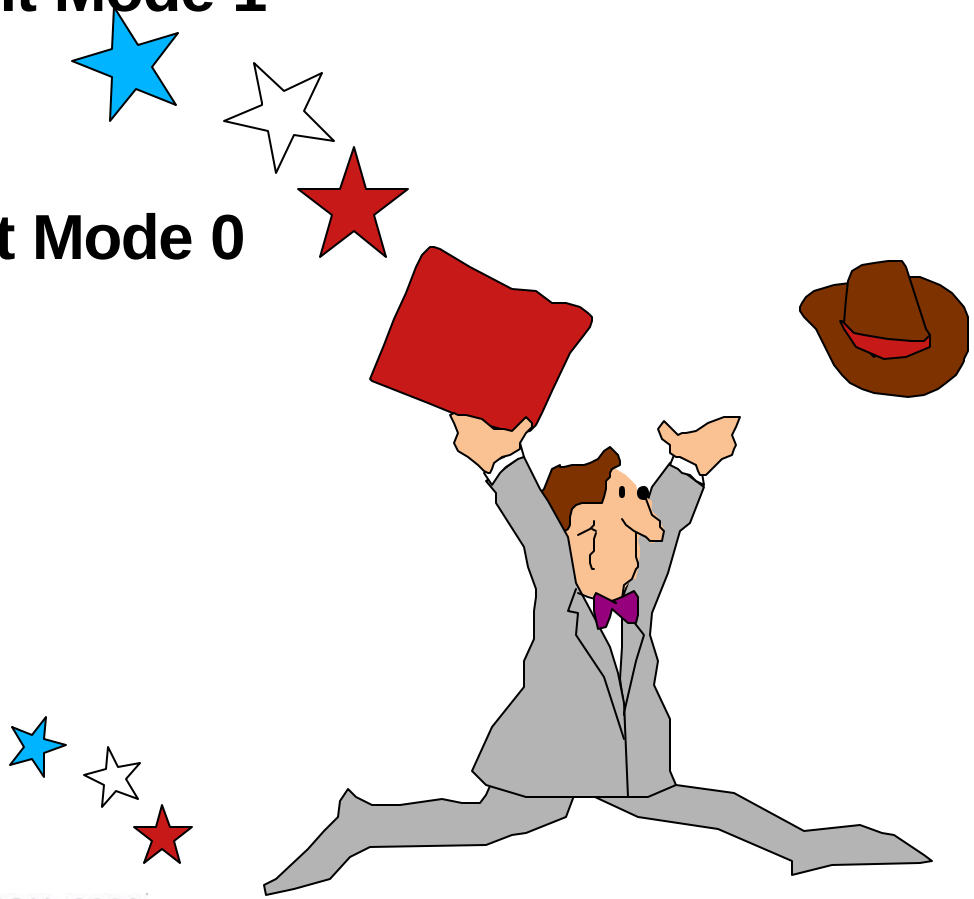
★ SAMPLE MESSAGE FLOW

I. Persistent socket/Commit Mode 1
   a. Conversation
   b. Non-Conversation
II. Transaction socket/Commit Mode 1
   a. Conversation
   b Non-Conversation
III. Transaction socket/Commit Mode 0
   a. Non-Conversation



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I b. Persistent Socket/CM1/Non-Conversation

CLIENT	IMS CONNECT	USER MSG EXIT	OTMA/IMS

1. connect--------->proc connect
2. send tc/data--->proc msg---------->rebuild/translate msg
   build OTMA hdrs
   proc msg<----------
   send msg---------->proc tran
   receive msg<----------send output
   proc msg---------->rebuild/translate msg
   remove OTMA hdrs
   proc msg<----------
3. read msg<------send msg
4. *send ack-------->read ack
5. *Read resp<------send RSM (deallocate commit/abort)
6. Repeat steps 2 through 5 above for next transaction or until you wish to terminate the persistent socket or wish to terminate the connection.

7. disconnect----->proc disconnect
   <-------issue disconnect

* = required only if synch level=confirm

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II a. Transaction Socket/CM1/Conversation

CLIENT	IMS CONNECT	USER MSG EXIT	OTMA/IMS

1. connect--------->proc connect
2. send tc/data--->proc msg---------->rebuild/translate msg
   build OTMA hdrs
   proc msg<----------
   send msg---------->proc tran
   receive msg<----------send output
   proc msg---------->rebuild/translate msg
   remove OTMA hdrs
   proc msg<----------
3. read msg<--------send msg
4. *send ack-------->read ack
5. Repeat steps 2 (no tran code) through 4 to conversation completion
6. *Read resp<-------send RSM (deallocate commit/abort
7. Disconnect------>proc disconnect
   <---------issue disconnect

* = required only if synch level=confirm

Repeat steps 1 through 7 above for next transaction

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II b. Transaction Socket/CM1/Non-Conversation

CLIENT	IMS CONNECT	USER MSG EXIT	OTMA/IMS

1. connect--------->proc connect
2. send tc/data--->proc msg---------->rebuild/translate msg
   build OTMA hdrs
   proc msg<----------
   send msg---------->proc tran
   receive msg<----------send output
   proc msg---------->rebuild/translate msg
   remove OTMA hdrs
   proc msg<----------
3. read msg<-------send msg
4. *send ack-------->read ack
5. *Read resp<------send RSM (deallocate commit/abort
6. Disconnect----->proc disconnect
   <--------issue disconnect

* = required only if synch level=confirm

Repeat steps 1 through 6 above for next transaction

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III a. Transaction Socket/CM0/Non-Conversation

CLIENT	IMS CONNECT	USER MSG EXIT	OTMA/IMS

1. connect--------->proc connect
2. send tc/data--->proc msg-------->rebuild/translate msg
   build OTMA hdrs
   proc msg<----------
   send msg----------->proc tran
   receive msg<----------send output
   proc msg---------->rebuild/translate msg
   remove OTMA hdrs
   proc msg<----------
3. read msg<------send msg
4. send ack-------->read ack
5. Repeat steps 2 (no tran code) through 4 to conversation completion
6. disconnect----->proc disconnect
   <-----issue disconnect

Repeat steps 1 through 6 above for next transaction

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