IMS TCP/IP OTMA Connection User's Guide

itocug-0002-01

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Note

Before using this information and the product it supports, be sure to read the information in “Notices” on page v.

ITOC User’s Guide

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Chapter 1. Overview of the IMS TCP/IP OTMA Connection

- “Introduction”
- “Chapter 2. IMS TCP/IP OTMA Connection Prerequisites” on page 9
- “Chapter 3. How to install and configure the ITOC” on page 11
- “Chapter 4. IMS TCP/IP OTMA Connection user exit support” on page 29

Introduction

The IMS TCP/IP OTMA Connection (ITOC) is a TCP/IP server that enables remote workstations to exchange messages with IMS OTMA. As shown in Figure 1, this server provides communication linkages between remote workstations and IMS (datastores). It supports multiple TCP/IP clients accessing multiple datastore resources. The IMS TCP/IP OTMA Connection runs on an MVS or OS/390 platform. For environmental details, see “Chapter 3. How to install and configure the ITOC” on page 11.

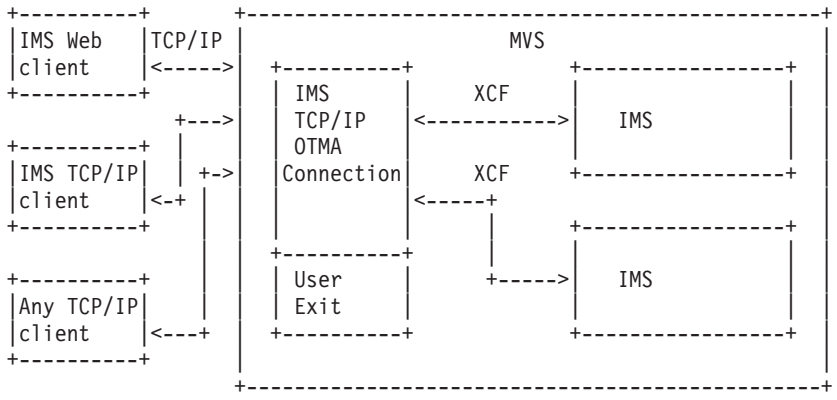


Figure 1. System overview

The IMS TCP/IP OTMA Connection performs router functions between remote workstations and datastores. Request messages received from remote workstations, via TCP/IP connections, are passed to a datastore through XCF sessions. The IMS TCP/IP OTMA Connection receives response messages from the datastore and then passes them back to the originating remote workstations. The IMS TCP/IP OTMA Connection architecture is designed to support IMS Web, but is not limited to working with IMS Web clients.

The IMS TCP/IP OTMA Connection also supports TCP/IP clients communicating with socket calls; for example, existing IMS TCP/IP clients. In order to support any TCP/IP client communicating with a different input data stream format, the IMS TCP/IP OTMA Connection allows user-written programs running in its address space to convert customer message format to OTMA message format before it ships to IMS. The same user-written programs can also convert OTMA message format to customer message format before sending a message back to a client. MVS TCP/IP already has an exit written for general customer use: exit EZAIMSO0. For details, see “Chapter 4. IMS TCP/IP OTMA Connection user exit support” on page 29 .

Components

As shown in Figure 2, the IMS TCP/IP OTMA Connection consists of three core components:

- Workstation communication component (WCC)
- Datastore communication component (DCC)
- Command component (CMD)

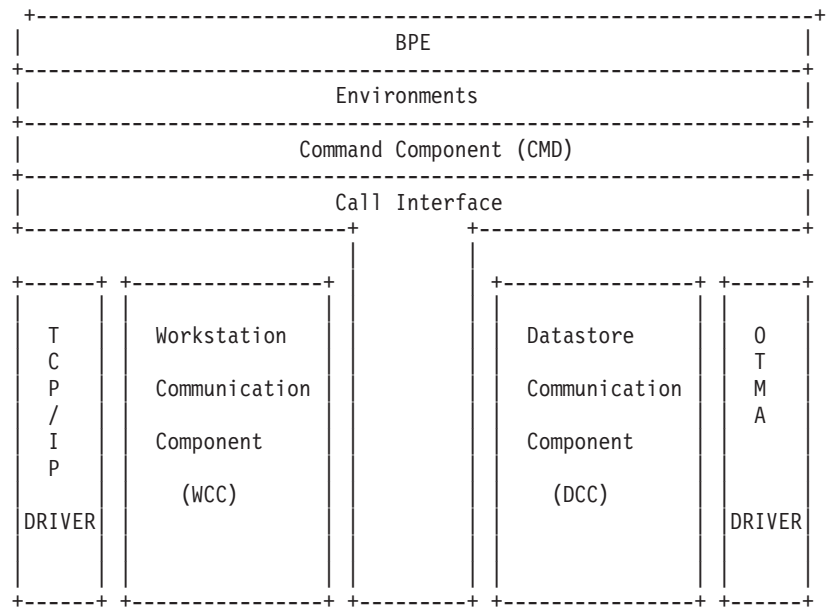


Figure 2. IMS TCP/IP OTMA Connection component layout

In addition to these core components, the IMS TCP/IP OTMA Connection uses a communication driver facility to isolate the core components from the communication software. The TCP/IP driver is used to communicate with IMS Web servers (and their client workstations) using the TCP/IP communications protocol, while the IMS OTMA driver is used to communicate with the datastores (IMSs) using the IMS OTMA communications protocol. Communication between components takes place via the call interface service. The call interface provides the encapsulation and isolation of structures between the components. Each IMS TCP/IP OTMA Connection component provides its own set of functions, which it registers with the call interface. When a component requires that a function be performed by another component, the first component calls the call interface using the following parameters:

- Component name to which the request is to be forwarded
- Function the component is to perform
- Parameters required for the function

The call interface uses a function work element (FWE) to carry information between components.

The base primitive environment (BPE) provides the following base services for the IMS TCP/IP OTMA Connection:

- Environment

- Storage
- Serialization
- Tracing

Workstation communication component

The workstation communication component processes communications between IMS Web servers (and their client workstations) and the IMS TCP/IP OTMA Connection.

Datastore communication component

The datastore communication component handles communications between the IMS TCP/IP OTMA Connection and the IMS datastores.

Command component

The command component processes commands received from the MVS console operator. This release supports the following commands:

Command	Description
CLOSEHWS	Terminates the IMS TCP/IP OTMA Connection (HWS).
OPENDS	Starts a communication session between the HWS and the specified datastore (IMS).
OPENPORT	Reestablishes the communication session between the HWS and the TCP/IP network through the specified port address.
SETRACF	Turns on and off the RACF flag.
STOPCLNT	Immediately terminates the communication session between the HWS and the specified client using the specified port address.
STOPDS	Immediately terminates the communication session between the HWS and the specified datastore (IMS).
STOPPORT	Immediately terminates the communication session between the HWS and the TCP/IP network that uses the specified port address.
VIEWDS	Displays the current status of the specified datastore (IMS).
VIEWHWS	Displays the current status of OTMA Connection.
VIEWPORT	Displays the current status of the communication session between the HWS and the specified port.

For details of these commands, see “IMS TCP/IP OTMA Connection commands” in the *IMS TCP/IP OTMA Connection Programmer’s Reference*.

Driver functions

The following sections list the functions for the TCP/IP communication driver and the OTMA communication driver.

TCP/IP communication driver functions

Open Allocates an open structure, sets up TCP/IP structures, and loads and initializes user exits.

Close Deallocates the open structure and terminates user exits.

Open thread
Allocates a communication structure and initializes a port and listen socket.

Term thread
Deallocates the communication structure and closes the listen socket.

Connect
Creates an accept socket for each request message.

Disconnect
Closes the accept socket.

Transmit
Returns a message to the originating workstation. Invokes a user exit if necessary.

Receive
Receives a message from the workstation. Invokes a user exit if necessary.

Post exit
Driven by MVS TCP/IP, posts a waiting thread when socket calls are completed.

OTMA communication driver functions

Open Allocates an open structure and queries XCF join status.

Close Deallocates the open structure.

Open thread
Allocates a communication structure. Queries an XCF group for the active target member and joins the XCF group.

Term thread
Leaves the XCF group and deallocates the communication structure.

Connect
Issues the client bid to the target server.

Disconnect
Terminates operation.

Transmit
Issues the IXCMSGO send message to MVS/XCF.

Receive
Receives the messages from MVS/XCF.

XCF group exit
Determines if the target member has terminated and alters the ctoken field CXTOKEN_STATE with TERM.

XCF message exit
Allows message exit processing by the HWS when driven by XCF.

Driver function flows

The IMS TCP/IP OTMA Connection is a concurrent server that supports multi-threading for transactional requests. The following sections describe the function flows for the TCP/IP driver and the OTMA driver.

TCP/IP driver flows

Figure 3 shows the TCP/IP driver multi-threading flow.

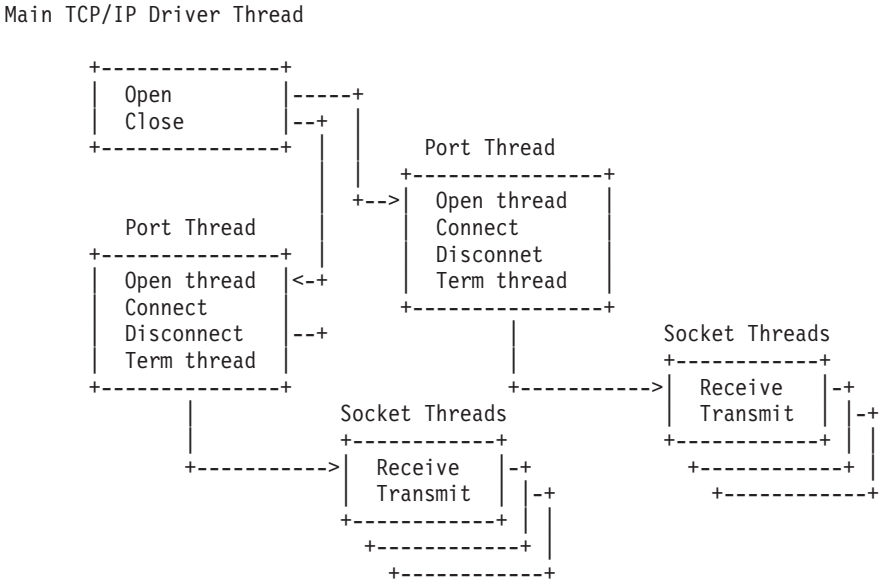


Figure 3. TCP/IP driver multi-threading

For each *portid* defined in the HWSCFG configuration member, the IMS TCP/IP OTMA Connection creates a port thread. This thread does all the initial setup and binds the port with a listen socket. When a request message arrives, the following sequence occurs:

1. The port thread accepts the request and returns to the WCC.
2. The WCC generates a socket thread to process the request.
3. The socket thread receives the entire message and returns to the WCC.
4. The IMS TCP/IP OTMA Connection (ITOC) passes the message to the DCC.
5. The DCC invokes the OTMA driver to retrieve data.
6. When the ITOC receives a response message from the datastore, the socket thread takes control and transmits the message back.
7. The socket thread terminates.

A socket thread exists only for the duration of one data retrieval cycle. It uses the BPE wait-and-post mechanism to optimize system usage.

OTMA driver flows

Figure 4 on page 6 shows the OTMA driver multi-threading flow.

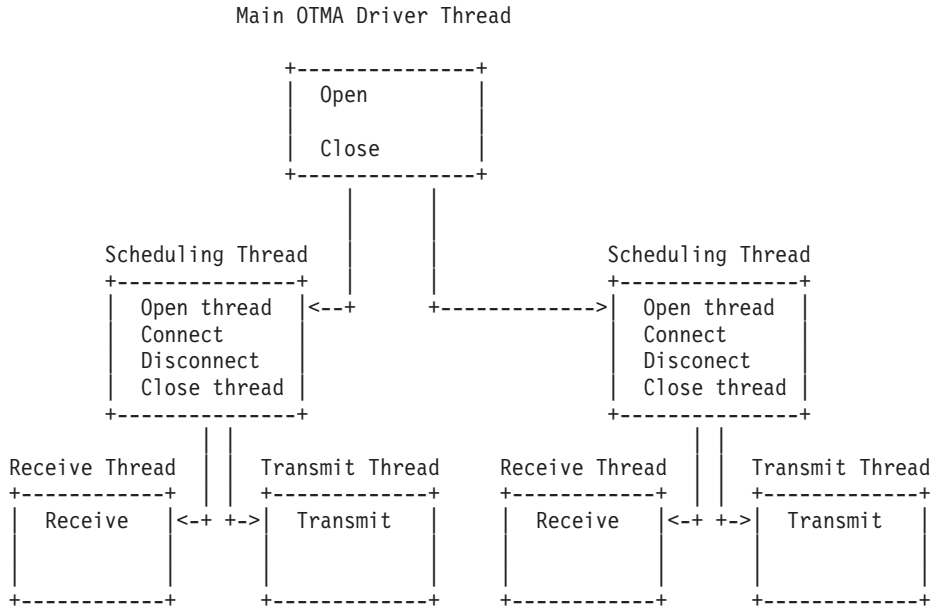


Figure 4. OTMA driver multi-threading

For each datastore that is defined in the HWSCFG configuration member, the IMS TCP/IP OTMA Connection creates a scheduling thread. It then creates a receive thread for receiving messages and a transmit thread for sending them.

Tips

In the following examples the datastore definition is:
`DATASTORE=(ID=DSNAME,MEMBER=HWSNAME,TMEMBER=IMSNAME,GROUP=GRPNAME...)`

1. You can check the status of the IMS TCP/IP OTMA Connection from IMS using the following IMS commands:
   - `/DIS OTMA`
   - `/DIS TMEMBER IMSNAME TPIPE DSNAME`

   /DIS OTMA

   When the IMS TCP/IP OTMA Connection is ready for use, the output of the `/DIS OTMA`command appears as follows:

   ```
   GROUP/MEMBER       XCF-STATUS     USER-STATUS          SECURITY
   GRPNAME
   -IMSNAME           ACTIVE         SERVER               FULL*
   -HWSNAME           ACTIVE         ACCEPT TRAFFIC

   * - CHECK, FULL, NONE or PROFILE depending on the OTMA Security
       setting (for example, enter /SEC OTMA NONE on the MVS system console
       to turn off RACF security for IMS OTMA clients). FULL is
       the default setting for OTMA security at IMS startup.
   ```

   /DIS TMEMBER IMSNAME TPIPE DSNAME

   When a message is sent to the datastore, the output appears as follows:

   ```
   MEMBER/TPIPE     ENQCT     DEQCT    QCT    STATUS
   HWSNAME
   IMSNAME            1         1      0
   ```

2. You can also check status using the following IMS TCP/IP OTMA Connection display commands:
   - VIEWHWS
   - VIEWPORT
   - VIEWDS

   For details of these commands, see “IMS TCP/IP OTMA Connection commands” in the *IMS TCP/IP OTMA Connection Programmer’s Reference*.
3. If you fail to receive a response to a request message sent from an IMS Web client Web browser (or to check the readiness of the host datastore), you can enter the following IMS commands:
   - /DIS A REG
   - /DIS TRAN TranName

   /DIS A REG

   You can use this command to verify that the dependent region where your host application runs is properly configured and ready to accept messages:

   ```
   REGID JOBNAME   TYPE  TRAN/STEP PROGRAM  STATUS   CLASS
       1    Job1   TP                       WAITING  1,  2,  3,  4
   ```

   /DIS TRAN TranName

   You can use this command to verify the class and status of a transaction and whether or not a transaction is currently queued for processing:

   ```
   TRAN     CLS ENQCT   QCT   LCT  PLCT CP NP LP SEGSZ SEGNO PARLM    RC
   TRANNAME   2     1     1 65535 65535  8  8  8     0     0  NONE     0
   ```

   QCT is the number of transactions that are currently queued. ENQCT includes transactions that have been dequeued (processed), as well as those that are currently on the queue.
4. If, when using the IMS or ITOC commands (or whenever you are using the IMS TCP/IP OTMA Connection), you receive an HWSXNNNN error message either on the MVS system console or in the response message at the IMS Web client browser, where X is an alphabetic character and NNNN is a four-digit number, see the explanations and references cited in *IMS TCP/IP OTMA Connection Messages and Codes*.
5. IMS TCP/IP OTMA Connection requires that all active clients, whether they are IMS Web or non-IMS Web TCP/IP clients, have unique client names. IMS Web Runtime creates unique RUNames which identify each request that an application makes to execute an IMS transaction. If you are using non-IMS Web TCP/IP clients, you must ensure that your clients each use a unique client name (see “Using generated code in non-Web applications” in the *IMS Web Programmer’s Reference* for more information). This is the name that is displayed for a client in the “CLIENT=” or “ORIGIN=” fields in *IMS TCP/IP OTMA Connection Messages and Codes*.
6. **Restriction**: Those IMS applications that issue a CHNG call and modify the alternate PCB with a transaction code are not supported. The reason they are not supported is because the originating transaction terminates and the connection to the client is disconnected. The transaction code specified on the CHNG call gets dispatched and its output is asynchronous, which is not supported by ITOC.

What's new in release 210

The following enhancements have been made for release 210:

- Added conversational support
  - Added ability for user to retain message continuity from a client
  - Added new message HWSP1495E
- Enhanced security
  - Added new command, SETRACF
  - Added new error message, HWSP1500E
- Added a new exit routine, HWSWEB00
- Updated installation and configuration
- Added a trace dump example in the messages and codes section
- Added a new exit routine that is supported by ITOC (EZAIMSO0)
- Removed 32K message restriction
- Separation of client ID and LTERM override name
- Input message format has been changed to allow for the removal of the 32K message restriction and separation of LTERM and client ID
- Output format from the exit routine on a READ has been changed to improve performance
- Message structure from the client has changed

  Attention: You must regenerate and recompile any projects generated with earlier versions of IMS Web!

Things to keep in mind:

- Because the message structure from the client has changed, be sure and review the new message structure.
- If you modified the HWSSMPL0 exit routine during installation, you need to make those same changes to the new HWSSMPL0 exit routine.

Reader comment form

A reader comment form is included with the hardcopy version of this book. If you would like to fill out the online version of the reader comment form, please link here or go to http://www.software.ibm.com/data/rcf/.

Chapter 2. IMS TCP/IP OTMA Connection Prerequisites

This section describes the hardware and software prerequisites for IMS TCP/IP OTMA Connection.

Hardware requirements

- Host processor capable of running IMS/ESA Transaction Manager Version 5 or later and IMS/ESA Database Manager Version 5 or later

Software requirements

- MVS/System Product Version 4.2 or later
- IMS/ESA Transaction Manager Version 5 or later
- IMS/ESA Database Manager Version 5 or later
- TCP/IP for MVS Version 3.2 (TCP/IP for MVS Version 3.3 does not support ITOC 2.1)

  Restriction: TCP/IP for MVS Version 3.4 will be supported for the next product refresh
- Resource Access Control Facility (RACF) Version 1.9.2 or equivalent product

Chapter 3. How to install and configure the ITOC

The IMS TCP/IP OTMA Connection (ITOC) provides the following components that enable remote workstations to exchange messages with IMS:

Host Web service (HWS)
An MVS application program that provides the following services:

- Communication to IMS Web Runtime or TCP/IP clients via TCP/IP connections
- Communication to IMS via OTMA connections

Base primitive environment (BPE)
A system-service component that supports IMS and HWS. This component is supplied only for systems running IMS 5.1, which does not include BPE; systems running IMS 6.1 should use the BPE that is installed with IMS 6.1.

Installing and configuring ITOC for IMS 5.1 or IMS 6.1 require the following considerations.

IMS 5.1 considerations
For IMS 5.1 environments, HWSJCLIN must be executed to link edit the ITOC load modules (HWSxxxxx) into an HWS RESLIB. We recommend that you place the ITOC modules in a separate HWS RESLIB.

In an IMS 5.1 environment, HWSBPEIN must be executed to link edit the Base Primitive Environment (BPE) load modules (BPExxxxx) into a separate BPE RESLIB. Placing the HWS and BPE modules in two separate RESLIBs in an IMS 5.1 environment, will make it easier to move to IMS 6.1.

When moving from an IMS 5.1 environment to an IMS 6.1 environment, you will need to replace the BPE RESLIB JCL statement with the IMS 6.1 RESLIB that contains the BPE modules.

In an IMS 5.1 environment, BPE maintenance will be part of ITOC maintenance.

IMS 6.1 considerations
For IMS 6.1 environments, HWSJCLIN must be executed to link edit the ITOC load modules (HWSxxxxx) into an HWS RESLIB. We recommend that you place the ITOC modules in a separate HWS RESLIB.

The HWSBPEIN must NOT be executed.

In an IMS 6.1 environment, ITOC uses the Base Primitive Environment (BPE) load modules in the IMS 6.1 RESLIB. Therefore, you must concatenate the HWS RESLIB and the IMS 6.1 RESLIB, which contains the BPE modules, in the startup JCL for your HWS region.

In an IMS 6.1 environment, BPE maintenance will be part of the normal IMS 6.1 maintenance.

In addition to these two components (HWS and BPE), ITOC includes:

- A sample user exit, HWSSMPL0
- ITOC's associated files, HWSIMSCB, HWSIMSEA, HWSEXPRM, and HWSOMPFX. The associated files can be used with the IMS client for Java™.
- Product installation and release documentation files

This section describes the following:

- "Installing the IMS TCP/IP OTMA Connection" on page 12

- "Defining the IMS TCP/IP OTMA Connection environment" on page 15
- "Invoking the IMS TCP/IP OTMA Connection" on page 23
- "Installing the HWSSMPL0 sample user message exit" on page 24
- "Installing the HWSWEB00 sample user message exit" on page 25
- "Installing the EZAIMSO0 user message exit" on page 25
- "Downloading the IMS client for Java sample program" on page 26
- "Installing the IMS client for Java sample program" on page 26
- "Modifying the sample Java client" on page 26

Installing the IMS TCP/IP OTMA Connection

Attention: ITOC and the IMS client for Java sample program are packaged using Info-ZIP's compression utility to create a self-extracting executable archive (zip) file. This program uses UnZip internally to extract the archived files. Info-ZIP's software (Zip, UnZip and related utilities) is free and can be obtained as source code or executables from various anonymous-ftp sites, including ftp.uu.net:/pub/archiving/zip/* or from the Web at http://www.cdrom.com/pub/infozip/.

To install the IMS TCP/IP OTMA Connection, perform the following actions:

1. IMS TCP/IP OTMA Connection (ITOC) 2.1.0 is available from the Internet. Go to the ITOC home page (http://www.software.ibm.com/data/ims/about/imstoc/) and select the Download icon.
2. From the ITOC download page, select the Download link for IMS TCP/IP OTMA Connection.
3. Fill out the survey and click Submit after accepting the license agreement.
4. In the section "For IMS TCP/IP OTMA Connection", select the link: Download for IMS TCP/IP OTMA Connection v.r.m. This connection downloads to your workstation the file, HWSMH*vrm*.exe (where *vrm* represents the version, release, and modification of ITOC). Using the Save dialog box, save the downloaded file to a temporary directory on a Windows or OS/2 workstation where it will be stored and its contents expanded in the next step.
5. Run the downloaded .exe file, which is a self-extracting, compressed file, by entering `HWSMHvrm.exe` at a Windows or OS/2 command prompt (where again *vrm* represents the version, release, and modification of IMS Web) to expand the contents of HWSMH*vrm* into the current directory. You can enter `HWSMHvrm.exe -t` to check the integrity of the zip file without actually expanding the files.

   Execution of this file generates the sequential files GENLIBB.BIN, BPELOAD.BIN, and LOAD.BIN, along with HTML and text versions of both these installation instructions and a list of changes to the contents of HWSMH*vrm*.exe and two .GIF files that contain graphics used in the HTML version of these installation instructions. Also contained in HWSMH*vrm*.exe is another self-extracting, compressed file, JAVASAMP.exe.

   GENLIBB.BIN contains:

   - A sample link edit job, HWSJCLIN, that you use to link edit the IMS TCP/IP OTMA Connection load modules into a RESLIB
   - HWSUMSG, which can be used to map a user-defined message format
   - A sample IMS Web user exit (HWSSMPL0) for use with ITOC clients

- Two macros (HWSEXPRM and HWSOMPFX) that can be used by that user exit (HWSSMPL0) or any IMS TCP/IP OTMA Connection user exits that you write
- The IMS Web user exit (HWSWEB00), where you can issue a RACF function

LOAD.BIN contains the IMS TCP/IP OTMA Connection load modules, which must be link edited and copied out into the RESLIB that you plan to use for IMS TCP/IP OTMA Connection.

BPELOAD.BIN contains the BPE load modules, which must be link edited and copied out into a RESLIB.

Recommendation: Use a separate load library for BPE in order to simplify migration from IMS 5.1 to IMS 6.1 when you are using ITOC on IMS 5.1.

The sample user exit (HWSSMPL0) contains code to translate messages into the format required by IMS Version 5 Open Transaction Manager Access (OTMA) and is used in conjunction with two macro files, HWSEXPRM and HWSOMPFX.

JAVASAMP.exe contains the IMS client for Java sample program, and HTML and text versions of both the installation instructions and a list of changes to the sample client for Java. See “Installing the IMS client for Java sample program” in the *IMS TCP/IP OTMA Connection Programmer’s Reference* for installation instructions.

Attention: The directory where JAVASAMP.exe is expanded must be located on an OS/2 or Windows drive that supports the long file names used for the expanded files.

6. If your file transfer tool will not do so automatically, allocate three fixed block record format, 80-byte record length sequential data sets, IMSHWS.SEQ.GENLIBB, IMSHWS.SEQ.LOAD, and IMSHWS.SEQ.BPELOAD, into which the sequential data sets will be transferred (see the next step in this procedure). Note that you may use names other than IMSHWS.SEQ.GENLIBB, IMSHWS.SEQ.LOAD, and IMSHWS.SEQ.BPELOAD for these data sets. If you are using IBM’s Personal Communications Workstation Program for Windows 95 (and NT 4), you may set up the file transfer options to automatically create these data sets using the required parameters.

   In the **Setup/Define Transfer-Types** option under the **Transfer** pulldown, enter a name in the **Transfer-Type Names** entry field, select **Fixed** for the Record Format, enter 80 for the Logical Record Length, and leave all other fields blank and all other selections unchecked or unselected. Save this Transfer-Type by pressing the Add pushbutton and then press OK. Be sure to use this Transfer-Type in the next step when sending the sequential files to the host.

   Restriction: The format for these data sets must be as follows:

   ```
   Organization  . . . : PS  (physical sequential)
   Record format . . . : FB  (fixed block)
   Record length . . . : 80  (bytes)
   ```

   Note that it is not necessary to specify a block size.

7. Using PCOMM or FTP from a workstation command prompt, upload the extracted and uncompressed files using binary transfer mode into the sequential data sets allocated in the MVS environment in the previous step.

Note that the PCOMM, Send File to Host.., function might not work correctly within ISPF. If you encounter a problem when using PCOMM's Send File to Host.. function while the emulator is in ISPF, exit ISPF so that the emulator is at a TSO READY prompt and try sending the file again.

8. Convert the sequential data sets to partitioned data sets by issuing the following commands from the ISPF 6 (ISPF Command Shell) prompt or from the TSO READY prompt:

```
RECEIVE INDSN(IMSHWS.SEQ.GENLIBB)
DSNAME(IMSHWS.GENLIBB)
RECEIVE INDSN(IMSHWS.SEQ.LOAD)
DSNAME(IMSHWS.LOAD)
RECEIVE INDSN(IMSHWS.SEQ.BPELOAD)
DSNAME (IMSHWS.BPELOAD)
```

Notes:

a. `RECEIVE` is used to restore the data sets because the sequential data sets were created using the `TRANSMIT` command. `TRANSMIT` converted the original partitioned data sets into sequential data sets. `RECEIVE` is used to convert them from sequential data sets back to their original partitioned organization.

b. The input data set names (IMSHWS.SEQ.GENLIBB, IMSHWS.SEQ.LOAD, and IMSHWS.SEQ.BPELOAD in the previous example) are the names of the data sets referred to in steps 6 on page 13 through 8 of this procedure.

c. MVS prompts you for the restore data set names (IMSHWS.GENLIBB, IMSHWS.LOAD, and IMSHWS.BPELOAD in the previous example, or names of your choice) after you have entered the `RECEIVE INDSN(IMSHWS.SEQ.xxx)`commands. It is not necessary to allocate the restore data sets. If they do not already exist, they are created with the proper formats.

Attention: If the restore data sets specified are existing data sets, any existing members are overwritten by like-named members of the input data sets. Therefore, if the same receive data sets are used for successive versions of the IMS TCP/IP OTMA Connection, the previous versions of the HWSJCLIN and HWSBPEIN members will be overwritten during the receive of the new GENLIBB data set and any customization of HWSJCLIN and/or HWSBPEIN will be lost!

d. If IMSHWS.GENLIBB is a temporary data set, copy the members of IMSHWS.GENLIBB to the correct data set. (To receive the GENLIBB members directly into your production PROCLIB data set, specify the correct PROCLIB in place of IMSHWS.GENLIBB.)

9. Modify the HWSJCLIN in the GENLIBB data set to correctly link edit the load modules for the IMS TCP/IP OTMA Connection for your installation. Change the //LOAD DD card to point to the LOADLIB where the IMS TCP/IP OTMA Connection is installed, and then change the //SYSLMOD DD card to point to your RESLIB. Ensure that your RESLIB has enough directory block space. Submit the modified HWSJCLIN, which then builds the RESLIB for you.
10. Modify the HWSBPEIN in the GENLIBB data set to correctly link edit the load modules for BPE for your installation. Change the //LOAD DD card to point to the LOADLIB where this copy of BPE is installed. Then change the //SYSLMOD DD card to point to your RESLIB. Ensure that your RESLIB has enough directory block space and submit the modified HWSBPEIN, which then builds the RESLIB for you.
11. Define the IMS TCP/IP OTMA Connection environment for IMS Web, as described in "Defining the IMS TCP/IP OTMA Connection environment" on page 15 .

Defining the IMS TCP/IP OTMA Connection environment

This section describes how to prepare the environment for the IMS TCP/IP OTMA Connection. To use the information provided in this section, you need a working knowledge of IMS transaction processing, RACF, IMS OTMA, and TCP/IP.

As the following HWS startup JCL statements show, both HWS and BPE have configuration members:

```
//HWS       PROC  RGN=4096K,SOUT=A,
//             BPECFG=BPECFGHT,
//             HWSCFG=HWSCFG00
//*
//*****************************************************************
//*  BRING UP AN IMS TCP/IP OTMA CONNECTION SYSTEM                *
//*****************************************************************
//STEP1    EXEC PGM=HWSHWS00,REGION=&RGN,TIME=1440,
//             PARM='BPECFG=&BPECFG,HWSCFG=&HWSCFG'
//STEPLIB  DD   DSN=HWS.RESLIB,DISP=SHR
//         DD   DSN=BPE.RESLIB,DISP=SHR
//PROCLIB  DD   DSN=USER.PROCLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=&SOUT
//SYSUDUMP DD   SYSOUT=&SOUT
```

Configuring host Web service (HWS)

HWS supports communication between one or more TCP/IP clients and IMS systems. HWS uses TCP/IP for communication with clients and IMS OTMA for communication with IMS. It also provides a mechanism to start or stop TCP/IP clients or datastores through the use of commands.

You can configure HWS to trigger access to multiple IMS TM systems to balance the workload of TCP/IP client requests. If a single IMS TM system cannot handle the workload of TCP/IP client requests, you can use HWS to balance that workload across multiple IMS TM systems.

To configure HWS, perform the following actions:

1. Authorize the Application Program Family (APF).
2. Update the Program Properties Table (PPT) in MVS/ESA. Updating the PPT allows HWS to run in authorized supervisor state and in key 7.
3. Create an HWS configuration member to hold the configuration statements that HWS uses during initialization.

The following sections describe these actions in more detail.

Authorizing HWS to the APF

The resident library in which the HWS modules reside must be authorized to the APF. Create and run a JCL job that authorizes this RESLIB to the APF.

Updating the MVS PPT

Because HWS is executed in supervisor state and key 7, add an entry for it in the MVS Program Properties Table (PPT) as follows:

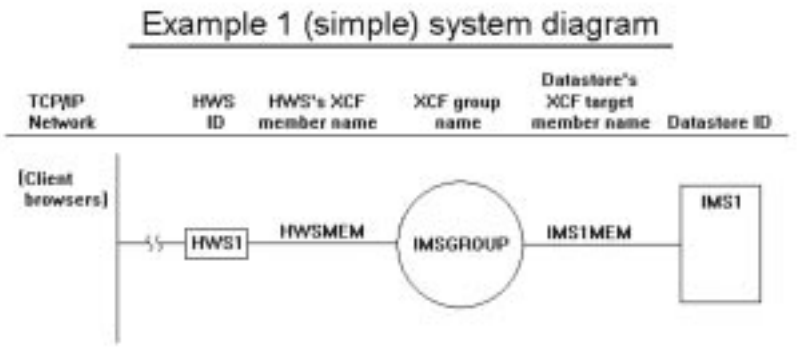
1. Edit the SCHEDxx member of the SYS1.PARMLIB data set.
2. Add the following entry in the MVS PPT:

```
PPT PGMNAME(HWSHWS00)     /* PROGRAM NAME = HWSHWS00           */
         CANCEL           /* PROGRAM CAN BE CANCELED           */
         KEY(7)           /* PROTECT KEY ASSIGNED IS 7         */
         SWAP             /* PROGRAM IS SWAPPABLE              */
         NOPRIV           /* PROGRAM IS NOT PRIVILEGED         */
         DSI              /* REQUIRES DATA SET INTEGRITY       */
         PASS             /* CANNOT BYPASS PASSWORD PROTECTION */
         SYST             /* PROGRAM IS A SYSTEM TASK          */
         AFF(NONE)        /* NO CPU AFFINITY                   */
         NOPREF           /* NO PREFERRED STORAGE FRAMES       */
```

3. To make the changes effective, do either of the following:
   - Re-IPL your MVS system.
   - Issue the MVS `SET SCH=` command.

Creating the HWS configuration member

Specify the environment for HWS as a member in your PROCLIB data set. HWS uses the information it retrieves from the member to establish communication with IMS and TCP/IP. You can define several configuration members in the PDS to select from during HWS startup. Specify the member name to use in the HWSCFG= parameter of the HWS startup JCL (see the previous HWS startup JCL example on page 15). See the following figure for an example of a simple system configuration.



- In the following HWS configuration member, the HWS ID is defined as `HWS01`. This HWS is configured to include the ports defined for TCP/IP communications and the IMS OTMA group and member names for communication with IMS.
- The TCP/IP configuration defines the HOSTNAME as `MVSTCPIP`, the RACFID as `RACFID`, the PORTID as `9999`, and the EXIT as `EZAEXIT`.
- The datastore configuration defines the ID as `IMS1`, the GROUP as `IMSGROUP`, the MEMBER as `HWSMEM`, and the TMEMBER as `IMS1MEM`.

```
************************************************
* HWS EXAMPLE 1 CONFIGURATION FILE
************************************************
HWS (ID=HWS01,RACF=N)
TCPIP (HOSTNAME=MVSTCPIP,RACFID=RACFID,PORTID=(9999),EXIT=(EZAEXIT))
DATASTORE  (ID=IMS1,GROUP=IMSGROUP,MEMBER=HWSMEM,TMEMBER=IMS1MEM)
```

HWS configuration statement parameters

As shown in the previous HWS configuration member example, you specify values for some of the parameters that define the way in which HWS is to communicate with TCP/IP and IMS OTMA, in the HWS configuration member. The HWS configuration member contains three types of configuration statements: HWS,

TCPIP, or DATASTORE. Because the configuration member must be in a dataset whose format is fixed block, 80-byte record length, a statement must be carried over to as many subsequent lines as required if the configuration statement is longer than 80 characters. Configuration statements should have no imbedded spaces or continuation characters at the ends of lines that must be continued to the next line.

HWS Specify only one HWS.

The HWS statement includes only two keyword parameters, which are as follows:

id The HWS name, which:

- Consists of alphanumeric character data
- Begins with an alphabetic character
- Has a length between 1 and 8 characters

racf Provide the RACF user identification and verification using the password and user ID provided from the Web or a user exit routine. Set it to yes or no as follows:

- Y
- N (this is the default)

TCPIP Specify only one TCPIP.

The TCPIP statement keyword parameters are as follows:

hostname
A 1 to 8 alphanumeric character field set to the name of the TCP/IP host.

racfid A 1 to 8 alphanumeric character field set to the default RACF ID for exits to pass to OTMA for security checking if the RACF ID has not explicitly been set in the incoming message.

portid A 1 to 8 character decimal field set to the port number or numbers that will bind to the socket. You can define more than one port as `PORTID=(9999,8888,7777)` to a maximum of 10. Port numbers must be within the range 1 to 65535 and must be selected so as not to conflict with other ports in the TCP/IP domain.

exit A 1 to 8 alphanumeric character field set to the name of the TCP/IP user exit that receives control for messages received from and sent to TCP/IP clients. More than one exit can be defined as `EXIT=(EZAEXIT,EZBEXIT,EZCEXIT)` to a maximum of 15. These exits support users other than IMS Web Runtime to use OTMA linkage through the HWS to IMS.

DATASTORE
To access IMS OTMA, specify each datastore with which the HWS communicates via IMS OTMA.

The DATASTORE statement keyword parameters are as follows:

id The datastore name, which:

- Consists of alphanumeric character data
- Begins with an alphabetic character
- Has a length between 1 and 8 bytes

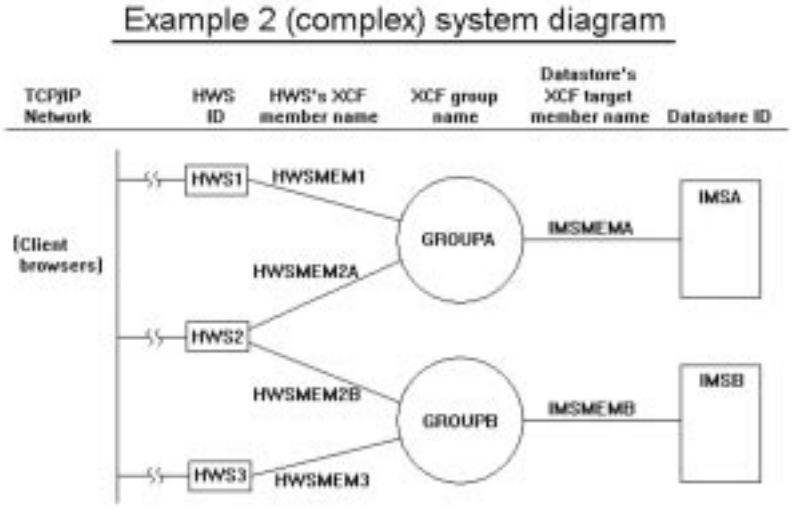
This ID must match the datastore ID that is used in the IMS Web generated (or user generated/modified) CGI source file.

group The XCF group name for the IMS OTMA. HWS uses this value to join the appropriate XCF group(s). Because HWS and IMS must be in the same XCF group in order to communicate, this group name must match the XCF group name that you define to IMS (*GRNAME*) in the IMS startup JCL (for example, ″OTMA=Y,***GRNAME***=&***GROUP***,USERVAR=&MEMBER″,...). Each HWS can join any number of groups

member
The XCF member name for IMS that identifies HWS in the XCF group specified by the &GROUP parameter. This name is the XCF name that IMS uses to communicate with HWS in that XCF group. This XCF member name for HWS must be unique in the datastore definitions for all datastores that are members of the same XCF group.

tmember
The XCF member name for IMS that HWS uses in order to communicate with an IMS in its XCF group. This target member name must match the member name IMS uses when it joins the XCF group. The XCF member name for IMS is specified in the IMS startup JCL in different ways, depending on the version of IMS that you are using and what level of service you have applied. In IMS 5.1 (without PQ12917 applied), the IMS startup parameters must include "...,OTMA=Y,GRNAME=&GROUP,***USERVAR***=&***TMEMBER***,...". In IMS 6.1 (without PQ10195 applied), USERVAR is replaced by APPLID ("...,OTMA=Y,GRNAME=&GROUP,***APPLID***=&***TMEMBER***,..."). With PQ12917 applied to IMS 5.1 or PQ10195 applied to IMS 6.1, USERVAR is replaced by OTMANM (″...,OTMA=Y,GRNAME=&GROUP, ***OTMANM***=&***TMEMBER***,...″). Each datastore definition within an HWS configuration member must contain a unique tmember name.

See the following figure for a complex system configuration.



- In this example, three HWS's are configured. Each HWS has its own configuration member.
- Each HWS uses a different port number for TCP/IP communications and can belong to multiple XCF groups.
- One or more IMS's can belong to each XCF group.
- When defining multiple datastores that belong to the same XCF group in a single HWS configuration member, the XCF member name for that HWS must be unique in each DATASTORE statement. However, if the datastores are members of different XCF groups, the XCF member names may be the same for different datastores within a single HWS configuration member. For example, observe that the XCF member name for HWS in the IMSA and IMSB DATASTORE statements in the HWS2 configuration member in the configuration example below, HWSMEM2, is the same for both DATASTORE statements because the IMSA and IMSB datastores are members of different XCF groups, GROUPA and GROUPB, respectively. Note that these member names could have been made unique, for example, HWSMEM2A and HWSMEM2B, but it is not necessary to do so. However, the XCF member names for HWS in the IMSB and IMSC DATASTORE statements in the HWS2 configuration member are different because the IMSB and IMSC datastores are members of the same XCF group, GROUPB.

```
************************************************
* HWS EXAMPLE 2 CONFIGURATION MEMBER FOR HWS1
************************************************
HWS (ID=HWS1, RACF=N)
TCPIP (HOSTNAME=MVSTCPIP,RACFID=RACFID,PORTID=(9999),EXIT=(EZAEXIT))
DATASTORE          (ID=IMSA,GROUP=GROUPA,MEMBER=HWSMEM1,TMEMBER=IMSMEMA)
************************************************

************************************************
* HWS EXAMPLE 2 CONFIGURATION MEMBER FOR HWS2
************************************************
HWS (ID=HWS2, RACF=N)
TCPIP (HOSTNAME=MVSTCPIP,RACFID=RACFID,PORTID=(9998),EXIT=(EZAEXIT))
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)
************************************************

************************************************
* HWS EXAMPLE 2 CONFIGURATION MEMBER FOR HWS3
************************************************
HWS (ID=HWS3, RACF=Y)
TCPIP (HOSTNAME=MVSTCPIP,RACFID=RACFID,PORTID=(9997),EXIT=(EZAEXIT))
DATASTORE          (ID=IMSB,GROUP=GROUPB,MEMBER=HWSMEM3B,TMEMBER=IMSMEMB)
DATASTORE          (ID=IMSB,GROUP=GROUPB,MEMBER=HWSMEM3C,TMEMBER=IMSMEMC)
************************************************
```

Defining HWS security

You can start HWS as a job or as a procedure.

If the datastore (which is IMS) is RACF protected, you have to start HWS as a job with the JOB card specifying a valid *USERID* in order to make the connection from HWS to IMS. The *USERID=&userid* parameter specified in the JOB card of the HWS job JCL is used as the security vehicle to ensure HWS access to IMS. &USERID must have READ access to *IMSXCF.group.member*. IMS OTMA provides security for the IMS XCF connection by defining and permitting

IMSXCF.group.member in the RACF *FACILITY* class. For details, see “IMS/ESA Open Transaction Manager Access Reference,” the section dealing with security for OTMA.

Configuring base primitive environment (BPE)

The HWS address space is built on top of the BPE. Generally, you do not need to work with the BPE. However, your IBM service representative could request that you change the default settings for certain BPE functions such as storage management, internal tracing, dispatching, and other system-service functions. IMS Web supplies a configuration data set member for BPE system service functions that you can modify.

This section describes how to change or modify the configuration data set member and includes some examples.

Changing the BPE configuration member

To change the settings, you can modify a member of the PDS that the PROCLIB DD card specifies. You select the member to use in the BPECFG= parameter of the HWS startup JCL.

The following example shows a BPE configuration member and the statement parameters. In this example, the TCP/IP to IMS trace includes entries for all component events.

```
********************************************************************
* CONFIGURATION FILE FOR BPE WITH HWS                              *
********************************************************************

LANG=ENU                              /* LANGUAGE FOR MESSAGES     */
                                      /* (ENU = U.S. ENGLISH)      */

#
# DEFINITIONS FOR BPE SYSTEM TRACES
#

TRCLEV=(AWE,LOW,BPE)                  /* AWE SERVER TRACE          */
TRCLEV=(CBS,MEDIUM,BPE)               /* CONTROL BLK SRVCS TRACE   */
TRCLEV=(LATC,LOW,BPE)                 /* LATCH TRACE               */
TRCLEV=(DISP,HIGH,BPE,PAGES=12)       /* DISPATCHER TRACE WITH 12  */
                                      /* PAGES (48K BYTES)         */
TRCLEV=(SSRV,HIGH,BPE)                /* GEN SYS SERVICES TRACE    */
TRCLEV=(STG,MEDIUM,BPE)               /* STORAGE TRACE             */

#
# DEFINITIONS FOR HWS TRACES
#

TRCLEV=(CMDT,HIGH,HWS)                /* HWS COMMAND TRACE         */
TRCLEV=(ENVT,HIGH,HWS)                /* HWS ENVIRONMENT TRACE     */
TRCLEV=(HWSW,HIGH,HWS)                /* SERVER TO HWS TRACE       */
TRCLEV=(OTMA,HIGH,HWS)                /* HWS COMM DRIVER TRACE     */
TRCLEV=(HWSI,HIGH,HWS)                /* HWS TO IMS OTMA TRACE     */
TRCLEV=(TCPI,HIGH,HWS)                /* HWS COMM DRIVER TRACE     */
```

As shown in the previous example of a BPE configuration member, you can specify parameters for LANG and TRCLEV.

Each BPE configuration statement begins with `LANG=` or `TRCLEV=`.

LANG You can specify the language to be used for message text. The default for LANG is ENU (U.S. English), which is the only supported language.

TRCLEV

You can specify different levels of tracing detail for BPE and HWS trace tables. BPE provides several internal trace tables to capture diagnostic information for the services that it provides. In addition, HWS has several trace tables for tracing its functions.

For each trace table type that BPE and HWS support, you can specify one `TRCLEV` keyword and the parameters that control tracing.

The parameters for TRCLEV are as follows:

type Specifies the type of trace table for which you are specifying a tracing level. The *type* parameter is a 1- to 4-character string that indicates the BPE or HWS trace table for which you are specifying a trace.

BPE trace tables

AWE Asynchronous Work Element Services trace table, which traces the activity of internal BPE server processes known as AWE servers. When you specify AWE as the *type*, specify BPE as the *product*.

CBS Control Block Services trace table, which traces requests for control block storage managed by BPE. When you specify CBS as the *type*, specify BPE as the *product*.

DISP Dispatcher trace table, which traces dispatcher activity by use of a sub-dispatching service that HWS uses. When you specify DISP as the *type*, specify BPE as the *product*.

LATC Latch services trace table, which traces internal serialization (latching) calls within the HWS address space. When you specify LATC as the *type*, specify BPE as the *product*.

SSRV General system services trace table, which is used to trace general BPE system service events for services, such as data set handling and printing, that do not have their own specific trace table. When you specify SSRV as the *type*, specify BPE as the *product*.

STG Storage service trace table, which traces storage service requests and module LOAD and DELETE requests made through BPE services. When you specify STG as the *type*, specify BPE as the *product*.

HWS trace tables

CMDT HWS command trace table, which traces command activity. When you specify CMDT as the *type*, specify HWS as the *product*.

OTMA HWS communication driver trace table, which traces internal communication protocol activity (XCF calls). When you specify OTMA as the *type*, specify HWS as the *product*.

TCPI HWS communication driver trace table, which traces communication protocol activity (TCP/IP calls). When you specify TCPI as the *type*, specify HWS as the *product*.

ENVT HWS environment trace table, which traces HWS environment events such as startup and shutdown. When you specify ENVT as the *type*, specify HWS as the *product*.

HWSI HWS to OTMA driver trace table, which traces communication activity between HWS and OTMA drivers. When you specify HWSI as the *type*, specify HWS as the *product*.

HWSW
HWS to TCP/IP driver trace table, which traces communication activity and events between TCP/IP drivers and the HWS. When you specify HWSW as the *type*, specify HWS as the *product*.

level Specifies the volume of trace data recorded in the trace table. You can specify the following levels:

ERROR
Only includes trace entries for error conditions. This is the default trace level for all trace table types listed previously.

HIGH High-volume tracing, which includes entries for all component events, such as every module entered in a call path.

LOW Low-volume tracing, which includes entries for key component events, such as the start of a unit of work (UOW). Use this trace level setting to trace normal HWS operation. If you have operations problems, increase the level of tracing.

MEDIUM
Medium-volume tracing, which includes entries for key component events and some detailed internal component events, such as a component going into an idle state.

NONE No tracing is done for the specified table, even if an error condition occurs. Do not use this level of tracing.

product
Indicates whether the trace table is under the control of BPE or HWS:

- Code BPE for all BPE trace tables
- Code HWS for all HWS trace tables

pages Specifies how many 4K pages to allocate for the trace table type. If you omit this parameter, BPE uses its own default value (usually 2 or 4 pages). Increase this value if the trace table wraps too quickly to find problems.

Examples of using TRCLEV

The following example shows a setting for the AWE services trace table:

```
TRCLEV=(AWE,LOW,BPE)
```

In this example, the AWE trace includes entries for key component events.

The following example shows a setting for the CBS services trace table.

```
TRCLEV=(CBS,MEDIUM,BPE)
```

In this example, the CBS trace includes entries for key component events and some internal component events.

The following example shows a setting for the LATC trace table:

```
TRCLEV=(LATC,LOW,BPE)
```

In this example, the LATC trace includes entries for key component events.

The following example shows a setting for the dispatcher trace table:

```
TRCLEV=(DISP,HIGH,BPE,PAGES=12)
```

In this example, the dispatcher trace includes entries for all component events. BPE allocates 12 pages (48K bytes) for the trace table.

The following example shows a setting for the general system services trace table:

```
TRCLEV=(SSRV,HIGH,BPE)
```

In this example, the general systems service trace includes entries for all component events.

The following example shows a setting for the storage service trace table:

```
TRCLEV=(STG,MEDIUM,BPE)
```

In this example, the storage service trace includes entries for key component events and some internal component events.

The following example shows a setting for the HWS to OTMA driver trace table:

```
TRCLEV=(HWSI,HIGH,HWS)
```

In this example, the HWS to OTMA driver trace includes entries for all component events.

The following example shows a setting for the HWS to TCP/IP driver trace table:

```
TRCLEV=(HWSW,HIGH,HWS)
```

In this example, the HWS to TCP/IP driver trace includes entries for all component events.

The following example shows a setting for the OTMA activity trace table:

```
TRCLEV=(OTMA,HIGH,HWS)
```

In this example, the OTMA activity trace includes entries for all component events.

The following example shows a setting for the TCP/IP activity trace table:

```
TRCLEV=(TCPI,HIGH,HWS)
```

In this example, the TCP/IP activity trace includes entries for all component events.

Invoking the IMS TCP/IP OTMA Connection

You invoke the IMS TCP/IP OTMA Connection using either an MVS procedure or an MVS job. If you start multiple IMS TCP/IP OTMA Connections (HWSs) with the same configuration, a connection outage can occur.

Recommendation: To avoid starting the same IMS TCP/IP OTMA Connection system more than once, start the IMS TCP/IP OTMA Connection by running an MVS job with a unique MVS initiator class assigned to it, rather than starting the connection as a procedure. Using a job to start HWS has the added advantage of allowing you to specify the RACF user id on the JOB card (in fact, your installation's security procedures might require you to specify this user id). The following is an example of such a job.

```
//HWS01    JOB   MSGLEVEL=1,TIME=1440,CLASS=Y,USERID=&USERID
//*********************************************************************
//*  BRING UP IMS TCP/IP OTMA CONNECTION USING A JOB                  *
//*********************************************************************
//HWS01    EXEC HWS,SOUT=A
```

The following example shows the JCL statements required to define the MVS environment for the IMS TCP/IP OTMA Connection.

```
//HWS       PROC  RGN=4096K,SOUT=A,
//             BPECFG=BPECFGHT,
//             HWSCFG=HWSCFG00
//*
//*********************************************************************
//*  BRING UP AN IMS TCP/IP OTMA CONNECTION SYSTEM                    *
//*********************************************************************
//STEP1    EXEC PGM=HWSHWS00,REGION=&RGN,TIME=1440,
//             PARM='BPECFG=&BPECFG,HWSCFG=&HWSCFG'
//STEPLIB  DD   DSN=HWS.RESLIB,DISP=SHR
//         DD   DSN=BPE.RESLIB,DISP=SHR
//PROCLIB  DD   DSN=USER.PROCLIB,DISP=SHR
//SYSPRINT DD   SYSOUT=&SOUT
//SYSUDUMP DD   SYSOUT=&SOUT
```

Use the following parameters to define the values in the JCL:

RGN= Specifies the size of the MVS address space to be allocated for the HWS control program (HWSHWS00).

SOUT=
Specifies the class assigned to SYSOUT DD statements.

BPECFG=
Specifies the name of a member in the PROCLIB data set that contains the BPE specifications.

HWSCFG=
Specifies the name of a member in the PROCLIB data set that contains the HWS configuration information.

Installing the HWSSMPL0 sample user message exit

The purpose of the sample user exit is to provide Internet users with the flexibility to use their own message formats to fit their specific business needs. As the sample program shows, HWSSMPL0 passes back the MOD name that a Java client can use to format its own output messages. You can also use your own formats to pass the client's authentication and have this or another user exit verify client authentication. The user exit offers unlimited possibilities for customization. To install the sample user exit, perform the following steps.

1. Compile HWSSMPL0. HWSSMPL0 and the four macro files, HWSIMSCB, HWSIMSEA, HWSEXPRM and HWSOMPFX, are members of the PDS into which you receive the GENLIBB dataset in step 8 on page 14 of "Installing the IMS TCP/IP OTMA Connection" on page 12 (IMSHWS.GENLIBB in the example).

2. Link edit the output from the compile job to create a loadable module named HWSSMPL0.
3. Copy the load module into your reslib.
4. Modify the IMS TCP/IP OTMA Connection configuration file so that it includes the HWSSMPL0 user exit in the TCPIP statement, as follows:

   ```
   TCPIP=(...,EXIT=(HWSSMPL0),..)
   ```

5. Restart IMS TCP/IP OTMA Connection.

For a description of the user exit message structures, see “User exit message description and structures” on page 43.

Installing the HWSWEB00 sample user message exit

The purpose of this sample user exit is to provide IMS Web users with the flexibility to edit their messages and do their own security checking.

1. Compile HWSWEB00. HWSWEB00 and the four macro files, HWSIMSCB, HWSIMSEA, HWSEXPRM and HWSOMPFX, are members of the PDS into which you receive the GENLIBB dataset in step 8 on page 14 of “Installing the IMS TCP/IP OTMA Connection” on page 12 (IMSHWS.GENLIBB in the example).
2. Link edit the output from the compile job to create a loadable module named HWSWEB00.
3. Replace the load module in your RESLIB.

   IMS TCP/IP OTMA loads the RESLIB module.

For a description of the user exit message structures, see “User exit message description and structures” on page 43.

Installing the EZAIMSO0 user message exit

The EZAIMSO0 user message exit is installed as part of HWSxxxxx module installation, using step 3 of HWSJCLIN. (HWSJCLIN is a sample link-edit job contained in GENLIB.BIN.) During installation, you need to modify the JCL for this exit routine for it to add the TCP/IP library. The following example is the DD statement that you need to change during installation:

```
//AEZAMOD1 DD DSN=W32A.TCPIP.V3R2.AEZAMOD1,DISP=SHR,UNIT=SYSDA,
//     VOL=SER=MVSS06
```

The following lines are the INCLUDE statements for EZAIMSO0 from step 3 of HWSJCLIN:

```
//SYSLIN DD *
  INCLUDE LOAD(EZAIMSO0)   ITOC SUPPLIED TCP/IP EXIT
  INCLUDE AEZAMOD1(EZAAE05F)   TCPIP TRANSLATE TABLES
  ENTRY  EZAIMSO0
  MODE RMODE(24),AMODE(31)
  NAME EXAIMSO0(R)
```

You can add the following INCLUDE statement to add the TCP/IP security exit, IMSLSECX:

```
  INCLUDE USERLOAD(IMSLSECX)
```

Downloading the IMS client for Java sample program

Attention: ITOC and the IMS Client for Java sample program are packaged using Info-ZIP's compression utility to create a self-extracting executable archive (zip) file. This program uses UnZip internally to extract the archived files. Info-ZIP's software (Zip, UnZip and related utilities) is free and can be obtained as source code or executables from various anonymous-ftp sites, including ftp.uu.net:/pub/archiving/zip/* or from the Web at http://www.cdrom.com/pub/infozip/.

1. Following the download instructions for IMS TCP/IP OTMA Connection, download HWSMH*vrm*.exe to a directory on an OS/2 or Windows platform.
2. If you choose to do so, you can enter `HWSMHvrm[.exe] -t` at an OS/2 or Windows command prompt. This will cause an integrity check of the HWSMH*vrm*.exe zip file to execute without actually extracting any of the files from the zip file. To extract files to the current directory, enter `HWSMHvrm[.exe]` at an OS/2 or Windows command prompt.
3. Move the JAVASAMP.exe file from the current directory (the directory into which it was extracted) to a directory on an OS/2 or Windows NT drive that supports long file names. This directory can be the directory where the sample client will be installed or another temporary directory. The remaining files in the directory where HWSMH*vrm*.exe was extracted are used for installing the IMS TCP/IP OTMA Connection.

   Attention: This directory **must** be located on an OS/2 or Windows drive that supports the long file names used for the Java files.
4. Optionally, you can enter `JAVASAMP[.exe] -t` at an OS/2 or Windows command prompt. This will cause an integrity check of the JAVASAMP.exe zip file to execute without actually extracting any of the files from the zip file. Run JAVASAMP.exe by entering `JAVASAMP[.exe]` at an OS/2 or Windows command prompt. The expanded files will be placed in the current directory where JAVASAMP.exe is executed.
5. Following the instructions in the next three sections, install the HWSSMPL0 sample user exit and the Java client.

Installing the IMS client for Java sample program

The IMS client for Java sample program can be installed on any platform on which a Sun compatible Java virtual machine has been installed.

1. The files for the IMS client for Java sample program might need to be copied to the platform where the sample program will be installed. This will be the case if the IMS client for Java sample program is to be installed on a platform other than the one where it was expanded.
2. Modify the source code to match your environment. (See "Modifying the sample Java client".)
3. Enter `javac *.java` at a command prompt for which the current directory is set to the directory containing all of the Java source files for the sample program. This will create the IMS client for Java class files. Java Development Kit v1.1 users can enter `javac -deprecation *.java` to see deprecated methods.

Modifying the sample Java client

You must modify the FrameInput.java file to construct input data that matches your environment (hostname, port number, transaction, and so forth).

The HWSSMPL0 program does not impose any limitations on the number of input and output message segments. The Java client uses multi-segment input and output text areas.

HWS requires that all active clients have unique client LUNAMEs that, for the sample Java client, are taken from the Userid field defined in FrameInput.java. Therefore, if you intend to allow multiple sample Java clients to run simultaneously, which is usually the case, you must either modify the FrameInput.java file so that the Userid will be unique for each active client at any given time or ensure in some other way that the Userid for each active client is unique. For test purposes, just be sure that you use a unique Userid for each Java client when you press the Submit button.

Chapter 4. IMS TCP/IP OTMA Connection user exit support

The IMS TCP/IP OTMA Connection communicates with IMS Web clients using an OTMA message header that is defined in the HWSOMPFX macro, and communicates with IMS via an XCF session. Clients who use TCP/IP Socket calls as their communication vehicle can design a user exit routine that runs with the IMS TCP/IP OTMA Connection to convert messages between formats as follows:

- Convert the client message format to OTMA message format
- Convert the IMS response, in OTMA message format, to client message format

These conversions enable the client to retrieve IMS data via a TCP/IP connection. The IMS TCP/IP OTMA Connection automatically sends and receives messages when they are formatted correctly.

This section describes:

- "How the ITOC communicates with a TCP/IP client"
- "How the ITOC communicates with user exits" on page 35
- "User exit message description and structures" on page 43
- "Macros" on page 55

How the ITOC communicates with a TCP/IP client

The IMS TCP/IP OTMA Connection expects all client messages that it receives to start with a common 32-byte message prefix. The following table shows the fixed format preceding the input message sent to ITOC from IMS Web clients.

Field	Length	Meaning
HDR_LLLL	4 bytes	Length of the total message, including this 32-byte message prefix. This field is read as a big-endian binary number. The value must be between 32 and 10,000,000 inclusive.
HDR_LL	2 bytes	Length of the prefix format. For messages from the IMS Web client, the length is X'1C' or binary '00000000 00011100'.
HDR_ZZ	2 bytes	Reserved.
HDR_ID	8 bytes	Character string. Specifies the identifier of the user exit that is to be driven after the complete message has been received. For details, see "How the ITOC communicates with user exits" on page 35 .
Reserved	4 bytes	Reserved for future use. Initialized to binary zeros.
HDR_FLG5	1 byte	Binary value. Input message type. Binary '10000000' - OTMA headers built by client. Binary '01000000 - translation done by client.
HDR_RESV	3 bytes	Reserved for future use.

Field	Length	Meaning
HDR_CLID	8 bytes	Character string. It specifies the name of the client ID that is used by ITOC. If this string is not supplied from the client, then the user exit must generate it. The client ID is returned to ITOC from the exit in the EXIT PARMLIST field, EXPREA_CLIID.

This message prefix tells the IMS TCP/IP OTMA Connection how long the message is, and to which user exit the message is to be passed. For the complete IMS Web message structure, see the table under “IMS Web message structure - type 1” on page 47 .

The IMS TCP/IP OTMA Connection also supports existing IMS TCP/IP applications, after making modifications to the message structure. In order to support these applications, the IMS TCP/IP OTMA Connection accepts MSGLength of LLLL when `MSGID = '*IRMREQ*'`, in either EBCDIC or ASCII format.

To remove the 32K message restriction and to separate the LTERM override name from the client name, it was necessary in the 2.1 release of ITOC to change the format of the message for TCP/IP applications.

Restriction: ITOC 2.1 no longer supports the TCP/IP message format (IRM format) that was supported by ITOC 1.1 and 1.2.

The base structure for non-IMS Web clients is shown in the following table. It contains the 32-byte message prefix followed by the user-defined structure.

Field	Length	Meaning
HDR_LLLL	4 bytes	Length of the total message, including this 32-byte message prefix. This field is read as a big-endian binary number. The value must be between 32 and 10,000,000 inclusive.
HDR_LL	2 bytes	Length of the prefix format. For messages from the non-IMS Web client, the length includes the common 32-byte prefix plus the user-defined portion.
HDR_ZZ	2 bytes	Reserved.
HDR_ID	8 bytes	Character string. Specifies the identifier of the user exit that is to be driven after the complete message has been received. For details, see “How the ITOC communicates with user exits” on page 35 .
Reserved	4 bytes	Reserved for future use.
HDR_FLG5	1 byte	Binary value. Input message type. Binary ’10000000’ - OTMA headers built by client. Binary ’01000000 - translation done by client.
HDR_RESV	3 bytes	Reserved for future use.

Field	Length	Meaning
HDR_CLID	8 bytes	Character string. It specifies the name of the client ID that is used by ITOC. If this string is not supplied from the client, then the user exit must generate it. The client ID is returned to ITOC from the exit in the EXIT PARMLIST field, EXPREA_CLIID.

Following the client ID (HDR_CLID) of the common portion of the prefix is the user portion, which must have the following (required by ITOC):

Field	Length	Meaning
Datastore ID	8 bytes	The Datastore ID passed by the client can be changed by the exit. The Datastore ID must be returned to ITOC in the HWSEXPRM structure in field EXPREA_DSID.

The following items should be considered for your installation:

- RACF values
  - User ID
    8 bytes
  - Group Name
    8 bytes
  - Pass ticket
    8 bytes
  - Transaction code
    8 bytes
- LTERM override name
  8 bytes
- MFS MOD name
  8 bytes
- Other required data for user-written exit
- Flag bytes for:
  - MFS MOD name to be internal
  - Commit mode
  - Sync level
  - ACK, NACK, and deallocate

Recommendation: If your installation is considering Java and the support of UNICODE, you might want to increase the 8-byte field (starting with client ID) to 16-byte fields, and left justify the data with blank pads to the right. By providing 16-byte fields, you will need to do minimal rework if and when UNICODE support is required.

The following table shows the new TCP/IP (non-IMS Web) fixed format preceding the input message. This format is the format used for both the EZAIMSO0 and HWSSMPL0 exits.

Field	Length	Meaning
HDR_LLLL	4 bytes	Length of the total message, including this 4-byte field. This field is read as a big-endian binary number. The value must be between 32 and 10,000,000 inclusive. The first 32 bytes are the same for all input messages.
HDR_LL	2 bytes	Length of the TCP/IP IRM header. For messages from non-IMS Web clients, the length is X'50' or binary '00000000 01010000'.
HDR_ZZ	2 bytes	Reserved.
HDR_ID	8 bytes	Character string. It specifies the identifier of the user exit that is to be driven after the complete message has been received. For details, see "How the ITOC communicates with user exits" on page 35 .
Reserved	4 bytes	Reserved for future use.
HDR_FLG5	1 byte	Binary value. Input message type. Binary '10000000' - OTMA headers built by client. Binary '01000000' - Translation performed by client.
HDR_RESV	3 bytes	Reserved for future use.
HDR_CLID	8 bytes	Character string. It specifies the name of the client ID that is used by ITOC. If this string is not supplied from the client, then the user exit must generate it. The client ID is returned to ITOC from the exit in the EXIT PARMLIST field, EXPREA_CLIID.
HDR_FLG1	1 byte	Binary value. This value is used to specify if the MFS mod name is to be returned. Binary '00000000' - user requests no MFS mod name to be returned. Binary '10000000' - user requests MFS mod name to be returned. If this value is not supplied by the client, the user exit must use a default value. The MFS mod name flag is returned to ITOC from the exit in the EXIT PARMLIST field, EXPREA_FLAG1.
HDR_FLG2	1 byte	Binary value. It specifies the commit mode. Binary '01000000' - commit mode '0'. Binary '00100000' - commit mode '1'. If this value is not supplied from the client, the user exit must use a default value. The commit mode flag is returned to ITOC from the exit in the OTMA header field, OMHDRSYN.

Field	Length	Meaning
HDR_FLG3	1 byte	Binary value. It specifies the sync level. Binary '00000000' - sync level is 'NONE'. Binary '00000001' - sync level is 'CONFIRM'. If this value is not supplied from the client, the user exit must use a default value. The sync level flag is returned to ITOC from the exit in the OTMA header field, OMHDRSLV.
HDR_FLG4	1 byte	Character value. It specifies if the client is sending: • A = ACK - Positive acknowledgment • N = NACK - Negative acknowledgment • D = DEALLOCATE - Deallocate connection The value is sent to ITOC to be forwarded to IMS. When the value is received and passed to the user exit, the exit builds the appropriate OTMA structure and returns it to ITOC.
HDR_TRAN	8 bytes	Character string. It specifies the IMS transaction code.
HDR_DSID	8 bytes	Character string. It specifies the Datastore name (IMS destination ID). This field must be specified by the client. The Datastore name is returned to ITOC from the exit in the OTMA header field, OMUSR_DESTID.
HDR_LTERM	8 bytes	Character string. It specifies the IMS LTERM override. This field can be set to a valid name or to blanks. The LTERM override name is returned to ITOC from the exit in the OTMA header field, OMHDRLM.
HDR_RFUID	8 bytes	Character string. It specifies the RACF user id. The client must provide it if RACF is to be used. The RACF user id name is returned to ITOC from the exit in the OTMA header field, OMSECUID.
HDR_RFGPN	8 bytes	Character string. It specifies the RACF group name. The client must provide it if RACF is to be used. The RACF group name is returned to ITOC from the exit in the OTMA header field, OMSECGRP.

Field	Length	Meaning
HDR_RFPT	8 bytes	Character string. It specifies the RACF PASSTICKET. The client must provide it if RACF is to be used. The PASSTICKET value is returned to ITOC from the exit in the OTMA header field, OMUSR_PASSTICK.

For the complete non-IMS Web message structure used by the EZAIMSO0 and HWSSMPL0 exits, see the table under “Non-IMS Web message structure - type 2” on page 48. The output from the user exit that is returned to ITOC has a new structure for release 2.1. The change was made to eliminate a series of getmains, freemains, and move operations of the message.

The following table shows the structure (one occurrence per message) of the message returned by the non-IMS Web client exit.

Table 1. Structure 1

Field	Length	Meaning
BPE header	64 bytes	Defined in the following section.
OTMA structure	Total length of OTMA header	See the HWSOMPFX macro (full OTMA structure) at the end of this section.
LLZZDATA	n bytes	• LL - length of segment • ZZ - set to binary zeros • DATA - user data
The above LLZZDATA is repeated to a maximum of 32K overall length. If there is more data, then the structures continues as shown in Table 2.		
LL	2 bytes	LL - set to binary zeros to denote the end of this structure.

The following table shows the structure that is repeated until all data has been mapped to be returned to ITOC.

Table 2. Structure 2

Field	Length	Meaning
BPE header	64 bytes	Defined in the following section.
OTMA structure	32 bytes	See the HWSOMPFX macro (control OTMA structure only) at the end of this section.
LLZZDATA	n bytes	• LL - length of segment • ZZ - set to binary zeros • DATA - user data
The above LLZZDATA is repeated to a maximum of 32K overall length. If there is more data, then the structures continues.		

Table 2. Structure 2 (continued)

Field	Length	Meaning
LL	2 bytes	LL - set to binary zeros to denote the end of this structure.

The following table shows the BPE header layout.

Field	Length	Meaning
LLLL	4 bytes	The length of the total structure and it is set to the first BPE header only. This field is managed by ITOC and must not be altered by the exit.
CHAIN PTR	4 bytes	The chain pointer to the next BPE header within this message. The last BPE header in the message must have binary zeros as a chain pointer value to denote the end of the BPE headers within the message. These chain pointers are set by the non-IMS Web user exit.
STORAGE TYPE	8 bytes	This field is managed by ITOC and should not be modified by the user exit.
TYPE ACCESS	4 bytes	This field is managed by ITOC and should not be modified by the user exit.
SUBPOOL	1 byte	This field is managed by ITOC and should not be modified by the user exit.
Reserved	39 bytes	This field is managed by ITOC and should not be modified by the user exit.

How the ITOC communicates with user exits

When the IMS TCP/IP OTMA Connection starts, it loads user exits one at a time and calls each user exit INIT subroutine.

Example: USREXIT1, USREXIT2, and USREXIT3 are defined in the HWSCFG parameter of the HWS startup JCL as follows:

```
TCPIP=(HOSTNAME=...,EXIT=(USREXIT1,USREXIT2,USREXIT3),...)
```

The IMS TCP/IP OTMA Connection loads USREXIT1 first and calls the USREXIT1 INIT subroutine. After successfully loading USREXIT1, the IMS TCP/IP OTMA Connection loads USREXIT2 and calls the USREXIT2 INIT subroutine, and then

repeats this process for USREXIT3. Any unsuccessful loading or INIT failure prevents the IMS TCP/IP OTMA Connection from connecting with TCP/IP.

Attention: If you define a user exit name in the HWS configuration member, but that user exit cannot be loaded during HWS startup, the job abends with Abend 806, RC=4.

In order to provide full user exit support in the IMS TCP/IP OTMA Connection environment, every user exit routine must include the subroutines INIT, READ, XMIT, TERM, and EXER. Only assembler language exits are supported by IMS TCP/IP OTMA Connection.

When a user exit takes control, it saves the contents of the registers and restores them when returning to the caller. The IMS TCP/IP OTMA Connection provides a 1K buffer in the parmlist to be used for this purpose. The register contents are listed in the following two tables.

Register contents on subroutine entry

Register	Contents
1	Pointer to a parmlist that is defined in the HWSEXPRM macro.
14	Return address of the IMS TCP/IP OTMA Connection.
15	Entry point address to the user exit routine. The entry point name and load module name for a user exit routine must be the same as the name used for the user exit routine in HWSCFG.

Register contents on subroutine exit

Register	Contents
1	Pointer to a parmlist that is defined in the HWSEXPRM macro.

INIT subroutine

After a user exit has been successfully loaded, the INIT subroutine for that user exit is called and a parmlist is passed to that user exit.

Contents of parmlist pointed to by register 1 at entry

Field	Length	Meaning
EXPRM_FUNCTION	4 bytes	Character string of value INIT. Specifies that the function to be performed is: `Initialize user exit`.
EXPRM_TOKEN	4 bytes	Address of a 1K buffer for user exit use. The user exit can use this storage for a save area and for local variables.

The user exit finishes all its initialization processes here. It returns two MSGID identifiers for the messages that it is to handle, as well as the increase to the output buffer size for its READ, XMIT, and EXER subroutines. The user exit returns the *increase* in buffer size, but not the actual buffer size. The only reason to return anything other than 0 is to allow the exit to add data to the data portion of the message. The storage required for the BPE headers and OTMA headers is computed by ITOC. Typically, one of the MSGIDs is used by ASCII clients and the

other by EBCDIC clients. IMS TCP/IP OTMA Connection computes the actual size of the output buffer, and it allocates the buffer size before it passes control to the user exit for READ, XMIT and EXER. The two identifiers can take any value, in EBCDIC or ASCII, other than the two reserved MSGIDs (see the following restriction), provided that the values are both unique among user exits called by a given HWS. Blanks and binary 0 are significant. The IMS TCP/IP OTMA Connection saves these identifiers to identify the owner of the incoming request messages. Any conflict in the identifiers must be resolved before a TCP/IP connection can be made.

Restriction: In addition to the reserved MSGID, `'*IRMREQ*'`, mentioned above for the support of existing IMS TCP/IP applications, `'*HWSWEB*'` is also a reserved MSGID and is used for IMS Web client support. A user exit that tries to use `'*HWSWEB*'` is rejected. In the case of duplicate MSGID identifiers, one of the user exits that uses the conflicting identifier must be dropped or rewritten with a unique identifier. A system administrator should coordinate the assignment of MSGIDs.

Contents of parmlist pointed to by register 1 at exit

Field	Length	Meaning
Reserved	68 bytes	Reserved space.
EXPINI_RETCODE	4 bytes	Binary. Specifies the return code. • 0=INIT function was successful. • 4=INIT function was not successful.
EXPINI_RSNCODE	4 bytes	Binary. Specifies the reason code.
EXPINI_STRING1	8 bytes	Character string. Specifies the first MSGID that clients can use to identify this user exit. This MSGID could be used for ASCII clients.
EXPINI_STRING2	8 bytes	Character string. Specifies the second MSGID that clients can use to identify this user exit. This MSGID could be used for EBCDIC clients.
EXPINI_BUFINC	4 bytes	Binary. Specifies the increase size to the output buffer needed to allow the exit to denote that data will be moved from the exit input buffer to the output buffer to add data to the message if required.
EXPINI_FLAG1	1 byte	Binary. Specifies if data was moved to the exit output buffer. Binary ’00000001’ - Data moved. Binary ’00000000’ - Data not moved. If this is a non-IMS Web exit, this flag must be set to binary ’00000001’. For an IMS Web exit, this flag is set to binary ’00000000’.

If the INIT subroutine fails to complete the initialization function successfully, the IMS TCP/IP OTMA Connection does not connect with TCP/IP. A system programmer can start the connection after the problem has been fixed by issuing the `OPENPORT` command. When all user exits have been loaded and initialized, the IMS TCP/IP OTMA Connection is ready to receive messages from TCP/IP application programs. The IMS TCP/IP OTMA Connection uses the TCP/IP Socket API to receive stream data across the net. The completion of a message is determined by its `MSGLength` value. The IMS TCP/IP OTMA Connection receives data up to the value specified in `MSGLength` and uses `MSGID` to determine which user exit receives control for processing the request message.

READ subroutine

After a complete request message that originated at an IMS Web client has been received, control is passed to the READ subroutine in the user exit whose `MSGID` matches the `MSGID` of that request message and a parmlist is passed to that user exit.

Contents of parmlist pointed to by register 1 at READ subroutine entry

Field	Length	Meaning
EXPRM_FUNCTION	4 bytes	Character string of value READ. Specifies that the function to be performed is: `Read client data and convert it to OTMA format.`
EXPRM_TOKEN	4 bytes	Address of a 1K buffer for user exit use. The user exit can use this storage for a save area and local variables.
EXPREA_INBUF	4 bytes	Address of the input buffer.
EXPREA_IBUFSIZE	4 bytes	Binary. Specifies the size of the input buffer.
EXPREA_OUTBUF	4 bytes	Address of the output buffer.
EXPREA_OBUFSIZE	4 bytes	Binary. Specifies the size of the output buffer.
EXPREA_FLAGI	1 byte	Data string flag • X'80' - Input data contains a MSGID maching `EXPINI_STRING1.` • X'40' - Input data contains a MSGID matching `EXPINI_STRING2.`
Reserved	3 bytes	Reserved space.
EXPREA_RACFID	8 bytes	Character string. Specifies the default user ID for RACF.
EXPREA_NAMEID	0 bytes	Pointer referenced to the next 16 bytes.
EXPREA_FAMILY	2 bytes	Binary. Specifies the client family type.
EXPREA_PORT	2 bytes	Binary. Specifies the client port number.

Field	Length	Meaning
EXPREA_ADDRESS	4 bytes	Client's IP address.
EXPREA_RESERVE	8 bytes	Reserved space.

EXPREA_IBUFSIZE and EXPREA_OBUFSIZE are the sizes of the input buffer and output buffer, respectively. These sizes are not related to the actual length of the input data and output data. The input buffer contains an exact copy of the data that was received from the client. The user exit might need to perform an ASCII-to-EBCDIC conversion on the data so that the data can be properly interpreted by the IMS application. The user exit can use EXPREA_FLAG1 to determine where the data originated and whether an ASCII-to-EBCDIC conversion is required.

The IMS TCP/IP OTMA Connection also supplies the default RACF user ID and the client's TCP/IP connection information to the user exit. At this point, the user exit might edit or filter its client's input data, then translate that data to OTMA message segments and place them in the output buffer. The user exit also must specify the length of the output data in EXPREA_DATALEN.

Contents of parmlist pointed to by register 1 at exit

Field	Length	Meaning
Reserved	68 bytes	Reserved space.
EXPREA_RETCODE	4 bytes	Binary. Specifies the return code. • 0=READ function was successful. Process the data. • 4=READ function was not successful. Send the data in EXPREA_OUTBUF back to client. • 8=READ function was not successful. Just clean up.
EXPREA_RSNCODE	4 bytes	Binary. Specifies the reason code.
EXPREA_DATALEN	4 bytes	Binary. Specifies the size of data in the EXPREA_OUTBUF to be returned to the IMS TCP/IP OTMA Connection. This field is only meaningful when EXPREA_RETCODE = 0 or 4.
EXPREA_CLID	8 bytes	Character string. It specifies the client ID name passed by the client or generated by the exit for non-IMS Web clients only.
EXPREAD_DSID	8 bytes	Character string. It specifies the Datastore ID name passed by the client or generated by the exit for non-IMS Web clients only.

The output buffer contains data when the return code is 0 or 4. When the return code is 4, the data in the output buffer is sent back to the user exit's client, and then the connection is closed and cleaned up. When the return code is 0, the IMS TCP/IP OTMA Connection prepares to present the data to a datastore. EXPREA_UFLAG1 is also saved by the IMS TCP/IP OTMA Connection. This flag is set by the user exit during READ subroutine processing and is used for recording user selected characteristics of the request message. This flag is passed back to the

user exit in the input parmlist pointed to by Register 1 on the next subroutine call, which is either an XMIT or an EXER subroutine call. You define the value of EXPREA_UFLAG1 in the user exit code. The IMS TCP/IP OTMA Connection uses this value to provide a communication vehicle between the READ and XMIT or EXER subroutines on a per request/response message basis. The XMIT and EXER subroutines can thus format the message in a better manner.

If the IMS TCP/IP OTMA Connection detects an error in the output data that would prevent it from properly presenting the data to the datastore (for example, the output data is not formatted properly to conform to the IMS OTMA protocol), the EXER subroutine is called where the error can be dealt with appropriately. If the IMS TCP/IP OTMA Connection does not detect any errors in the output data, the XMIT subroutine is called where the data is passed to IMS OTMA for processing by the datastore. The IMS TCP/IP OTMA Connection then waits until it receives the response message from IMS OTMA. After receiving a response, it calls the XMIT subroutine of the appropriate user exit (based on the MSGID in the response) and passes it an exact copy of the response data that it received from IMS OTMA.

XMIT subroutine

After a complete response message has been received from the datastore, control is passed to the XMIT subroutine in the user exit whose MSGID matches the MSGID of the response message (which in turn matches the MSGID of the original request message) and a parmlist is passed to that user exit.

Contents of parmlist pointed to by register 1 at entry

Field	Length	Meaning
EXPRM_FUNCTION	4 bytes	Character string of value XMIT. Specifies that the function to be performed is: Read OTMA data and convert it to client format.
EXPRM_TOKEN	4 bytes	Address of a 1K buffer for user exit use. The user exit can use this storage for a save area and local variables.
EXPXMT_INBUF	4 bytes	Address of the input buffer.
EXPXMT_IBUFSIZE	4 bytes	Binary. Specifies the size of the input buffer.
EXPXMT_OUTBUF	4 bytes	Address of the output buffer.
EXPXMT_OBUFSIZE	4 bytes	Binary. Specifies the size of the output buffer.
EXPXMT_FLAGI	1 byte	Data string flag • X'80' - Input data contains a MSGID matching EXPINI_STRING1. • X'40' - Input data contains a MSGID matching EXPINI_STRING2.
EXPXMT_UFLAG1	1 byte	User flag. X'xx' - User-defined value. The value was set in READ subroutine.
Reserved	2 bytes	Reserved space.

EXPXMT_IBUFSIZE and EXPXMT_OBUFSIZE are the sizes of the input buffer and output buffer, respectively. These sizes are not related to the actual length of the input data and output data. The input buffer contains an exact copy of the OTMA message segments that were received from the datastore. The user exit might need to perform an EBCDIC-to-ASCII conversion on the data so that the data can be properly interpreted by the client application. The user exit can use EXPXMT_FLAG1 to determine where the request message from the client originated and whether an EBCDIC-to-ASCII conversion is required. The user exit translates OTMA message segments to its client's data format, places the data in the output buffer, and specifies the length of the output data in RXPXMT_DATALEN. The user exit might also edit or filter the output data at this point.

Contents of parmlist pointed to by Register 1 at exit

Field	Length	Meaning
Reserved	68 bytes	Reserved space.
EXPXMT_RETCODE	4 bytes	Binary. Specifies the return code. • 0=XMIT function was successful. Process the data. • 8=XMIT function was not successful. Just clean up.
EXPXMP_RSNCODE	4 bytes	Binary. Specifies the reason code.
EXPXMT_DATALEN	4 bytes	Binary. Specifies the size of data in the EXPXMP_OUTBUF to be returned to the IMS TCP/IP OTMA Connection. This field is only meaningful when EXPXMT_RETCODE = 0.

When the return code is 0, the data in the output buffer is sent back to the originator of the client request message. If the return code is not 0, the connection is dropped. If the user exit sets a non-zero return code value, the connection closes without sending a response back to the originator of the client request message.

TERM subroutine

When the IMS TCP/IP OTMA Connection is shutting down, control is passed, in turn, to the TERM subroutine in each user exit that is currently active, and a parmlist is passed to that user exit.

Contents of parmlist pointed to by register 1 at entry

Field	Length	Meaning
EXPRM_FUNCTION	4 bytes	Character string of value TERM. Specifies that the function to be performed is: Clean up in preparation for IMS TCP/IP OTMA Connection shutdown.
EXPRM_TOKEN	4 bytes	Address of a 1K buffer for user exit use. The user exit can use this storage for a save area and local variables.

The user exit finishes all its termination processes here.

Contents of parmlist pointed to by register 1 at exit

Field	Length	Meaning
Reserved	68 bytes	Reserved space.
EXPTRM_RETCODE	4 bytes	Binary. Specifies the return code. • 0=TERM function was successful. • 4=TERM function was not successful.
EXPTRM_RSNCODE	4 bytes	Binary. Specifies the reason code.

IMS TCP/IP OTMA Connection shutdown proceeds independently of the return code value. The return code merely indicates the completeness of the user exit cleanup.

EXER subroutine

When the IMS TCP/IP OTMA Connection detects an error in the output buffer after execution of the previous READ subroutine completes, control is passed to the EXER subroutine in the same user exit where the READ subroutine executed and a parmlist is passed to that user exit.

Contents of parmlist pointed to by register 1 at entry

Field	Length	Meaning
EXPRM_FUNCTION	4 bytes	Character string of value EXER. Specifies that the function to be performed is: `Process error found in output buffer after previous READ subroutine processing completed.`
EXPRM_TOKEN	4 bytes	Address of a 1K buffer for user exit use. The user exit can use this storage for a save area and local variables.
EXPXER_OUTBUF	4 bytes	Address of the output buffer.
EXPXER_OBUFSIZE	4 bytes	Binary. Specifies the size of the output buffer.
EXPXER_FLAGI	1 byte	Data string flag • X'80' - Input data contains a MSGID matching `EXPINI_STRING1.` • X'40' - Input data contains a MSGID matching `EXPINI_STRING2.`
EXPXER_UFLAG1	1 byte	User flag. X'xx' - User-defined value. The value was set in READ subroutine.
Reserved	2 bytes	Reserved space.
EXPXER_CODE	4 bytes	Binary. Specifies the failure code. • 4=Error in the output bufer from the previous READ function.

Field	Length	Meaning
EXPXER_REASON	4 bytes	Binary. Specifies the failure reason. • 20=Segment length error • 24=Missing first in chain flag • 28=Missing last in chain flag • 32=Sequence number error

The user exit could have experienced difficulties in forming OTMA message segment format and should notify its client of this situation (for example, through an error message). The user exit can use EXPXER_FLAG1 to determine where the request message from the client originated and whether to compose an ASCII or EBCDIC data stream for sending back to the originating client.

Contents of parmlist pointed to by register 1 at exit

Field	Length	Meaning
Reserved	68 bytes	Reserved space.
EXPXER_RETCODE	4 bytes	Binary. Specifies the return code. • 4=Send the data in EXPXER_OUTBUF back to client. • 8=Just clean up.
EXPXER_RSNCODE	4 bytes	Binary. Specifies the reason code.
EXPXER_DATALEN	4 bytes	Binary. Specifies the size of data in the EXPXER_OUTBUF to be returned to clients. This field is only meaningful when EXPER_RETCODE=4.

When the return code is 4, the IMS TCP/IP OTMA Connection sends the data in the output buffer back to the client. If the user exit sets the return code value to 8, the connection closes without a response.

User exit message description and structures

ITOC allows up to 15 user exit messages to be defined in the configuration file (see the example on page 16). There are two input message structures supported by ITOC and two message structures supported on return from the user exit.

Input messages from client

The following table shows the structure for input messages received from the client by ITOC.

Input message structure type	OTMA header present	Exit data translated	Exit type flag	Supporting msg type
1	Y	Y	11000000	HWSWEB00
1	Y	N	10000000	HWSSMPL0 modified to not build OTMA headers

Input message structure type	OTMA header present	Exit data translated	Exit type flag	Supporting msg type
2	N	Y	01000000	HWSSPLO0 modified to not translate data
2	N	N	00000000	EXAIMSO0 or HWSSMPL0

The following table shows the structure for input messages from the client that are returned by the exit back to ITOC.

Input message structure type	Exit output message structure type	Exit type flag	Supporting msg type
1	1	11000000	HWSWEB00
1	1	10000000	HWSSMPL0 modified to not build OTMA headers
2	3	01000000	HWSSPLO0 modified to not translate data
2	3	00000000	EXAIMSO0 or HWSSMPL0

Output message to client

The output message from IMS is passed to the user exit that was called from the client. The user exit normally removes the OTMA headers for output if the exit added the OTMA headers for input. The user exit normally translates the data from EBCDIC to ASCII if it did the translation for input. And the reverse is true if these things were not done for input.

The OTMA header can consist of up to five sections. If the exit is to remove the OTMA header (not present on input), there must be a check for each section. The five sections include:

- Control (always present in the OTMA structure)
- Header (might or might not exist in the OTMA structure)
- Security (might or might not exist in the OTMA structure)
- User (might or might not exist in the OTMA structure)
- Application (might or might not exist in the OTMA structure)

Output message from IMS to ITOC

All output messages received by ITOC from IMS consist of the same structure, the OTMA header followed by LLZZ DATA, and if the message contains multiple segments, then the OTMA header and LLZZ DATA are repeated for the number of segments in the message.

Output message from IMS returned by the exit back to ITOC

The message returned to ITOC from the exit consists of one of two structures:

- Messages with OTMA structures imbedded in the message
- Message with no OTMA structures imbedded in the message

ITOC TCP/IP message exit (EZAIMSO0)

This TCP/IP exit is shipped with ITOC, and link-edited into the ITOC RESLIB. You must use this TCP/IP exit rather than the one shipped by TCP/IP. The installation must place the ITOC RESLIB that contains the ITOC supplied exit (EZAIMSO0) in front of the TCP/IP RESLIB. The EZAIMSO0 exit is shipped as object code only (OCO). (See the sample user exit, EZAIMSO0. You can install it as described in “Installing the EZAIMSO0 user message exit” on page 25.) The installation can also change the name of this exit to ensure that this exit is called rather than the one shipped with TCP/IP; the new exit name must be specified in the EXIT=( ) parm of the Configuration file definition.

The COMMIT mode is set to ″1,″ and the SYNC level is set to ″NONE″. These values can be overridden by supplying the COMMIT mode and/or sync level in the message prefix received from the client (see client message formats in HDR_FLG2 and HDR_FLG3 shown in the table under “How the ITOC communicates with a TCP/IP client” on page 29).

The ITOC EZAIMSO0 exit performs the translation from ASCII to EBCDIC and builds the required message structure containing the OTMA headers for messages received *from* the client. This exit performs the translation from EBCDIC to ASCII and removes the OTMA headers for messages being transmitted *to* the client.

When you install the supplied sample user exit HWSSMPL0, you can modify it and link-edit it out as EZAIMSO0 to replace the copy supplied by ITOC, if you want to change any of the options (for example, translation, OTMA build, commit mode, sync level, etc. in EZAIMSO0.

The ITOC supplied user exit, EZAIMSO0, calls the user-provided security exit, IMSLSECX, and passes a parm list in register 1 to the security exit if one is defined in the exit. For the security parm list structure, see “Security exit” on page 46.

Input message structure passed to EZAIMSO0 exit
The message structure (type 2) is defined in “Non-IMS Web message structure - type 2” on page 48.

Input message structure returned from EZAIMSO0 exit
The message structure (type 3) is defined in “Non-IMS Web message structure - type 3” on page 50.

Output message passed to EZAIMSO0 exit
The message structure is defined in “Non-IMS Web message structure” on page 52 .

Output message returned from EZAIMSO0 exit
The message structure is defined in “Non-IMS Web message structure” on page 53 .

Sample user exit message (HWSSMPL0)

The sample exit performs the same functions as the ITOC EZAIMSO0 exit, is supplied as source code, and can be modified by the installation.

The COMMIT mode is set to ″1,″ and the SYNC level is set to ″NONE″. These values can be overridden by supplying the COMMIT mode and/or sync level in the message prefix received from the client (see client message formats in HDR_FLG2

and HDR_FLG3 shown in the table under “How the ITOC communicates with a TCP/IP client” on page 29). Or, you can change the exit to set the COMMIT mode and SYNC level to the desired values.

The ITOC HWSSMPL0 exit performs the translation from ASCII to EBCDIC and builds the required message structure containing the OTMA headers for messages received *from* the client. This exit performs the translation from EBCDIC to ASCII and removes the OTMA headers for messages being transmitted *to* the client.

This user exit calls the user-provided security exit if one is defined to this exit and passes a parm list in register 1. For the security parm list structure, see “Security exit”.

Input message structure passed to HWSSMPL0 exit
The message structure is defined in “Non-IMS Web message structure - type 2” on page 48.

Input message structure returned from HWSSMPL0 exit
The message structure is defined in “Non-IMS Web message structure - type 3” on page 50.

Output message passed to HWSSMPL0 exit
The message structure is defined in “Non-IMS Web message structure” on page 52 .

Output message returned from HWSSMPL0 exit
The message structure is defined in “Non-IMS Web message structure” on page 53 .

IMS Web client user exit message (HWSWEB00)

This IMS Web client exit is shipped with ITOC, and link-edited into the installation RESLIB. This exit does not perform a translation or build to the OTMA headers. Both the translation and insertion or deletion of the OTMA header is done by the IMS Web client server. HWSWEB00 is supplied as source code and can be modified.

The COMMIT mode is set to ″1,″ and the SYNC level is set to ″NONE.″

This user exit calls the user-provided security exit if one is defined to this exit and passes a parm list in register 1. For the security parm list structure, see “Security exit”.

Input message structure passed to HWSWEB00 exit
The message structure is defined in “IMS Web message structure - type 1” on page 47.

Input message structure returned from HWSWEB00 exit
The message structure is defined in “IMS Web message structure - type 1” on page 49.

Output message passed to HWSWEB00 exit
IMS Web output messages are not passed to the exit.

Security exit

You must provide a security exit (or use the TCP/IP exit, IMSLSECX) if any security checking is to be done by the message exit. Due to the many options available for

security, and the fact that most installations have their own specific security method, no sample security exit is provided. The call to RACF is performed by ITOC if RACF parameters are provided in the OTMA header when the message exit returns the message.

The name of the security exit called by EZAIMSO0 is *IMSLSECX*. The name of the security exit called by HWSSMPL0 is *user supplied* and is defined in the HWSSMPL0 message exit. If you require a security exit, you must provide the exit and modify the HWSSMPL0 to provide the security exit name. The name of the security exit called by HWSWEB00 is *user supplied* and must be defined in the HWSWEB00 message exit. The name of the security exit called by HWSJAVA0 is *user supplied* and is defined in the HWSJAVA0 message exit.

Parameter list for user security exit:

The following is the list and order of parameters being passed to the security exit, IMSLSECX. The order of the parameters is *fixed* for the ITOC supplied exit, EZAIMSO0.

- Address of fullword client's IP address
- Address of halfword client's port
- Address of 8-char string IMS transaction
- Address of halfword data type (data type setting: 0=ASCII, 1=EBCDIC)
- Address of fullword length of user data
- Address of user-supplied data
- Address of fullword set by security exit
- Address of fullword set by security exit
- Address of RACF userid
- Addr of RACF groupid

Message structures

The following section describes the message structures for IMS Web and non-IMS Web messages.

Input message from client and passed to exit

Input messages from the client consist of IMS Web and non-IMS Web message structures.

IMS Web message structure - type 1: The following table shows the input message format supported by ITOC from an IMS Web client.

Field	Length	Meaning
LLLL	4 bytes	Length of entire message, including LLLL field
LL	2 bytes	Length of IMS Web interface header, including LLZZ field
ZZ	2 bytes	Reserved (set to binary zeros)
ID	8 bytes	Char value of HWSWEB
Reserved	4 bytes	Reserved (set to binary zeros)

Field	Length	Meaning
FLG5	1 byte	Binary value for input message type
Reserved	3 bytes	Reserved (set to binary zeros)
Client ID	8 bytes	Char value of a unique client ID
OTMA HDR	466 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data this data segment (no tran code)

Non-IMS Web message structure - type 2: The following table shows the input message format supported by ITOC from a non-IMS Web client.

Field	Length	Meaning
LLLL	4 bytes	Length of entire message, including LLLL field
LL	2 bytes	Length of TCP/IP interface header
ZZ	2 bytes	Reserved (set to binary zeros)
ID	8 bytes	Char value of IRMREQ
Reserved	4 bytes	Reserved for furture use.
FLG5	1 byte	Binary value for input message type
Reserved	3 bytes	Reserved (set to binary zeros)
Client ID	8 bytes	Char value of a unique client ID

Field	Length	Meaning
The following definition is for use with the EZAIMSO0 and HWSSMPL0 exits. The user installation can provide their own exit, and structure the following items as required by the user exit. The following items should be considered.		
FLG1	1 byte	Binary MFS flag
FLG2	1 byte	Binary COMMENT MODE flag
FLG3	1 byte	Binary SYNC LEVEL flag
FLG4	1 byte	Char value conversation byte
TRANCODE	8 bytes	Char value for user transaction code
DATASTORE	8 bytes	Char value for Datastore ID
LTERM NAME	8 bytes	Char value for LTERM override name
RACF UID	8 bytes	Char value for RACF user ID
RACF GNM	8 bytes	Char value for RACF group name
PASSTICKET	8 bytes	RACF passticket/password
The following is the data structure for all non-IMS Web clients.		
LL	2 bytes	Length of data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data this data segment (no tran code)
LL	2 bytes	End of message (set to binary 0000 0000 0000 0100)
ZZ	2 bytes	Reserved (set to binary zeros)

Input message returned from message exit

Input messages from the message exit consist of IMS Web and non-IMS Web message structures.

IMS Web message structure - type 1: The IMS Web exit output message format that is supported by ITOC is the same message format of the input message. See “IMS Web message structure - type 1” on page 47 for the message format.

The total length of the message can be 10,000,000 bytes. The length of each segment (from the BPE header to the next BPE header) within the message can be a maximum of 32 K.

Non-IMS Web message structure - type 3: The following table shows the output message format supported by ITOC from a non-IMS Web client exit.

Field	Length	Meaning
BPE HEADER	32 bytes	See BPE header definition that follows this table
OTMA HDR	466 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of first data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
repeat of LL,ZZ,DATA		
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the this data segment (no tran code)
YY	2 bytes	Binary value of zero
BPE HEADER	32 bytes	See BPE header definition that follows this table
OTMA HDR	32 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
Repeat of LL,ZZ,DATA		
LL	2 bytes	Length of this data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data this data segment (no tran code)
...		
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data this data segment (no tran code)
YY	2 bytes	Binary value of zero

Field	Length	Meaning
BPE HEADER	32 bytes	See BPE header definition that follows this table
OTMA HDR	32 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of this data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
...		
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data this data segment (no tran code)
YY	2 bytes	Binary value of zero

Restriction: The length of data from one BPE header to the next BPE header cannot exceed 32 K, excluding the BPE header and the OTMA header.

BPE header format:

Field	Length	Meaning
LLLL	4 bytes	Length of field of entire buffer
CHAIN PTR	4 bytes	Chain pointer to next BPE header
STORAGE TYPE	8 bytes	Storage type
TYPE ACCESS	4 bytes	Type access
SUBPOOL	1 byte	Subpool
RESV	39 bytes	Reserved

Restriction: Only the chain pointer field is modified by the message exit to chain the BPE headers together with the last BPE chain pointer set to binary zeros. The other fields in the BPE header ***MUST NOT BE MODIFIED BY THE EXIT***.

Output message from IMS to ITOC

Output messages from IMS to ITOC consist of the IMS Web and non-IMS Web message structures.

IMS Web message structure: The following table shows the message format from ITOC to the client. IMS Web output is not passed to the IMS Web exit.

Field	Length	Meaning
LLLL	4 bytes	Total message length
Id	8 bytes	*HWSWEB*
OTMA HDR	466 bytes	See OTMA DSECT in MODLIB for description

Field	Length	Meaning
LL	2 bytes	Length of data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with this data segment (no tran code)
OTMA HDR	32 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
LL	2 bytes	Length of this data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data nth data segment (no tran code)
...		
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)

Non-IMS Web message structure: The following table shows the message format from ITOC to the exit.

Field	Length	Meaning
OTMA HDR	Length of total OTMA headers.	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of data segment

Field	Length	Meaning
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
OTMA HDR	20 bytes	See OTMA DSECT in MODLIB for description
LL	2 bytes	Length of this and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with this data segment (no tran code)

Output message from message exit

Output messages from the message exit consist of the non-IMS Web message structures.

Non-IMS Web message structure: The non-IMS Web message structure can consist of one or more TCP/IP message structures. These TCP/IP message structures are described in this section.

RMM - Request Mod Message

Returned as the first structure of an output message if the MFS mod name is requested and the data output is present

Field	Length	Meaning
LL	2 bytes	Length of RMM message
ZZ	2 bytes	Reserved (set to binary zeros)
ID	8 bytes	Char value of REQMOD
MOD	8 bytes	Char value of the requested MFS MOD name

CSM - Complete Status Message

Returned as the last structure of an output message if the input message is processed successfully

Field	Length	Meaning
LL	2 bytes	Length of CMS message
ZZ	2 bytes	Reserved (set to binary zeros)
ID	8 bytes	Char value of CSMOKY

RSM - Request Status Message

Returned as the only structure of an output message if ITOC or the message exit determined an error occurred

Field	Length	Meaning
LL	2 bytes	Length of RMM message
ZZ	2 bytes	Reserved (set to binary zeros)
ID	8 bytes	Char value of REQSTS
RETC	4 bytes	Return code
RESC	4 bytes	Reason code

The output message is in one of the following formats:

- MFS MOD name requested and data is being sent

Field	Length	Meaning
RMM header (optional)	20 bytes	Request Mod message, contains mod name if requested
LL	2 bytes	Length of data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data 2nd data segment (no tran code)
...		
LL	2 bytes	Length of nth and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data nth data segment (no tran code)
CMS	12 bytes	Complete status message

- MFS MOD name not requested and only data is being sent

Field	Length	Meaning
LL	2 bytes	Length of data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data with the tran code first
LL	2 bytes	Length of 2nd data segment
ZZ	2 bytes	Reserved (set to binary zeros)

Field	Length	Meaning
DATA	n bytes	User data 2nd data segment (no tran code)
...		
LL	2 bytes	Length of nth and last data segment
ZZ	2 bytes	Reserved (set to binary zeros)
DATA	n bytes	User data nth data segment (no tran code)
CMS	12 bytes	Complete status message

- Error detected by ITOC or the message exit

Field	Length	Meaning
RSM	20 bytes	Return/Reason codes

Macros

There are four macros supported by ITOC: HWSEXPRM, HWSOMPFX, HWSIMSCB, and HWSIMSEB.

HWSEXPRM

This macro provides the mapping for the parameter list that is passed to the user exit on each subroutine call. A copy of this macro is in MODLIB. To see the structure, print the source.

HWSOMPFX

This macro maps the OTMA message prefix format to the output buffer that the user exit returns on each READ subroutine call and the input buffer that is passed to the user exit on each XMIT subroutine call. A copy of this macro is in MODLIB. To see the structure, print the source.

HWSIMSCB

This macro maps the IMS request messages and BPE header formats used by HWSSMPL0. A copy of this macro is in MODLIB. To see the structure, print the source.

HWSIMSEB

This macro maps the storage area used by HWSSMPL0. A copy of this macro is in MODLIB. To see the structure, print the source.

Glossary

base primitive environment (BPE). A system service component that underlies the HWS address space.

datastore. An IMS TM system that provides transaction and database processing.

host Web service (HWS). An MVS application program that uses TCP/IP communications to TCP/IP clients or Web browsers and IMS OTMA communication to IMS.

IMS DB. An IMS Database Manager database, which provides host data for remote workstations.

IMS Open Transaction Manager Access (OTMA). A transaction-based connectionless client/server protocol.

port. The interface between TCP and a local process. This interface enables the process to call TCP, and in turn enables TCP to deliver data streams to the appropriate process.

socket. The host IP address appended to the port number. This address is unique on the internetwork. The connection between two sockets provides a full duplex communication path between the end processes.

TCP/IP. Transmission Control Protocol/Internet Protocol.

XCF. MVS Extended Coupling Facility.

XCF group. A logical collection of XCF members. The datastore and the HWS should join to the same group.

XCF member. An MVS application that joins an XCF group.

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