

E31

Let's Talk IMS TOC Diagnostics

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Debugging IMS Connect - Agenda

▲ Agenda

- **Section 1: IMS Connect Overview**
- **Section 2: Setup for Debugging**
- **Section 3: Documentation Collection**
- **Section 4: Using the TCPI Internal Trace**
- **Section 5: Using the Recorder External Trace**
- **Section 6: Tying TCPI Trace to Recorder Trace**

Section 1: IMS Connect Overview

Section 1: IMS Connect Overview

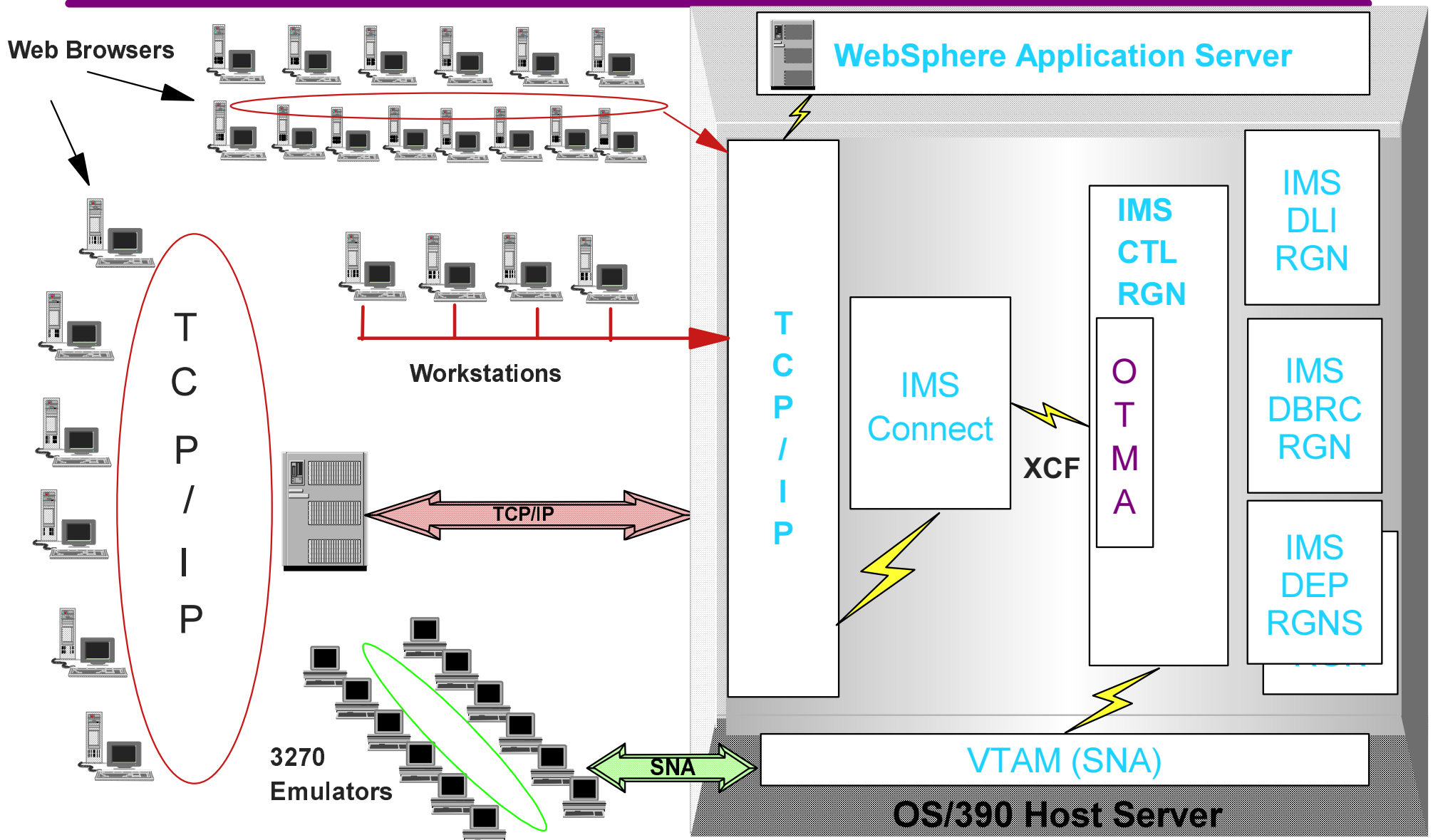
IMS Connect Diagnostics Regarding this presentation..

This procedure is intended to help systems programmers diagnose IMS Connect (IMS TOC). This presentation documents information that is Diagnosis Information provided by IMS.

Attention: Do not use this Diagnosis Information as a programming interface.

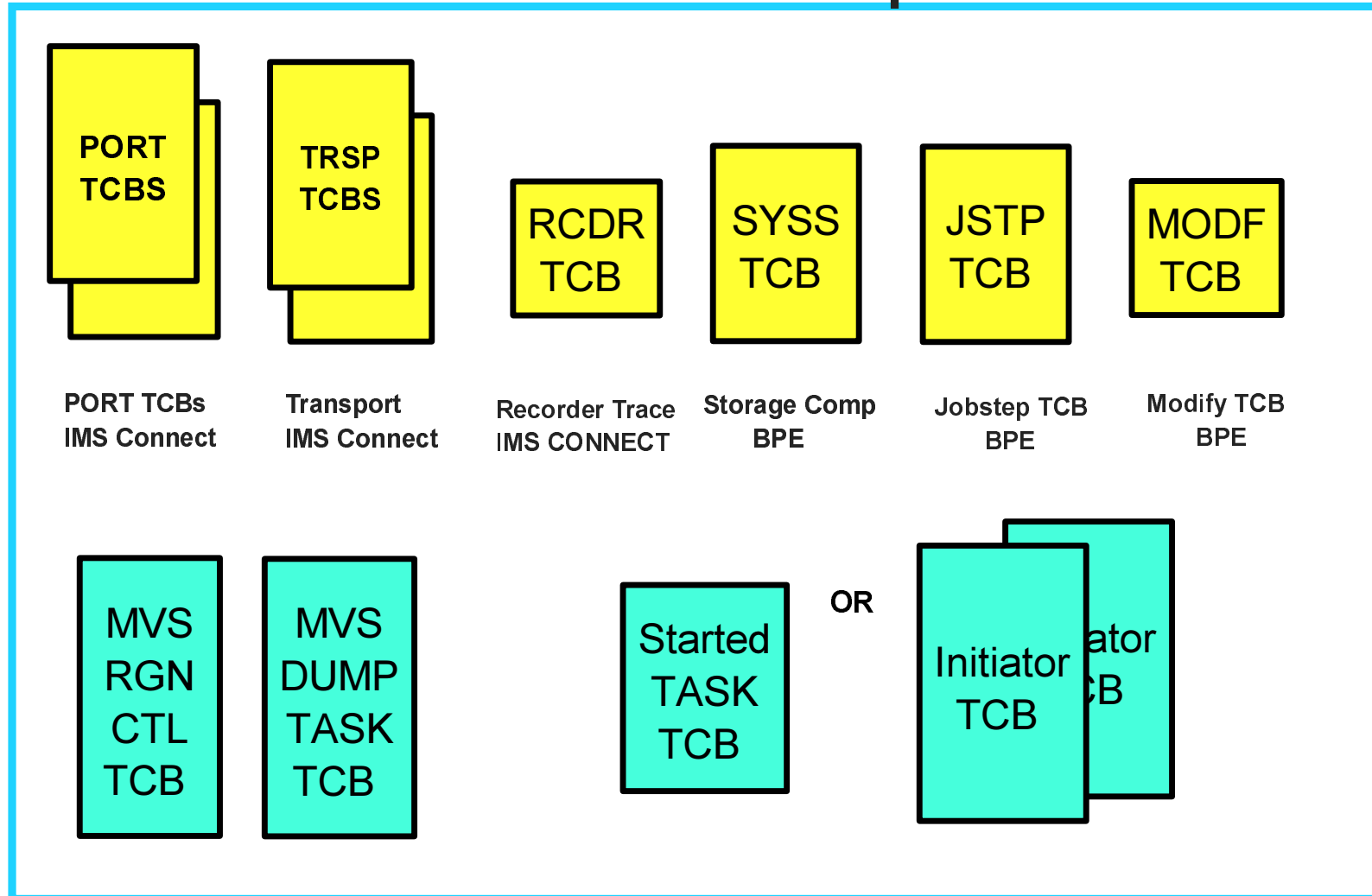
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IMS Connect Overview: External Environment



IMS Connect Overview: IMS Connect Address Space

IMS Connect Address Space



BPE = Base Primitive Environment

Section 2: Setup for Debugging

Section 2: Setup for Debugging

MVS Setup Recommendations: System Trace Table

△ Set MVS System Trace table size to 999K

- Default size is only 64K
- The MVS command "TRACE ST,999K" can be specified in the MVS COMMNDxx SYS1.PARMLIB member.
- Advantages:
 - ▶ Extremely valuable for a large variety of problem types.
- Considerations:
 - ▶ System Trace Table is page fixed storage.
 - ▶ Installations need to ensure there are enough real page frames to make this specification.

MVS Setup Recommendations: Master Trace Table

▲ Set MVS Master Trace Table size to 500K

- Default size is only 24K, approx. 336 messages. 500K specification = approx. 7000 messages.
- "TRACE MT,500K" can be specified in the SCHEDxx member of SYS1.PARMLIB.
 - ▶ See OS/390 MVS Diagnosis: Tools and Service Aids, OS/390 Initialization and Tuning Guide/ Ref, and MVS Systems Commands manuals for complete details
- Advantages:
 - ▶ Master trace maintains a table of the most recently issued operator messages.
 - ▶ Allows view of external events at the time of failure.
- Considerations:
 - ▶ Ensure Master Trace Table is large enough to span most error time frames.
 - ▶ Uses Subpool 229 Key 0 High Private Pageable Storage of the master scheduler address space.

MVS Setup Recommendations: IMS Tech Session E30

- ▲ Please see IMS Technical Conference session E30 "How to Setup and Gather Documentation for IMS Problems" for further MVS setup recommendations.

IMS Connect Setup Recommendations

Region Size

▲ IMS Connect startup parameter REGION=OM

- Allows for increased usage of private area for high peak thread usage while allowing for increased trace table sizes.
 - See MVS JCL Reference Manual for information regarding REGION= parameter.
- Use IEFUSI exit to reserve storage for termination processing. This will allow MVS pass control to IMS Connect for normal termination processing. MVS recommends that .5 meg be reserved in LSQA for this process.
 - See MVS Installation Exits Manual for more information regarding IEFUSI exit.

IMS Connect Setup Recommendations

SYS1.DUMP Datasets

- ▲ Abends that affect the IMS Connect address space, will be recorded in the following ways:
 - SDUMP macro may be issued, resulting a machine readable dump sent to the SYS1.DUMP datasets.
 - SYS1.LOGREC entries may be produced to describe the error.
- ▲ Ensure that SYS1.DUMP datasets are available as already expected for the standard IMS regions.

IMS Connect Setup Recommendations

SYSMDUMP DD

▲ Specify SYSMDUMP DD in JCL of IMS Connect:

```
//HWS          PROC   RGN=OM, SOUT=A,
//              BPECFG=BPECFG00,
//              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
//SYSMDUMP   DD     DSN=IMSCONN, UNIT=SYSDA, DISP=(, DELETE, KEEP),
//              SPACE=(CYL, 150, 100, RLSE)
//HWSRCORD   DD     DSN=HWSRCDR, DISP=SHR
```

- ▲ The SYSMDUMP specification will be used by IMS Connect in the event that SDUMP processing should fail.
- ▲ The following dump options should be specified in the SYS1.PARMLIB(IEADMR00) member to ensure that adequate areas of MVS storage are dumped to diagnose the problem under most circumstances:
 - SDATA=(CSA,LSQA,RGN,SQA,SUM,SWA,TRT)

IMS Connect Setup Recommendations

BPE Trace Tables- BPECFG

- ▲ Use the BPECFG=nnnnnnn IMS Connect execution parameter to specify the Proclib member to contain the configuration for the BPE (Base Primitive Environment).

```
//HWS          PROC   RGN=0M,SOUT=A,
//              BPECFG=BPECFG00,
//              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
//SYSMDUMP     DD     DSN=IMSCONN,UNIT=SYSDA,DISP=(,DELETE,KEEP),
//              SPACE=(CYL,150,100,RLSE)
//HWSRCORD     DD     DSN=HWSRCRDR,DISP=SHR
```

IMS Connect Setup Recommendations

BPE Trace Tables - Test

- ▲ The BPECFG=nnnnnnn Proclib member should contain the following entries for BPE internal trace tables:

```
#
# DEFINITIONS FOR BPE SYSTEM TRACES
#
TRCLEV= (AWE, HIGH, BPE, PAGES=100)          /* AWE SERVER TRACE          */
TRCLEV= (CBS, HIGH, BPE, PAGES=100)          /* CONTROL BLK SRVCS TRACE   */
TRCLEV= (DISP, HIGH, BPE, PAGES=150)         /* DISPATCHER TRACE          */
TRCLEV= (LATC, HIGH, BPE, PAGES=200)         /* LATCH TRACE                */
TRCLEV= (SSRV, HIGH, BPE, PAGES=100)         /* GEN SYS SERVICES TRACE    */
TRCLEV= (STG, HIGH, BPE, PAGES=100)         /* STORAGE TRACE              */
TRCLEV= (ERR, BPE, PAGES=100)                /* ERROR TRACE                */
```

- ▲ Raising the trace level and number of pages increases the chances of finding the error event in the internal traces.
- ▲ Storage for the internal table traces exists in extended private.

IMS Connect Setup Recommendations

BPE Trace Tables

- ▲ The BPECFG=nnnnnnn Proclib member recommendation for the BPE internal traces in a new production region.

```
#
# DEFINITIONS FOR BPE SYSTEM TRACES
#
TRCLEV= (AWE, HIGH, BPE, PAGES=48)          /* AWE SERVER TRACE          */
TRCLEV= (CBS, MEDIUM, BPE, PAGES=24)       /* CONTROL BLK SRVCS TRACE   */
TRCLEV= (DISP, HIGH, BPE, PAGES=72)        /* DISPATCHER TRACE         */
TRCLEV= (LATC, MEDIUM, BPE, PAGES=72)     /* LATCH TRACE              */
TRCLEV= (SSRV, HIGH, BPE, PAGES=12)        /* GEN SYS SERVICES TRACE   */
TRCLEV= (STG, LOW, BPE, PAGES=24)          /* STORAGE TRACE            */
TRCLEV= (ERR, BPE, PAGES=12)               /* ERROR TRACE              */
```

- ▲ This efficiency of the internal table traces is optimized, but consideration needs to be taken regarding local system performance criteria when adjusting the trace level setting.
- The higher the trace level, the greater the number of entries recorded.

IMS Connect Setup Recommendations

IMS Connect Trace Tables

- ▲ The BPECFG=nnnnnnn Proclib member should contain the following entries for IMS Connect internal trace tables:

```
#
# DEFINITIONS FOR IMS Connect Internal Traces
#
TRCLEV= (CMDT,HIGH,HWS,PAGES=100)      /* COMMAND TRACE          */
TRCLEV= (OTMA,HIGH,HWS,PAGES=100)      /* COMM DRIVER XCF CALLS  */
TRCLEV= (TCPI,HIGH,HWS,PAGES=100)      /* COMM DRIVER TCP/IP CALLS */
TRCLEV= (ENVT,HIGH,HWS,PAGES=100)      /* EVENT STARTUP SHUTD,ETC */
TRCLEV= (HWSI,HIGH,HWS,PAGES=100)      /* COMM BETWEEN OTMA/CONNECT */
TRCLEV= (HWSW,HIGH,HWS,PAGES=100)      /* COMM BETWEEN TCPIP/CONNECT*/
```

IMS Connect Setup Recommendations

Recorder Trace

- ▲ Specify the HWSRCORD DD statement in the IMS Connect JCL to allow the Recorder Trace to be gathered should an error scenario develop.

```
//HWS          PROC  RGN=0M,SOUT=A,
//              BPECFG=BPECFG00,
//              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
//SYSMDUMP    DD   DSN=IMSCONN,UNIT=SYSDA,DISP=(,DELETE,KEEP),
//              SPACE=(CYL,150,100,RLSE)
//HWSRCORD    DD   DSN=HWSRCDR,DISP=SHR
```

IMS Connect Setup Recommendations

Recorder Trace Allocation

▲ Recorder trace HWSRCORD dataset allocation recommendation

```
Organization. . . . : PS
Record format . . . : FB
Record length . . . : 1440
Block size. . . . . : 14400
1st extent cylinders: 200
Secondary cylinders : 100
```

Section 3: Documentation Collection

Section 3: Documentation Collection

Data Collection Preservation of Standard Documentation

△ Consider implementing normal operating procedures to preserve the following documentation near the time of error.

- MVS Console (SYSLOG)
- JES JOBLOG of jobs related to failure
- SYS1.LOGREC
- Any Dumps Produced
- IMS OLDS/SLDS
- Additional manual dump intervention

Data Collection

Additional Manual Dump Intervention

- ▲ IMS Connect produces SDUMPs for some internal errors without human intervention.
- ▲ IMS Connect Wait/Loop or partial loss of function conditions will require intervention to produce an SVC dump.
- ▲ Past experience indicates that IMS hangs can be caused by interaction with many address spaces including:
 - ▶ IMS Control Region
 - ▶ IMS DLI/SAS Region
 - ▶ DBRC Region
 - ▶ Troublesome IMS Dependent Regions
 - ▶ IRLM Region
 - ▶ CCTL Regions
 - ▶ Other IMS Connect Regions
 - ▶ APPC
 - ▶ VTAM
 - ▶ ESAF - DB2, MQSeries, others
 - ▶ Other Regions ???
 - ▶ Other IMSplex members
 - With all their related regions as mentioned here.
 - ▶ TCP/IP

Data Collection Recorder Trace Operations

- ▲ The Recorder Trace can be started by issuing:
 - RECORDER OPEN

- ▲ The Recorder Trace is stopped by issuing:
 - RECORDER CLOSE

- ▲ Currently, the Recorder Trace will stop once the dataset is full.

- ▲ This may will require special operating considerations
 - To reset to the beginning of the dataset:
 - ▶ RECORDER CLOSE

 - ▶ RECORDER OPEN

- ▲ Print using IDCAMS utility.

Data Collection

IMS Connect Commands

▲ Issue the following IMS Connect commands two to three times to gather status:

- **VIEWHWS**
 - ▶ Displays the current activity of the IMS Connect
- **VIEWPORT portid**
 - ▶ Displays the current activity of a port
- **VIEWDS datastore_id**
 - ▶ Displays the current activity of a datastore

Data Collection Non-IMS Connect Commands

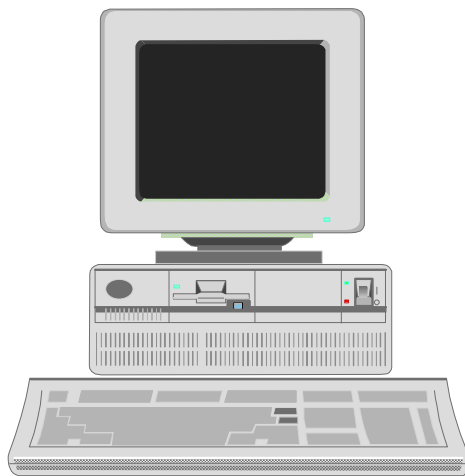
▲ The following IMS commands can be used to gather further external symptoms to help define a problem.

- /DIS OTMA
- /DIS TMEMBER
- /DIS ACTIVE REG
- /DIS TRAN tranname

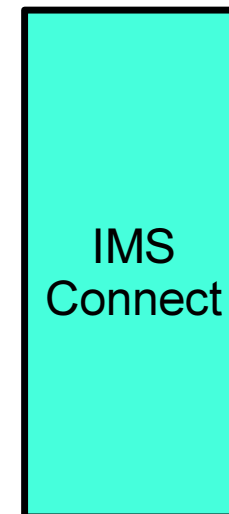
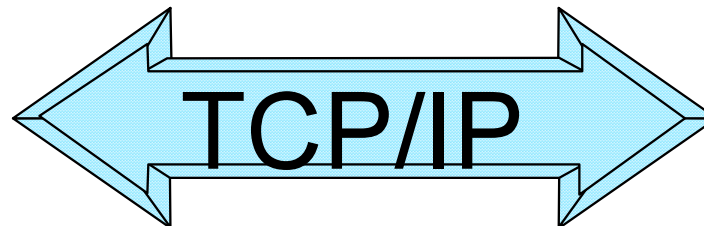
Using the TCPI Internal Trace Overview

The TCPI Internal trace table traces communication protocol activity (TCP/IP calls).

We will focus on trace entries involving the received data from the client to IMS Connect



Client



General - [24 x 80]

File Edit Transfer Appearance Communication Assist Window Help

PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit

----- IPCS PRIMARY OPTION MENU -----

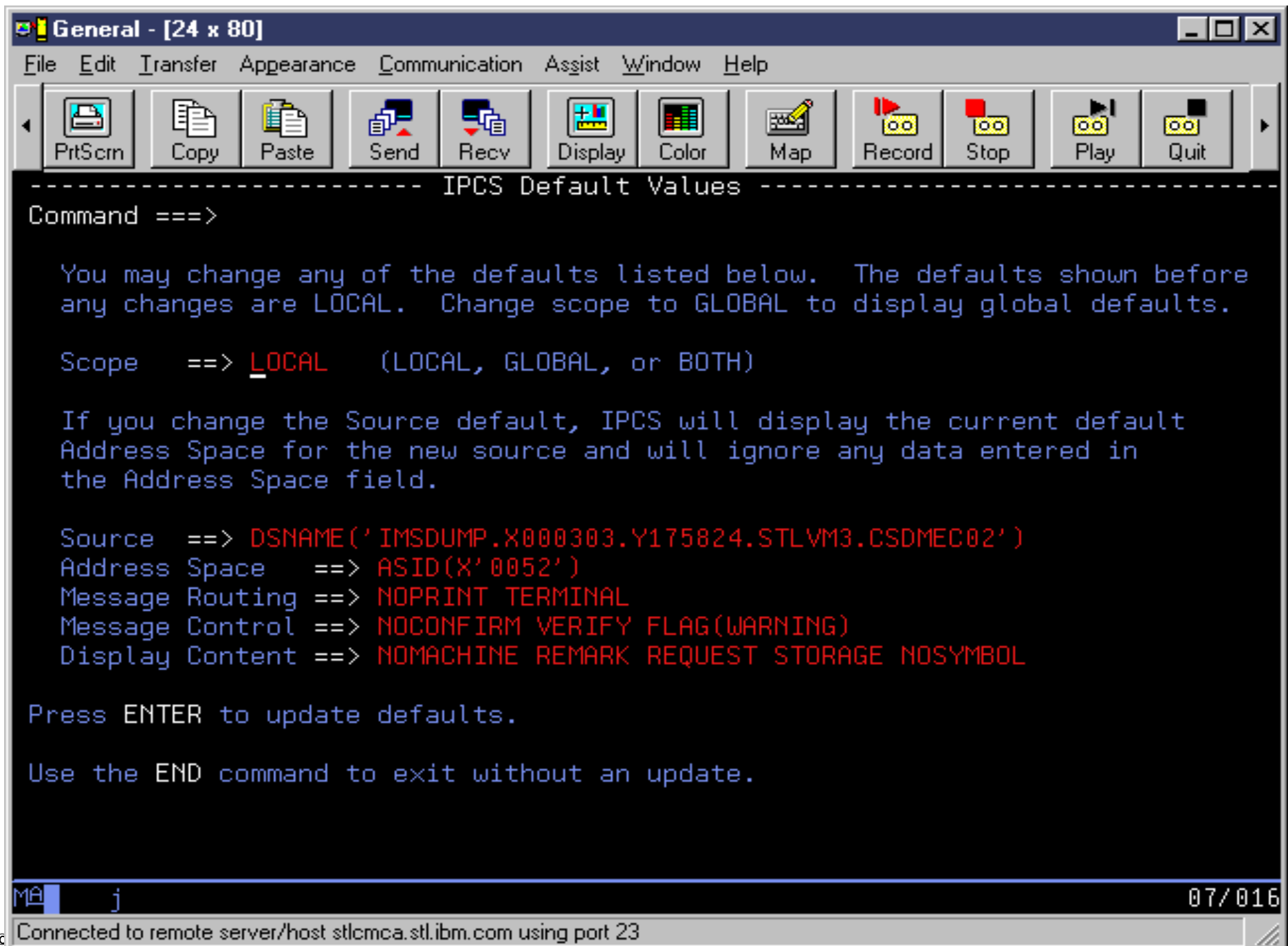
OPTION ==> 0

0	DEFAULTS	- Specify default dump and options	*****
1	BROWSE	- Browse dump data set	* USERID - M030776
2	ANALYSIS	- Analyze dump contents	* DATE - 00/03/07
3	UTILITY	- Perform utility functions	* JULIAN - 00.067
4	INVENTORY	- Inventory of problem data	* TIME - 17:29
5	SUBMIT	- Submit problem analysis job to batch	* PREFIX - M030776
6	COMMAND	- Enter subcommand, CLIST or REXX exec	* TERMINAL - 3278
T	TUTORIAL	- Learn how to use the IPCS dialog	* PF KEYS - 24
X	EXIT	- Terminate using log and list defaults	*****

Enter END command to terminate IPCS dialog

MA j 02/016

Connected to remote server/host stlcmca.stl.ibm.com using port 23



```
General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScrn Copy Paste Send Recv Display Color Map Record Stop Play Quit
----- IPCS Default Values -----
Command ==>

You may change any of the defaults listed below.  The defaults shown before
any changes are LOCAL.  Change scope to GLOBAL to display global defaults.

Scope ==> LOCAL (LOCAL, GLOBAL, or BOTH)

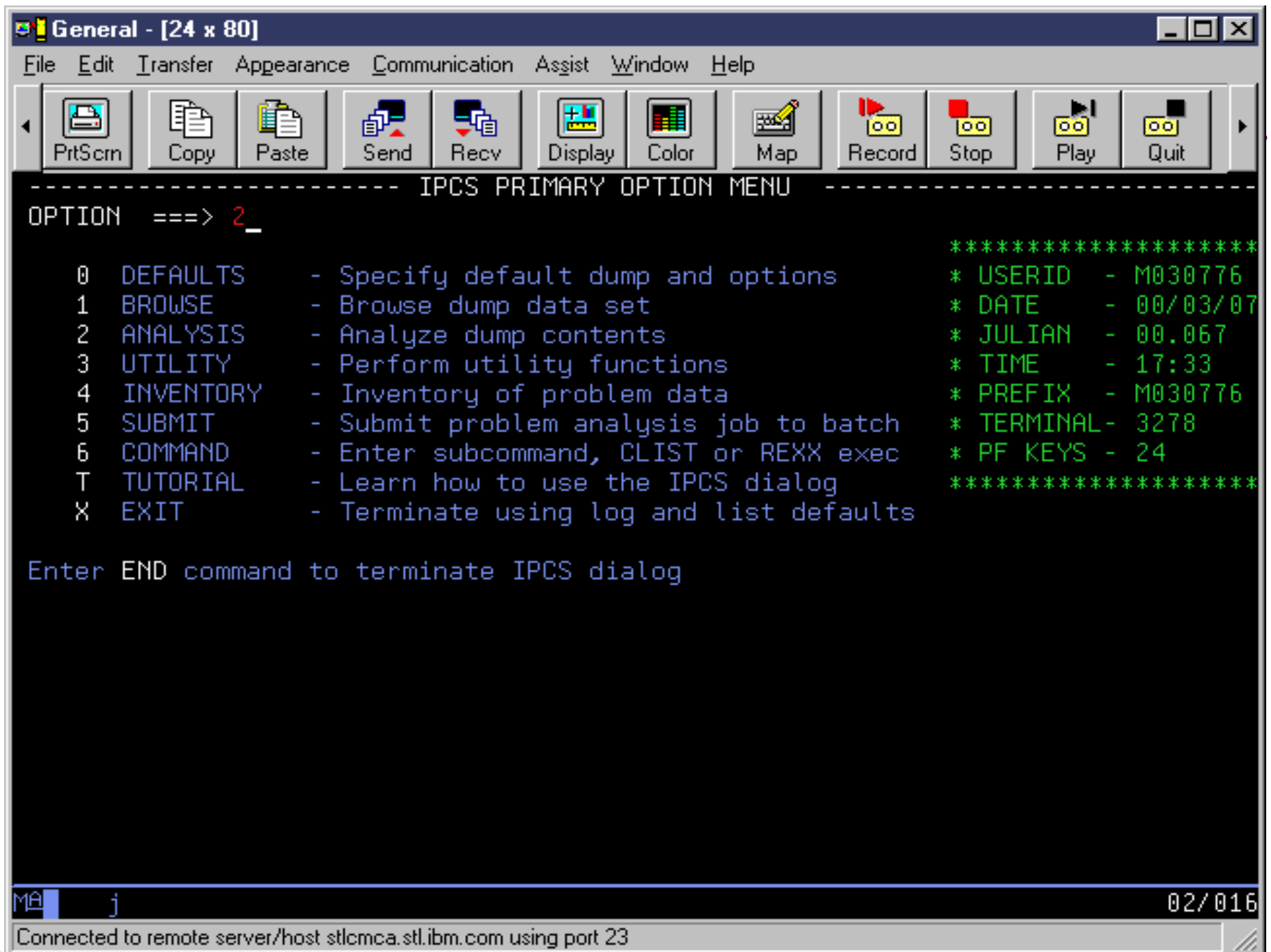
If you change the Source default, IPCS will display the current default
Address Space for the new source and will ignore any data entered in
the Address Space field.

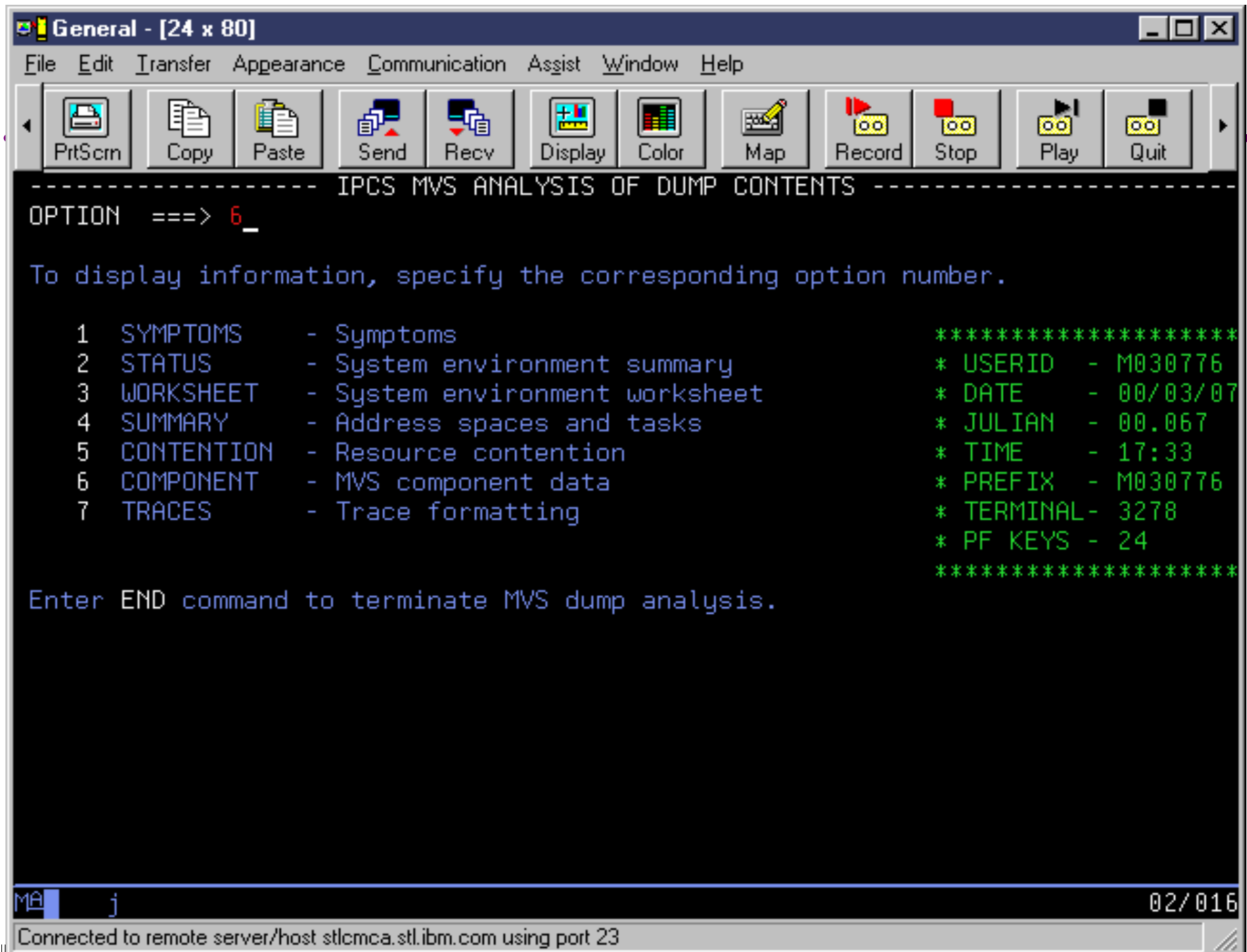
Source ==> DSNAME('IMSDUMP.X000303.Y175824.STLVM3.CSDMEC02')
Address Space ==> ASID(X'0052')
Message Routing ==> NOPRINT TERMINAL
Message Control ==> NOCONFIRM VERIFY FLAG(WARNING)
Display Content ==> NOMACHINE REMARK REQUEST STORAGE NOSYMBOL

Press ENTER to update defaults.

Use the END command to exit without an update.

MA j 07/016
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```





```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
----- IPCS MVS DUMP COMPONENT DATA ANALYSIS -----
OPTION ==>                                SCROLL ==> CSR

To display information, specify "S option name" or enter S to the left
of the option desired. Enter ? to the left of an option to display
help regarding the component support.

S Name      Abstract
- ALCWAIT   Allocation wait summary
- AOMDATA   AOM analysis
- APPCDATA  APPC/MVS Data Analysis
- ASCHDATA  APPC/MVS Scheduler Data Analysis
- ASMCHECK  Auxiliary storage paging activity
- ASMDATA   ASM control block analysis
- AVMDATA   AVM control block analysis
- CICS330   CICS Version 3 Release 3 analysis
- COMCHECK  Operator communications data
- COUPLE    XCF Coupling analysis
- CTRACE    Component trace summary
- DAEDATA   DAE header data
- DB2DATA   DB2 analysis
- s DFSAAMPR  IMS Interactive Dump Formatter
- DIVDATA   Data in virtual storage
- DLFDATA   Data Lookaside Facility data

MA j                                     22/004
Connected to remote server/host stlcmca.stl.ibm.com using port 23
    
```

```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
----- IMS DUMP FORMATTING PRIMARY MENU -----
OPTION  ==> 6_
                                                    More:  +
0  INIT          - IMS formatting initialization and content summary
1  BROWSE        - Browse Dump dataset (IPCS norm)          *****
2  HI-LEVEL     - IMS Component level formatting           *USERID   - M030776
3  LOW-LEVEL    - IMS ITASK level formatting               *DATE     - 00/03/07
4  ANALYSIS     - IMS dump analysis                       *JULIAN   - 00.067
5  USER        - IMS user formatting routines             *TIME     - 17:53
6  BPE          - IMS BPE subsystem formatting             *PREFIX   - M030776
7  CQS         - IMS CQS subsystem formatting              *TERMINAL - 3278
8  IMS Connect - IMS Connect subsystem formatting         *PF KEYS  -
9  ORS         - IMS ORS subsystem formatting              *****
E  EDA         - IMS Enhanced Dump Analysis
Enter END or RETURN command to terminate IMS component formatting.
Use PFKeys to scroll up and down if needed.

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MA j
                                                    02/016
Connected to remote server/host stlcmca.stl.ibm.com using port 23

```



```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScrn Copy Paste Send Recv Display Color Map Record Stop Play Quit
----- IMS BPE SUBSYSTEM DUMP FORMATTING MENU -----
OPTION ==> 0_
 0 INIT - Show BPE status and initialize dump
 1 BROWSE - Browse dump dataset (IPCS norm)
 2 HI-LEVEL - BPE component level formatting
 3 LOW-LEVEL - BPE detail level formatting

X EXIT - Exit BPE dump formatting menu

Enter END or RETURN command to terminate IMS component formatting.

*****
*USERID - M030776
*DATE - 00/03/07
*JULIAN - 00.067
*TIME - 17:54
*PREFIX - M030776
*TERMINAL- 3278
*PF KEYS - 24
*****

```

General - [24 x 80]

File Edit Transfer Appearance Communication Assist Window Help

PrtScrn Copy Paste Send Recv Display Color Map Record Stop Play Quit

----- BPE DUMP CONTENT STATUS AND CONTROL -----

COMMAND ===> _

Enter the BPE jobname to cause the BPE symbols to be set for this dump.

If your dump formatter is at BPE 1.3 (IMS 7.1) or above, you can also specify the address space by ASID, and you can get a list of dumped BPE address spaces by leaving the jobname and the ASID fields blank.

	JOBNAME	ASID	A.S. TYPE	DUMPED?
BPE	HWSG	0052	HWS	YES

BPE SDWA Address: 006CC920 BPE Release: 010300
BPE CSCD Address: 06F01870 HWS Release: 020200
HWS Sys Name: HWS Product #: 5655-B01

MA j 02/015

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General - [24 x 80]

File Edit Transfer Appearance Communication Assist Window Help

PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit

----- IMS BPE SUBSYSTEM DUMP FORMATTING MENU -----

OPTION ==> 2_

- 0 INIT - Show BPE status and initialize dump
- 1 BROWSE - Browse dump dataset (IPCS norm)
- 2 HI-LEVEL - BPE component level formatting
- 3 LOW-LEVEL - BPE detail level formatting

X EXIT - Exit BPE dump formatting menu

*USERID - M030776
*DATE - 00/03/07
*JULIAN - 00.067
*TIME - 17:57
*PREFIX - M030776
*TERMINAL- 3278
*PF KEYS - 24

Enter END or RETURN command to terminate IMS component formatting.

MA j A 02/016

Connected to remote server/host stlcmca.stl.ibm.com using port 23

```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
----- BPE HIGH LEVEL DUMP FORMATTING OPTIONS Row 1 to 11 of 11
Command ==> Scroll ==> PAGE
N <====SPOOL OUTPUT? (Y OR N)
  S = Select (default formatting)      Select choice(s) and hit ENTER
  M = Select (minimum formatting)      to process or UP/DOWN to scroll
  X = Select (maximum formatting)
  T = Select (trace STCK formatted as time stamp)

Cmd  Option          Description
-----
ALL  ALL              All BPE selections (overrides others)
SUMMARY  SUMMARY          General dump status, registers, failing thread
CSCD  CSCD              BPE main anchor block
THREAD  THREAD           BPE thread blks (save areas)
THREADI  THREADI         Interesting thd blks (own latches, not in normal waits...)
S  TRACE            All BPE-managed trace tables
-  DISP            BPE dispatcher blocks
  CBTE           BPE storage control blocks
  AWE            BPE AWE services blocks
  USRX          BPE user exit services blocks
  CMD           BPE command services blocks
***** Bottom of data *****
MA  j                A                18/002
Connected to remote server/host stlcmca.stl.ibm.com using port 23

```

```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> F 'TCPI Trace' SCROLL ==> CSR
***** TOP OF DATA *****

*****
***** BPE DUMP FORMATTING FOR HWSG, ASID=0052, BPE VERSION=1.3.0 *****
*****

*****
* * * TRACE: BPE Trace Tables * * *
*****

-----
--- BPE ERR Trace Table ---
-----

TTHE: 06F118D8
+0000 ID..... TTHE      LENGTH... 00000050  TYPE.... ERR
+000C NUMPGS... 0002     ENTLEN... 0020     UDATALEN. 0000
+0012 TRCLEVCT. 0000     FLG1..... B0      LEVEL.... 04
+0016 SP..... 00        IDX..... C0      RESERVED. 00000000
    
```

```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
IPCS OUTPUT STREAM ----- FOUND: LINE 4738 COL 10
Command ==> SCROLL ==> CSR
-----
--- HWS TCPI Trace Table ---
-----

TTHE: 06F11730
+0000 ID..... TTHE      LENGTH... 00000050  TYPE..... TCPI
+000C NUMPGS... 0002     ENTLLEN... 0020      UDATALEN. 0000
+0012 TRCLEVCT. 0000     FLG1..... A1       LEVEL.... 04
+0016 SP..... 00       IDX..... 06       RESERVED. 00000000
+001C RESERVED. 00000000
      Trace Table Pointer Section:
+0020 TRTABLE.. 06F3F000  FIRSTENT. 06F3F020  LASTENT.. 06F40FE0
+002C NEXTENT.. 06F3FFA0  RESERVED. 00000000  RESERVED. 00000000
      TTHE Chaining Section:
+0038 NEXT..... 00000000  FIRST.... 06F11730  LATCH.... 00000000
+0044          00000000  TOKVAL... 00000000  RESERVED. 00000000
Flag analysis for TTHE_FLG1:
  TTHE_F1_LOCANYP (X'80') - Tables are in 31-bit storage
  TTHE_F1_INUSE   (X'20') - This TTHE is in use
  TTHE_F1_LAST    (X'01') - This is the last TTHE in this TTH
Trace level for this table is HIGH

```

```

General - [24 x 80]
File Edit Transfer Appearance Communication Assist Window Help
PrtScr Copy Paste Send Recv Display Color Map Record Stop Play Quit
IPCS OUTPUT STREAM ----- Line 4767 Cols 1 78
Command ==>
Code Subcode Trace Entry Trace Data
-----
TCPI :SDVB0 BLD DRIVER FUNCTION BLK 05A00000 00000000 00000000
00000000 00000000 00000000
B3B06569 4CB04F01
TCPI :SDVB0 DRIVER TABLE BUILT 05AF0000 00000000 00000000
00000000 00000000 00000000
B3B06569 6A879A03
TCPI :SDOPN TCPIP OPEN, CALL EXIT 05400000 06F98418 00000000
00000000 00000000 00000000
B3B06569 6AB6FB03
TCPI :SDOPN TCPIP OPEN COMPLETE 054F0000 00000000 00000000
00000000 00000000 00000000
B3B06569 87128B09
TCPI :SDOTD OPEN TCPIP THREAD 05500000 06F03E00 06FB4000
00000000 00000000 00000000
B3B06569 8D558208
TCPI :SDOTD INIT API COMPLETE 05560000 00000000 00000000
00000000 00000000 00000000
B3B0656A 622D3901
TCPI :SDOTD OBTAIN LISTEN SOCKET 05590000 00000000 00000000
00000000 00000000 00000000

```

TCPI Trace Table

Trace table data (oldest entry dumped first):

Code	Subcode	Trace Entry
TCPI	:SDVB0	BLD DRIVER FUNCTION BLK 05A00000 00000000 00000000 00000000 00000000 00000000 B3B06569 4CB04F01
TCPI	:SDVB0	DRIVER TABLE BUILT 05AF0000 00000000 00000000 00000000 00000000 00000000 B3B06569 6A879A03
TCPI	:SDOPN	TCPIP OPEN, CALL EXIT 05400000 06F98418 00000000 00000000 00000000 00000000 B3B06569 6AB6FB03
TCPI	:SDOPN	TCPIP OPEN COMPLETE 054F0000 00000000 00000000 00000000 00000000 00000000 B3B06569 87128B09
TCPI	:SDOTD	OPEN TCPIP THREAD 05500000 06F03E00 06FB4000 00000000 00000000 00000000 B3B06569 8D558208
TCPI	:SDOTD	INIT API COMPLETE 05560000 00000000 00000000 00000000 00000000 00000000 B3B0656A 622D3901
TCPI	:SDOTD	OBTAIN LISTEN SOCKET 05590000 00000000 00000000 00000000 00000000 00000000 B3B0656A 624E1401
TCPI	:SDOTD	BIND SOCKET PORT 055C0000 00000000 00000000 00000000 00000000 00000000 B3B0656A 73F4E607
TCPI	:SDOTD	LISTEN AT SOCKET 05600000 00000000 00000000 00000000 00000000 00000000 B3B0656A 77509007
TCPI	:SDOTD	OPEN TCPIP THREAD COMP 056F0000 00000000 00000000 00000000 00000000 00000000 B3B0656A 7750C807
TCPI	:SDCON	TCPIP CON, ISSUE ACCEPT 05200000 06F9A378 06F03E00 00000000 00000000 00000000 B3B0656A 77514607

TCPI Trace Table

```

TCPI :SDCON TCPIP CONNECT COMPLETE      052F0000 00000000 00000000 00000000 00000000
00000000
                B3B065E8 B489A208
TCPI :SDCON TCPIP CON, ISSUE ACCEPT      05200000 06F9A378 06F03E00 00000000 00000000
00000000
                B3B065E8 B497EA08
TCPI :SDRCV RECEIVE CLIENT DATA      05700000 06FC4820 06FBE000 00000000 00000000 00000000
                B3B065E8 B4AD4508 - Recieve Start Timestamp
TCPI :SDRCV ISSUE TCPIP CLIENT READ    05730000 00010000 06F445E0 00000000 00000000 00000000
**TCPIP Client read begin.
                B3B065E8 B4AD7208
TCPI :SDRCV TCPIP READ COMPLETE        05760000 00000001 00000000 00000000 06FC5280 00000020
**Initial Client read (until 20 bytes)    #bytes          |A(IO read)|#Request
                B3B065FB 6851CF06
TCPI :SDRCV TCPIP READ COMPLETE        05760000 0000001F 00000000 0000006A 06FC5281 0000001F
**Initial client read (complete at 20 bytes). #bytes          MsgLngth|A(IO read)|#Request
                B3B065FB A4FBD505
TCPI :SDRCV NON-IWEB READ              057B0000 06FC9040 0000006A 00000020 06FC5280 00000000
**Non-HWSWEB00 exit called                A(Exit IPB) MsgLngth|Amt Read|A(IO read)
                B3B065FB A5001905
TCPI :SDRCV MID/LAST CLIENT READ        057C0000 0000004A 00000000 06FC90A0 00000000 00000000
                #Request|          A(Exit IPB)
                B3B065FB A5145F05
TCPI :SDRCV BUFFER OBT'D FOR EXIT      05830000 06FC56F8 06FBE000 06FC9080 0000006A
06FCA040
                B3B065FB A5177D05          A(Exit IPB)  A(Exit OPB)
TCPI :SDRCV COMPLETE MSG PROCESSED    05790000 00000000 00000000 C2E4C6C6 C3D3C9C5
D5E3F0F2
    
```

Section 6: Using the Recorder External Trace

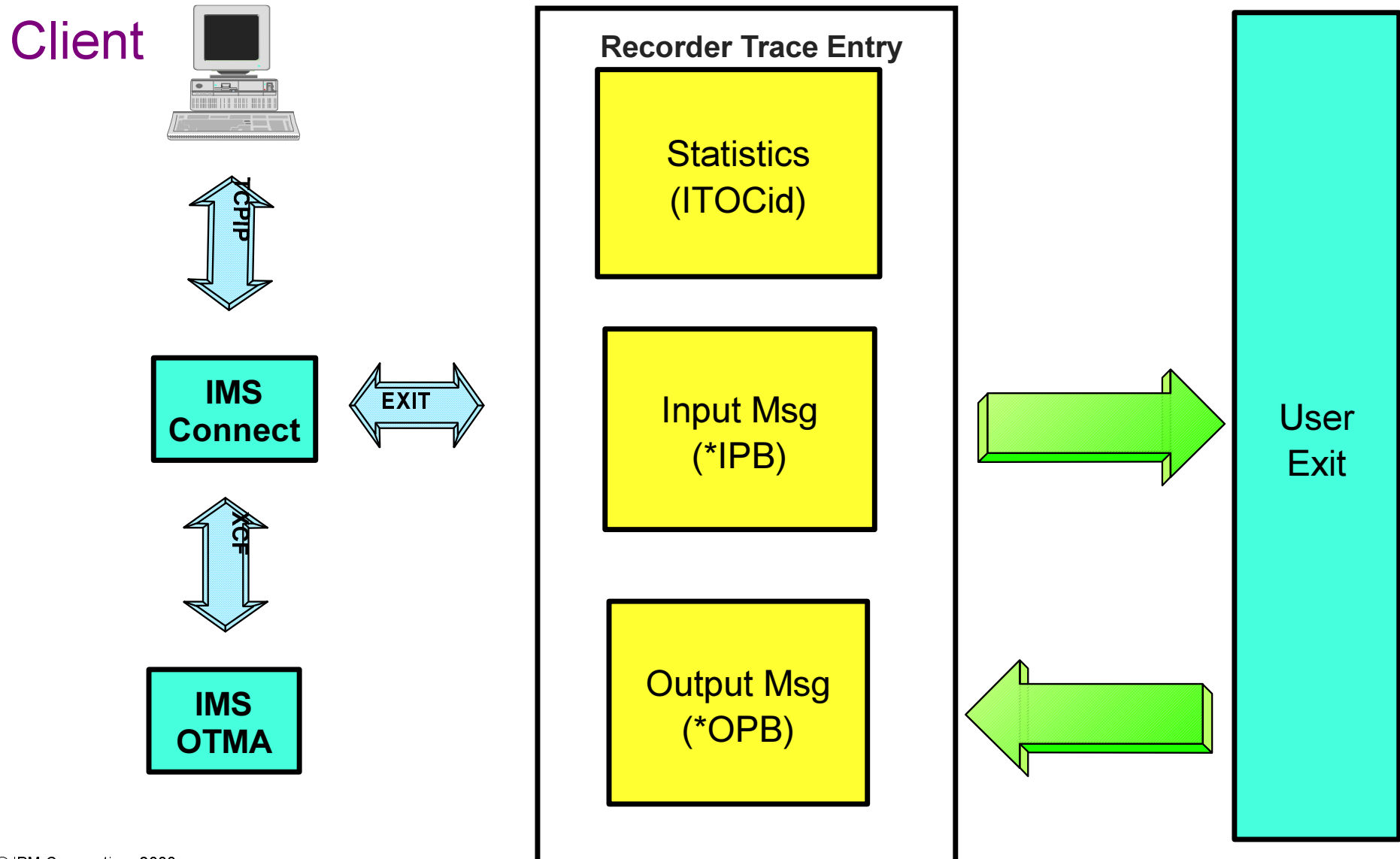
Section 6: Using the Recorder External Trace

Using the Recorder Trace Overview

The Recorder trace produces entries of the message structure on entry to and exit from the IMS Connect user exit

- **Example: DFSSMPL0**
 - ▶ **Convert client input message to OTMA - on receive**
 - ▶ **Convert ASCII to EBCDIC - on receive**
 - ▶ **Security and MFS functions**
 - ▶ **Convert EBCDIC to ASCII - on send**
 - ▶ **Convert OTMA to client message format - on send**

Using the Recorder Trace Overview (cont.)



Recorder Trace: ITOCRC - Raw Form

LISTING OF DATA SET -IMSTESTL.HWSRCDR

RECORD SEQUENCE NUMBER - 1

```

000000 00000000 C9E3D6C3 D9C30052 00000877 17480584 0100063F 00000000 00000000 *...ITOCRC.....*
000020 C3D3C9C5 D5E3F0F2 B3B065E8 B4AB9108 B3B065FB A51C1E05 00000000 00000000 *CLIENT02...Y.....*
000040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CC9D7C2 *.....*IPB*
000060 0000006A 00500000 2A4E4F41 55544F2A 00000000 00000000 434C4945 4E543032 *....&...+|...|.....<..+...*
000080 00200120 43444542 54524E32 534F434B 45594520 20202020 20202020 55535254 *.....+..|.....*
0000A0 30303120 55534552 47525020 20202020 20202020 00120000 43444542 54524E32 *.....&.....+.*
0000C0 2024434F 4E560004 00000000 00000000 00000000 00000000 00000000 00000000 *..|+.....*
0000E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000100 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000120 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000140 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000160 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000180 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
0001A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
0001C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
0001E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000200 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000220 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000240 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000260 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000280 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
0002A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
0002C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```

Recorder Trace ITOCRC - Raw (cont.)

```

0002E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CD6D7C2 * .....*OPB*
000300 01400000 00000000 00000000 0000A0F0 00000000 00000000 00000000 00010000 * .....0.....*
000320 00480020 01000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000340 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00004040 * .....*
000360 40404040 40400000 006AC614 0902E4E2 D9E3F0F0 F1400903 E4E2C5D9 C7D9D740 * ....F...USRT001 ..USERGRP
*
000380 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0003A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0003C0 00000000 00000000 00000000 00000000 00000100 0000E2D6 C3D2C5E8 C5400000 * .....SOCKEYE ..*
0003E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000400 00000000 00004040 40404040 40400000 00000000 00000000 00000000 00000000 * .....*
000420 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000440 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000460 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000480 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0004A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0004C0 00000000 00000000 00000000 00000000 00000012 0000C3C4 C5C2E3D9 D5F2405B * .....CDEBTRN2 $*
0004E0 C3D6D5E5 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *CONV.....*
000500 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000520 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000540 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000560 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000580 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CC5D5C4 * .....*END*

```

Recorder Trace - Statistic and IPB

x'28': B3B065E8 B4AB9108
Time Msg Received

x'30': B3B065FB A51C1E05
Time Msg Enqueued

x'04': ITOCRC or ITOCSN
MSG Receive or Send

RECORD SEQUENCE NUMBER - 1

```

000000 00000000 C9E3D6C3 D9C30052 00000877 17480584 0100063F 00000000 00000000 *...ITOCRC.....*
000020 C3D3C9C5 D5E3F0F2 B3B065E8 B4AB9108 B3B065FB A51C1E05 00000000 00000000 *CLIENT02...Y.....*
000040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CC9D7C2 *.....*IPB*
000060 0000006A 00500000 2A4E4F41 55544F2A 00000000 00000000 434C4945 4E543032 *...&...+|...|.....<..+...*
000080 00200120 43444542 54524E32 534F434B 45594520 20202020 20202020 55535254 *.....+..|.....*
0000A0 30303120 55534552 47525020 20202020 20202020 00120000 43444542 54524E32 *.....&.....+.*
0000C0 2024434F 4E560004 00000000 00000000 00000000 00000000 00000000 00000000 *..|+.....*
0000E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000100 - 0001E0 equal to 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```

X'60': LLLL | IRM | LLZZ | TRANCODEDATA | 00040000

x'20': Client Name

Recorder Trace - OPB

***OPB - Output Buffer**

LLZZTRANCODEDATA

```

0002E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CD6D7C2 * .....*OPB*
000300 01400000 00000000 00000000 0000A0F0 00000000 00000000 00000000 00010000 * .....0.....*
000320 00480020 01000000 00000000 00000000 00000000 00000000 00000000 * .....*
000340 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000360 40404040 40400000 006AC614 0902E4E2 D9E3F0F0 F1400903 E4E2C5D9 C7D9D740 * ....F...USRT001 ..USERGRP *
000380 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0003A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0003C0 00000000 00000000 00000000 00000000 00000100 0000E2D6 C3D2C5E8 C5400000 * .....SOCKEYE ..*
0003E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000400 00000000 00004040 40404040 40400000 00000000 00000000 00000000 * .....*
000420 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000440 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000460 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000480 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0004A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
0004C0 00000000 00000000 00000000 00000000 00000012 0000C3C4 C5C2E3D9 D5F2405B * .....CDEBTRN2 $*
0004E0 C3D6D5E5 00000000 00000000 00000000 00000000 00000000 00000000 *CONV.....*
000500 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000520 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000540 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000560 00000000 00000000 00000000 00000000 00000000 00000000 00000000 * .....*
000580 00000000 00000000 00000000 00000000 00000000 00000000 5CC5D5C4 * .....*END*

```


Section 6: Tying TCPI Trace to Recorder Trace

Section 6: Tying TCPI Trace to Recorder Trace

Recorder Trace - Statistic and IPB

x'28': B3B065E8 B4AB9108
Time Msg Received

x'30': B3B065FB A51C1E05
Time Msg Enqueued

x'04': ITOCRC or ITOCSN
MSG Receive or Send

RECORD SEQUENCE NUMBER - 1

```

000000 00000000 C9E3D6C3 D9C30052 00000877 17480584 0100063F 00000000 00000000 *...ITOCRC.....*
000020 C3D3C9C5 D5E3F0F2 B3B065E8 B4AB9108 B3B065FB A51C1E05 00000000 00000000 *CLIENT02...Y.....*
000040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CC9D7C2 *.....*IPB*
000060 0000006A 00500000 2A4E4F41 55544F2A 00000000 00000000 434C4945 4E543032 *...&...+|...|.....<..+...*
000080 00200120 43444542 54524E32 534F434B 45594520 20202020 20202020 55535254 *.....+..|.....*
0000A0 30303120 55534552 47525020 20202020 20202020 00120000 43444542 54524E32 *.....&.....+.*
0000C0 2024434F 4E560004 00000000 00000000 00000000 00000000 00000000 00000000 *...|+.....*
0000E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000100 - 0001E0 equal to 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```

X'60': LLLL | IRM | LLZZ | TRANCODEDATA | 00040000

x'20': Client Name

TCPI Trace Table

TCPI :SDCON TCPIP CONNECT COMPLETE	052F0000 00000000 00000000 00000000 00000000
B3B065E8 B489A208	
TCPI :SDCON TCPIP CON, ISSUE ACCEPT	05200000 06F9A378 06F03E00 00000000 00000000
B3B065E8 B497EA08	
<u>TCPI :SDRCV RECEIVE CLIENT DATA</u>	<u>05700000</u> 06FC4820 06FBE000 00000000 00000000 00000000
	<u>B3B065E8 B4AD4508</u> - Recieve Start Timestamp
<u>TCPI :SDRCV ISSUE TCPIP CLIENT READ</u>	<u>05730000</u> 00010000 06F445E0 00000000 00000000 00000000
**TCPIP Client read begin.	
B3B065E8 B4AD7208	
<u>TCPI :SDRCV TCPIP READ COMPLETE</u>	<u>05760000</u> <u>00000001</u> 00000000 00000000 <u>06FC5280</u> <u>00000020</u>
**Initial Client read (until 20 bytes)	#bytes A(IO read) #Request
B3B065FB 6851CF06	
<u>TCPI :SDRCV TCPIP READ COMPLETE</u>	<u>05760000</u> <u>0000001F</u> 00000000 0000006A <u>06FC5281</u> <u>0000001F</u>
**Initial client read (complete at 20 bytes).	#bytes MsgLngth A(IO read) #Request
B3B065FB A4FBD505	
<u>TCPI :SDRCV NON-IWEB READ</u>	<u>057B0000</u> <u>06FC9040</u> <u>0000006A</u> <u>00000020</u> <u>06FC5280</u> 00000000
**Non-HWSWEB00 exit called	A(Exit IPB) MsgLngth Amt Read A(IO read)
B3B065FB A5001905	
<u>TCPI :SDRCV MID/LAST CLIENT READ</u>	<u>057C0000</u> 0000004A 00000000 <u>06FC90A0</u> 00000000 00000000
	#Request A(Exit IPB)
B3B065FB A5145F05	
<u>TCPI :SDRCV BUFFER OBT'D FOR EXIT</u>	<u>05830000</u> 06FC56F8 06FBE000 <u>06FC9080</u> 0000006A
<u>06FCA040</u>	
B3B065FB A5177D05	A(Exit IPB) A(Exit OPB)
<u>TCPI :SDRCV COMPLETE MSG PROCESSED</u>	<u>05790000</u> 00000000 00000000 C2E4C6C6 C3D3C9C5

TCPI Trace Table

x'28': B3B065E8 B4AB9108
Time Msg Received

The Recorder Trace "received" timestamp will precede the TCPI 0570 trace entry.

```

TCPI :SDRCV RECEIVE CLIENT DATA      05700000 06FC4820 06FBE000 00000000 00000000 00000000
      B3B065E8 B4AD4508 - Recieve Start Timestamp
TCPI :SDRCV ISSUE TCPIP CLIENT READ   05730000 00010000 06F445E0 00000000 00000000 00000000
**TCPIP Client read begin.
      B3B065E8 B4AD7208
TCPI :SDRCV TCPIP READ COMPLETE       05760000 00000001 00000000 00000000 06FC5280 00000020
**Initial Client read (until 20 bytes) #bytes |A(IO read)|#Request
      B3B065FB 6851CF06
TCPI :SDRCV TCPIP READ COMPLETE       05760000 0000001F 00000000 0000006A 06FC5281 0000001F
**Initial client read (complete at 20 bytes). #bytes      MsgLngh|A(IO read)|#Request
      B3B065FB A4FBD505
TCPI :SDRCV NON-IWEB READ             057B0000 06FC9040 0000006A 00000020 06FC5280 00000000
**Non-HWSWEB00 exit called            A(Exit IPB) MsgLngh|Amt Read|A(IO READ)
      B3B065FB A5001905
TCPI :SDRCV MID/LAST CLIENT READ      057C0000 0000004A 00000000 06FC90A0 00000000 00000000
      #Request|      A(Exit IPB)
      B3B065FB A5145F05
TCPI :SDRCV COMPLETE MSG PROCESSED   05790000 00000000 00000000 C2E4C6C6 C3D3C9C5
D5E3F0F2
    
```

x'30': B3B065FB A51C1E05
Time Msg Enqueued

A3905 <- Receive Complete TS CLIENT02
The Recorder Trace "enqueued" timestamp will follow the TCPI 0579 trace entry.

TCPI Trace Table

x'28': B3B065E8 B4AB9108
Time Msg Received

TCPI :SDRCV RECEIVE CLIENT DATA 05700000 06FC4820 06FBE000 00000000 00000000 00000000
B3B065E8 B4AD4508 - Recieve Start Timestamp

TCPI :SDRCV ISSUE TCPIP CLIENT READ 05730000 00010000 06F445E0 00000000 00000000 00000000
 **TCPIP Client read begin.
 B3B065E8 B4AD7208

TCPI :SDRCV TCPIP READ COMPLETE 05760000 00000001 00000000 00000000 06FC5280 00000020
 **Initial Client read (until 20 bytes) #bytes |A(IO read)|#Request
 B3B065FB 6851CF06

TCPI :SDRCV TCPIP READ COMPLETE 05760000 0000001F 00000000 0000006A 06FC5281 0000001F
 **Initial client read (complete at 20 bytes). #bytes MsgLngth|A(IO read)|#Request
 B3B065FB A4FBD505

TCPI :SDRCV NON-IWEB READ 057B0000 06FC9040 0000006A 00000020 06FC5280 00000000
 **Non-HWSWEB00 exit called A(Exit IPB) MsgLngth|Amt Read|A(Buffer)
 B3B065FB A5001905

TCPI :SDRCV MID/LAST CLIENT READ 057C0000 0000004A 00000000 06FC90A0 00000000 00000000
 #Request|
 B3B065FB A5145F05

TCPI :SDRCV COMPLETE MSG PROCESSED 05790000 00000000 00000000 C2E4C6C6 C3D3C9C5
 D5E3F0F2

x'30': B3B065FB A51C1E05
Time Msg Enqueued

A3905

x'20': Client Name
Recorder Entry

Recorder Trace - Statistic and IPB

x'28': B3B065E8 B4AB9108
Time Msg Received

x'30': B3B065FB A51C1E05
Time Msg Enqueued

x'04': ITOCRC or ITOCSN
MSG Receive or Send

RECORD SEQUENCE NUMBER - 1

```

000000 00000000 C9E3D6C3 D9C30052 00000877 17480584 0100063F 00000000 00000000 *...ITOCRC.....*
000020 C3D3C9C5 D5E3F0F2 B3B065E8 B4AB9108 B3B065FB A51C1E05 00000000 00000000 *CLIENT02...Y.....*
000040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 5CC9D7C2 *.....*IPB*
000060 0000006A 00500000 2A4E4F41 55544F2A 00000000 00000000 434C4945 4E543032 *...&...+|...|.....<..+...*
000080 00200120 43444542 54524E32 534F434B 45594520 20202020 20202020 55535254 *.....+..|.....*
0000A0 30303120 55534552 47525020 20202020 20202020 00120000 43444542 54524E32 *.....&.....+.*
0000C0 2024434F 4E560004 00000000 00000000 00000000 00000000 00000000 00000000 *...|+.....*
0000E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
000100 - 0001E0 equal to 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```

X'60': LLLL | IRM | LLZZ | TRANCODEDATA | 00040000

x'20': Client Name