



Software Group | Enterprise Networking and Transformation Solutions (ENTS)

CS z/OS CICS Sockets Enhancements

Agenda

- **Performance enhancement - CICS Sockets tracing**
- **Performance enhancement - CICS monitoring**
- **Move TRUE to 31-bit storage**
- **Various general CICS Sockets enhancements**





Performance enhancement
CICS Sockets tracing

CICS Sockets trace control

➤ The IP CICS Sockets interface will only issue CICS Trace records when required through the use of the TRACE configuration option.

- ƒ Associated with the IP CICS Sockets interface.
- ƒ Specified as TRACE=YES|NO with the default being YES.
- ƒ When TRACE is specified as YES then the IP CICS Sockets interface will generate CICS AP 199 or '00C7'x records for every EZASOKET call.
 - These records are generated when a CICS Auxiliary trace is active.
- ƒ Requires the CICS Master User trace flag to be on.
- ƒ Formatted by using the CICS Auxiliary Trace formatting utility program.
- ƒ Four records are written for each EZASOKET call.
- ƒ Can be specified on the EZACICD macro when building the CICS Sockets configuration file.
- ƒ Can also be specified when defining a CICS system using the EZAC transaction.

```

EDIT ---- CFGTRACE JCL A1 ----- COLUMNS 001 080
COMMAND ==>                               SCROLL ==> CSR
000075 CICS1A  EZACICD TYPE=CICS,           Generate configuration record      X
000076                APPLID=CICS1A,       APPLID of CICS                    X
000077                TCPADDR=TCPCS,       Address space name for TCP/IP     X
000078                CACHMIN=0,           Minimum refresh time for CACHE    X
000079                CACHMAX=20,          Maximum refresh time for CACHE    X
000080                CACHRES=5,           Maximum number of active resolvers X
000081                OTE=YES,              Use Open Transaction Environment   X
000082                TCBLIM=12,            TCB Limit                          X
000083                TRACE=NO,             No tracing needed                  X
000084                ERRORTD=TCPM          Name of TD queue for error messages

```

Starting/stopping CICS Sockets trace dynamically

➤ The IP CICS Sockets Operator transaction, EZAO, can be used to dynamically start or stop IP CICS Sockets CICS Tracing. This method is useful when it is necessary to expeditiously start tracing, such as during the problem documentation gathering process.

- ⌘ EZAO,START,TRACE
- ⌘ EZAO,STOP,TRACE

```
EZAO, START, TRACE                                APPLID = CICS1A

APPLID=      ==> CICS1A                          APPLID of CICS

CICS/SOCKETS CICS TRACING IS ENABLED

PF 3 END                                          12 CNCL
```

Inquire about the status of CICS Sockets tracing

- The IP CICS Sockets Operator transaction can also be used to inquire about the status of CICS tracing - and other CICS Sockets runtime-related options.

```
EZAO, INQUIRE, CICS                                APPLID = CICS1A

TRACE          ==> NO                               Trace CICS Sockets
MAXOPENTCBS    ==> 00260                             CICS Open API, L8, TCB Limit
ACTOPENTCBS    ==> 00000                             Active CICS Open API, L8, TCBS
TCBLIM         ==> 00000                             Open API TCB Limit
ACTTCBS        ==> 00000                             Number of Active Open API TCBS
QUEUEDEPTH     ==> 00000                             Number of Suspended Tasks
SUSPENDHWM     ==> 00000                             Suspended Tasks HWM

PF 3 END                                           12 CNCL
```

CICS trace settings in support of CICS Sockets trace

➤ When specifying TRACE=YES, the CICS Master User trace flag must be on.

• Use the CETR CICS transaction to verify/change those settings

```
CETR                CICS Trace Control Facility                CICT CICS1A

Type in your choices.

Item                Choice                Possible choices
Internal Trace Status  ==> STARTED                STArted, STOpped
Internal Trace Table Size ==> 64      K                16K - 1048576K

Auxiliary Trace Status  ==> STOPPED                STArted, STOpped, PAused
Auxiliary Trace Dataset ==> A                      A, B
Auxiliary Switch Status ==> NEXT                    NO, NExt, All

GTF Trace Status       ==> STOPPED                STArted, STOpped

Master System Trace Flag ==> ON                      ON, OFf
Master User Trace Flag  ==> ON                      ON, OFf

When finished, press ENTER.

PF1=Help  3=Quit  4=Components  5=Tex/Trn  6=JVM  9=Error List
```

IP CICS Sockets CICS Tracing - Notes

NOTES

➤ **The IP CICS Sockets trace records are primarily designed to be used by the service representative. The IP CICS Sockets trace records generated are as follows:**

- , AP 00C7 USER EVENT - APPLICATION-PROGRAM-ENTRY - EZACIC01 - *socket function* (ENTRY) Tran: *transaction-ID*
- , AP 00C7 USER EVENT - APPLICATION-PROGRAM-ENTRY - EZACIC01 - TIE_TRACE_AREA before transform
- , AP 00C7 USER EVENT - APPLICATION-PROGRAM-ENTRY - EZACIC01 - TIE_TRACE_AREA after transform
- , AP 00C7 USER EVENT - APPLICATION-PROGRAM-ENTRY - EZACIC01 - *socket function* (EXIT) Tran: *transaction-ID*
- , AP 00C7 USER EVENT - APPLICATION-PROGRAM-ENTRY - EZACIC01 - ERROR DETECTED BY CICS SOCKETS

CICS Sockets trace performance impacts

➤ CICS Sockets trace improvements

┆ CPU reduced when using z/OS V1R7 CICS Sockets tracing (TRACE=YES)

┆ New option (TRACE=NO) to turn off CICS Sockets tracing

┆ z/OS V1R7 vs V1R6 :

Release Trace ON/OFF	Trans / Second	Trans/Sec Delta %	CPU/Tran	CPU/Tran Delta %
V1R6 (Trace ON)	1552	Base	1142.4	Base
V1R7 Trace=YES	1682.3	+ 8.4 %	1082.9	- 5.2 %
V1R7 Trace=NO	1824.7	+ 17.7 %	1020.4	- 10.7 %

Things to think about

➤ **The data contained in the IP CICS Sockets trace records are designed to assist the IBM service team in diagnosing a problem. If at all possible, try to capture this trace data by ensuring the following:**

- ┆ That the CICS Master User flag is on.
 - Use the CICS CETR transaction to verify this flag.
- ┆ That the IP CICS Sockets TRACE=YES is specified.
 - Use the EZAO command to dynamically enable tracing.
- ┆ That the CICS Auxiliary trace is active when tracing to the auxiliary trace data sets.
 - Use the CEMT SET AUX command to enable CICS Auxiliary tracing.

➤ **No migration changes are needed to continue IP CICS Sockets CICS tracing, since the default for TRACE is YES.**

➤ **If you would like to prevent IP CICS Sockets trace records from being generated, say for a production-level CICS region, then:**

- ┆ Either add an entry on the EZACICD,TYPE=CICS macro specifying TRACE=NO
- ┆ Or use the EZAC,ALTER,CICS transaction specifying TRACE as NO.
- ┆ Or dynamically alter the tracing status by specifying EZAO,STOP,TRACE or by specifying EZAO,SET,CICS specifying TRACE as NO. If you dynamically change TRACE then make sure you reflect that change in your IP CICS Sockets configuration.



Performance enhancement
CICS monitoring

CICS Sockets - CICS monitoring

➤ **The IP CICS Sockets interface will create CICS Event Monitoring Point (EMP) data only when an associated entry exists in the CICS Monitor Control Table (MCT).**

- ┆ EMPs are recorded for both the Task Related User Exit (TRUE), EZACIC01, and the Listener, EZACIC02.
- ┆ There is no external control other than the MCT entries and the overall CICS Monitoring status.
- ┆ A check is made by IP CICS Sockets to determine whether the EMP about to be executed has previously failed. The failure being tested is due to CICS returning a response of INVREQ whenever the EXEC CICS MONITOR command is invoked. When the EMP has failed with a response of INVREQ then all future attempts to execute that specific EMP will be disabled.
- ┆ If the EMP has not previously failed then the EXEC CICS MONITOR command will be issued.
- ┆ If the EMP has previously failed then the EXEC CICS MONITOR will be skipped.
- ┆ The TRUE and Listener will steadily learn what EMPs are not specified in the MCT.
- ┆ The use of the IP CICS Sockets MCT entries are totally optional. All or any number may be specified in the MCT.
- ┆ IP CICS Sockets must be recycled to reset any disabled EMPs. The MCT must be updated to reflect any desired associated entries.

➤ **The IP CICS Sockets MCT entries are designed to give statistical information about the usage of the IP CICS Sockets interface and Listener. They are currently broken up into two distinct categories:**

- ┆ Task Related User Exit (TRUE) - EZACIC01
 - The TRUE is invoked for each call to EZASOKET.
- ┆ Listener - EZACIC02
 - The listener is basically an application program that calls EZASOKET.

IP CICS Sockets CICS monitoring - TRUE

NOTES

➤ **The IP CICS Sockets Task Related User Exit MCT entries report on the following classes:**

- Counter/Clock - Initialization Call
- Counter/Clock - Read Call
- Counter/Clock - Write Call
- Counter/Clock - Select/Selectex Call
- Counter/Clock - Other Call
- Counter - Use of a reusable task
- Counter - Use of an attached task
- Summary counters - Task termination
- Summary counters - Interface termination
- Counter - Use of an Open API, L8, TCB
- Counter - Number of times at TCBLIM

➤ **These MCT entries are available as a sample at hlq.SEZAINST(EZACIMCT).**

➤ **When adding these entries to your MCT, remember to regenerate any required dictionary records for the post processing of the data.**

➤ **The DFH\$MOLS program may be used to report these statistical findings.**

IP CICS Sockets CICS monitoring - Listener

NOTES

➤ **The IP CICS Sockets Listener MCT entries report on the following classes:**

- Number of Connection Requested Accepted
- Number of Transactions Started
- Number of Transactions Rejected Due To Invalid Transaction ID
- Number of Transactions Rejected Due To Disabled Transaction
- Number of Transactions Rejected Due To Disabled Program
- Number of Transactions Rejected Due To Givesocket Failure
- Number of Transactions Rejected Due To Negative Response from Security Exit
- Number of Transactions Not Authorized to Run
- Number of Transactions Rejected Due to I/O Error
- Number of Transactions Rejected Due to No Space on TD queue
- Number of Transactions Rejected Due to TD Length Error
- Summary counters at Listener termination

➤ **These MCT entries are available as a sample at hlq.SEZAINST(EZACIMCL).**

➤ **When adding these entries to your MCT, remember to regenerate any required dictionary records for the post processing of the data.**

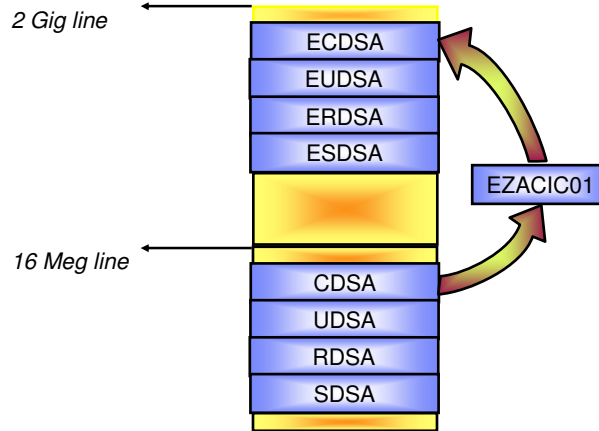
➤ **The DFH\$MOLS program may be used to report these statistical findings.**



Move TRUE to 31-bit storage

Move TRUE to 31-bit storage

- IP CICS Sockets Task Related User Exit (TRUE) is EZACIC01 and is the vehicle used to support sockets in CICS application programs. TRUEs are enabled to CICS and CICS will load these programs in the Dynamic Storage Areas based on link edit attributes.



Dynamic Storage Area's (CICS/ESA 4.1 and up):


Move TRUE to 31-bit storage

> The IP CICS Socket interface, which is implemented as a task-related user exit (TRUE), has been updated to allow loading and execution of the interface load module above the 16MB line, in the extended CICS-key dynamic storage area (ECDSA).

> The EZY1258I message is used for diagnosis and will show the entry points for both the listener, EZACIC02, and the Task Related User Exit, EZACIC01. Since the TRUE was AMODE(24) it contained an AMODE(24) entry point address:

⌋ EZY1258I 03/24/04 14:19:07 EZACIC02 ENTRY POINT IS 174F1028

⌋ EZY1258I 03/24/04 14:19:07 EZACIC01 ENTRY POINT IS 00121028




24 bit address

> Now that the TRUE is relinked as AMODE(31) RMODE(ANY) then EZY1258I will report an AMODE(31) address:

⌋ EZY1258I 03/25/04 13:34:54 EZACIC02 ENTRY POINT IS 174F7028

⌋ EZY1258I 03/25/04 13:34:54 EZACIC01 ENTRY POINT IS 1746E028



31 bit address

Move TRUE to 31-bit storage - Notes

NOTES

- When the interface is enabled through the use of the Operator transaction (EZAO,START,CICS, or the PLT program, EZACIC20) then the TRUE is enabled to CICS as an adapter program with the LINKEDITMODE option. The TRUE is now being link edited as AMODE(31) RMODE(ANY). The LINKEDITMODE option instructs CICS to load EZACIC01 above the 16 MB line in the ECDSA
- For AMODE(24) callers, CICS will convert addresses to 31-bit before passing to the TRUE thereby ensuring that AMODE 24 bit applications are preserved.
- CICS recommends that TRUEs are:
 - ✓ Written so they can always run AMODE 31
 - ✓ Link-edited as AMODE 31
 - ✓ Enabled with the LINKEDITMODE option
- ✓ **Notice:** The following report segment was generated through the use of the STAT transaction.

```

Applid CICS1A   Sysid CICT   Jobname DCICST23   Date 12/06/2004   Time 16:26:25           CICS 6.3.0           PAGE 14
-----
Subpool          Initial   Getmain   Freemain   Current   Current   Current   % of   Peak
Name            Location Access   Free      Requests Requests Elements Element Stg Page Stg  DSA   Page Stg
-----
EZACIC01      ECDSA    CICS      4K         11         0         11      10,032   12K   0.10%   12K
  
```



Various general CICS Sockets
enhancements

Enhanced configuration and operator transactions

➤ Both the configuration, EZAC, and operator, EZAO, transaction share the same Basic Mapping Support (BMS) map. It continues to support a 3278-2 (24x80) terminal type.

➤ In order to add new attributes to the enhanced Listener definition, it was required to move to a second screen.

⌋ The attributes on the first Listener screen are those that are common to both the standard and enhanced listener.

⌋ The attributes on the second Listener screen are those that are unique to the standard and enhanced Listener.

➤ **Enhanced Listener attributes: screen 1 of 2.**

```

EZAC,DISplay,LISTENER (enhanced listener. screen 1 of 2)  APPLID = CICS1A

APPLID      ==> CICS1A          APPLID of CICS System
TRANID      ==> CSRM           Transaction Name of Listener
PORT        ==> 03011         Port Number of Listener
AF          ==> INET          Listener Address Family
IMMEDIATE   ==> YES           Immediate Startup Yes|No
BACKLOG     ==> 020           Backlog Value for Listener
NUMSOCK     ==> 050           Number of Sockets in Listener
ACCTIME     ==> 999           Timeout Value for ACCEPT
GIVTIME     ==> 999           Timeout Value for GIVESOCKET
REACTIME    ==> 999           Timeout Value for READ

Verify parameters, press PF8 to go to screen 2

PF 3 END                8 NEXT                12 CNCL
  
```



Enhanced configuration and operator transactions

➤ Configuration and operator transaction enhancements:

- ⌋ Consistent flow across all elements
- ⌋ Better field placement
- ⌋ Consistent look, feel, field attributes
- ⌋ Protect unchangeable fields
- ⌋ Enhanced error checking
- ⌋ Enhanced run-time checks
- ⌋ Enhanced change control

➤ Enhanced Listener attributes: screen 2 of 2.

```

EZAC,DISplay,LISTENER (enhanced listener.  screen 2 of 2)  APPLID = CICS1A

CSTRANid  ==> CIST           Child Server Transaction Name
CSSTYPe   ==> KC            Startup Method (KC|IC|TD)
CSDELAY   ==> 000000        Delay Interval (hhmmss)
MSGLENgth ==> 011          Message Length (0-999)
PEEKDATA  ==> YES          Enter Y|N
MSGFORMat ==> ASCII        Enter ASCII|EBCDIC
USEREXIT   ==> CISTSE       Name of User/Security exit
GETTID     ==> NO          Get AT-TLS ID (YES|NO)
USERID     ==>             Listener User ID
WLM group 1 ==>           Workload Manager Group Name 1
WLM group 2 ==>           Workload Manager Group Name 2
WLM group 3 ==>           Workload Manager Group Name 3

Verify parameters, press PF7 to go back to screen 1
Press ENTER or PF3 to exit

PF 3 END           7 PREV           12 CNCL
  
```



Various smaller enhancements to CICS Sockets

- **Enhance the CICS trace data reported on the AP 199 '00C7'x CICS trace records.**
- **Enhance the EZACICD macro to allow it to support more than 255 listener definitions per interface.**
 - ┆ Maximum is now 4095
- **Enhance the listener definition to allow an appropriate user ID to be associated with the Listener task and possibly the started child server transaction.**
 - ┆ If this new parameter is not specified, then the Listener task gets the user ID from either the CICS PLT user ID (if the Listener is started via the CICS PLT) or the ID of the user that invoked the EZAO transaction (if the Listener is started via the EZAO transaction).
 - ┆ If this new parameter is specified, then any user that starts the Listener (the PLT user if the Listener is started via the PLT) must have surrogate security access to this user ID. This user ID would have to be permitted to any resources the Listener accesses, such as child server transactions and programs.
- **Define EZACIC06 as reentrant. Reentrant programs calling EZACIC06 will be able to establish and retain the reentrancy attribute when being link edited.**
 - ┆ EZACIC06 is a utility program that may be used to translate bit-masks into character arrays and character arrays into bit-masks. This program is useful for COBOL programmers for building and interpreting bit-masks for SELECT and SELECTEX calls.
- **Use the CSMT CICS Transient data queue when ERRORTD is not defined to CICS.**
 - ┆ ERRORTD is the name of the CICS Transient Data queue used to deliver IP CICS Sockets messages. If the queue name specified by ERRORTD is not found during IP CICS Sockets initialization then the default CSMT queue is used.
 - ┆ Ensure that the Transient data queue is defined to CICS. A recycling of IP CICS Sockets will be necessary to reset the ERRORTD queue once it is forced to CSMT.



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