#SHAREorg

Exploring VTAM's Performance Parameters

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Whether a seasoned VTAM Systems Programmer for decades, or a newbie to the mainframe world of Communications Server, this session will provide powerful information to take home to your shop. Basic knowledge of VTAM is all that is required in order to benefit from the gems that will be revealed to you. Performance improvement is not limited to storage and response time: you can expect those areas to be covered. Performance improvement can come from many corners, and most of the information you will glean from this session is unlikely to have been considered. Have your eyes opened and learn some new ways, including some old ways, to tune good ol' VTAM.

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Where? What? WHY? When?

If your system is running fine I think your interest lies elsewhere than making slight improvements to VTAM.

But ....

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Where? What?

Where and what are VTAM's performance parameters.

VTAM has a several parameters which effect the performance of the application, the network or the even the system.

These parameters are set in the application major node, switched major node or by the startoptions in ATCSTRxx.

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EAS Definition Application Major Node

EAS = 509

If your EAS value is specified as lower than the number of sessions that you actually have, sessions would still be established as usual. However, the efficiency of searching for the session representation could be impaired if a smaller table was allocated due to the lower EAS value

```
DIS CICS2,O
DISPLAY NET,ID=CICS2,SCOPE=ONLY
IST097I  DISPLAY  ACCEPTED
IST075I  NAME = NETA.CICS2,      TYPE = APPL
IST486I  STATUS= ACT/S    , DESIRED STATE= ACTIV
......
IST1634I  DATA SPACE USAGE: CURRENT =        0 MAXIMUM  =      256
IST171I  ACTIVE SESSIONS =  0000011682              ,SESSION REQUESTS =
0000000001
IST314I  END
```

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EAS Definition Application Major Node

Application EAS ...

If an application is planned to have more than 509 sessions, then this number should be increased accordingly. High paging rates are seen if this value is set to small!

Accurate coding of the EAS value for your applications can save storage in your system. For example, if you estimate that there will be less than 30 sessions with this application, but you let the EAS value default to 509, then an extra 4K table will be allocated from common storage. The size of the table is based on the EAS value that you code and is determined as follows:

Table size	EAS value
4K	30- 4000
8K	4001- 8000
16K	8001-16000
32K	16001-32000
64K	32001-48000
128K	48001-56000
256K	56001-64000
512K	greater than 64000

If your EAS value is specified as lower than the number of sessions that you actually have, sessions would still be established as usual. However, the efficiency of searching for the session representation could be impaired if a smaller table was allocated due to the lower EAS value.

Complete your sessions evaluation online at SHARE.org/AnaheimEval

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EAS Definition Application Major Node

APPLNODE VBUILD TYPE=APPL

CICS2   APPL   AUTH=ACQ,   PERMIT APPLICATION TO ACQUIRE LUS

                EAS=509,   CONCURRENT APPLICATION SESSIONS

SNA Network Implementation : For a non-TSO application program, you should specify an EAS value that equals the average number of sessions, but does not exceed 32767

SNA Resource Definition Reference: gives a range from 0 to 65535

I recommend using value from the Resource Definition Reference

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IBMTGPS and XCF

*

XCF TGP COSTTIME=0,COSTBYTE= 1 ,   *

SECURITY=SECURE,PDELAY=NEGLIGIB,   *

CAPACITY=25M

*

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APPN Logmodes and Class of Service

Choosing the correct APPNCOS/subarea COS can affect the performance of VTAM

There are two ways to resolve COS Names

LOGMODE Table Method

COS Mapping Table Method

For a more detailed description see

Session 3222 SHARE in Denver Summer 2009
Johnathan Harter: APPN LOGMODEs and Class of Services

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Slow responsetime

```
D NET,ID=CNR000BA,HPRDIAG=YES
IST075I  NAME = CNR01D1E       , TYPE = PU_T2.1
....
IST875I  APPNCOS TOWARDS RTP = #INTER
....
IST1477I  ALLOWED DATA FLOW RATE =    25 KBITS/SEC
IST1516I  INITIAL DATA FLOW RATE =    12 KBITS/SEC
IST1841I  ACTUAL DATA FLOW RATE =    117 KBITS/SEC            <= half of the line speed
IST1511I  MAXIMUM NETWORK LAYER PACKET SIZE =   1469 BYTES
...


D NET,ID=CNR00091, HPRDIAG=YES
IIST075I  NAME = CNR00091       , TYPE = PU_T2.1
...
IST875I  APPNCOS TOWARDS RTP = #CONNECT
....
IST1477I  ALLOWED DATA FLOW RATE =   5000  BITS/SEC
IST1516I  INITIAL DATA FLOW RATE =    12 KBITS/SEC
IST1841I  ACTUAL DATA FLOW RATE =     0 KBITS/SEC          <=  #CONNECT has not enough throughput
```

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Slow responsetime because of a new connection

Remember if LOGMODE is not recognized the APPNCOS comes from the first entry of ISTINCLM

 D NET,SESSION,SID=E2633551AE1B4417

IST350I DISPLAY TYPE = SESSIONS

IST879I PLU/OLU REAL = GBIBMFR.FR0ZNF12 ALIAS = DEXYZ00.FR0ZNF12

IST879I SLU/DLU REAL = DEXYZ000.NVFTS1 ALIAS = GBIBMFR.NVFTS1

IST880I SETUP STATUS = ACTIV

IST875I ADJSSCP TOWARDS PLU = ISTAPNCP

IST875I ADJSSCP TOWARDS SLU = ISTAPNCP

IST875I ALSNAME TOWARDS PLU = CNR01D1E

IST875I ALSNAME TOWARDS SLU = CNR00587

IST933I LOGMODE=*BLANK* , COS=*BLANK*   NO logmode provided when RTP was setup

IST1438I LOGMODE *BLANK* UNKNOWN IN THIS DOMAIN, DEFAULT IS ISTCOSDF

IST875I APPNCOS TOWARDS PLU = #INTER

IST875I APPNCOS TOWARDS SLU = #INTER

IST314I END

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Slow responsetime solution

When a logmode is available either from the application or from a predefined CDRSC the APPNCOS will taken from the logmode

```
 D NET,SESSION,SID=CA13EF2AE1238BF7
IST097I  DISPLAY  ACCEPTED
IST350I  DISPLAY TYPE = SESSIONS
IST879I  PLU/OLU REAL = GBIBMFR.FR0ZNF12  ALIAS = DEXYZ00.FR0ZNF12
IST879I  SLU/DLU REAL = DEXYZ000.NVFTS1 ALIAS = GBIBMFR.NVFTS1

IST875I  ALSNAME TOWARDS PLU = CNR01B8A
IST875I  ALSNAME TOWARDS SLU = CNR01A7E
IST933I  LOGMODE=FTPBIND , COS=BATCH
IST875I  APPNCOS TOWARDS PLU = #BATCH
IST875I  APPNCOS TOWARDS SLU = #BATCH
.....
IST314I  END
```

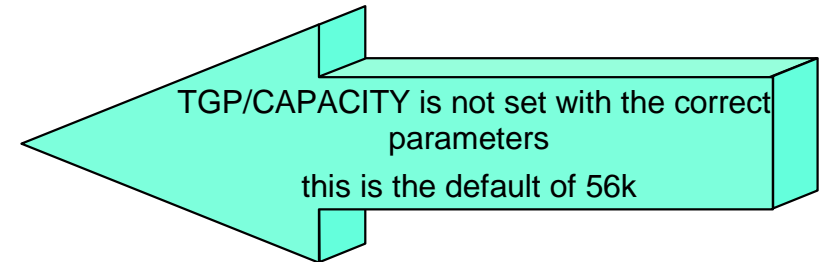Angela Schmitz, AS Communication Consultant Services

Slow responsetime because of a new connection

Check with D NET,ID=CNR03F57,HPRDIAG=YES the status of CPSVCMG pipe

```
IST075I  NAME = CNR03F57        , TYPE = PU_T2.1
IST1392I  DISCNTIM = 00010 DEFINED AT PU   FOR DISCONNECT
....
IST1477I  ALLOWED DATA FLOW RATE =    128 KBITS/SEC
IST1516I  INITIAL DATA FLOW RATE =   2600  BITS/SEC
IST1841I  ACTUAL DATA FLOW RATE =      2 KBITS/SEC
IST1511I  MAXIMUM NETWORK LAYER PACKET SIZE =   1461 BYTES
IST1478I  NUMBER OF UNACKNOWLEDGED BUFFERS =     0
IST1479I  RTP CONNECTION STATE = CONNECTED          - MNPS = NO
IST1855I  NUMBER OF SESSIONS USING RTP =         2
.....
IST1860I  NUMBER OF NLPS SENT =    201117 - OVERFLOW =        0
IST1861I  NUMBER OF NLPS RECEIVED =    247887 - OVERFLOW =        0
IST1842I  NUMBER OF NLPS RETRANSMITTED =        64
IST1843I  NUMBER OF NLPS ON WAITING-TO-SEND QUEUE =     0
IST1847I  NUMBER OF NLPS ON WAITING-FOR-ACKNOWLEDGEMENT QUEUE =     0
IST1862I  ARB MAXIMUM SEND RATE =     52 KBITS/SEC
IST1844I  ARB MODE = GREEN
IST1846I  CURRENT RECEIVER THRESHOLD =   1166118 MICROSECONDS
IST1846I  MAXIMUM RECEIVER THRESHOLD =   1320000 MICROSECONDS
IST1846I  MINIMUM RECEIVER THRESHOLD =    585000 MICROSECONDS
IST1848I  SEND BYTE COUNT =   14259879 RECEIVE BYTE COUNT =   33126613
IST1849I  LARGEST NLP SENT =      597 BYTES
IST1850I  LARGEST NLP RECEIVED =      584 BYTES
IST1851I  SMOOTHED ROUND TRIP TIME =        28 MILLISECONDS
 ....
IST1857I  BACKPRESSURE REASON COUNTS:
IST1858I  PATHSWITCH    SEND QUEUE MAX    STORAGE FAILURE
IST1859I      6          0              0
.....
```

TGP/CAPACITY is not set with the correct parameters
this is the default of 56k

Both EE partner need to have the same definitions. Having not the right CAPACITY set results in reduced initial throughput and excessive pathswitches

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Slow responsetime because of a new connection

Not having the right CAPACITY setting results in reduced initial throughput and excessive path switches.

The characteristics of an EE line is defined by the TGP parameter defined in the member IBMTGPS. To resolve different line speed by otherwise the same characteristics set the CAPACITY parameter with the correct line speed.

The setup of an RTP pipe starts with 1 fifth of the actual speed without the parameter set

The default is 56 kb

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Startoptions

Start options define and affect VTAM's characteristics, behavior and performance

► **D NET,VTAMOPTS,FORMAT=COMPLETE**
► **D NET,BFRUSE,BUFFER=SHORT**

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D NET,BFRUSE,BUFFER=SHORT

```
IST350I  DISPLAY TYPE = BUFFER POOL DATA
IST632I  BUFF    BUFF  CURR  CURR  MAX    MAX   TIMES    EXP/CONT    EXP
IST633I   ID     SIZE TOTAL AVAIL TOTAL  USED    EXP    THRESHOLD   INCR

IST356I  IO00     999 12000 11935 12000   214      0      32/-----    64
IST356I  BS00     260  6006  5926  6006   103      0       1/-----    42

IST356I  LP00    2032    40    37    40    24      0       4/-----     6
IST356I  XD00     697    60    28    60    42      0       1/-----     5

IST356I  LF00     120 32790   496 32790 32367      0       1/-----    30
IST356I  CRPL     144 15000  9498 15000  5964      0      20/-----    50

IST356I  SF00     112   160    59   160   109      0       1/-----    32
IST356I  SP00     176    63    63    63     6      0       1/-----    42
IST356I  AP00      56    56    56    56     0      0       3/-----    56

IST356I  TI00     632  2004  1976  2004   424      0       1/-----    30
IST356I  T100    1004    48    48    48    18      0       1/-----    32
IST356I  T200    2028    40    40    40    24      0       7/-----    32

IST356I  CRA4    4080   210   201   210    92      0      20/-----    10
IST356I  CRA8    8176    48    46    48    17      0       2/-----     6
```

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Startoptions: Buffer Pools

Buffer expansions is a performance issue

In a subarea environment the critical buffers are: IOBUF and BSBUF

```
IST356I  IO00     999 12000 11935 12000    214       0    32/-----    64
IST356I  BS00     260  6006  5926  6006    103       0     1/-----    42
```

TN3270 and IP printing application do use another pair of buffers which should be watched: LFBUF and CRPL (range 1-32767)

```
IST356I  LF00     120 32790   496 32790 32367       0     1/-----    30
IST356I  CRPL     144 15000  9498 15000  5964       0    20/-----    50
```

IBM-supplied values are appropriate for system which do not use TN3270!

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Startoptions: Buffer Pools

APPN/HPR/EE the following should be increased the default is much to low: TI00, T100 and T200

```
IST356I  TI00    632  2004  1976  2004   424       0     1/-----    30
IST356I  T100   1004    48    48    48    18       0     1/-----    32
IST356I  T200   2028    40    40    40    24       0     7/-----    32
```

Fixed IBM-supplied values are appropriate for most systems. The default value for this pool is set at a conservative value in case the functions that use this pool are not used. If using the functions that utilize this pool, use the DISPLAY net,BFRUSE command to monitor usage and then set the BASENO for the pool at the normal high period usage.

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D NET,VTAMOPTS,FORMAT=COMPLETE

IST1309I	START OPTION	CURRENT VALUE		ORIGINAL VALUE		ORIGIN
IST1310I	AFFDELAY	0		0		ATCSTR00
IST1310I	APPNCOS	#CONNECT		#CONNECT		ATCSTR00
IST1310I	ASIRFMSG	OLUSSCP		OLUSSCP		DEFAULT
IST1310I	BN	YES		YES		ATCSTR00
IST1310I	BNDYN	NONE		NONE		ATCSTR00
IST1310I	BNORD	DEFINED		DEFINED		ATCSTR00
IST1310I	CINDXSIZ	74959		74959		ATCSTR00
IST1310I	DIALRTRY	YES		YES		DEFAULT
IST1310I	DUPDEFS	DEPLU		DEPLU		ATCSTR00
IST1310I	ENHADDR	YES		YES		ATCSTR00
IST1310I	HPRPST	LOW	480S	LOW	480S	ATCSTR00
IST1310I	HPRPST	MEDIUM	240S	MEDIUM	240S	ATCSTR00
IST1310I	HPRPST	HIGH	150S	HIGH	150S	ATCSTR00
IST1310I	HPRPST	NETWRK	90S	NETWRK	90S	ATCSTR00
IST1310I	HSRTSIZE	29989		29989		ATCSTR00
IST1310I	NUMTREES	100		100		DEFAULT
IST1310I	OSRTSIZE	251		251		ATCSTR00
IST1310I	TOPOTIME	18:28		18:28		DEFAULT
IST1310I	VTAMEAS	70999		70999		ATCSTR00

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AFFDELAY

AFFDELAY affects Generic Resource behavior

AFFDELAY = 0 - on session termination the affinity will be deleted.

AFFDELAY > 0 - if time has not expired, the affinity will be considered to be in force and the new session will be assigned to the same Generic Resource member

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DUPDEFS

DUPDEFS specifies whether VTAM should continue searching for a target resource when the resource has been found but is not active.

This default is the worst performer and hardly ever necessary!

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ENHADDR

Specifies whether VTAM can assign element address greater than 65,535.

The default is NO

VTAM assigns network addresses for all resources that share its subarea

- **With ENHADDR=YES, PARSESS=NO APPLs in an APPL major node are assigned extended addresses when the major node is activated.**
- **With ENHADDR=YES, PARSESS=YES APPLs in an APPL major node, if VTAM has no subarea connections (is a pure Network Node or pure End Node), two extended addresses will be assigned to each APPL when the major node is started.**
- **APPN session partner element addresses come out of this subarea's 64K element address pool if you specify ENHADDR=NO**

Reducing the number of addresses:

If there are a large number of APPL definitions with a name pattern, then the use of model APPL definitions eliminates the need to predefine these APPLs. If PARSESS=NO, VTAM assigns one network address when the APPL is activated. If PARSESS=YES, VTAM assigns two network address when the APPL is activated. By using model APPL definitions, the assigned network addresses are reduced to only those for active applications.

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HPRPST

HPRPST Specifies the maximum time that VTAM tries a path switch before ending a connection.

Consider in an EE environment the time to find a new route before ending a path switch.

The default is lower than the default IP values which means the pathswitches starts before IP is finished.

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NUMTREES

Setting up a high number for NUMTREES makes session setup faster, but takes up more storage than a lower number.

Setting up a lower number makes session setup slower because routes will have to be calculated.

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TOPOTIME

If TOPOTIME is not specified, topology garbage collection runs every 24 hours after the time that topology and routing service is activated at VTAM initialization.

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VTAM's control blocks

VTAM's SSCP function provides support und session services for all endusers. It create control blocks for all nodes during activation.

To access the control blocks as efficently as possible a hash function and table are used. The size of the table should be selected based on the number of network names.

The search efficiency is reduced conciderably for larger table sizes.

Prime numbers usually produce the best distribution.

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Performance Startoptions

D NET,VTAMOPTS,FUNCTION=PERFTUNE

The command returns all startoptions which were once contants of ISTRACON.

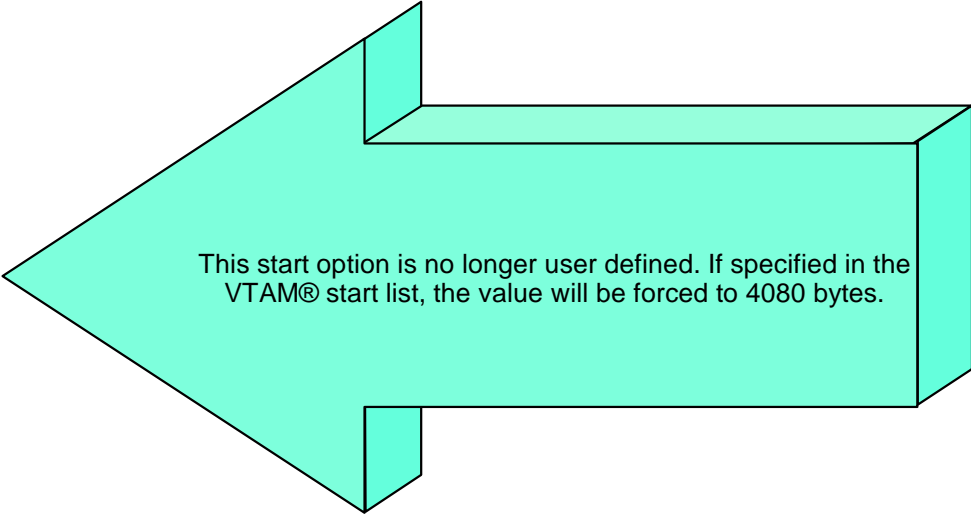| Startoption	ISTRACON
CINDXSIZ	RACCITSZ
HNTSIZE	RACHNTSZ
HSRTSIZE	RACHSRT
OSRTSIZE	RACHONSRT
VTAMEAS	RACEAS

This start option is no longer user defined. If specified in the VTAM® start list, the value will be forced to 4080 bytes.

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CINDXSIZ

From z/OS Comm Svr: SNA Resource Definition Reference

CINDXSIZ   CINDXSIZ=table_size

range: 28–16777199 bytes default: 8176

Specifies the maximum size of the ISTCIT and ISTCONVT index tables.

Question: Who knows ISTCIT and ISTCONVT?

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CINDXSIZ

From SNA DATA Areas CID Index Table:

The CIT provides a mapping for the VTAM CID index table. The CID index table provides direct access to a function management control block (FMCB) or FMCB extension given a unique session identifier (the CID)

CONVID Index Table:

The CONVT provides direct access to an APPC conversation control block (RAB) given a unique conversation identifier (CONID)

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CINDXSIZ

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Chapter 5.2.2.14 Size of the CID Index Table

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HSRTSIZE

z/OS Comm Svr: SNA Resource Definition Reference

HSRTSIZE=number_of_queue_pointers
 range:1–2097148 default: 9973

Specifies the number of queue pointers in the symbol resolution table (SRT) for the network containing the VTAM host node.

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OSRTSIZE

z/OS Comm Svr: SNA Resource Definition Reference

OSRTSIZE=number_of_queue_pointers

range: 1–2097148   default: 43

Specifies the number of queue pointers in the symbol resolution table (SRT) directory for networks other than the VTAM host node's network.

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HSRTSIZE and OSRTSIZE

The following is true for both HSRTSIZE and OSRTSIZE

For networks with a large number of LUs, increasing this number

shortens the length of the queues, thereby

decreasing the logon time.

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HSRTSIZE and OSRTSIZE

After deleting it from the customization manual it first appeared back in 1995 as   APAR II02531 mentioned:

In large networks this value should be set higher. Higher paging rates in module ISTNRCSD or ISTNRCSA are seen, when this value is too low.

and finally made it back in the customization manual (without a reference in the Resource Definition Reference).

Attention:

The values shown in the z/CS SNA Customization are the same as in 3.4.2 manual! -   I recommend that you substitute them with those from the SNA Resource Definition Reference manual.

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HSRTSIZE and OSRTSIZE

For HSRTSIZE as well OSRTSIZE you need to add all

- **PUs**
- **Lines**
- **LUs**
- **CDRSCs**
- **Applications**
- **MPC**
- **XCF**
- **......**

in one word all network resources.

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VTAMEAS

z/OS Comm Svr: SNA Resource Definition Reference

VTAMEAS   VTAMEAS=number_of_concurrent_sessions
range: 0–2147483647   default: 32001

Specifies the number of concurrent sessions VTAM can have with other LUs.

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VTAMEAS

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5.2.2.15 EAS Value

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How to determine the size of the network?

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VTAMSTATS

```
D NET,STATS,TYPE=VTAM
IST350I  DISPLAY TYPE = STATS,TYPE=VTAM

IST1345I      ID       VALUE          DESCRIPTION
IST1227I       7         135 = INTERCONNECT CONTROLLERS FOR XCAEE01
IST1227I      63       21848 = RECOVERABLE SESSIONS
 .....
IST1227I      67         435 = PU STATEMENTS UNDER SW LINES
IST1227I      51      126220 = ACTIVE LU TOTAL
IST1227I      10         435 = TOTAL LINE STATEMENTS FOR XCA MAJOR NODES
IST1227I      65         435 = NUMBER OF LINES DEFINED
IST1227I      80        5984 = NETWORK INDEPENDENT LU TOTAL
 ......
IST1227I      50      169564 = DEFINED LU TOTAL
 ......
IST1227I      64       42084 = CURRENT NUMBER OF SESSION PARTNERS
IST1227I     100       35480 = DYNAMIC DIRECTORY ENTRIES
IST1454I         109 STATISTICS   DISPLAYED
IST314I  END
```

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Prime numbers

Using a prime number of queue pointers results in a fairly even distribution of SRT entries to the queues. It is recommended that you choose a prime number.

	default value	prime number	max value	prime number
CINDXSIZ	81**76**	81**67**	16777199	16777199
HSRTSIZE	9973	9973	209714**8**	209714**3**
OSRTSIZE	43	43	209714**8**	209714**3**
VTAMEAS	32001	3200**3**	2147483647	2147483647
EAS	509	509	65535	655**21**

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References

➤ **LY43-0056-1   VTAM(TM): Customization Version 3.4.1 for MVS/ESA**
(1992)
SC31-8778   z/OS Comm Svr: SNA Resource Definition Reference

➤ **SC31-8777   z/OS Comm Svr: SNA Network Implementation Guide**

➤ **GC31-6852   z/OS Comm Svr: SNA Data Areas Volume 1**

➤ **SC31-6854   z/OS Comm Svr: SNA Customization**

➤ **APAR II02531**
➤ **Session 3222 Summer SHARE 2009 Johnathan Harter,**
APPN LOGMODEs And Class Of Services

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