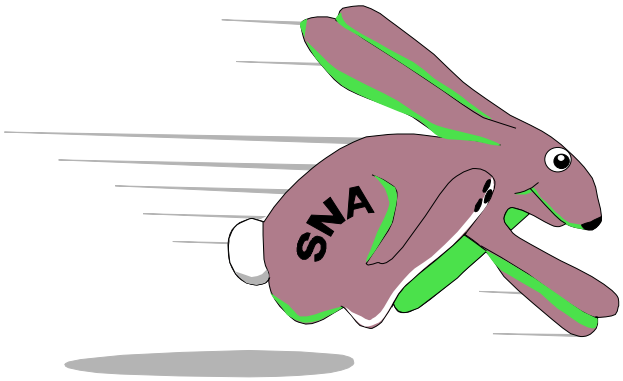
VSE/VTAM Tuning

Sessions E43 & E44



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RETURN TO INDEX

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Agenda

- ASI Procedure Considerations
- VTAM Partition Considerations
- VTAM Buffer Pools
- VTAM Start Options
- Class of Service
- Channel Coattailing
- Session Pacing
- References

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IPL Procedure Parms

- VSIZE
  - include data space (VTAM 4.2)
  - monitor with MAP command
- BUFSIZE
  - supervisior I/O buffer usage
  - monitor with SIR command
- System GETVIS
  - SVA-24
  - SVA-31 (VTAM 4.2)
  - monitor with GETVIS command

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VSE/ESA 2.x IPL Proc

```
500,$$A$SUPX, VSIZE=180M, VIO=512K,VPOOL=64K,LOG
ADD 500:51F,3277
ADD D00:D03,3390
ADD E20:E23,3490
ADD FEC,3505            POWER DUMMY READER, DO NOT DELETE
ADD FED,2520B2          POWER DUMMY PUNCH, DO NOT DELETE
ADD FEE,PRT1            POWER DUMMY PRINTER, DO NOT DELETE
ADD FEF,PRT1            POWER DUMMY PRINTER, DO NOT DELETE
ADD FFA,3505            ICCF INTERNAL READER, DO NOT DELETE
ADD FFC,3505            ICCF DUMMY READER, DO NOT DELETE
ADD FFD,2520B2          ICCF DUMMY PUNCH,  DO NOT DELETE
ADD FFE,PRT1            ICCF DUMMY PRINTER, DO NOT DELETE
ADD FFF,CONS            DUMMY CONSOLE, DO NOT DELETE
SET ZONE=WEST/00/00

DEF SYSCAT=DOSRES
DEF SYSREC=SYSWK1
SYS JA=YES
SYS BUFSIZE=1500
SYS NPARTS=44
SYS SEC=NO
SYS PASIZE=30M
SYS SPSIZE=0K
SYS BUFLD=YES
DPD VOLID=DOSRES,CYL=211,NCYL=15,TYPE=N,DSF=N
DPD VOLID=SYSWK1,CYL=446,NCYL=15,TYPE=N,DSF=N
DPD VOLID=DOSRES,CYL=414,NCYL=14,TYPE=N,DSF=N
DPD VOLID=DOSRES,CYL=428,TYPE=N,DSF=N
DLA NAME=AREA1,VOLID=DOSRES,CYL=64,NCYL=3,DSF=N
SVA SDL=300, GETVIS=(768K,3M), PSIZE=(256K,2000K)
```

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ALLOC Procedure

► VTAM Partition Size

- environment ’B’ default 6M
- major factors:
  - program area size
  - buffer pool requirements
  - use of 31-bit partition GETVIS (VTAM 4.2)

► DSIZE (VTAM 4.2)

- environment ’B’ default 20M
- major factors:
  - data space requirements (VDISK, sort, etc...)
  - number of VTAM applications
  - use of VTAM data compression

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JCL0 Procedure

- Partition Priority

  - default setting

    PRTY BG,FB,FA,F9,F8,F7,F6,F5,F4,F2,F3,F1

- VTAM Ahead of POWER

  - use no priority checking parm

    PSTART F3,K3,NPC

- PRTYIO

  - AR command
  - default setting is FIFO

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VTAM Startup Parms

- SETPFIX LIMIT
  - 424K default (w/supplied JCL)
  - 640K recommended minimum
  - 31-bit PFIX used if partition > 16M (VTAM 4.2)

- SIZE
  - 2268K recommended for VTAM 3.4
  - ISTINCVT recommended for VTAM 4.2

- DSPACE (VTAM 4.2)
  - 1M minimum
  - 2M default (w/supplied JCL)

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VTAM 4.2 Startup JCL

```
* $$ JOB JNM=VTAMSTRT,DISP=L,CLASS=3
// JOB VTAMSTRT  START VTAM
// OPTION DUMP,SADUMP=5
// SETPARM XNCPU=''
// EXEC PROC=$COMVAR,XNCPU
// EXEC DTRSETP,PARM='CPUVAR&XNCPU;;SET XSTATF3=ACTIVE'
/*
// SETPFIX LIMIT=424K
* // SETPFIX LIMIT=(,300K)
// ASSGN SYS000,UA
// ASSGN SYS001,DISK,VOL=SYSWK1,SHR     TRACE FILE ASSIGNMENT
// ASSGN SYS004,DISK,VOL=SYSWK1,SHR     TRACE FILE ASSIGNMENT
// ASSGN SYS005,DISK,VOL=SYSWK1,SHR     NCP LOAD/DIAG FILE ASSGN
// LIBDEF   *,SEARCH=(PRD2.COMM,PRD2.COMM2,PRD2.CONFIG,                    *
            PRD1.BASED,PRD1.BASE),PERM
// LIBDEF   DUMP,CATALOG=SYSDUMP.F3,PERM
// EXEC ISTINCVT, SIZE=ISTINCVT, PARM='CUSTNO=C555-555-5555,VTAMPW=5979-4*
            015-4627-6185-9388', DSPACE=2M
// EXEC DTRSETP,PARM='CPUVAR&XNCPU;;SET XSTATF3=INACTIVE'
/*
/&
* $$ EOJ
```

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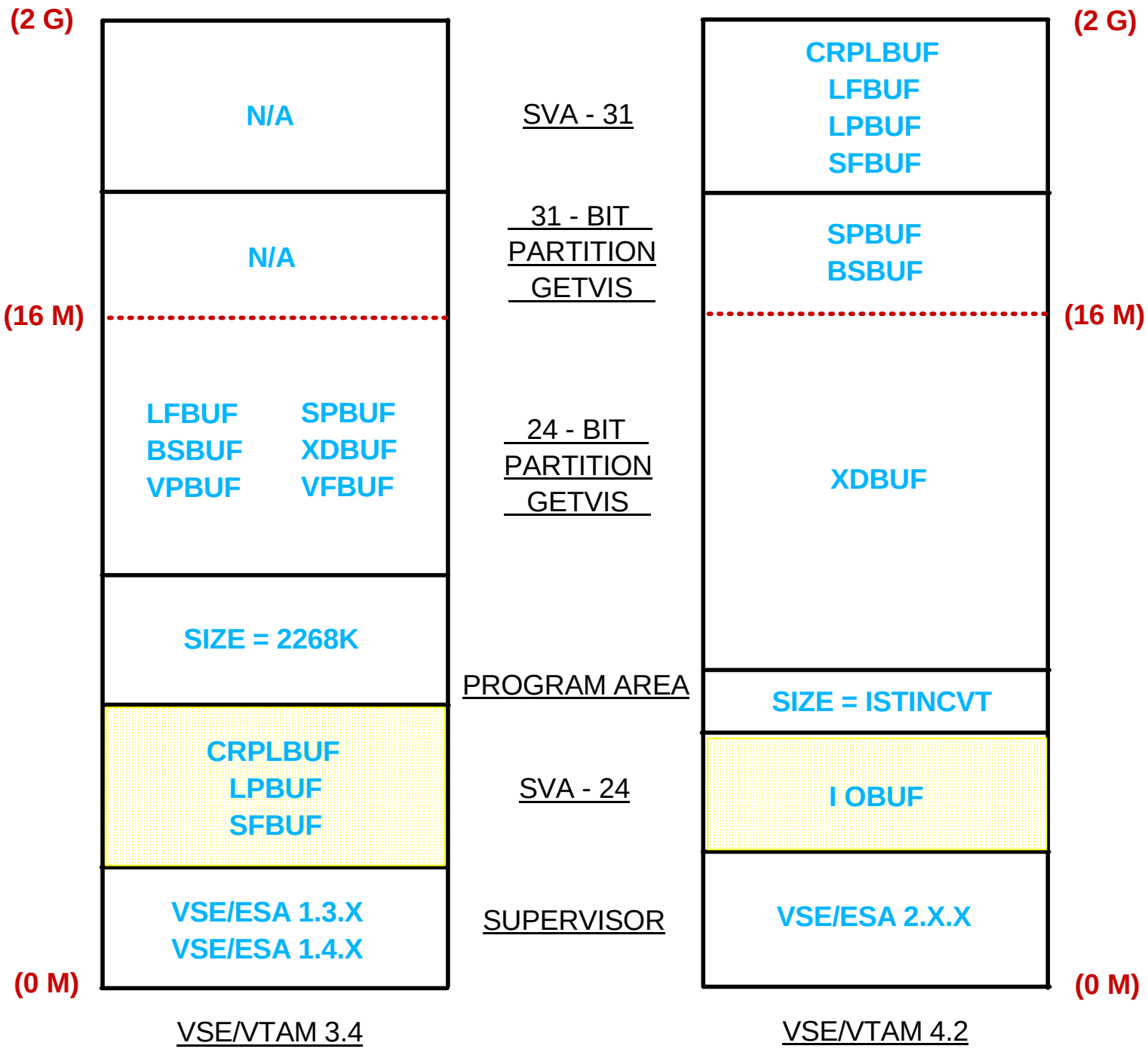
VTAM Partition Storage Layout



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Tuning VTAM Buffer Pools

- Supplied Values are a Starting Point
- Calculate Buffer Sizes for:
  - maximum efficiency
  - minimum storage waste
- I/O Buffers
  - every environment is unique
  - use a common value across network hosts
  - optimum value = average PIU size
- Primary Tool:
  - D NET,BFRUSE command
- Average PIU Size is Growing
  - graphics applications
  - file transfer programs

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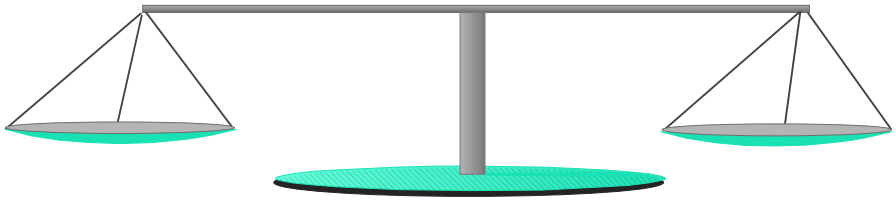
Monitoring Buffer Pool Usage

D NET,BFRUSE,BUFFER=SHORT

```
1C39I COMMAND PASSED TO ACF/VTAM
IST097I DISPLAY ACCEPTED
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  SF    112    32    30    32    2    0      1/-----   32
IST356I  IO    359    70    52   110  102   42      6/00046   20
IST356I  SP    144   210   210   210    0    0      1/-----   51
IST356I  LP   2032    12     7    12    8    0      2/-----    6
IST356I  LF    120    90    88    90    2    0      1/-----   30
IST356I  BS    216    34    34    34    0    0     17/-----   17
IST356I  XD    681    10    10    10    0    0      5/-----    5
IST356I  CR    164    60    50    60   27    0     29/-----   22
```



BUFF SIZE - does not include 16 byte SMS header or rounding
CURR TOTAL - current # of buffers in pool (baseno + expansions)
CURR AVAIL - # of free buffers in pool, out of CURR TOTAL
MAX TOTAL - maximum # of buffers in pool (baseno + expansions)
MAX USED - maximum # of buffers used in pool, out of MAX TOTAL
TIMES EXP - # of times the pool expanded
EXP THRESHOLD - pool expansion point (xpanpt)
CONT THRESHOLD - pool contraction point (2 * EXP INCR + EXP THRESHOLD)
EXP INCR - pool expansion increment (xpanno)

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VTAM 3.4 Tuning Guidelines

► I/O Buffer Pool

- select BUFSIZE (even number)
- optimize # of buffers/page, LFBUF formula:
  coded value + 63 + 16 rounded up to doubleword boundry
  divide into 4096 for buffers per page
  remainder is wasted storage/page
- set UNITSZ in NCP <= BUFSIZE
- set BASENO to 4K page increment
- set XPANNO to 4K page increment (VTAM rounds up)
- set XPANPT - SLOWPT >= largest MAXBUFRU

► Other Buffer Pools

- formula:
  BUFSIZE + 16 rounded up to doubleword boundry
  divide into 4096 for buffers per page
- set BASENO to 4K page increment
- set XPANNO to 4K page increment (VTAM rounds up)
- set VPBUF & VFBUF to 4K page increment (VTAM rounds up)

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VTAM 4.2 Tuning Guidelines

► I/O Buffer Pool

- select BUFSIZE (even number)
- optimize # of buffers/page, IOBUF formula:
  coded value + 71 + 16 rounded up to doubleword boundry
  divide into 4096 for buffers per page
  remainder is wasted storage/page
- set UNITSZ in NCP <= BUFSIZE
- set BASENO to 4K page increment (VTAM rounds up)
- set XPANNO to 4K page increment (VTAM rounds up)
- set XPANPT - SLOWPT >= largest MAXBUFRU

► Other Buffer Pools

- formula:
  BUFSIZE + 16 rounded up to doubleword boundry
  divide into 4096 for buffers per page
- set BASENO to 4K page increment
  (VTAM rounds up except for CRPLBUF & SPBUF)
- set XPANNO to 4K page increment (VTAM rounds up)

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VSE/VTAM Buffer Sizes

Buffer Pool	VTAM 3.4	VTAM 4.2	Notes
BSBUF	168 **24/pg**	232 **17/pg**	
CRPLBUF	168 **24/pg**	184 **22/pg**	
LFBUF	see notes	136 **30/pg**	#/pg in VTAM 3.4 depends on size coded in ATCSTRxx
IOBUF	N/A	see notes	#/pg in VTAM 4.2 depends on size coded in ATCSTRxx
LPBUF	2048 **2/pg**	2048 **2/pg**	
SFBUF	416 **9/pg**	128 **32/pg**	
SPBUF	144 **28/pg**	160 **25/pg**	
XDBUF	696 **5/pg**	704 **5/pg**	
VFBUF	see notes	N/A	VTAM 3.4 code # of bytes rounded up to a 4k page
VPBUF	see notes	N/A	VTAM 3.4 code # of bytes rounded up to a 4k page

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Tuning Examples

► VSE/VTAM 3.4

```
BSBUF=(28,,,1),
CRPLBUF=(60,,,1),
LFBUF=(70,288,,11),
LPBUF=(12,,,6),
SFBUF=(20,,,20),
SPBUF=(210,,,32),
VFBUF=102400,
VPBUF=446464,
XDBUF=(6,,,1)
```

→

```
BSBUF=(48,,,24),
CRPLBUF=(72,,,24),
LFBUF=(72,432,4,24,12),
LPBUF=(12,,,6),
SFBUF=(27,,,9),
SPBUF=(224,,,28),
VFBUF=102400,
VPBUF=446464,
XDBUF=(10,,,5)
```

► VSE/VTAM 4.2

```
BSBUF=(28,,,,1),
CRPLBUF=(60,,,,1),
LFBUF=(70,,,,11),
IOBUF=(70,288,,,11),
LPBUF=(12,,,,6),
SFBUF=(20,,,,20),
SPBUF=(210,,,,32),
XDBUF=(6,,,,1)
```

→

```
BSBUF=(34,,,,17),
CRPLBUF=(66,,,,22),
LFBUF=(30,,,,30),
IOBUF=(72,424,4,,24,12),
LPBUF=(12,,,,6),
SFBUF=(32,,,,32),
SPBUF=(225,,,,25),
XDBUF=(10,,,,5)
```

NOTE:

The IBM supplied values in ATCSTR00.B do not represent recommended or customized values. These examples assume the supplied values of BASENO for each buffer pool are appropriate and tunes for minium storage waste.

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VTAM Start Options

- HOTIOTRM

  - detection and termination of HOT I/O
    set HOTIOTRM start option and XPANLIM on IOBUF
  - detection only
    set XPANLIM on IOBUF

- SGALIMIT

  - limits SVA24 (VTAM 3.4)
  - limits SVA31 (VTAM 4.2)

- SGA24

  - limits SVA24 (VTAM4.2)

- SONLIM

  - session outage notification limit
  - one IOBUF/SON is required
  - default setting
    SONLIM=(60,30)

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Class of Service

- Traffic Prioritization
  - 2 = high priority (VTAM internal)
  - 1 = medium priority (interactive)
  - 0 = low priority (batch)
- Implemented Via Table/LOGMODE
  - no default table provided for subarea
  - default priority for all traffic = (0,0)
  - COS name specified in LOGMODE entry
- Required Table Name
  - ISTSDCOS
- Special COS Names
  - ISTVTCOS
  - (blank)

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Sample COS Table

```
* $$ JOB JNM=CATCOS,CLASS=5,DISP=D
// JOB CATCOS       CREATE ACF/VTAM COS TABLE
// LIBDEF *,SEARCH=(PRD1.BASE,PRD2.CONFIG),TEMP
// LIBDEF PHASE,CATALOG=PRD2.CONFIG
// OPTION CATAL
   PHASE ISTSDCOS,*
// EXEC ASSEMBLY
                 PRINT   NOGEN
ISTSDCOS COSTAB
***                High Priority Traffic                ***
ISTVTCOS  COS VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2),(7,2))
SUPPORT   COS VR=((0,2),(1,2),(2,2),(3,2),(4,2),(5,2),(6,2),(7,2))
***                Medium Priority Traffic              ***
INTERACT  COS VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1),(7,1))
                 COS VR=((0,1),(1,1),(2,1),(3,1),(4,1),(5,1),(6,1),(7,1))
***                Low Priority Traffic                 ***
BATCH       COS VR=((0,0),(1,0),(2,0),(3,0),(4,0),(5,0),(6,0),(7,0))
                 COSEND
                 END
/*
// EXEC LNKEDT
/&
* $$ EOJ
```

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Sample MODETAB Using COS

```
IESINCLM  MODETAB
* PNET mode entry
PNET        MODEENT  LOGMODE=PNET,FMPROF=X'03',TSPROF=X'03',                X
                     PRIPROT=X'72',SECPROT=X'72',PSNDPAC=X'03',              X
                     SSNDPAC=X'03',SRCVPAC=X'03',COS=BATCH
* SNA Printer in SCS mode entry
SCSCSPRT MODEENT  LOGMODE=SCSCSPRT,FMPROF=X'03',TSPROF=X'03',               X
                     PRIPROT=X'B1',SECPROT=X'90',COMPROT=X'3080',            X
                     SSNDPAC=X'01',SRCVPAC=X'01',RUSIZES=X'8585',            X
                     PSNDPAC=X'01',PSERVIC=X'01000000E100000000000000',      X
                     COS=BATCH
* SNA 3270 terminal mode entry
SP3272QS  MODEENT  LOGMODE=SP3272QS,FMPROF=X'03',TSPROF=X'03',              X
                     PRIPROT=X'B1',SECPROT=X'90',COMPROT=X'3080',            X
                     RUSIZES=X'88F7',PSERVIC=X'028000000000185000000300',    X
                     COS=INTERACT
* My SNA terminal mode entry
WOLFF       MODEENT  LOGMODE=WOLFF,FMPROF=X'03',TSPROF=X'03',               X
                     PRIPROT=X'B1',SECPROT=X'90',COMPROT=X'3080',            X
                     RUSIZES=X'88F7',PSERVIC=X'028000000000185000000300',    X
                     COS=SUPPORT
                MODEEND
                END
```

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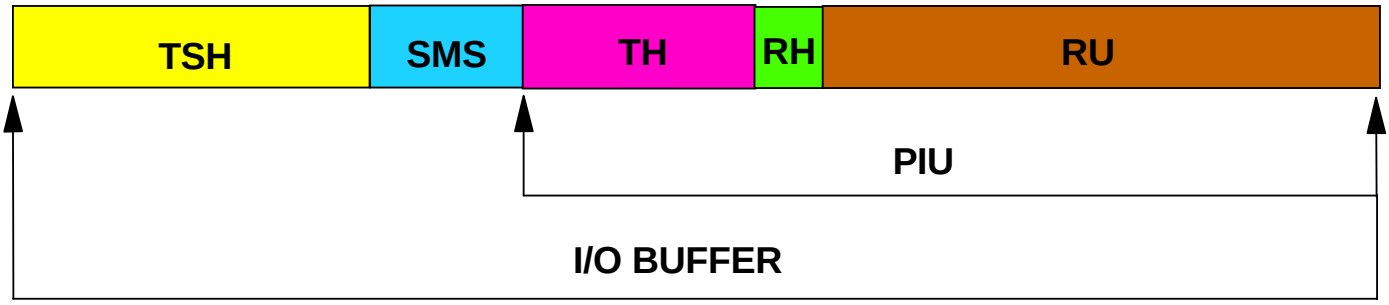
VTAM I/O Basics



► I/O Buffer Anatomny

- Transmission Subsystem Header (TSH)
- Storage Management Services (SMS)
- Path Information Unit (PIU)
- Transmission Header (TH)
- Request Header (RH)
- Request Unit (RU)

► Concepts

- I/O is done on a PU basis
- only one PIU per I/O buffer is allowed
- PIU's can span multiple I/O buffers
- TSH provides a CCW skeleton
- channel programs are chained writes, followed by chained reads

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Coattailing

- Blocking of PIU's

  - increases channel throughput
  - reduces channel I/O
  - reduces CPU utilization
  - can impact response time

- Implement Coattailing with DELAY Parm

  - CA Majornode
    * GROUP/LINE/PU for CTCA (default .1)
    * GROUP/LINE/PU for NCP (default .2)
  - NCP Majornode
    * PCCU statement (default .2)
  - XCA Majornode
    * PORT statement (default .05)
  - LOCAL SNA Majornode
    * PU statement (default .2)

- Channel Program Triggers

  - DELAY timeout
  - channel 'QDPTH' reached
  - ATTN request for 'READ'
  - priority PIU received

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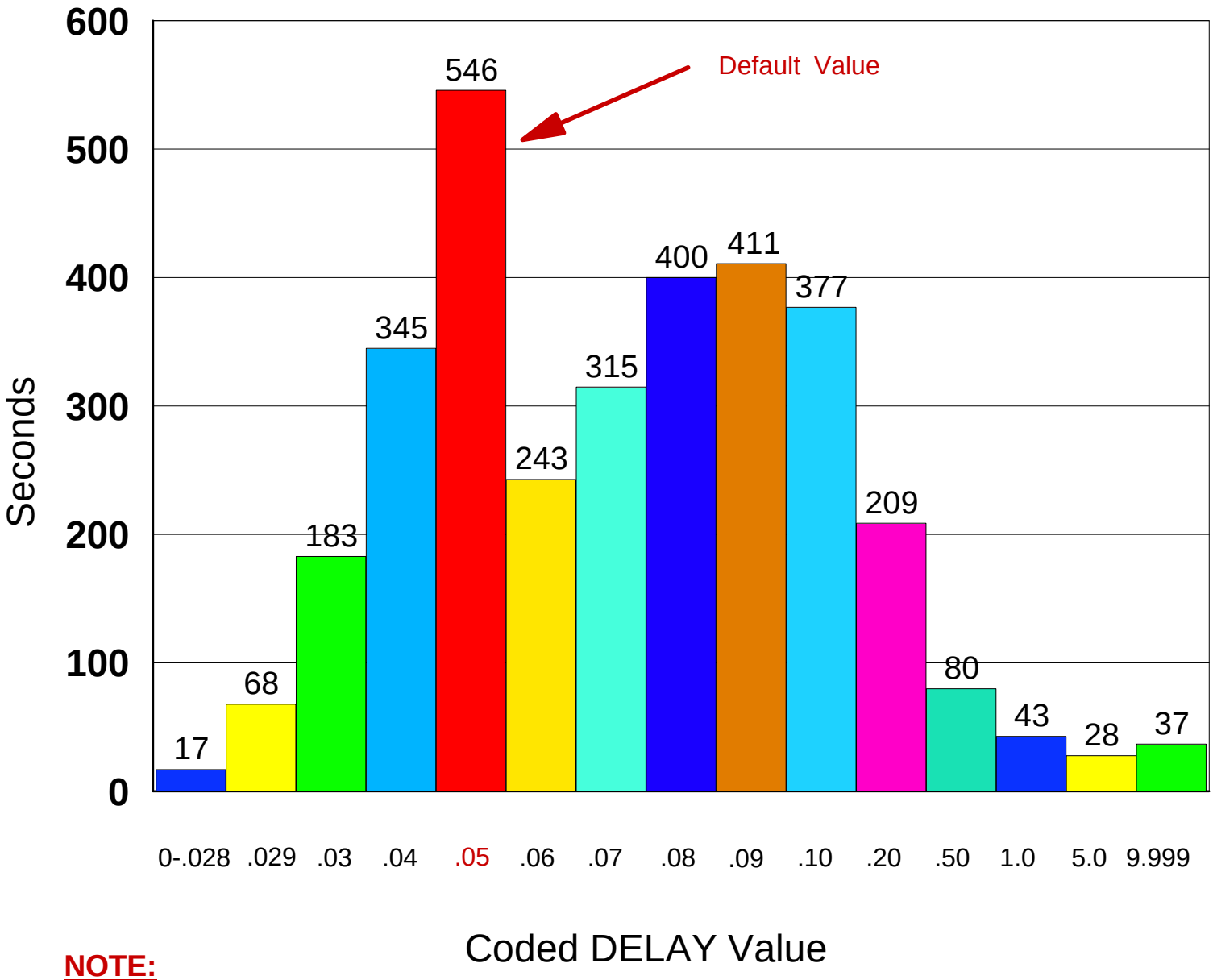
Effects of DELAY on 1M file download through OSA-2



NOTE:

Your mileage WILL vary...

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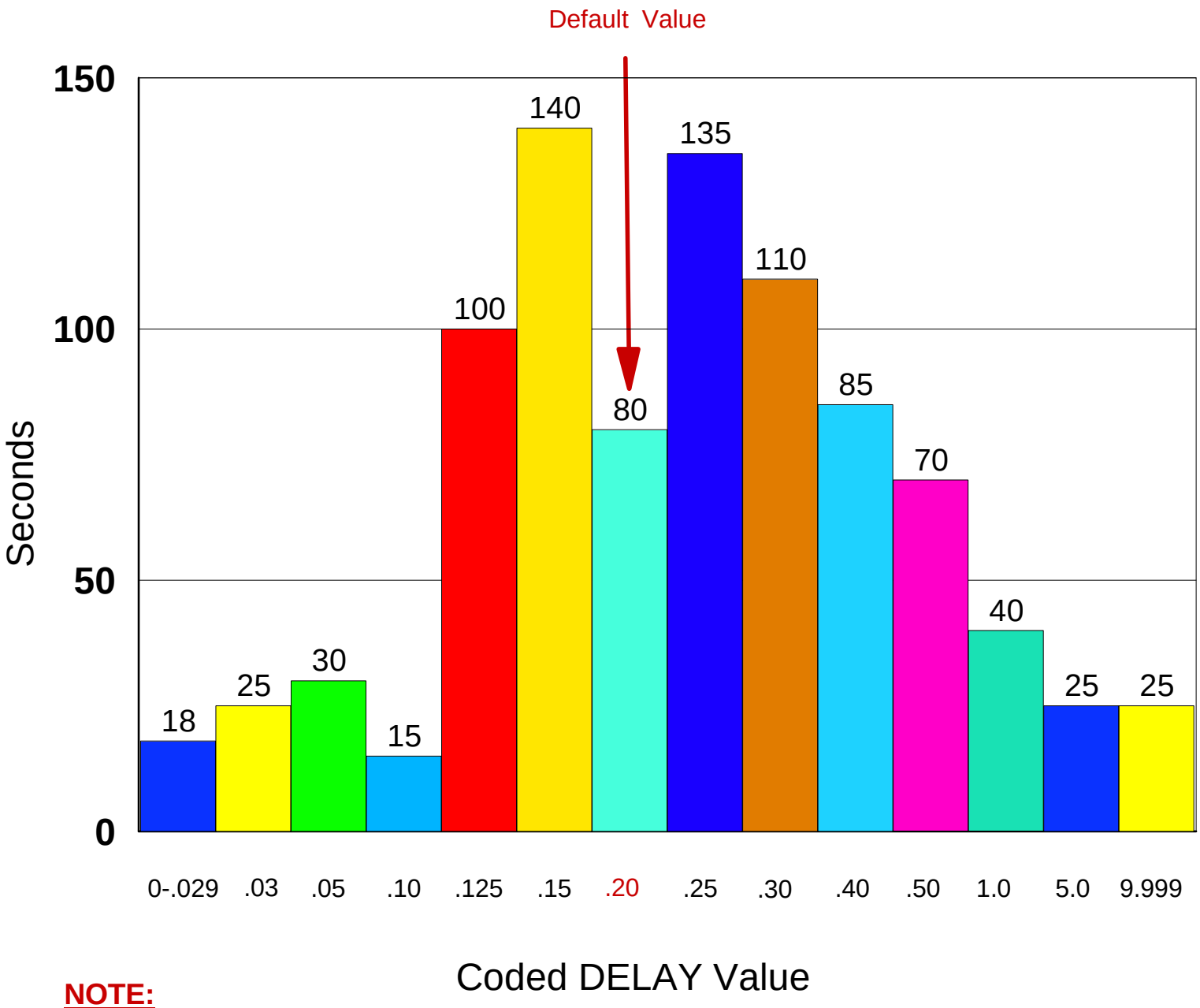
Effects of DELAY on 1M file download through 3174-11L



NOTE:

Your mileage WILL vary...

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Improving Throughput Recommendations

- Larger BASENO of IOBUF's
- Larger XPANNO of IOBUF's
- Larger MAXBFRU values
- Larger IOBUF size
- Small non-zero DELAY value

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Pacing and Flow Control

► Types of Session Pacing

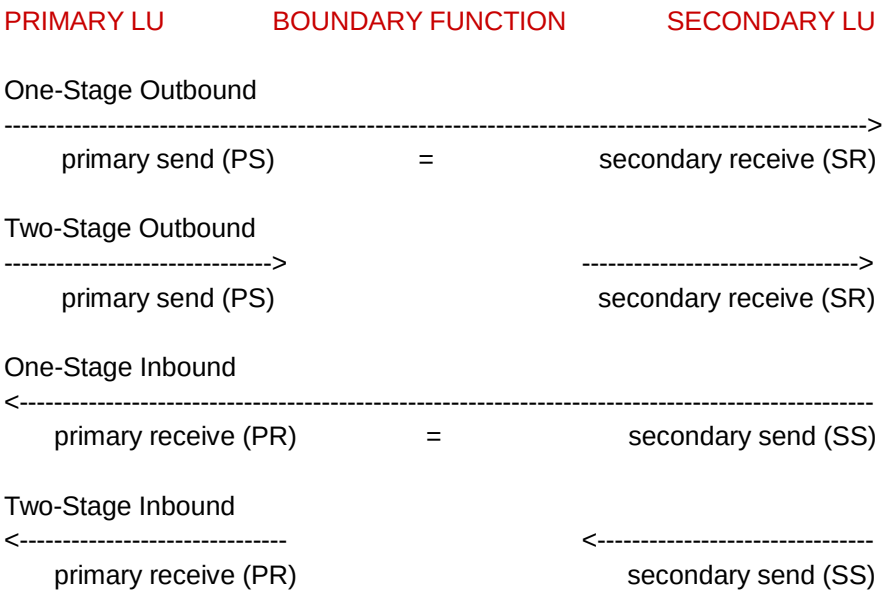
- fixed session pacing
- adaptive session pacing

► Pacing Stages

- one stage
- two stage

► Four Pacing Windows

- primary send (PS)
- secondary receive (SR)
- secondary send (SS)
- primary receive (PR)



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Determining Pacing Values

- DLOGMOD Entry
  - PSNDPAC (PS)
  - SRCVPAC (SR)
  - SSNDPAC (SS)
- LU Definition
  - PACING Parm (default=1)
  - VPACING Parm (default=2)
- APPL Definition
  - AUTH=NVPACE (default VPACE)
  - VPACING Parm (default 7)

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Pacing Guidelines

APPLICATION to APPLICATION

PRIMARY LU	SECONDARY LU
outbound, one-stage	inbound, one-stage
---------->	<----------
if PLU AUTH=NVPACE use 0 else if PSNDPAC ¬= 0 use it else use SLU VPACING	if SSNDPAC = 0 use it else use PLU VPACING

APPLICATION to NCP SNA LU

PRIMARY LU	SECONDARY LU
outbound, two-stage	inbound, one-stage
---------->	<----------
(first stage) if PLU AUTH=NVPACE use 0 else if PSNDPAC ¬= 0 use it else use SLU VPACING (second stage) if SRCVPAC ¬= 0 use it else use SLU PACING	if SSNDPAC = 0 use it else use PLU VPACING

APPLICATION to LOCAL SNA LU

PRIMARY LU	SECONDARY LU
outbound, two-stage	inbound, two-stage
---------->	<----------
(first stage) if SRCVPAC ¬= 0 use it else use SLU VPACING (second stage) if SRCVPAC ¬= 0 use it else use SLU VPACING	(first stage) if SSNDPAC = 0 use it else use PLU VPACING (second stage) if SSNDPAC = 0 use it else use PLU VPACING

APPLICATION to X-DOMAIN SNA LU

PRIMARY LU	SECONDARY LU
outbound, two-stage	inbound, two-stage
---------->	<----------
(first stage) if PLU AUTH=NVPACE use 0 else if PSNDPAC ¬= 0 use it else use SLU VPACING (second stage) if SRCVPAC ¬= 0 then use it else use SLU PACING	(first stage) use SSNDPAC (second stage) if SSNDPAC = 0 use it else use PLU VPACING

APPLICATION to NON-SNA LU

PRIMARY LU	SECONDARY LU
outbound, one-stage	inbound, one-stage
---------->	<----------
use SRCVPAC	use SSNDPAC

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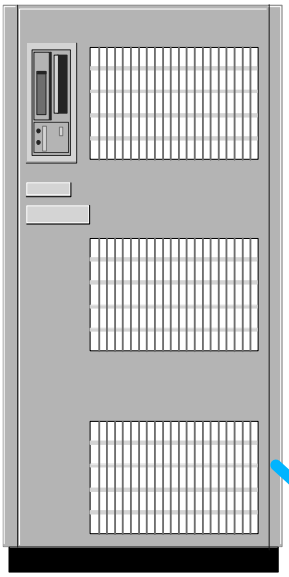
Test Configuration

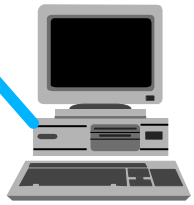


```
VTMAPPL  VBUILD TYPE=APPL
DBDCCICS APPL  AUTH=(PASS,ACQ),MODETAB=IESINCLM,PARSESS=YES
PRODCICS APPL  AUTH=(PASS,ACQ),MODETAB=IESINCLM,PARSESS=YES
POWER    APPL  AUTH=(ACQ)
PNET     APPL  AUTH=(PASS,ACQ),VPACING=3,MODETAB=VTMLOGTB,DLOGMOD=PNET
PSFAPPL  APPL  AUTH=ACQ,EAS=1,SONSCIP=YES
IESWAITT APPL  AUTH=(NOACQ)
```

IBM 9221-191
VSE/ESA 2.3.1
VSE/VTAM 4.2
6140 Token Ring ICA

16M Token Ring LAN Segment

IBM Pentium 200MMX PC
IBM OS/2 Warp 4
IBM CM/2
16M PCI Token Ring Adaptor



```
TOKENLAN VBUILD TYPE=SWNET
*
VSEPU01  PU   ADDR=01,
              IDBLK=05D,
              IDNUM=18100,
              LANSW=YES,
              MAXDATA=265,
              MAXOUT=7,
              PUTYPE=2,
              SAPADDR=4,
              PACING=1,
              VPACING=2,
              DLOGMOD=SP3272QS,
              MODETAB=IESINCLM,
              SSCPFM=USSSCS,
              USSTAB=VTMUSSTR
*
VSELU01A LU   LOCADDR=2,ISTATUS=ACTIVE
VSELU01B LU   LOCADDR=3,ISTATUS=ACTIVE
```

```
SP3272QS MODEENT LOGMODE=SP3272QS,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B*
      1',SECPROT=X'90',COMPROT=X'3080',RUSIZES=X'85C7',PSERVIC*
      =X'02800000000000185000000300'
```

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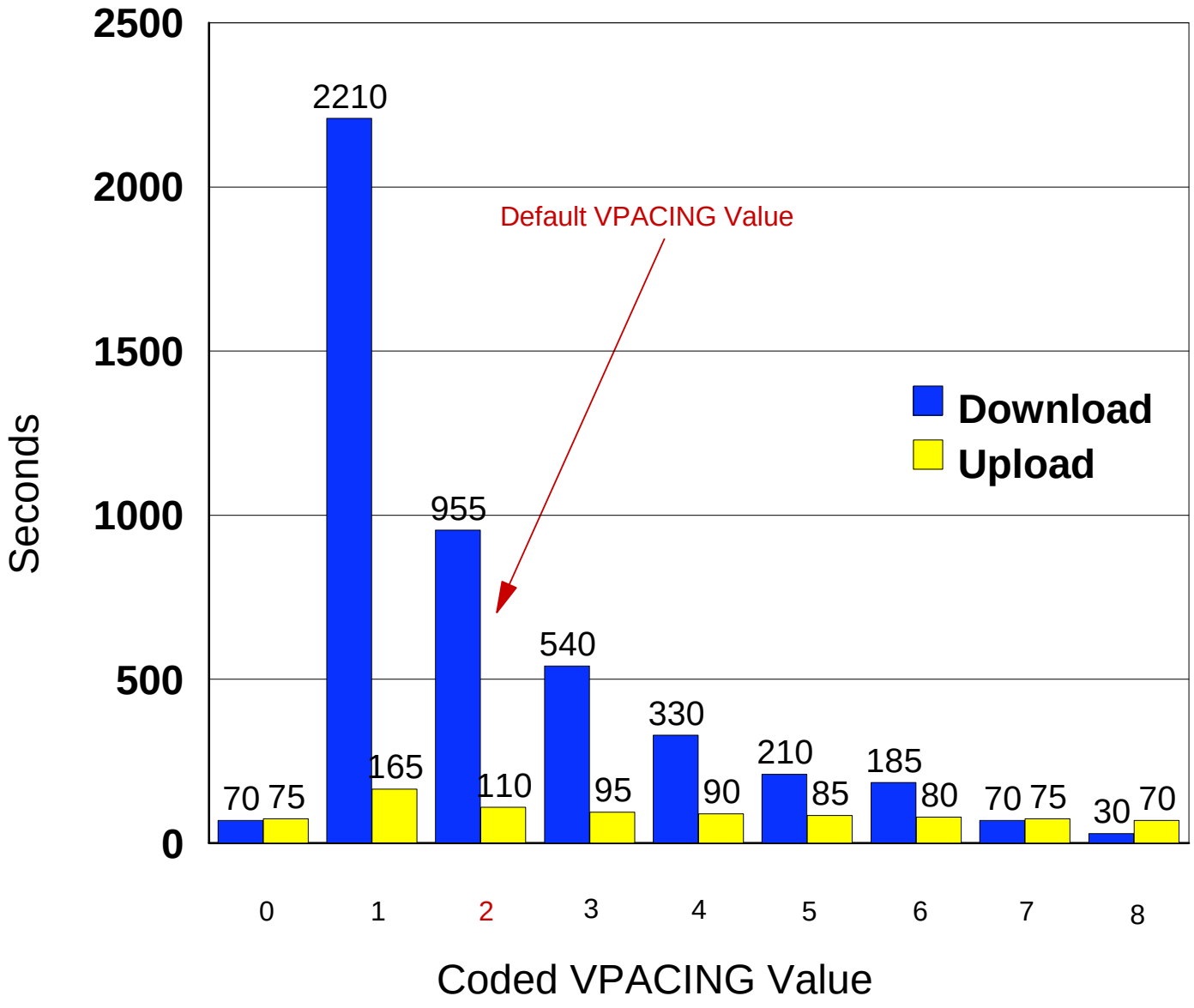
Effects of VPACING on 1M file transfer through 9221 TR ICA



NOTE:

Your mileage WILL vary...

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Reference Sources

- VSE/ESA Planning (SC33-6606)
- VSE/ESA System Control Statements (SC33-6613)
- VSE/ESA Networking Support (SC33-6608)
- VTAM Resource Definition Reference (SC31-6498)
- VTAM Network Implementation Guide (SC31-6494)
- VTAM Customization (LY43-0063)
- VTAM Diagnosis (LY43-0065)