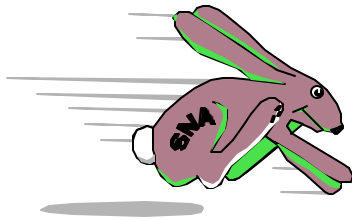


VSE/VTAM Tuning

WAVV 2000



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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

- supervisor I/O buffer usage
- monitor with SIR command

▶ System GETVIS

- SVA-24
- SVA-31 (VTAM 4.2)
- monitor with GETVIS command



VSE/ESA 2.x IPL Proc

```

500,$$ASSUPX, 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



VTAM Startup Params

▶ 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)



VTAM 4.2 Startup JCL

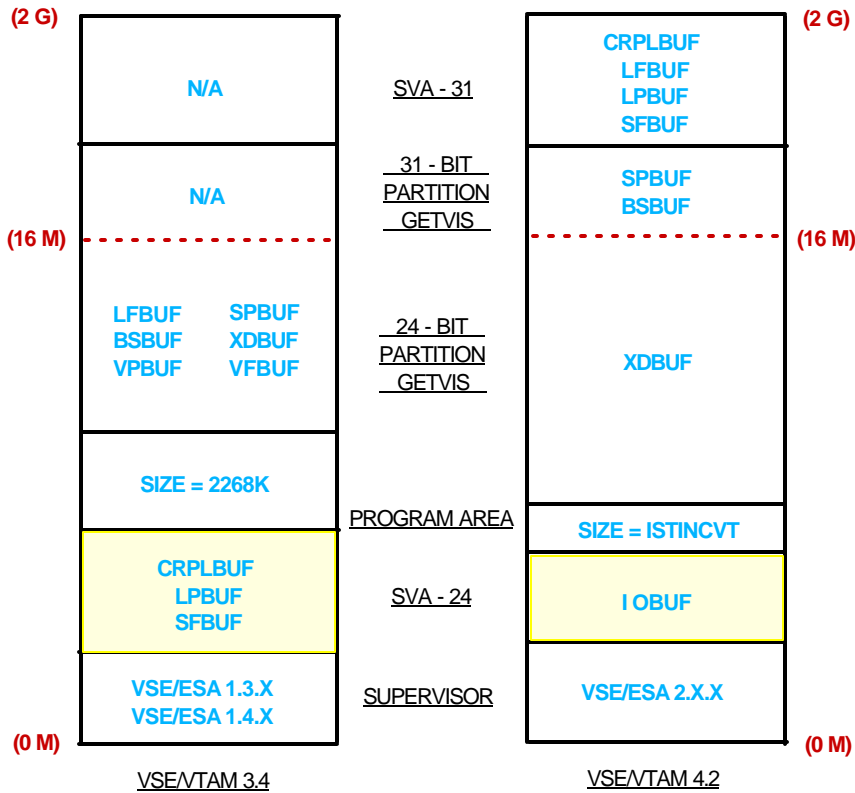
```

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

```



VTAM Partition Storage Layout



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



Monitoring Buffer Pool Usage

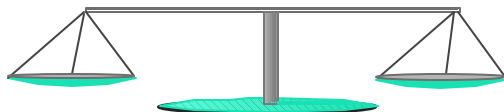
D NET,BFRUSE,BUFFER=SHORT

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)



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)



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)



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



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.



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)



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)



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

```



Sample MODETAB Using COS

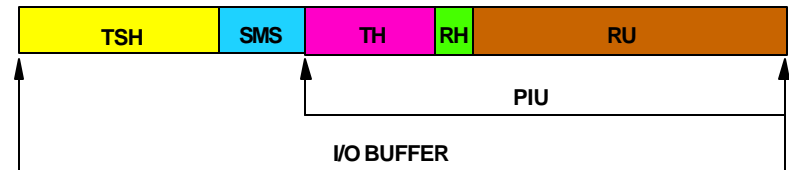
```

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

```



VTAM I/O Basics



I/O Buffer Anatomy

- 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



Coattailing

▶ Blocking of PIU's

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

▶ Implement Coattailing with DELAY Parm

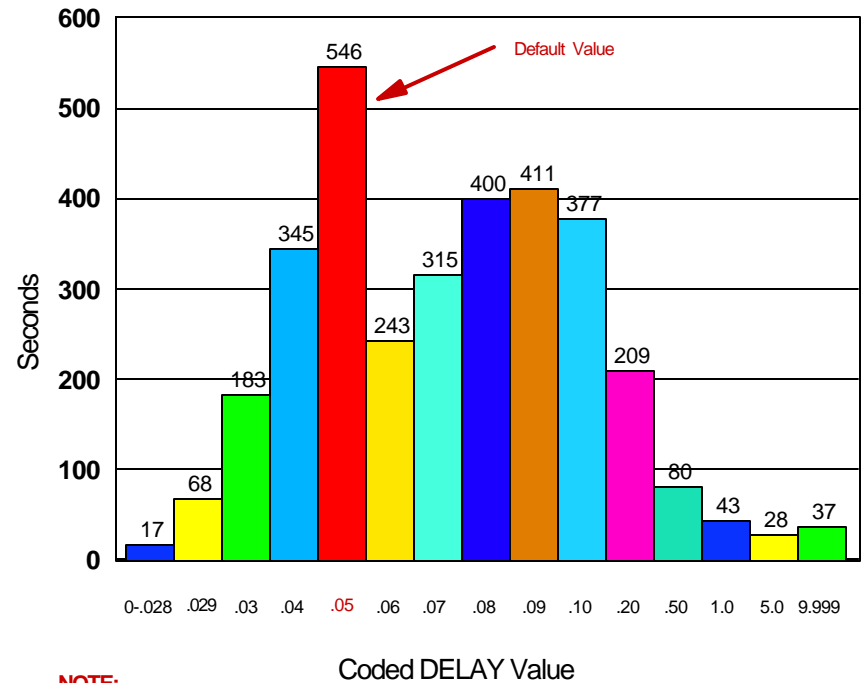
- CA Majormode
 - * GROUP/LINE/PU for CTCA (default .1)
 - * GROUP/LINE/PU for NCP (default .2)
- NCP Majormode
 - * PCCU statement (default .2)
- XCA Majormode
 - * PORT statement (default .05)
- LOCAL SNA Majormode
 - * PU statement (default .2)

▶ Channel Program Triggers

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

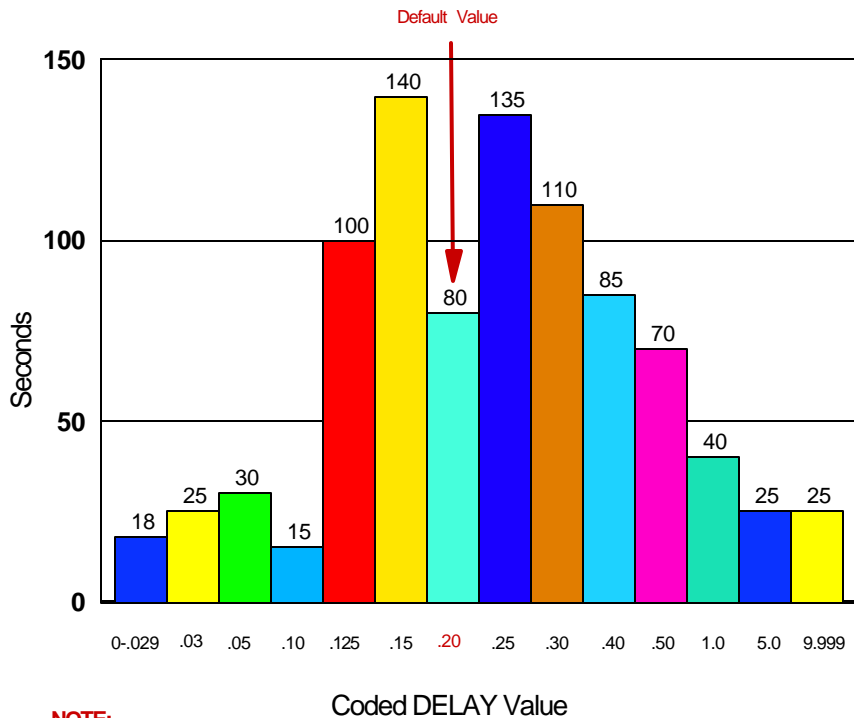


Effects of DELAY on 1M file download through OSA-2



NOTE:
Your mileage WILL vary...

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



NOTE:

Your mileage WILL vary...

Improving Throughput Recommendations

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



Pacing and Flow Control

▶ Types of Session Pacing

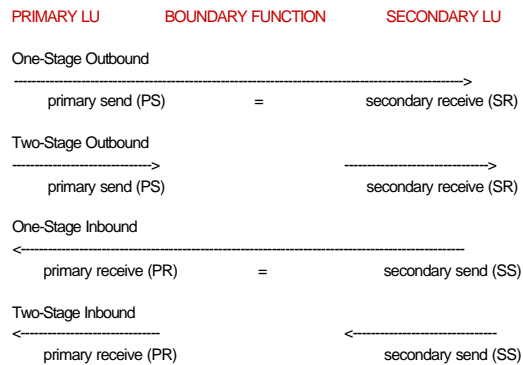
- fixed session pacing
- adaptive session pacing

▶ Pacing Stages

- one stage
- two stage

▶ Four Pacing Windows

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



Determining Pacing Values

▶ DLOGMOD Entry

- PSNDPAC (PS)
- SRCVPAC (SR)
- SSNDPAC (SS)

▶ LU Definition

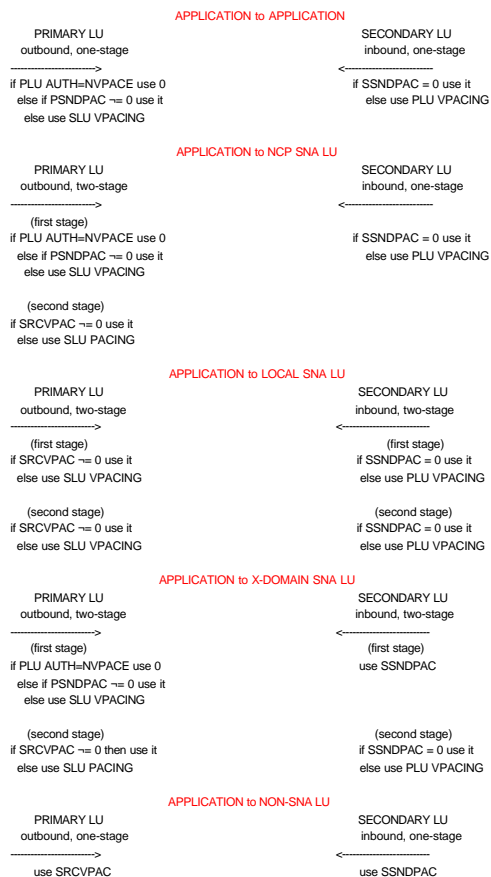
- PACING Parm (default=1)
- VPACING Parm (default=2)

▶ APPL Definition

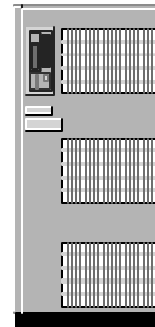
- AUTH=NVPACE (default VPACE)
- VPACING Parm (default 7)



Pacing Guidelines



Test Configuration



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



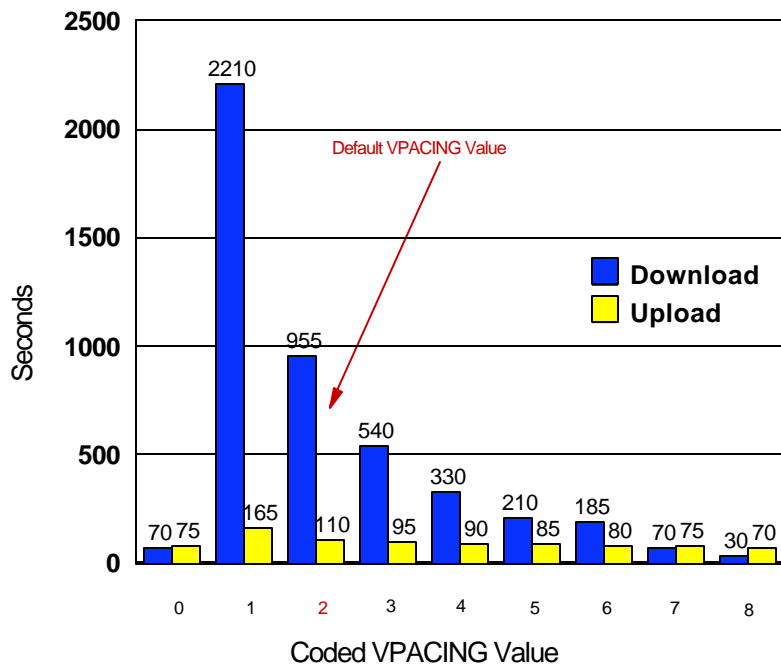
TOKENLAN VBUILD TYPE=SWNET

```

*
VSEPU01 PU ADDR=01,
IDBLK=05D,
IDNUM=18100,
LANSW=YES,
MAXDATA=265,
MAXOUT=7,
PUTYPE=2,
SAPADDR=4, SP3272QS MODEENT LOGMODE=SP3272QS,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B*
PACING=1,
VPACING=2,
DLOGMOD=SP3272QS,
MODETAB=IESINCLM,
SSCPFM=USSSCS,
USSTAB=VTMUSSTR
*
VSELU01A LU LOCADDR=2,ISTATUS=ACTIVE
VSELU01B LU LOCADDR=3,ISTATUS=ACTIVE
  
```



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



NOTE:

Your mileage WILL vary...



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)