IBM Software Group

Communications Server for z/OS V1R5 Performance Measurements

April 2004

Performance Disclaimer

The performance data discussed in this presentation was collected using a dedicated system environment.

Therefore, the results obtained in other configurations or operating system environments may vary.

Performance Presentation

- Communications Server Performance Summary
- AWM Client/Server Workload
- Hardware/Software configurations
- Release to Release Comparison (z/OS V1R5 vs. z/OS V1R4)
  - AWM Client/Server Benchmarks (TCP)
  - AWM Client/Server Benchmarks (UDP)
  - FTP Server
  - TN3270 Server
  - Enterprise Extender
  - Sysplex Sockets
- z/OS V1R5 CS Performance Measurements
  - Effect of enabling IPv6 for TN3270
  - Effect of enabling IPv6 for Enterprise Extender
  - Effect of enabling IPv6 for CICS Sockets
  - Effect of TN3270E definite response
  - Effect of exploiting new Asynchronous I/O interface
  - Effect of exploiting INBPERF option on LINK/INTERFACE statement
  - Effect of Checksum Offload on z/990
  - Effect of Crypto Instruction on z/990 and IPSEC
- Summary

Performance Measurements

The majority of the performance benchmarks in this presentation were obtained using the IBM Application Workload Modeler (AWM) for z/OS (V1R1)

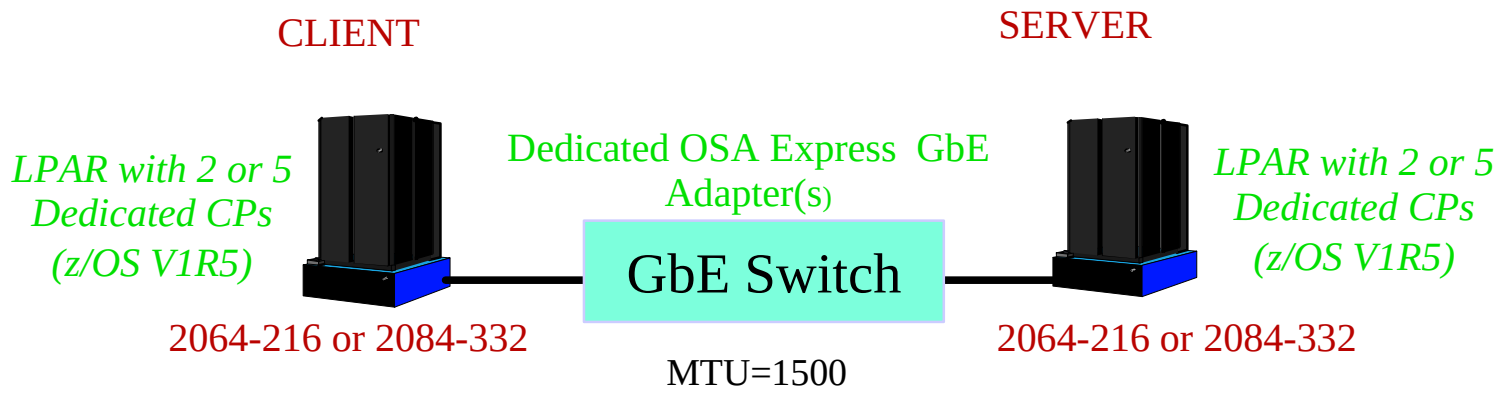
- ***"IBM Application Workload Modeler for z/OS Release 1 provides the ability to model, measure, and analyze the performance of networks and applications in a client/server, multiprotocol, multiplatform environment. With Application Workload Modeler R1, you can more accurately plan for the roll-out of additional software or function, and determine where upgrades may be required in your network and systems."***

- **For more information, visit the Application Workload Modeler web site:**
  http://www.ibm.com/software/network/awm/index.html

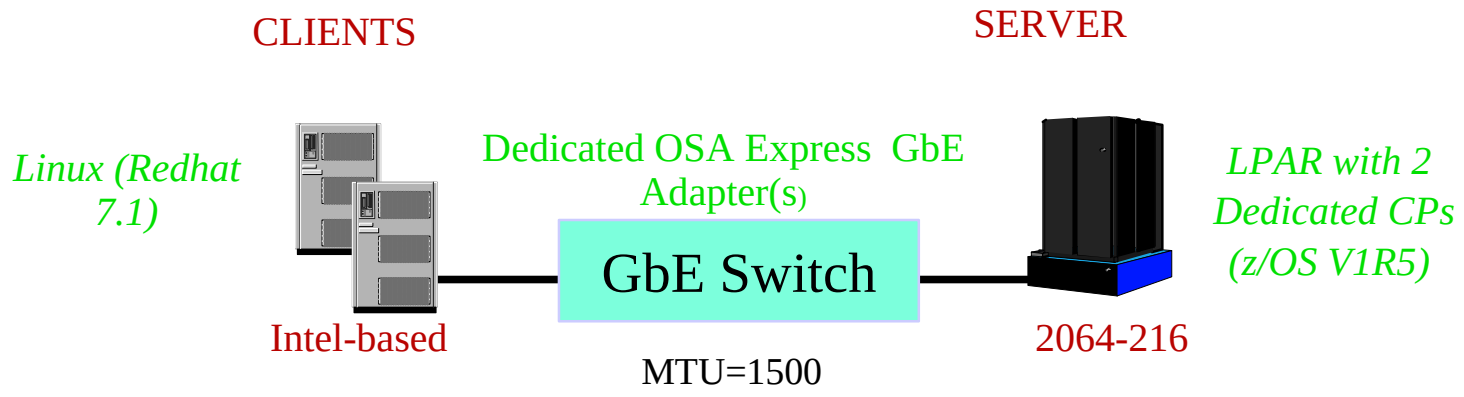
When measuring comparisons between releases, any transaction rate or CPU cost differences within +/- 3% was considered statistically insignificant.

Hardware/Software Configurations

➢ AWM Client/Server Benchmarks (CRR, RR, STR) and TN3270



➢ FTP Server

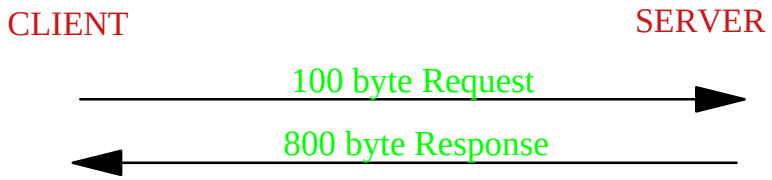


- All measurements done with z/900 (2064-216) unless explicitly specified

AWM Benchmark Descriptions

RR Workload

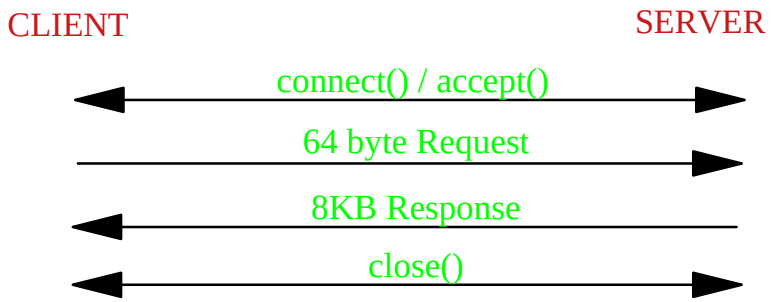
- Request-Response
  - Simulate TN3270
  - Interactive workloads



- 60 connections

CRR Workload

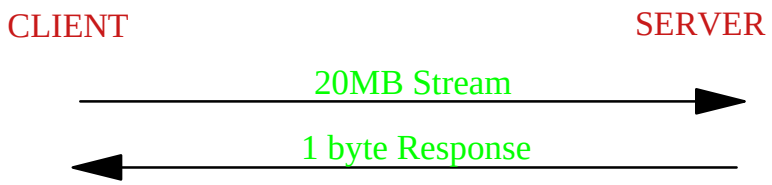
- Connect-Request-Response
  - Static Web Serving



- 9 connections

STR Workload

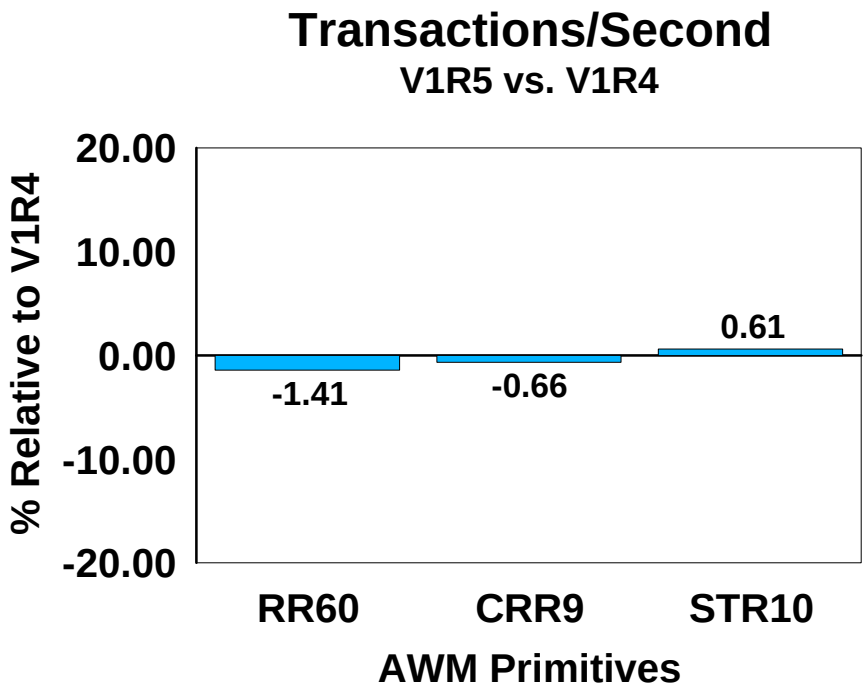
- Streaming
  - Simulate FTP or ADSM
  - Memory-to-Memory

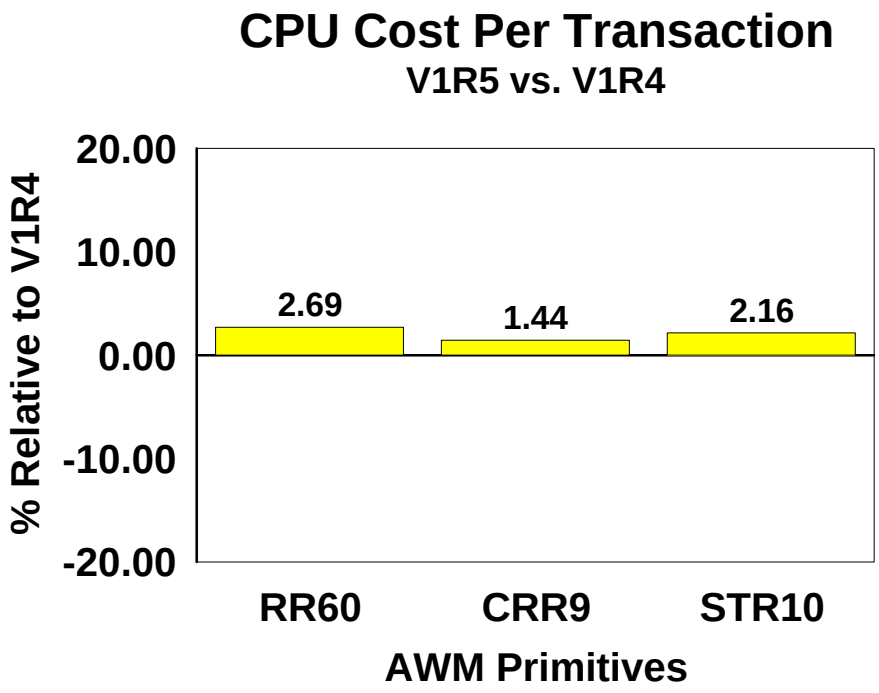


- 10 connections

AWM Release to Release Comparison

- AWM IPv4 Client/Server Benchmarks (TCP)
  - All trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant.

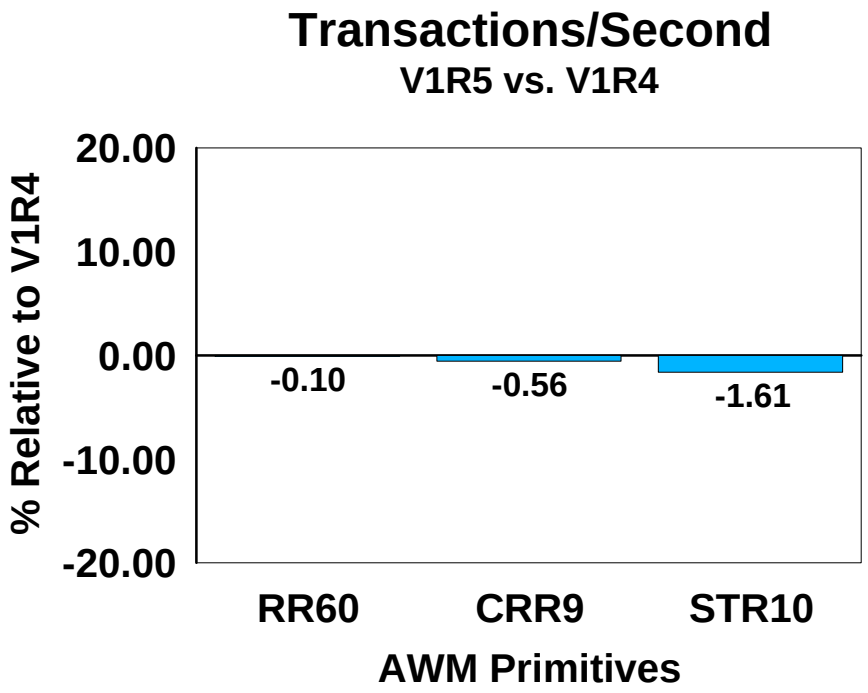


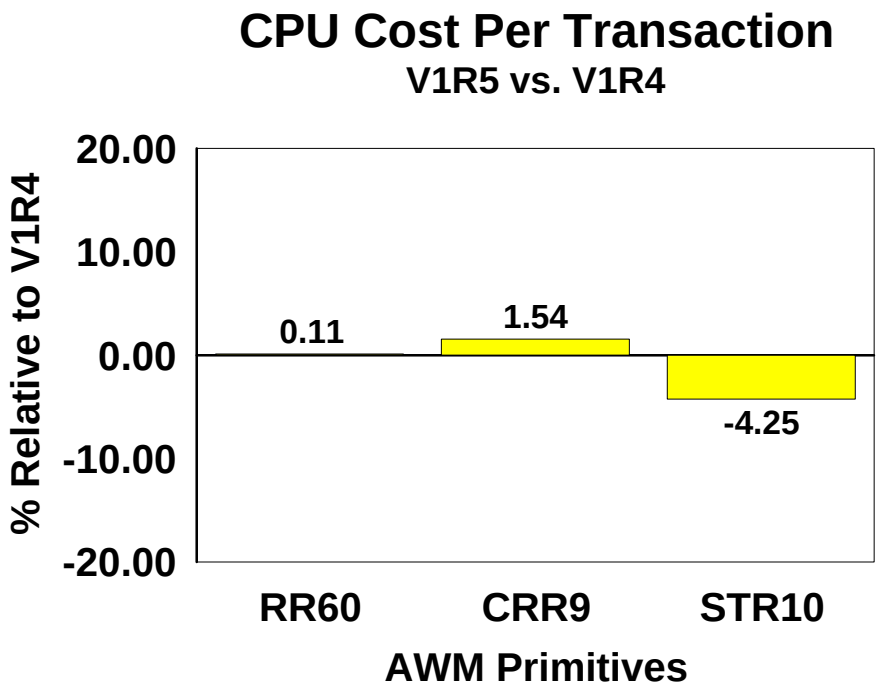


- Measurements done with PQ88777 applied

AWM Release to Release Comparison

- AWM IPv6 Client/Server Benchmarks (TCP)
  - Most trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant. V1R5 STR10 CPU costs are lower than V1R4.

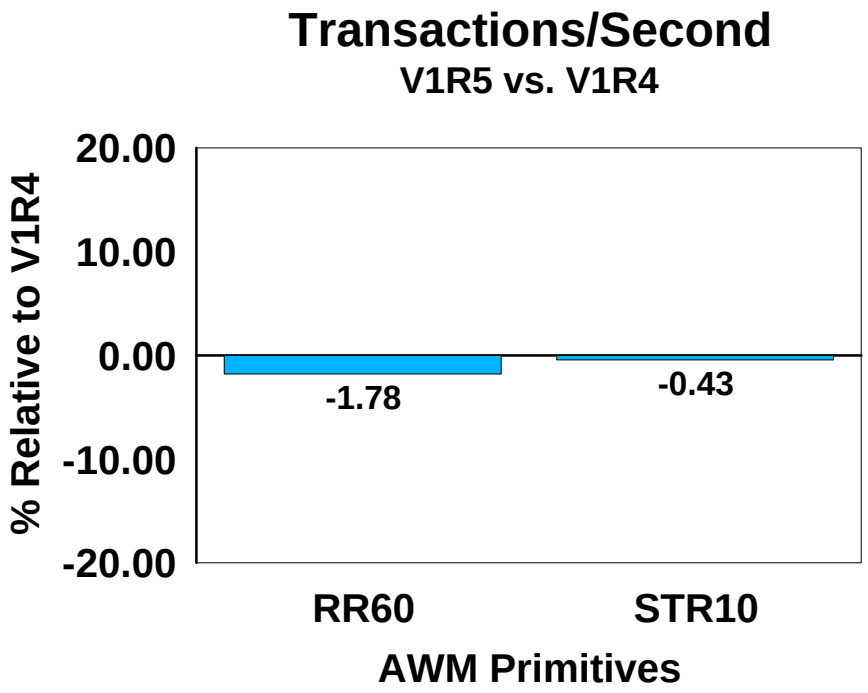


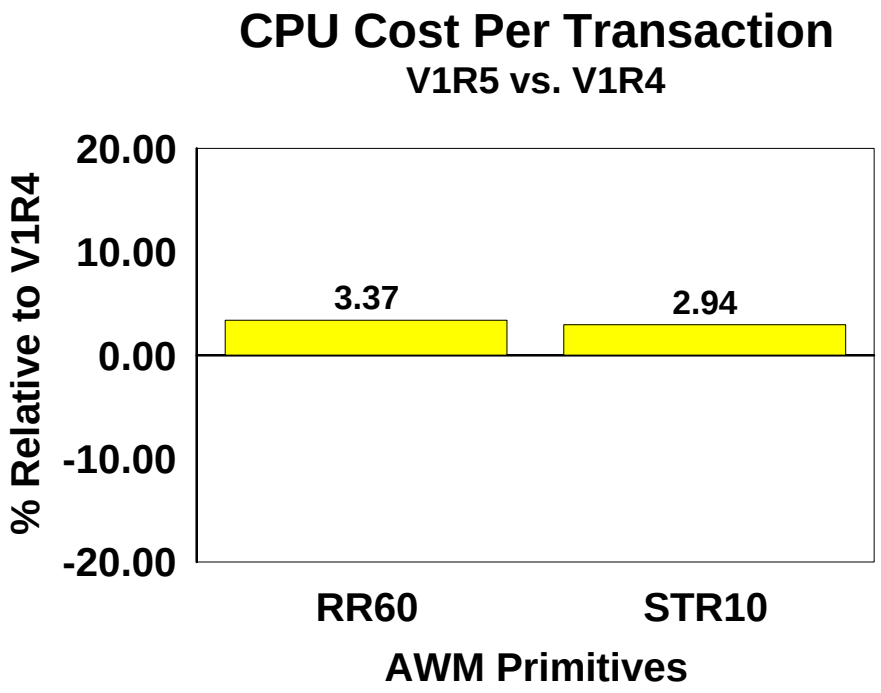


- Measurements done with PQ88777 applied

AWM Release to Release Comparison

- AWM IPv4 Client/Server Benchmarks (UDP)
  - Most trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant. V1R5 RR60 CPU costs are higher than V1R4.

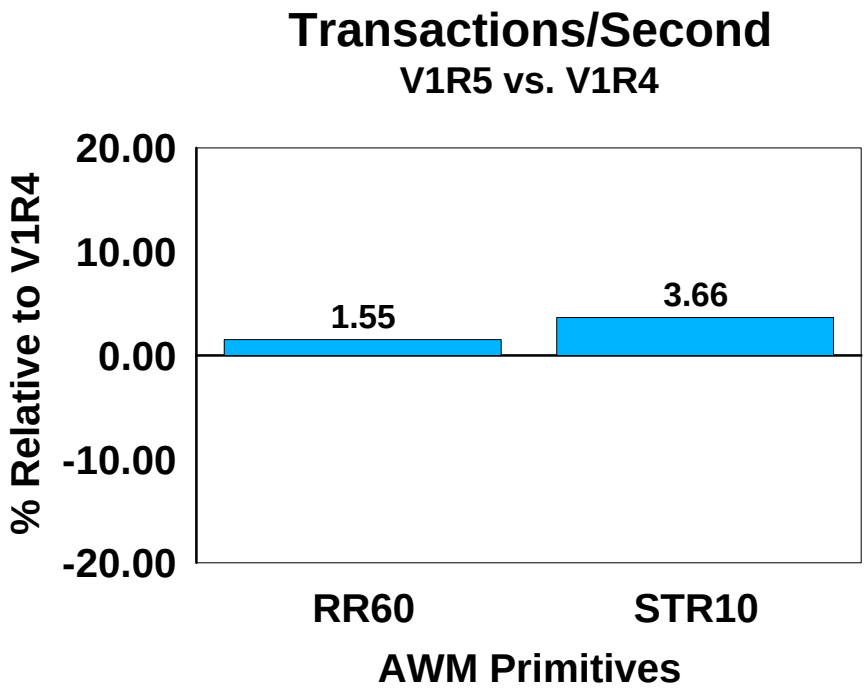


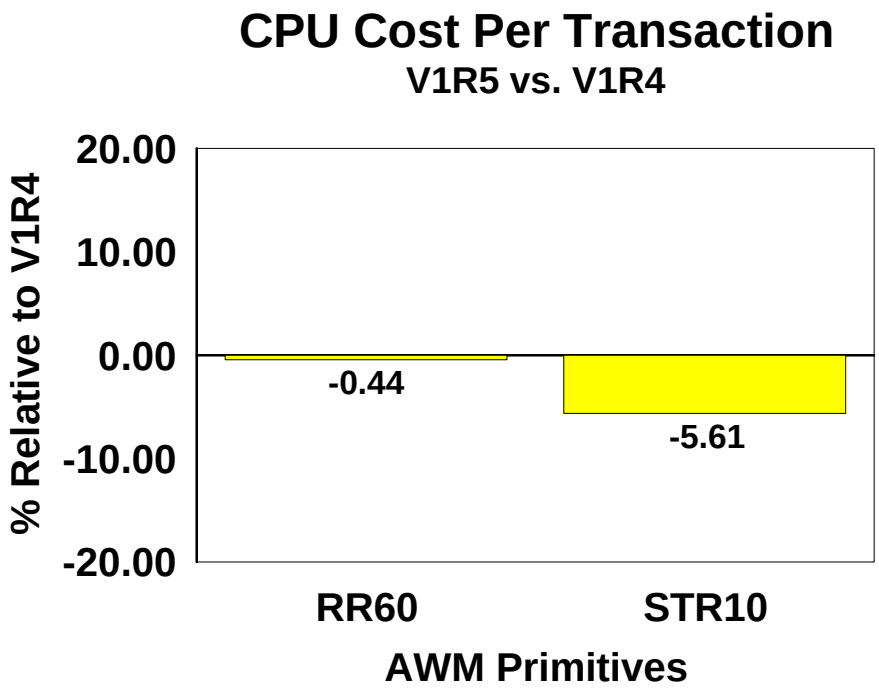


  - Measurements done with PQ88777 applied

AWM Release to Release Comparison

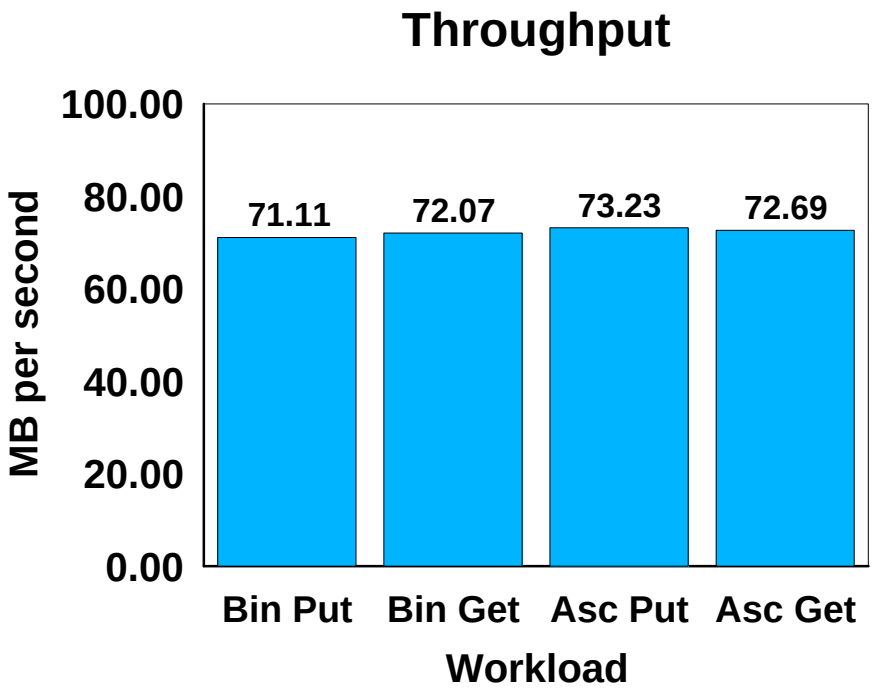
- AWM IPv6 Client/Server Benchmarks (UDP)
  - Most trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant. V1R5 STR10 trans/sec are higher and CPU costs are lower than V1R4.

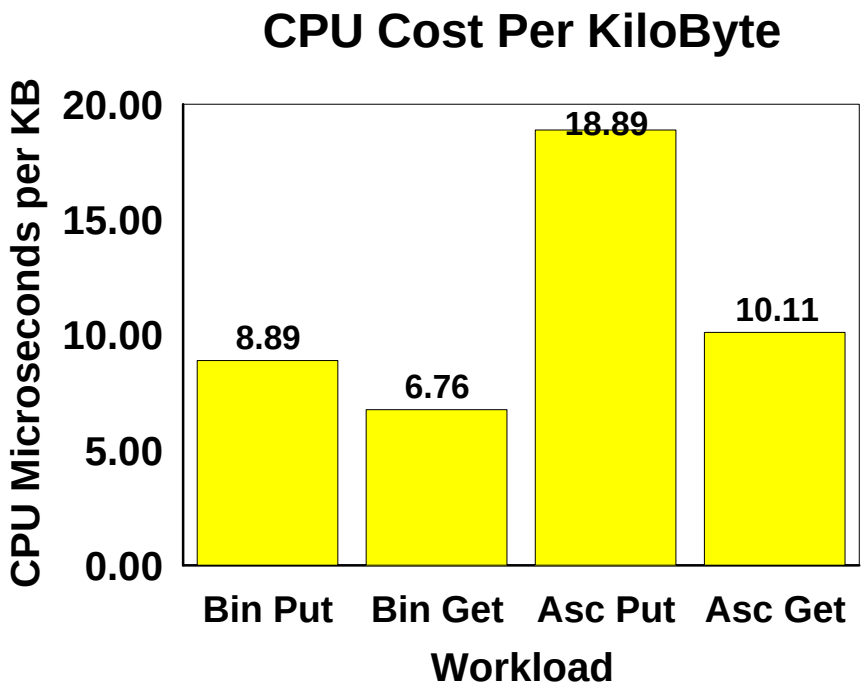




FTP Release Measurement

- V1R5 FTP Server IPv4

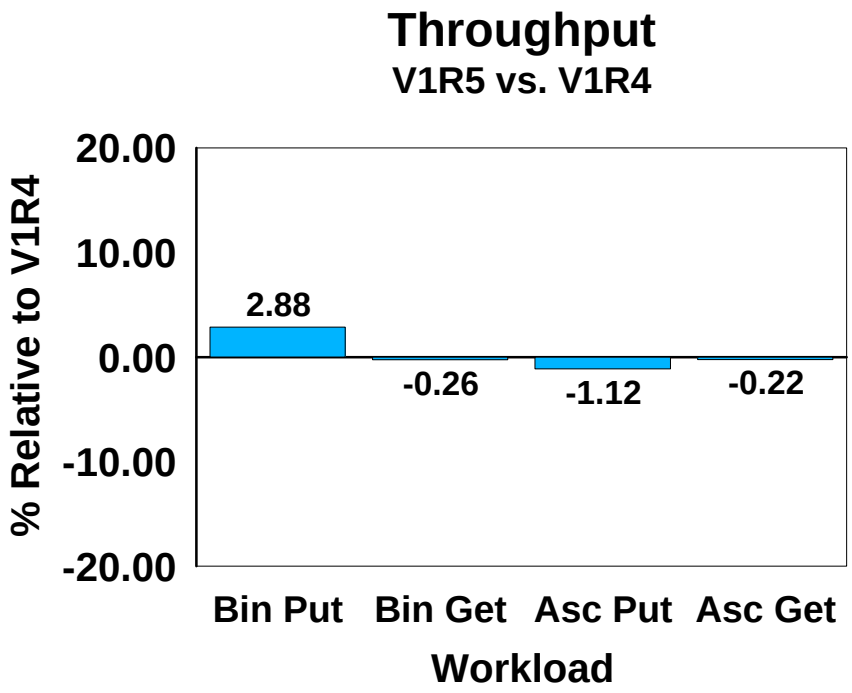


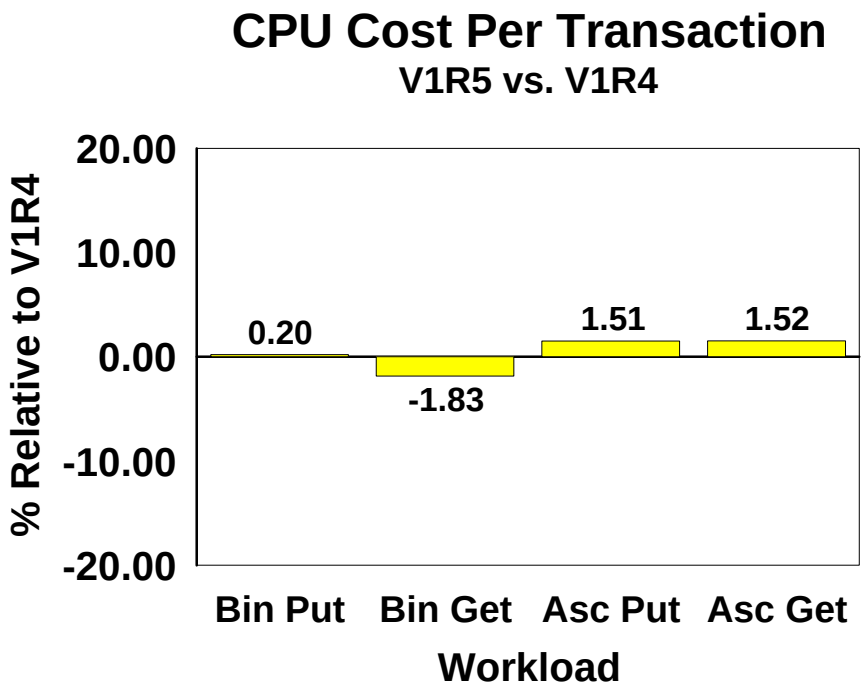


- PUT: Linux to MVS (8 FTP Sessions, Binary/ASCII PUT initiated from Linux clients)
- GET: MVS to Linux (8 FTP Sessions, Binary/ASCII GET initiated from Linux clients)
- Measurements done with PQ86225 applied

FTP Release to Release Comparison

- FTP Server IPv4
  - All throughput and CPU costs differences between V1R5 and V1R4 are insignificant.

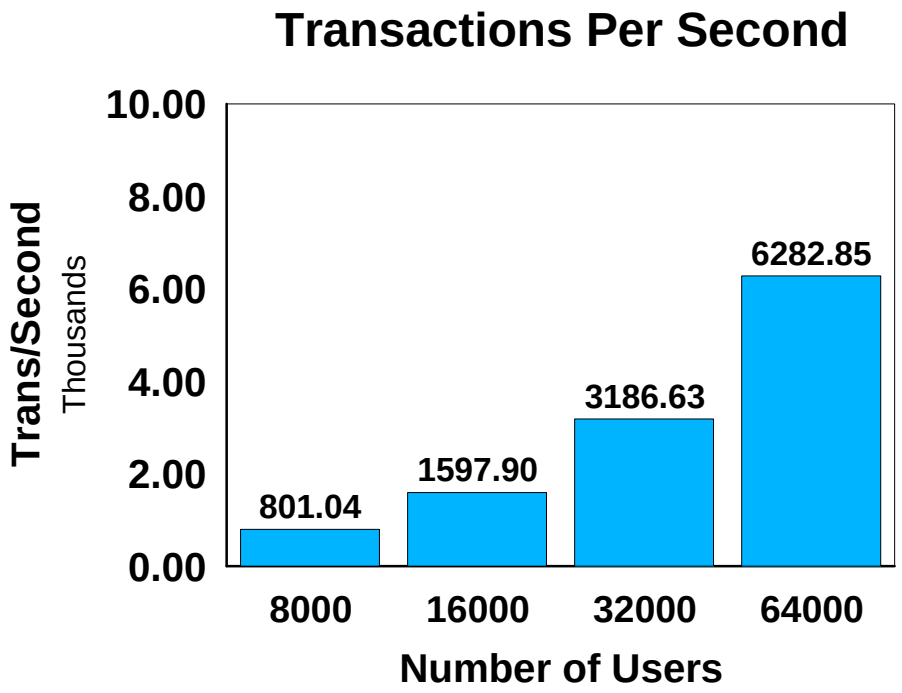


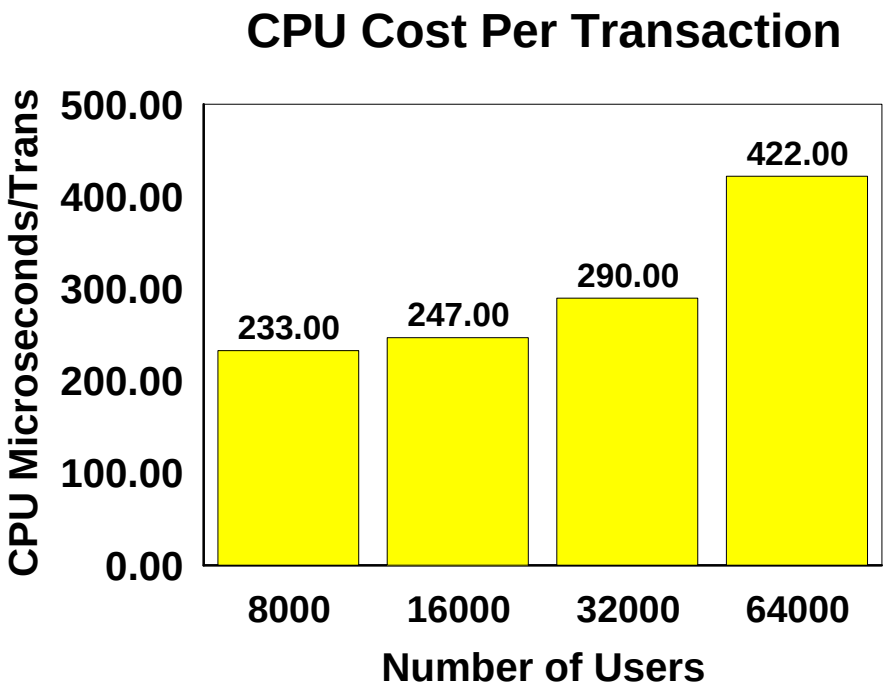


- PUT: Linux to MVS (8 FTP Sessions, Binary/ASCII PUT initiated from Linux clients)
- GET: MVS to Linux (8 FTP Sessions, Binary/ASCII GET initiated from Linux clients)
- Measurements done with PQ86225 applied

TN3270 Release Measurement

- V1R5 TN3270 Server IPv4





- MVS to MVS (5 CPs each LPAR)
- Six transactions per minute per user

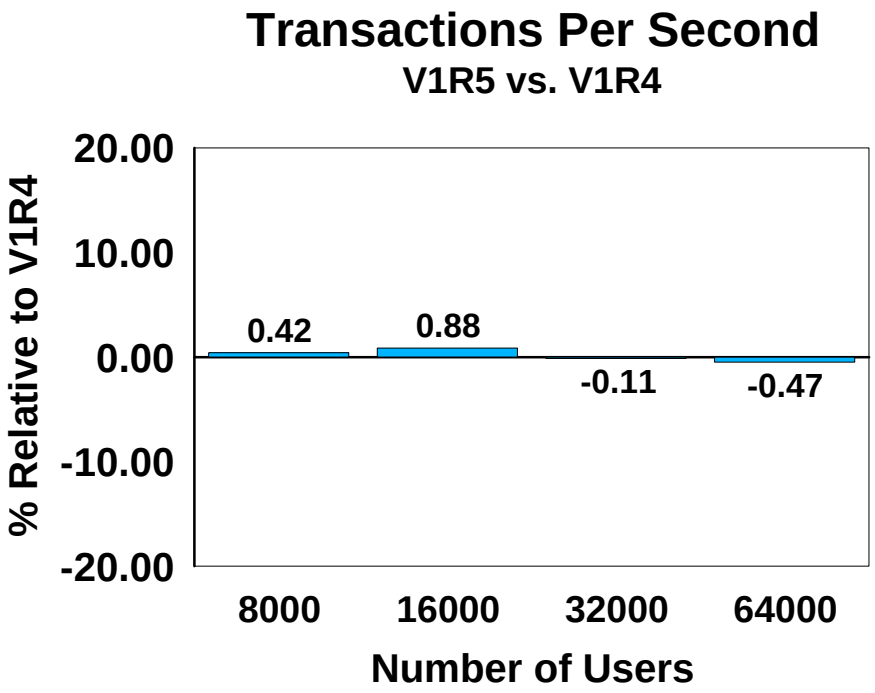
TN3270 Release Storage Summary

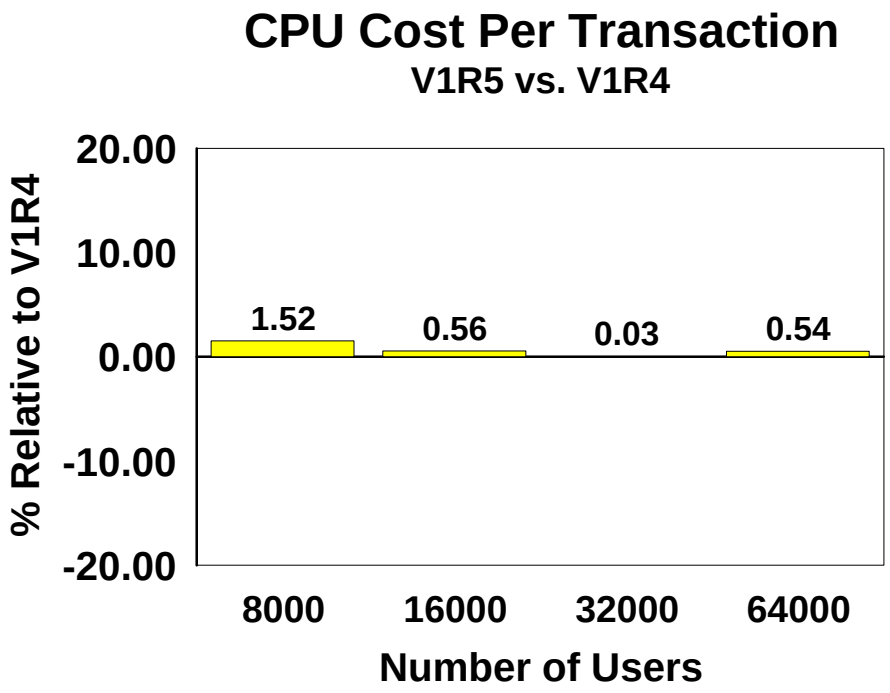
- V1R5 TN3270 Server IPv4

# of TN3270 Users	0	4000	8000	16000	32000	64000
TCP/IP Below	0.23 MB	0.28 MB	0.31 MB	0.34 MB	0.40 MB	0.55 MB
TCP/IP Above	8.55 MB	10.00 MB	10.00 MB	10.00 MB	10.10 MB	10.10 MB
TCP/IP LSQA (SWA/229/230) Below	0.19 MB	0.20 MB	0.30 MB	0.30 MB	0.39 MB	0.39 MB
TCP/IP LSQA (SWA/229/230) Above	16.30 MB	31.70 MB	46.60 MB	75.00 MB	131.00 MB	257.00 MB
CSM Data Space	8.76 MB	21.60 MB	22.18 MB	23.93 MB	25.38 MB	29.97 MB
System CSA Below	0.32 MB	0.32 MB	0.32 MB	0.32 MB	0.32 MB	0.32 MB
System CSA Above	30.60 MB	56.20 MB	69.30 MB	93.30 MB	145.00 MB	245.00 MB
System SQA Below	0.35 MB	0.39 MB	0.40 MB	0.40 MB	0.40 MB	0.40 MB
System SQA Above	9.45 MB	10.90 MB	12.40 MB	12.40 MB	12.30 MB	12.40 MB
Total Below	1.08 MB	1.18 MB	1.32 MB	1.35 MB	1.51 MB	1.65 MB
Total Above	73.66 MB	130.40 MB	160.48 MB	214.63 MB	323.78 MB	554.37 MB
Total	74.75 MB	131.58 MB	161.80 MB	215.88 MB	325.29 MB	556.20 MB
Total Per User		14.21 KB	10.88 KB	8.83 KB	7.83 KB	7.54 KB

TN3270 Release to Release Comparison

- TN3270 Server IPv4
  - All trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant.

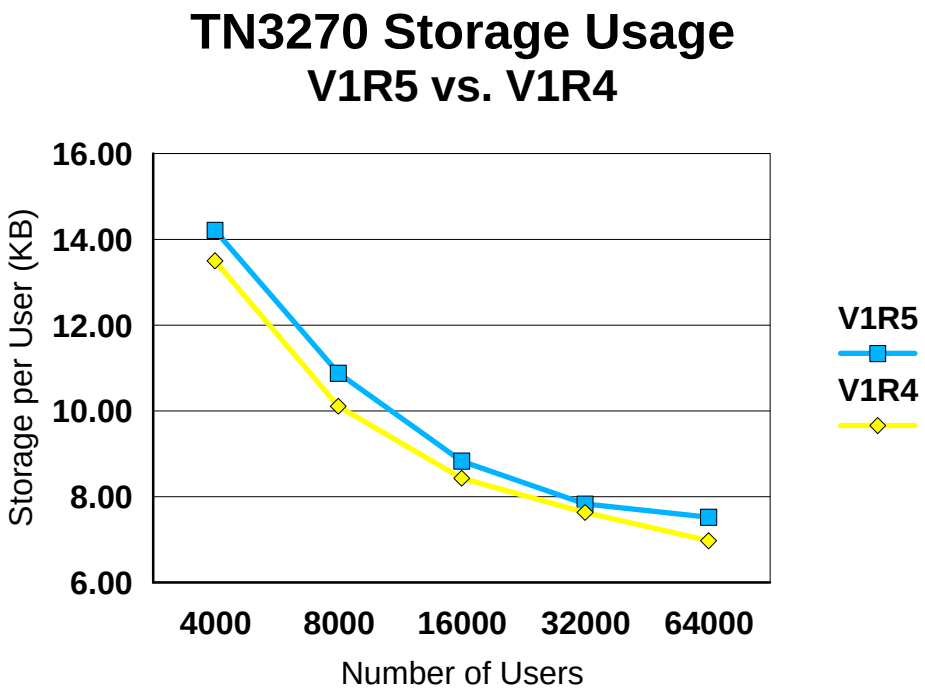




- MVS to MVS (5 CPs each LPAR)
- Six transactions per minute per user

TN3270 Release to Release Comparison

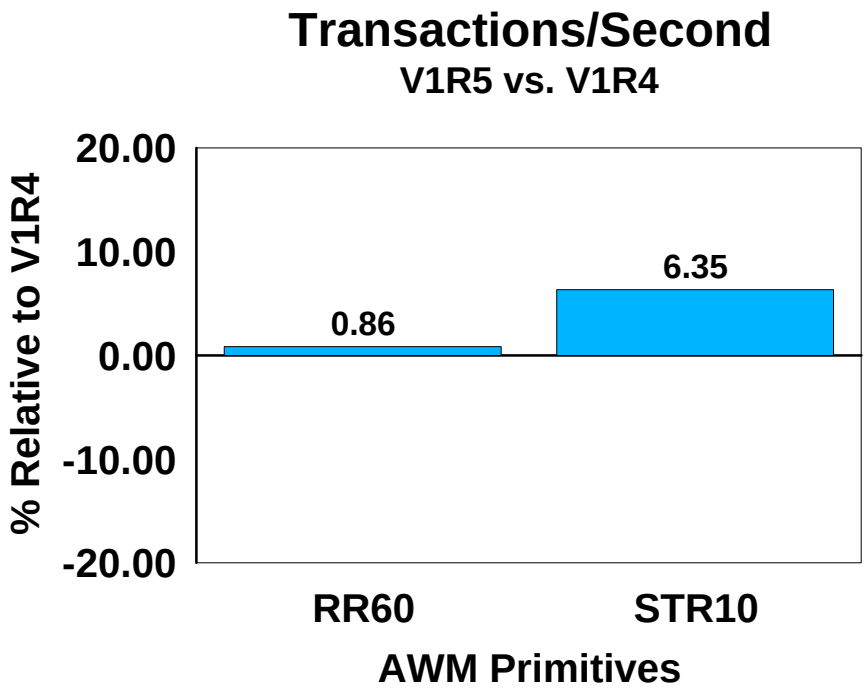
- TN3270 Server IPv4
  - V1R5 storage usage per TN3270 user is slightly higher than V1R4.

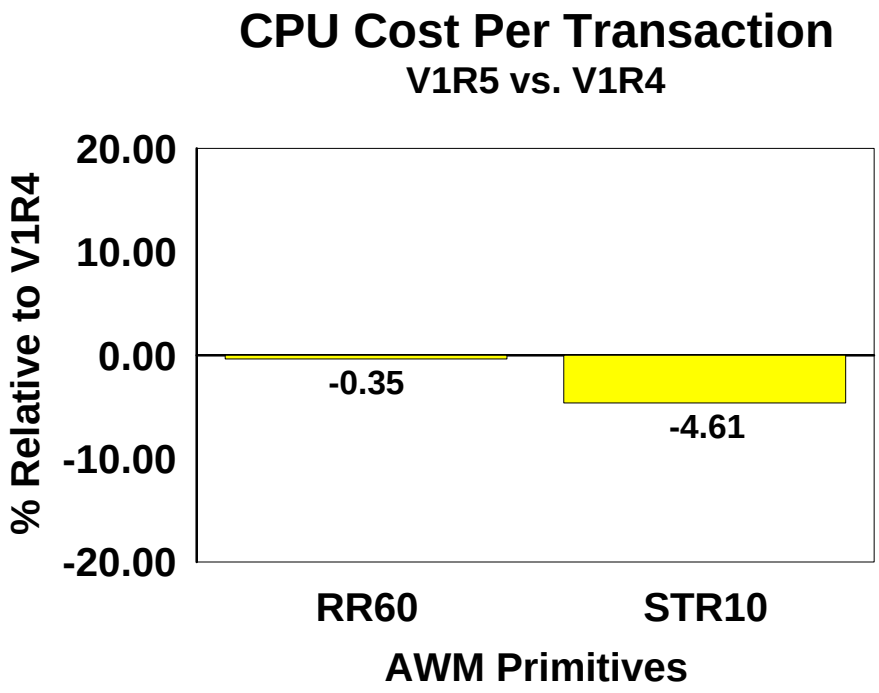


- MVS to MVS (5 CPs each LPAR)
- Six transactions per minute per user

Enterprise Extender Release to Release Comparison

- Enterprise Extender IPv4 Benchmarks
  - Most trans/sec and CPU costs differences between V1R5 and V1R4 are insignificant. V1R5 STR10 trans/sec are higher and CPU costs are lower than V1R4.

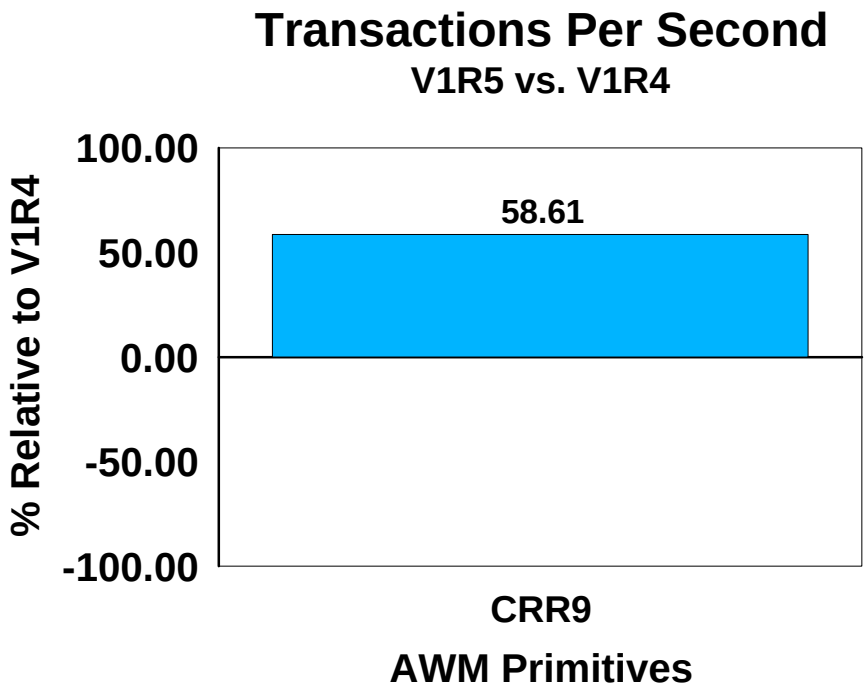


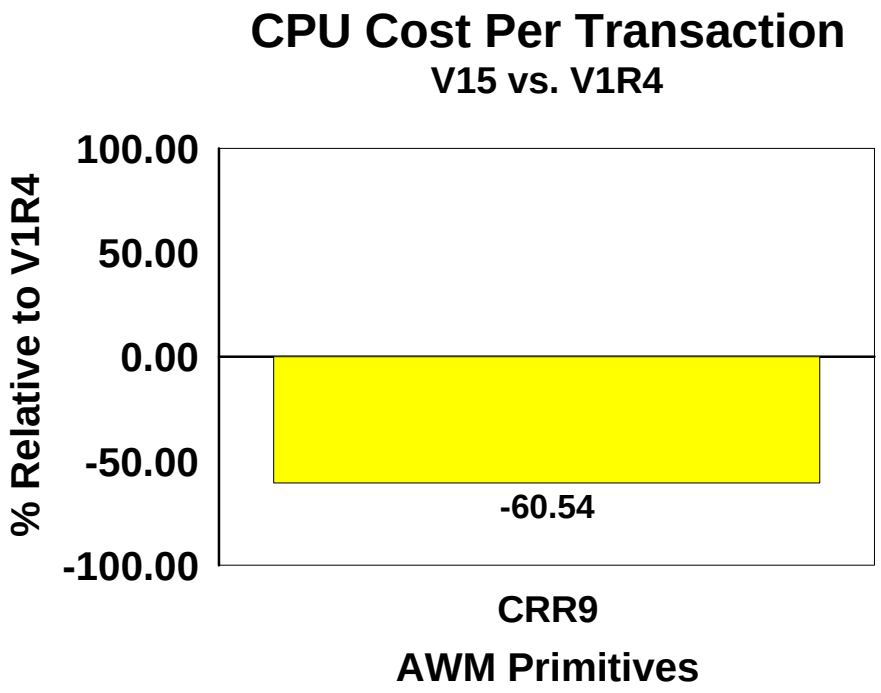


- T1 buffers set to 128
- T2 buffers set to 2048

Sysplex Sockets Release to Release Comparison

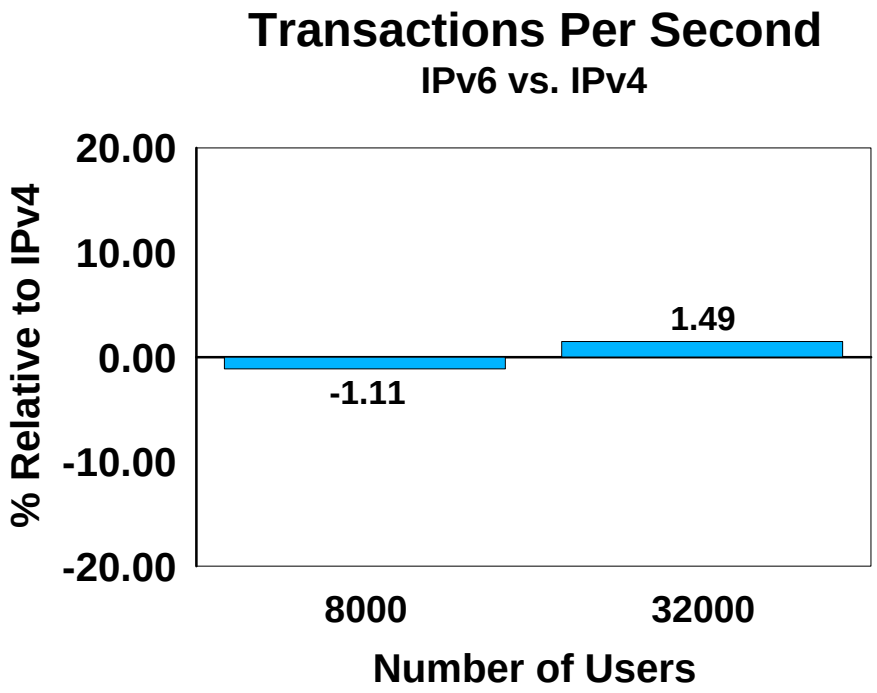
- Sysplex Sockets IPv4 Benchmarks
  - V1R5 trans/sec are higher and CPU costs are lower than V1R4.

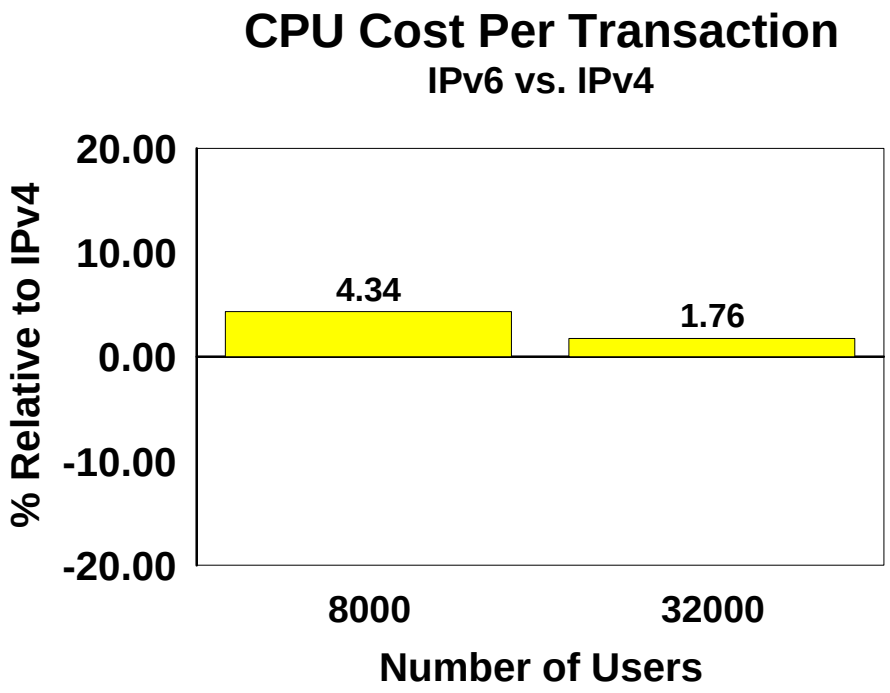




TN3270 Release Comparison

- V1R5 TN3270 Server
  - Most trans/sec and CPU costs differences between IPv6 and IPv4 are insignificant. IPv6 CPU costs for 8000 users is higher than IPv4.

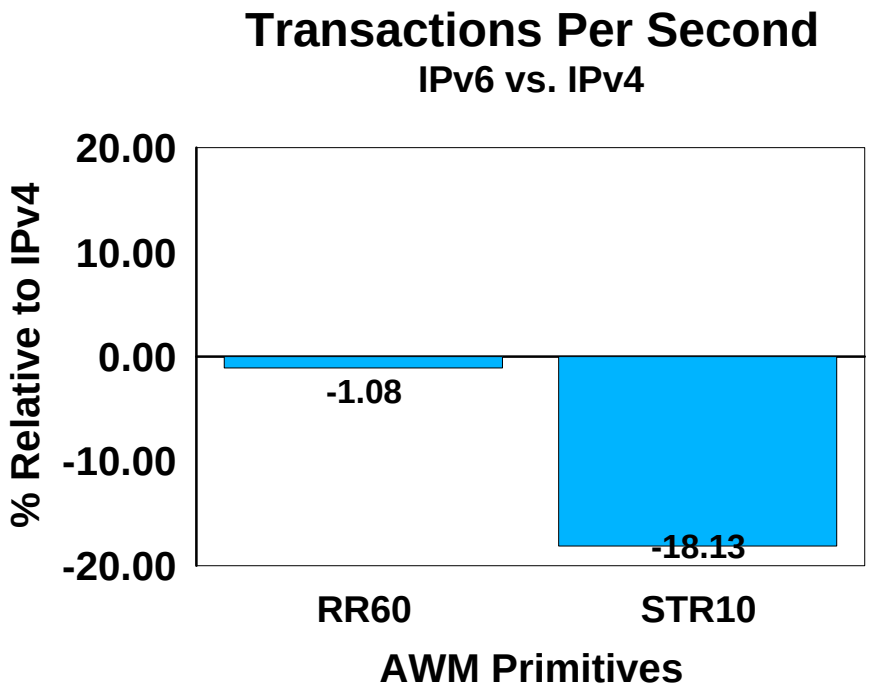


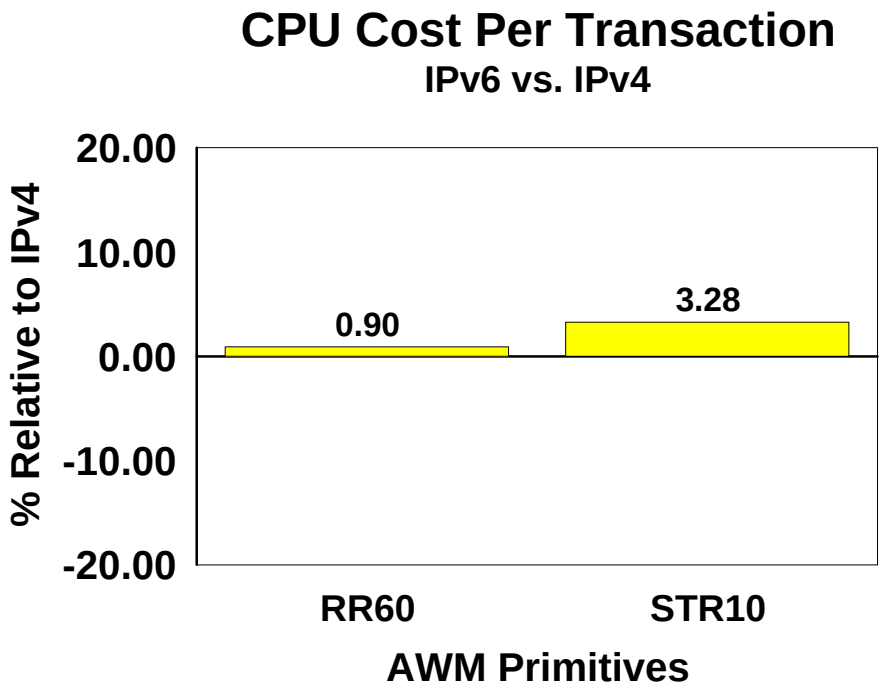


- MVS to MVS (5 CPs each LPAR)
- Six transactions per minute per user

Enterprise Extender Release Comparison

- Enterprise Extender
  - Most trans/sec and CPU costs differences between IPv6 and IPv4 are insignificant. IPv6 STR10 trans/sec are lower and CPU costs are higher than IPv4. This is due to OSA-GB processing of IPv6 packets.

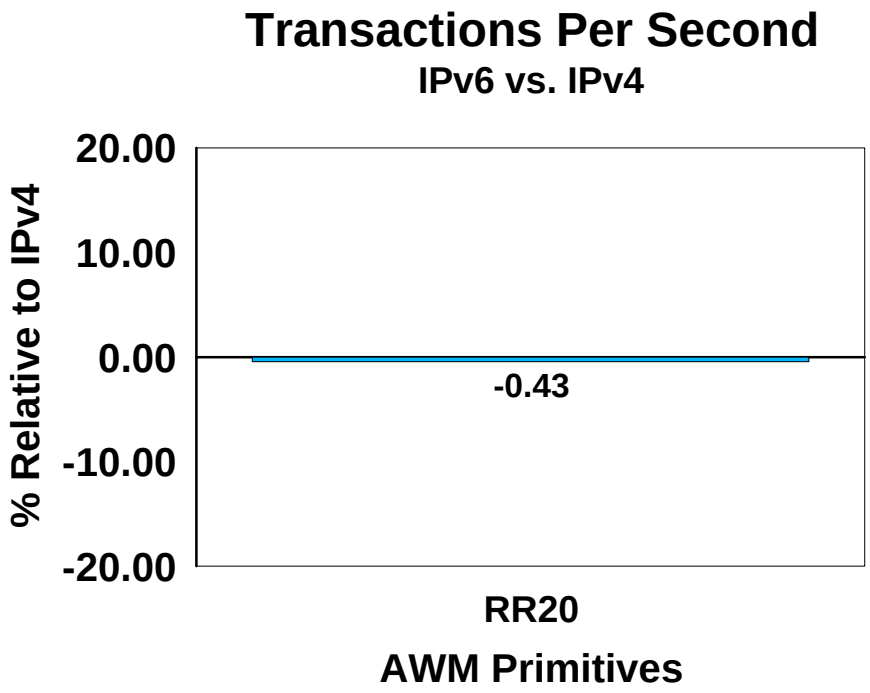


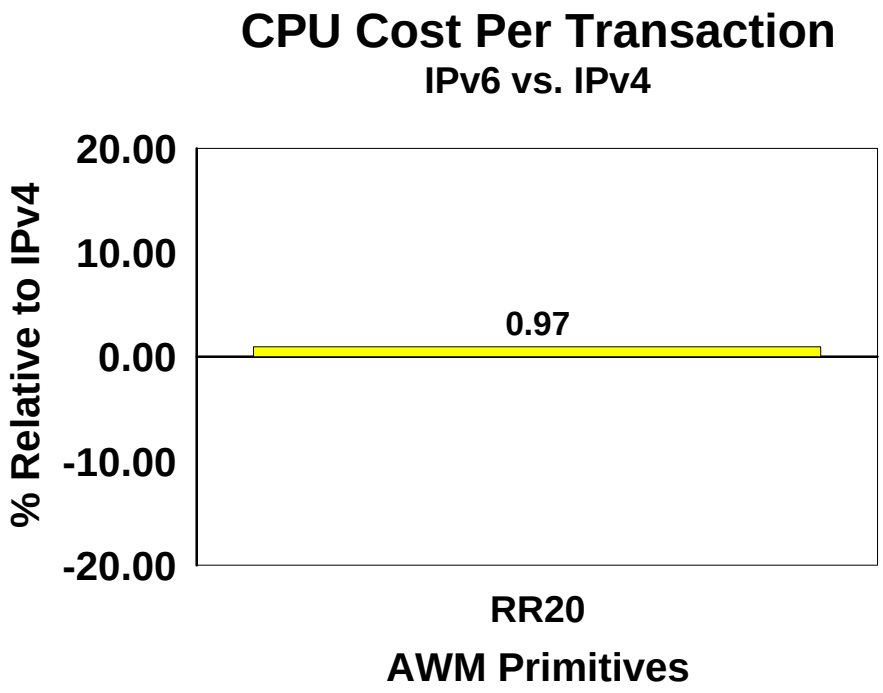


- T1 buffers set to 128
- T2 buffers set to 2048
- Open problem with OSA Development regarding IPv6 STR10 transaction rate across OSA-GB

CICS Sockets Release Comparison

- V1R5 CICS Sockets
  - All trans/sec and CPU costs differences between IPv6 and IPv4 are insignificant.

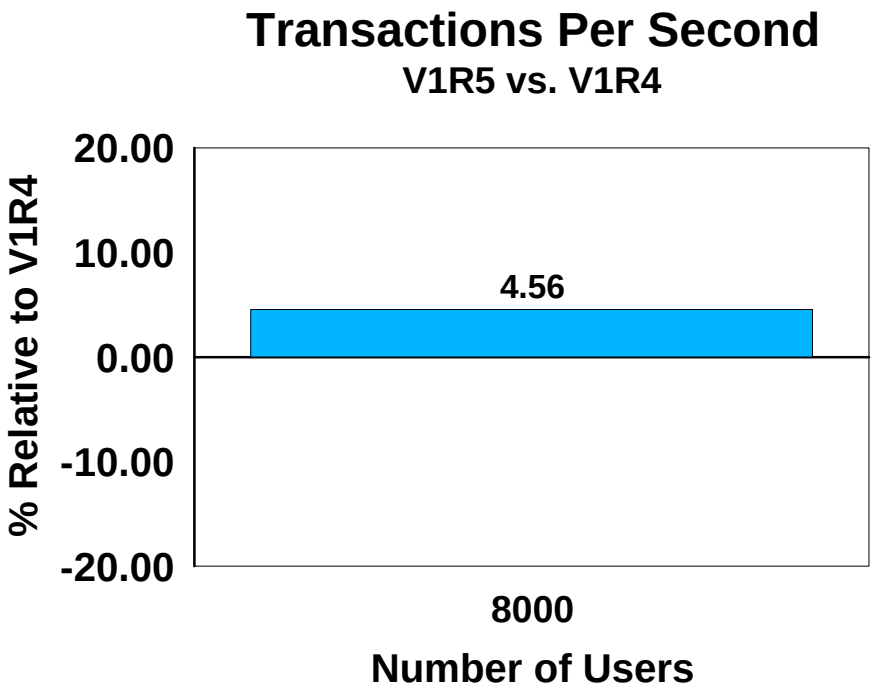


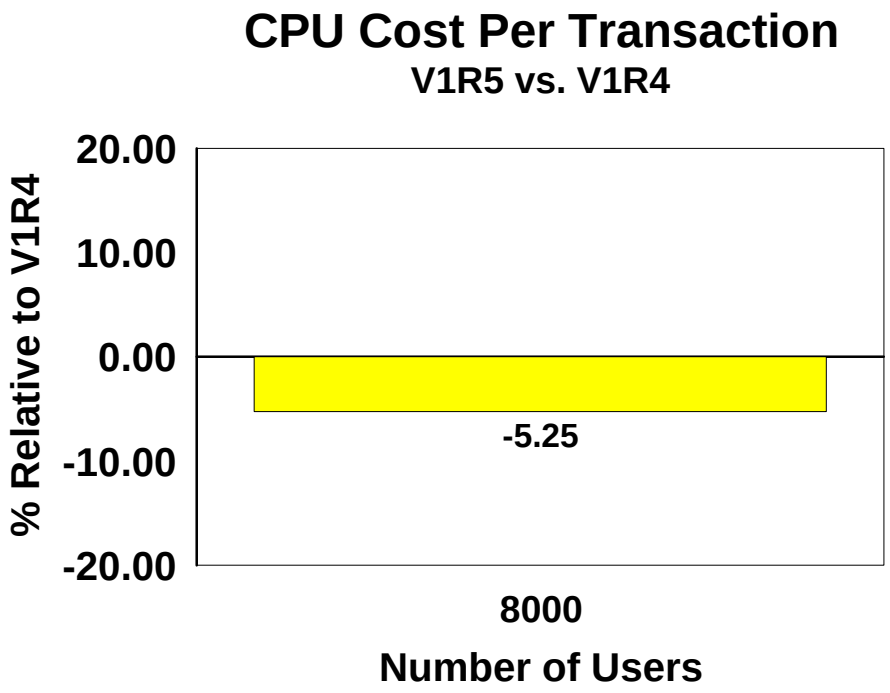


  - 200 byte request, 200 byte response

TN3270E Definite Response Comparison

- TN3270E Server with Definite Response
  - V1R5 trans/sec are higher and CPU costs are lower than V1R4.

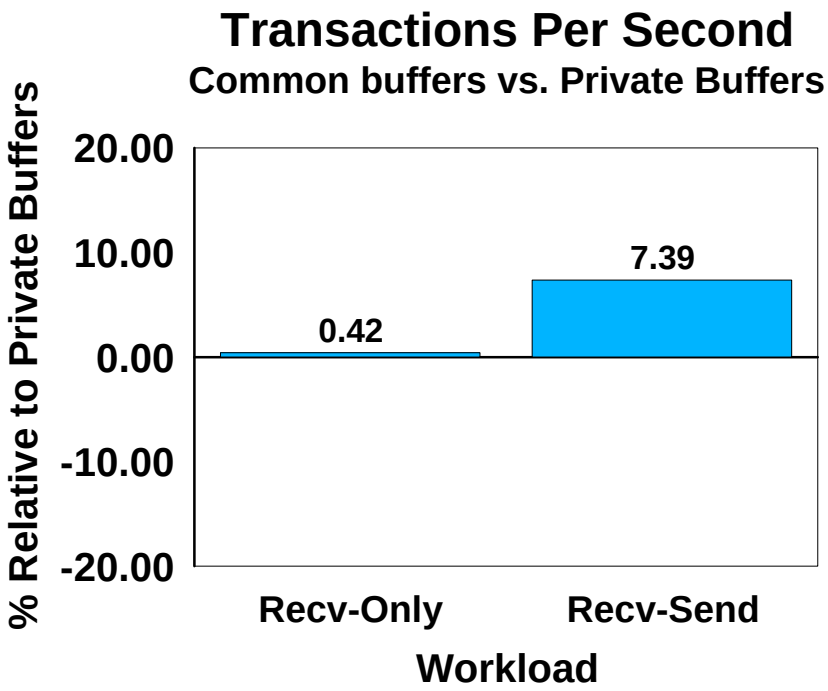


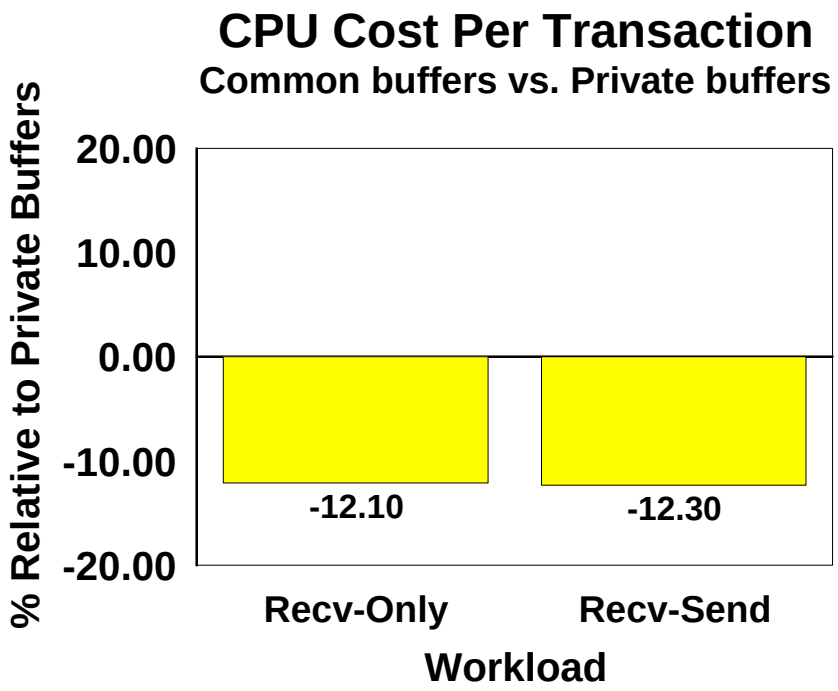


- MVS to MVS (5 CPs each LPAR)
- No think time

Asynchronous I/O Release Comparison

- V1R5 Asynchronous I/O Enhancement
  - Exploiting common storage buffers provides higher trans/sec and lower CPU costs than using private storage buffers.

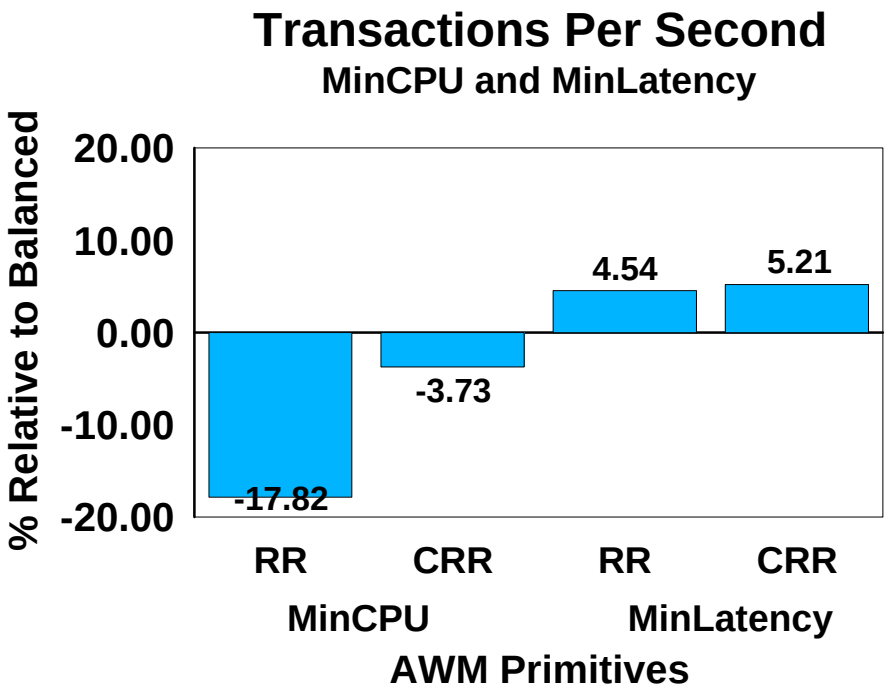


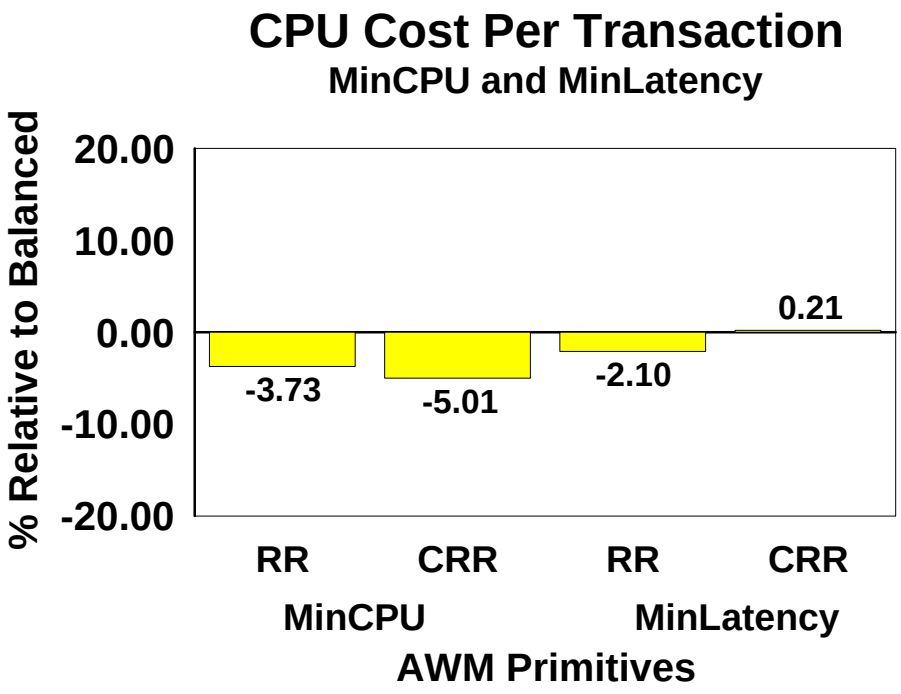


- Recv-Only: 200 byte request received
- Recv-Send: 200 byte request received, 4 byte response sent

INBPERF Release Comparison

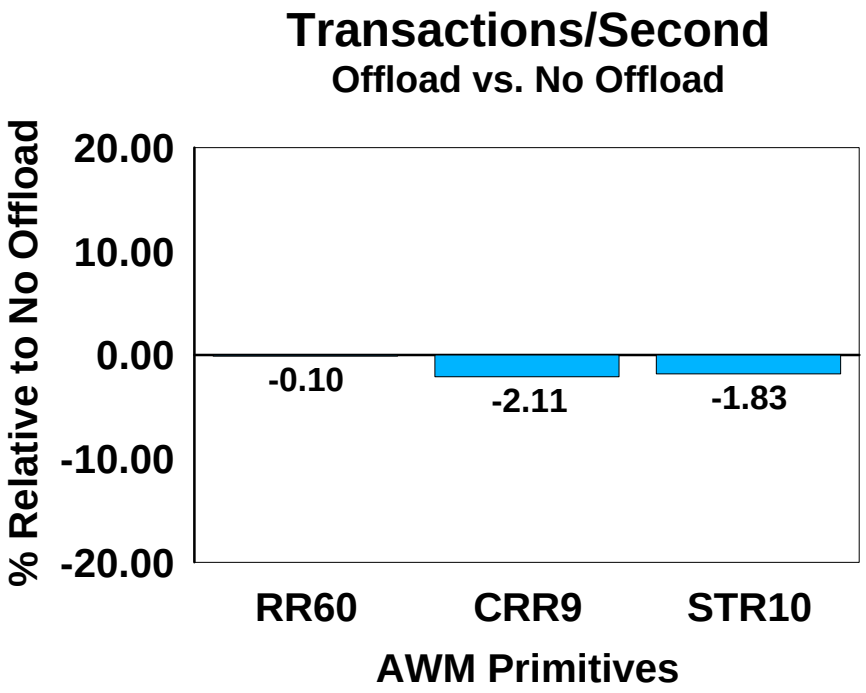
- V1R5 INBPERF MinCPU and MinLatency Effects
  - MinCPU results in lower trans/sec and lower CPU cost than Balanced.
    MinLatency results in higher trans/sec and insignificant CPU cost than Balanced.

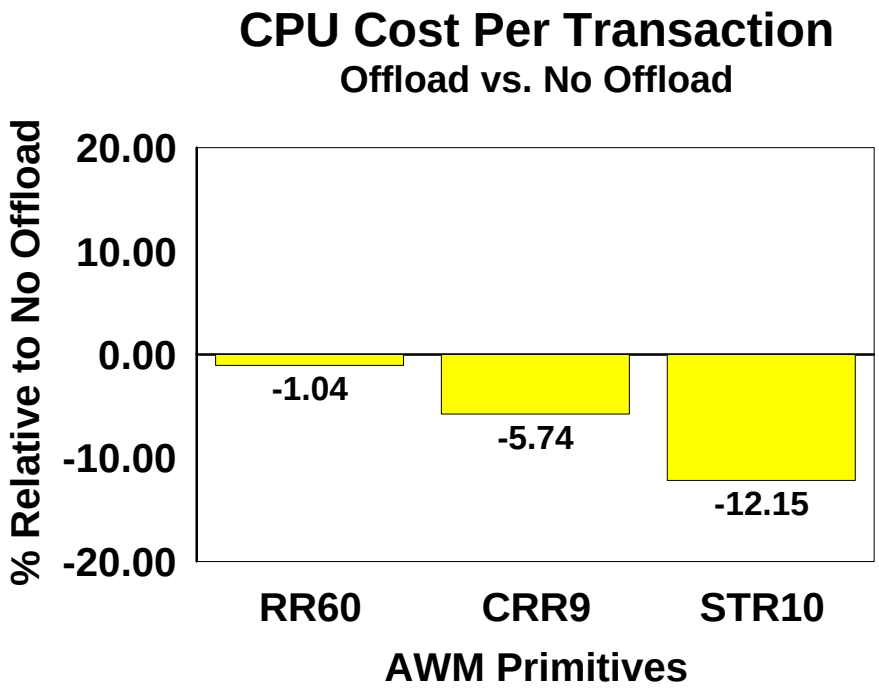




Checksum Offload Release Comparison

- V1R5 AWM IPv4 Client/Server Benchmarks (TCP)
  - Most trans/sec and CPU costs differences between Checksum Offload and No Checksum Offload are insignificant. Checksum Offload CRR9 and STR10 CPU costs are lower than No Checksum Offload.

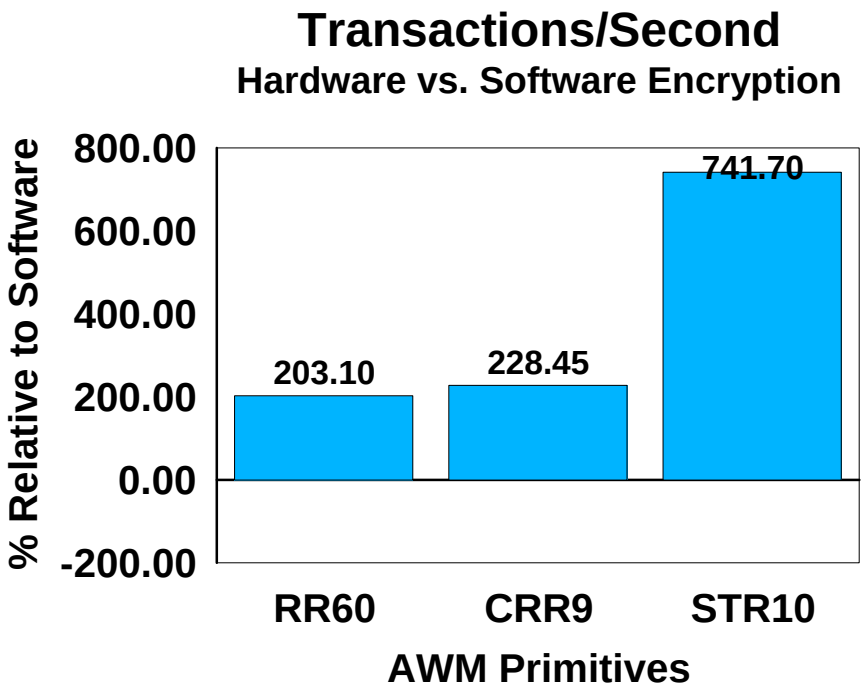


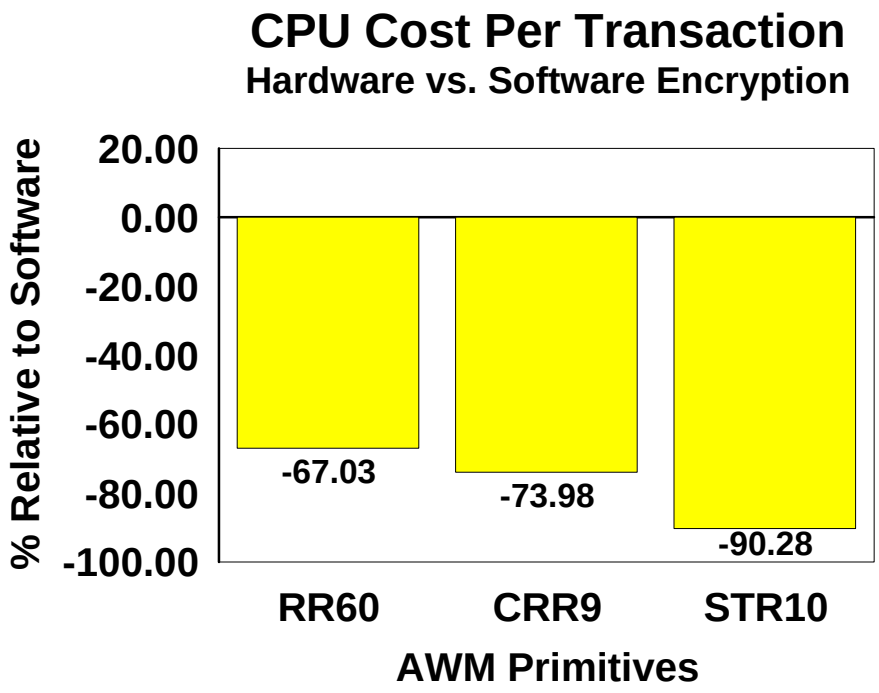


  - Measurements done using z/990 (2084-332)

Crypto-Assist Release Comparison

- AWM IPv4 Client/Server Benchmarks (TCP)
  - Using the Crypto-Assist instruction for encryption/decryption results in higher trans/sec and lower CPU costs than using software.





- Measurements done using z/990 (2084-332)
- ESP tunnel defined using TDES encryption

z/OS V1R5 CS Performance Summary

Recommended Service Levels

- Apars PQ86225 and PQ88777
- OSA microcode level: z/900 - 3.50 : z/990 - 5.50

z/OS CS Performance References

- http:://www.share.org
  - TCP/IP for z/OS - Performance Tuning Tips and Capacity Planning (session 3919, 02/2004)
- http://www.ibm.com/software/network/commserver/os390/library
  - z/OS V1R5 Communications Server Product Bookshelf

Release to Release Summary

- Overall z/OS V1R5 Communications Server performance is equivalent or better than z/OS V1R4 Communications Server
- z/OS V1R5 Communications Server provides improved performance for:
  - Enterprise Extender streaming workloads
  - TN3270E Definite Response enhancements
  - Asynchronous I/O enhancements
  - Sysplex Sockets
  - Checksum Offload for z/990
  - Hardware encryption for z/990