



IBM Software Group

z/OS Communications Server TN3270 Capacity Planning 2008

Clear Text, TLS, and AT-TLS

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Contents

- Disclaimers 5
- Requirement 6
- Workload Characteristics 7
- Test Environment 8
- Limitations / Optimizations 11
- Summary of Results 12
- Scalability (clear text, TLS, and AT-TLS) 14
- Clear Text Measurements 21
 - ▶ Performance Metrics
 - ▶ MIPS Requirements
 - ▶ Storage Utilization
- TLS Measurements 37
 - ▶ Performance Metrics
 - ▶ MIPS Requirements
 - ▶ Storage Utilization
- AT-TLS Measurements 53
 - ▶ Performance Metrics
 - ▶ MIPS Requirements
 - ▶ Storage Utilization



Contents

- Secure Compared to Clear Text 69
- Conclusions 82
- Appendix 83



Disclaimers

- This document contains System z9 CPU capacity planning guidelines for z/OS Communications Server TN3270. The measurements were made on a z9-109 (2094-S38). Please use the Large Systems Performance Reference (LSPR) data to adjust the CPU capacity numbers in this document to the level of zSeries hardware you are planning to use.
- All performance data contained in this document was obtained in the specific operating environment and under the conditions described and is presented as an illustration only. Performance obtained in other operating environments may vary and customers should conduct their own testing.

Requirement

- Customer requests for TN3270 Capacity Planning data are increasing
 - ▶ For each z/OS CS release, performance measurements have traditionally been made for 8K, 16K, 32K, 64K, and 128K TN3270 users with results published in the performance summary report.
 - ▶ Recently, customers have been requesting data for as many as 256K TN3270 users.
 - Performance metrics (CPU cost per transaction, MIPS, transactions per second, etc.)
 - Scalability
 - Storage utilization
 - ▶ Customer goals:
 - Consolidation of multiple TN3270 installations on a single z/OS LPAR.
 - Replacing SNA transport with TN3270 IP.
 - Consolidating outboard TN3270 installations on z/OS.

Workload Characteristics

- TN3270E users with a transaction size of 100 bytes in and 800 bytes out.
- 30 second think time between transactions.
- Workloads generated using the IBM TPNS program product.
- ITPECHO TPNS echo program used as the TN3270 application.
- A series of measurements were made with the following characteristics:
 - ▶ TN3270 users ranging from 8K to 256K
 - ▶ TN3270 servers ranging from 1 to 8
 - ▶ TN3270 ports per server ranging from 1 to 4
- Measurements were made with no security (clear text), Transport Layer Security (TLS), and Application Transparent TLS (AT-TLS). The TLS and AT-TLS measurements were made using Triple DES (3DES) encryption and Secure Hash Algorithm (SHA) authentication.

Note 1: z9 hardware was used by the TN3270 server for all measurements presented in this document. On the z9, encryption and decryption for 3DES is performed by the hardware (CPACF).

Note 2: All MIPS requirements were calculated using the Large System Performance Reference (LSPR) MIPS rating based on the z/OS 1.6-MIX ratio.

Test Environment

➤ Client hosts:

- ▶ One z990 2084-332 LPAR with 4 dedicated CPs
- ▶ One z9-109 2094-S38 LPAR with 4 dedicated CPs
- ▶ 4G of real storage
- ▶ 1.2G of ECSA; CSA=(3000,1200M)
- ▶ FIXEDMAX(1500M); ECSAMAX(200M)
- ▶ z/OS CS V1R9
- ▶ Two TCP/IP stacks per LPAR
- ▶ Each TCP/IP stack running one copy of TPNS (four TPNS instances total driving up to 64,000 users each)

➤ TN3270 server host:

- ▶ One z9-109 2094-S38 LPAR with 4 dedicated CPs
- ▶ 4G of real storage
- ▶ 700M of ECSA; CSA=(3000, 700M)
- ▶ FIXEDMAX(1500M); ECSAMAX(120M)
- ▶ z/OS CS V1R9
- ▶ One TCP/IP stack
- ▶ One, two, four, or eight TN3270 servers
- ▶ MAXFILEPROC=131,072; MAXSOCKETS=260,000

Test Environment continued

- Application host:
 - ▶ One z9-109 2094-S38 with 4 dedicated CPs
 - ▶ 4G of real storage
 - ▶ 700M of ECSA; CSA=(3000,700M)
 - ▶ FIXEDMAX(1500M); ECSAMAX(120M)
 - ▶ z/OS CS V1R9
 - ▶ One TCP/IP stack
 - ▶ Four instances of the TPNS ITPECHO application (up to 64,000 connections each)
- Connectivity:
 - ▶ Client hosts to Server host: IP over OSA Express-2 Gigabit Ethernet
 - ▶ Server host to Application host: EE over OSA Express-2 Gigabit Ethernet

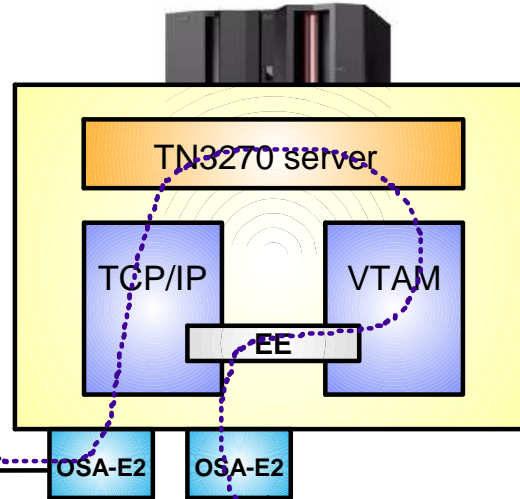
Test Environment continued - Configuration Diagram

zSeries z990 2084-334
and
z9-109 2094-S38



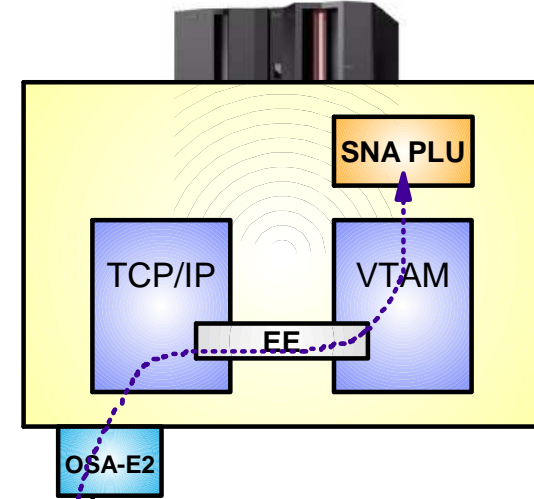
TN3270 IP traffic
Gigabit Ethernet

zSeries z9-109
2094-S38



SNA LU2 EE traffic
Gigabit Ethernet

zSeries z9-109
2094-S38



Client host LPARs:

- ▶ 4 dedicated CPs
- ▶ 4 GB real storage
- ▶ 1.2 GB ECSA
- ▶ FIXED MAX(1500M)
- ▶ ECSA MAX(200M)
- ▶ TCP/IP x 2 (4 stacks total)
- ▶ TPNS x 2 (4 instances total; up to 64K users each)

Server host LPAR:

- ▶ 4 dedicated CPs
- ▶ 4 GB real storage
- ▶ 700MB ECSA
- ▶ FIXED MAX(1500M)
- ▶ ECSA MAX(120M)
- ▶ TCP/IP
- ▶ TN3270 x 1, 2, 4, or 8
- ▶ MAXFILEPROC=131,072
- ▶ MAXSOCKETS=260,000

Application host LPAR:

- ▶ 4 dedicated CPs
- ▶ 4 GB real storage
- ▶ 700MB ECSA
- ▶ FIXED MAX(1500M)
- ▶ ECSA MAX(120M)
- ▶ TCP/IP
- ▶ ITPECHO x 4 (up to 64K connections each)

Limitations / Optimizations

- Four client TCP/IP stacks are required to drive 256K users due to the 64K ephemeral port limitation per stack.
- Storage tuning is required to support 256K TN3270 sessions on a single LPAR.
 - ▶ CSA and private storage must be balanced.
 - ▶ Extra page data space is required on the server and application hosts when TLS or AT-TLS security is used with large numbers of users.
 - ▶ Use of secure connections requires significantly more private storage than clear text. With z/OS CS running in 32 bit mode, the maximum number of secure connections that can be supported is 128K. Attempts to go significantly beyond 128K connections were unsuccessful due to storage constraints. Common and private storage requirements were unable to be balanced such that all storage requirements could be accommodated in the 2 Gigabytes that are addressable in 32 bit mode.
- VTAM buffer tuning is required to support 256K users.
 - ▶ Refer to the appendix for specifics.

Note 1: For V1R9, the maximum connections per port has been expanded from 128K to 512K.

Note 2: For V1R9, significant ECSA reductions have been achieved. A single TCP/IP stack with a single port now has adequate storage available to support 256K clear text connections and 128K secure connections.

Summary of Results

- Multiple TN3270 servers and ports versus one:
 - ▶ The performance for one versus multiple TN3270 servers and one versus multiple ports is similar. The following is a sampling of results for 256K clear text users:
 - One server with 1 port: .176 ms CPU/tr; 8,275 TPS
 - One server with 2 ports: .173 ms CPU/tr; 8,221 TPS
 - Two servers with 1 port each: .175 ms CPU/tr; 7,918 TPS
 - Two servers with 4 ports each: .186 ms CPU/tr; 8,046 TPS
 - Four servers with 1 port each: .166 ms CPU/tr; 8,014 TPS
 - Eight servers with 1 port each: .181 ms CPU/tr; 8,306 TPS
 - ▶ The storage requirements for the TCP/IP stack are similar for one versus multiple TN3270 servers.
 - ▶ Since each TN3270 server requires it's own private storage pool, the total storage requirements for the TN3270 servers increase as the number of servers increase.

Summary of Results continued

- Secure connections versus clear text:
 - ▶ The CPU penalty for secure connections varies widely. The CPU increase ranges from as little as 7% to as much as 69%. The average CPU increase for TLS secure connections with 3DES SHA compared to clear text is about 40% and the average for AT-TLS secure connections is about 30%.
 - ▶ The CPU penalty for secure connections is less for two TN3270 servers than for one.

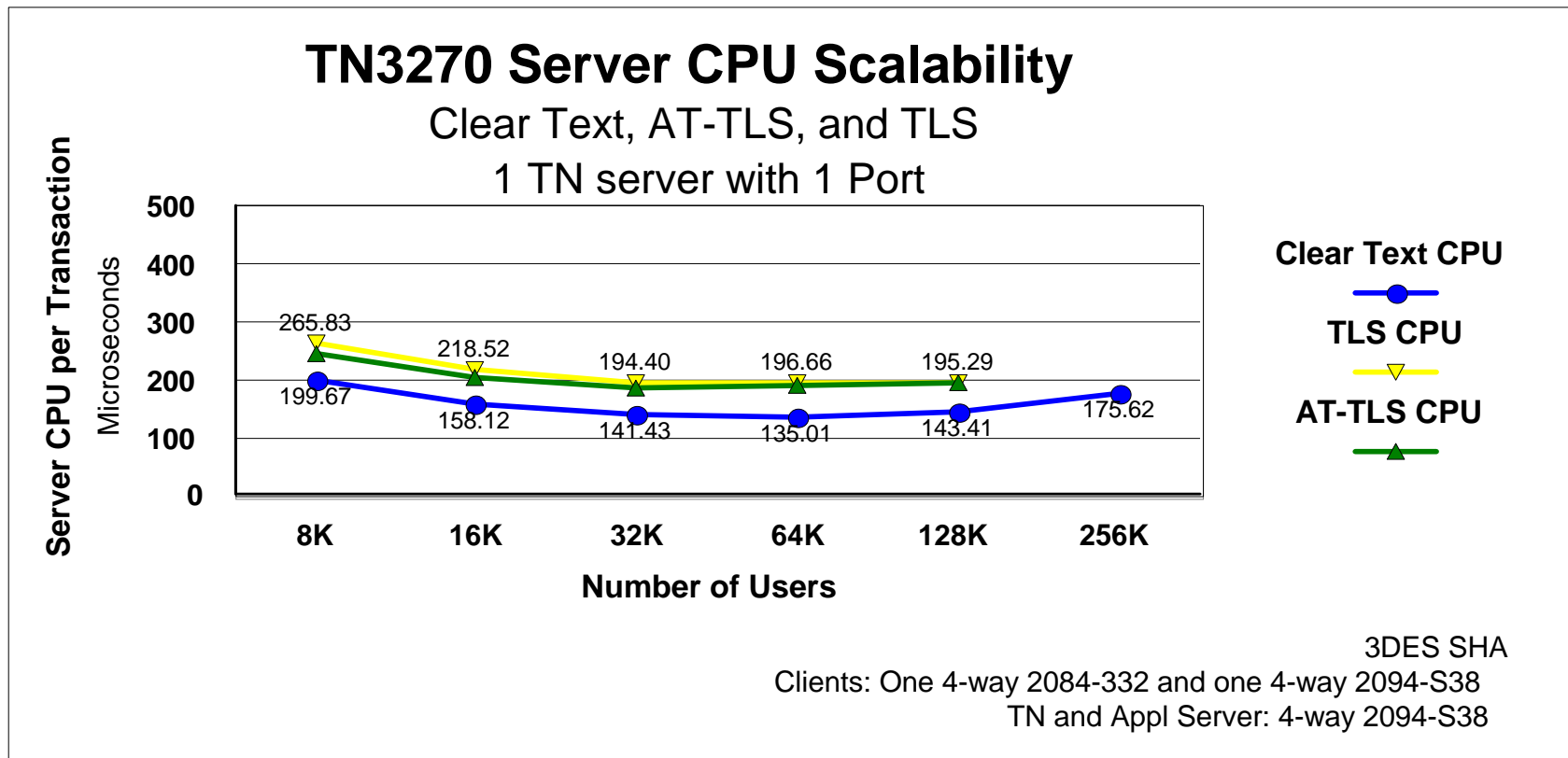


Scalability (Clear Text and Secure)



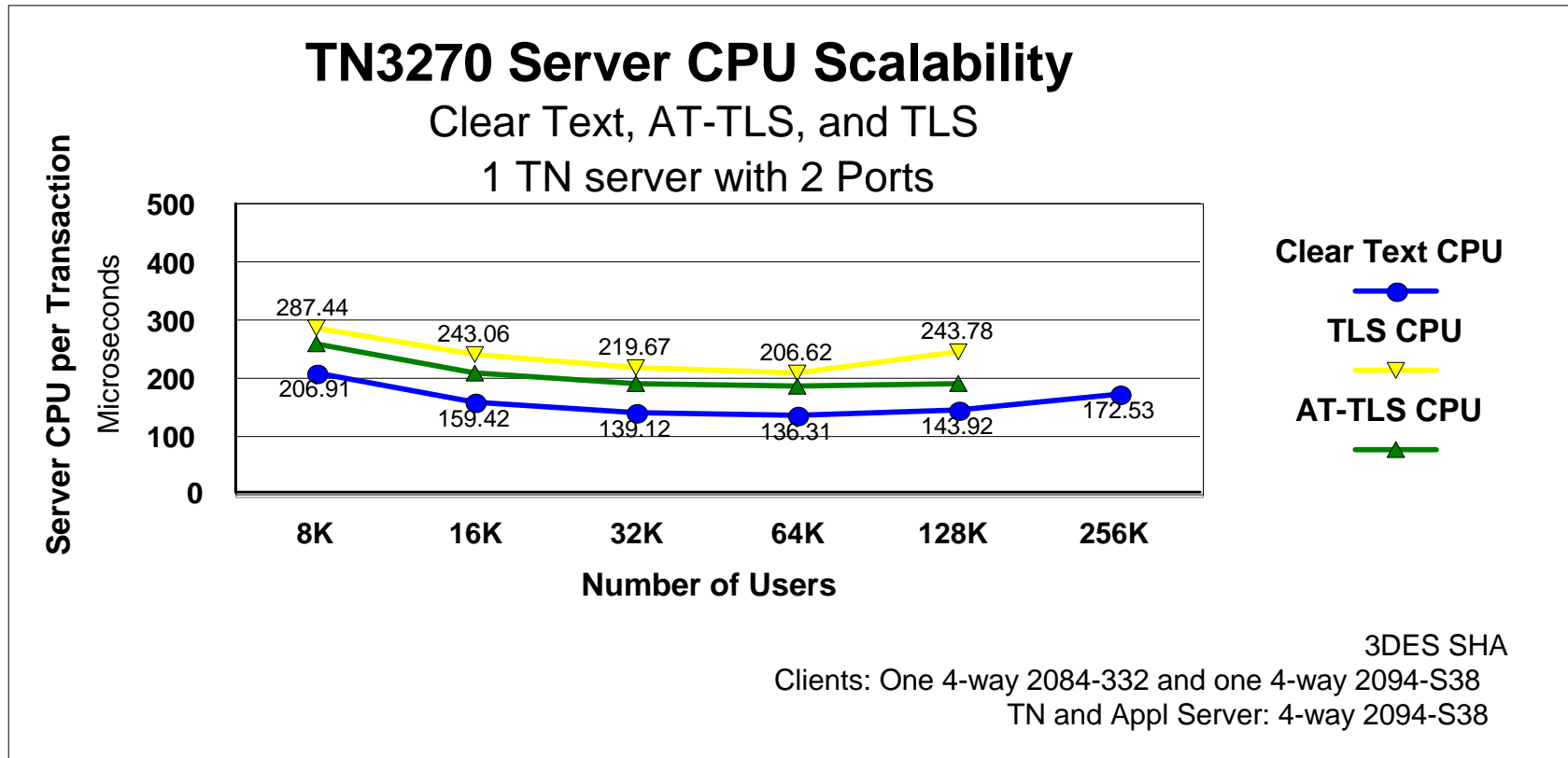
Telnet Server Scalability

- One TN3270 server with one port



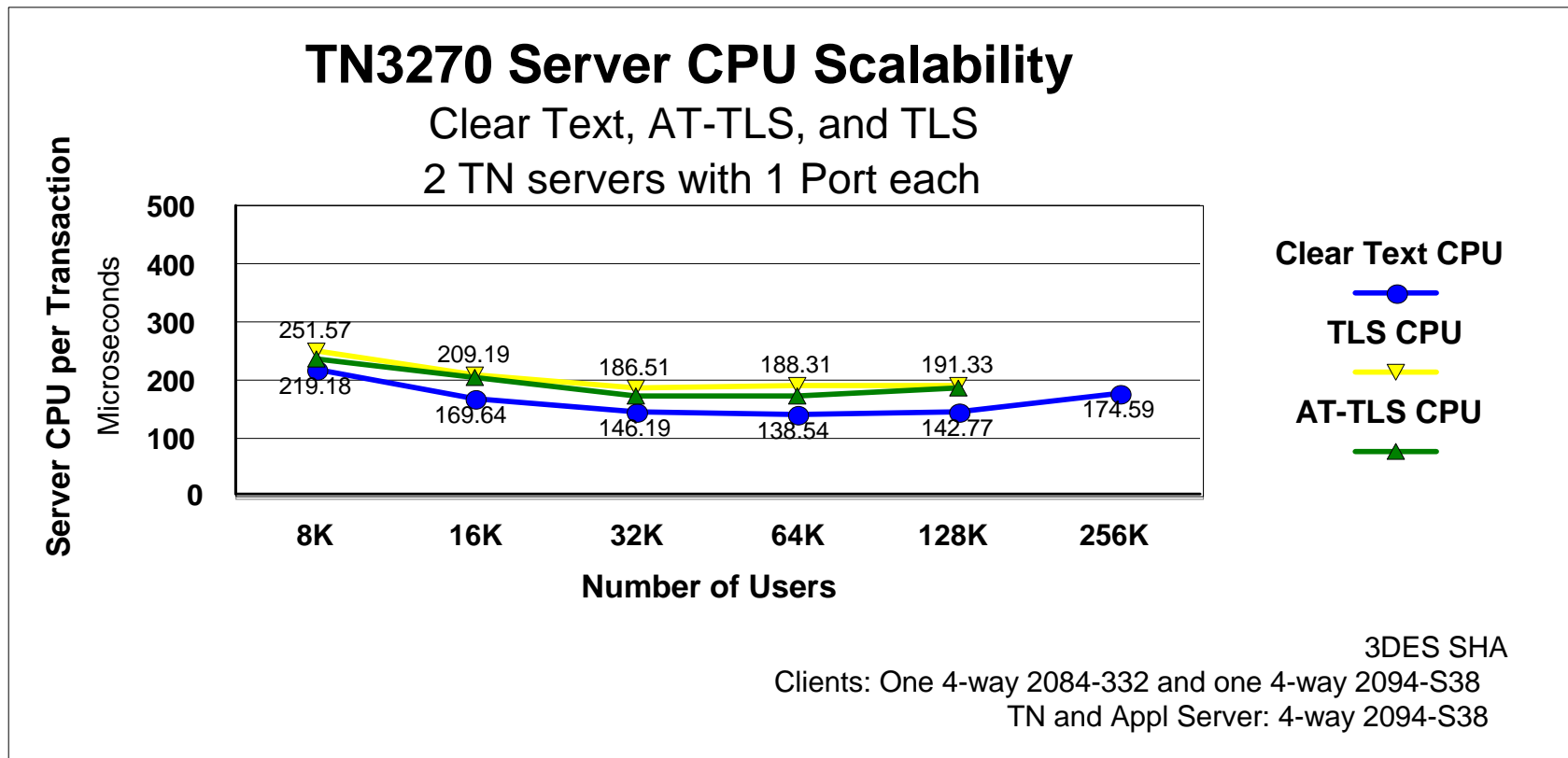
Telnet Server Scalability

- One TN3270 server with two ports



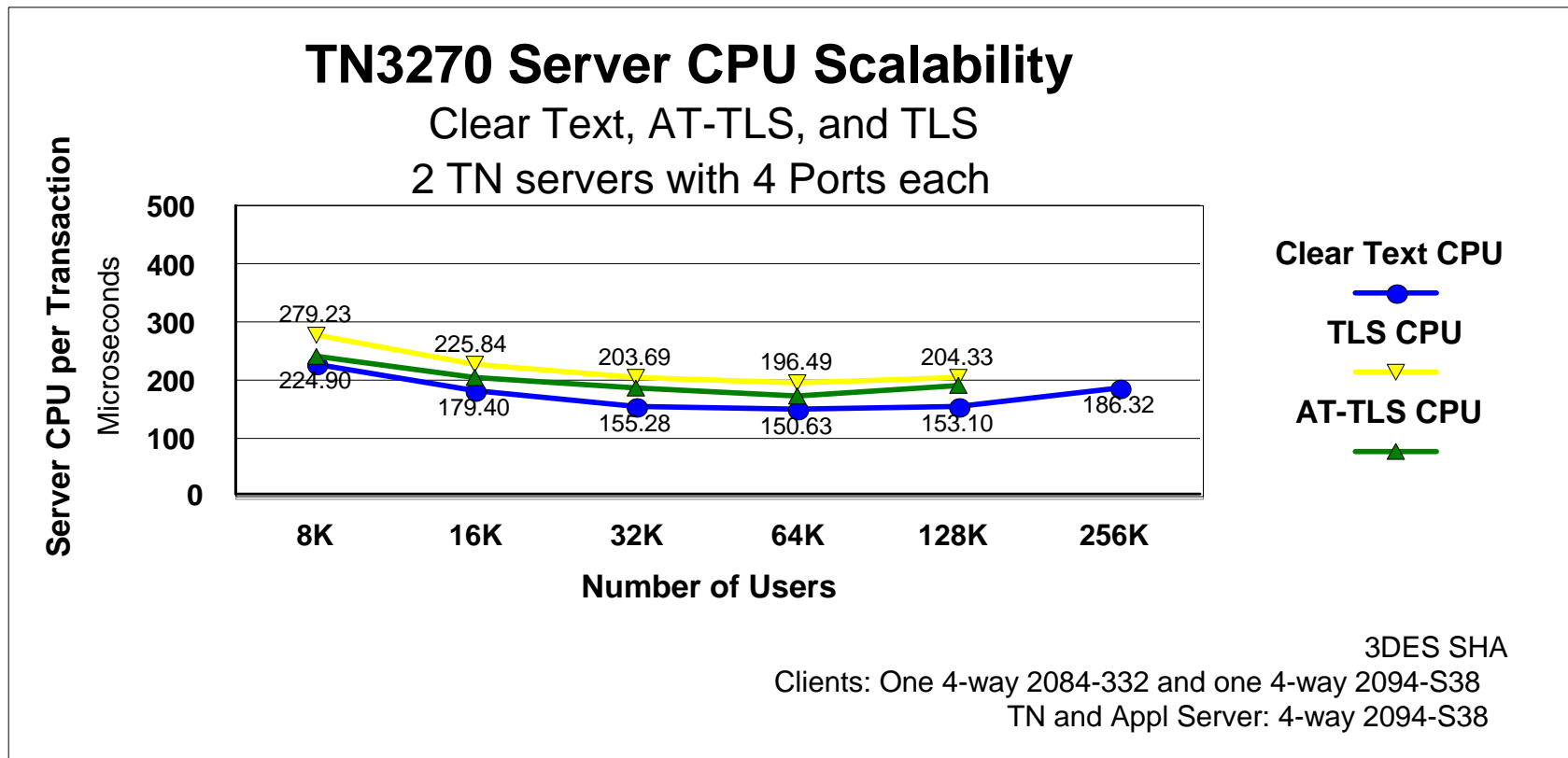
Telnet Server Scalability

- Two TN3270 servers with one port each



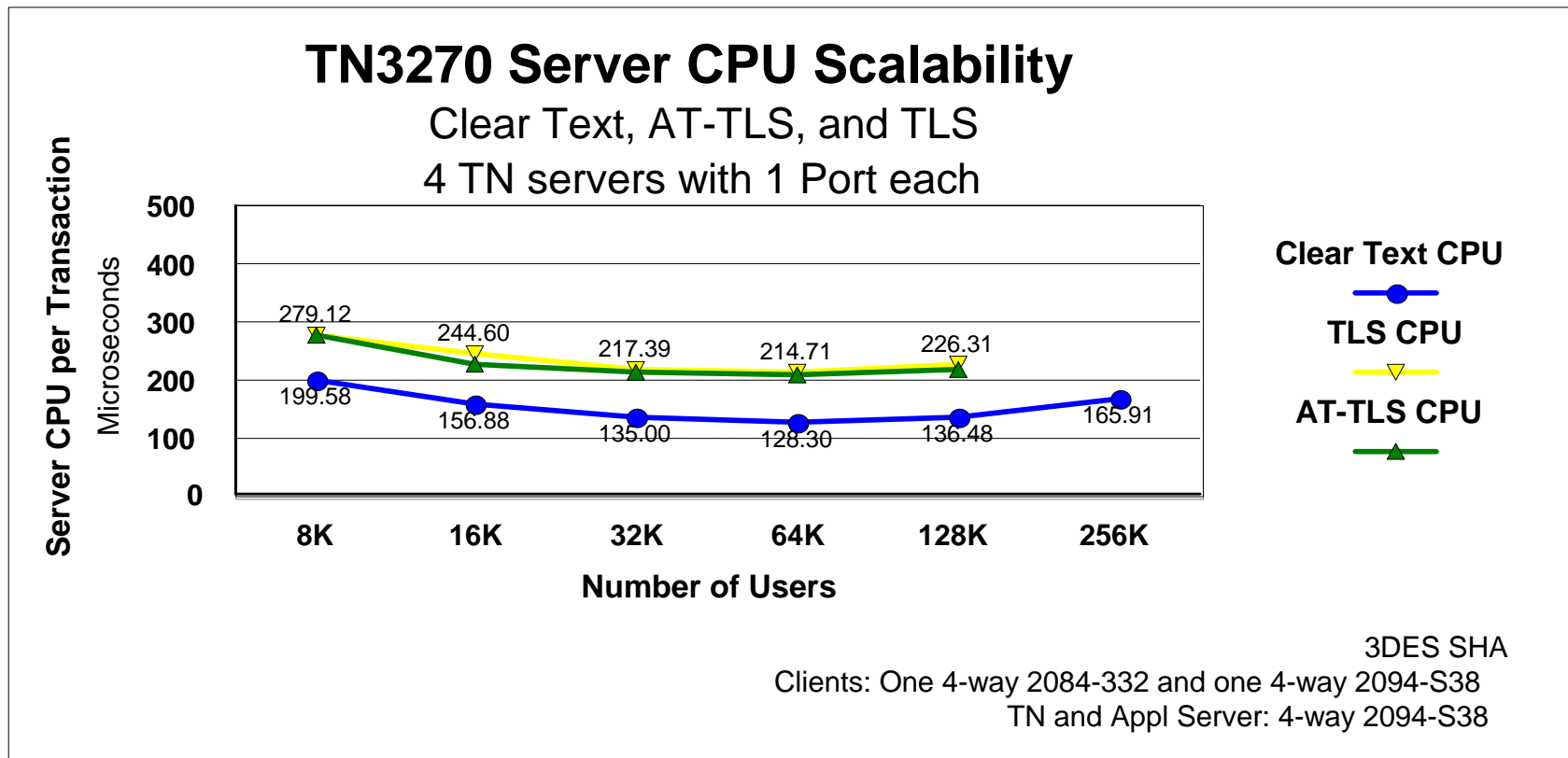
Telnet Server Scalability

- Two TN3270 servers with four ports each



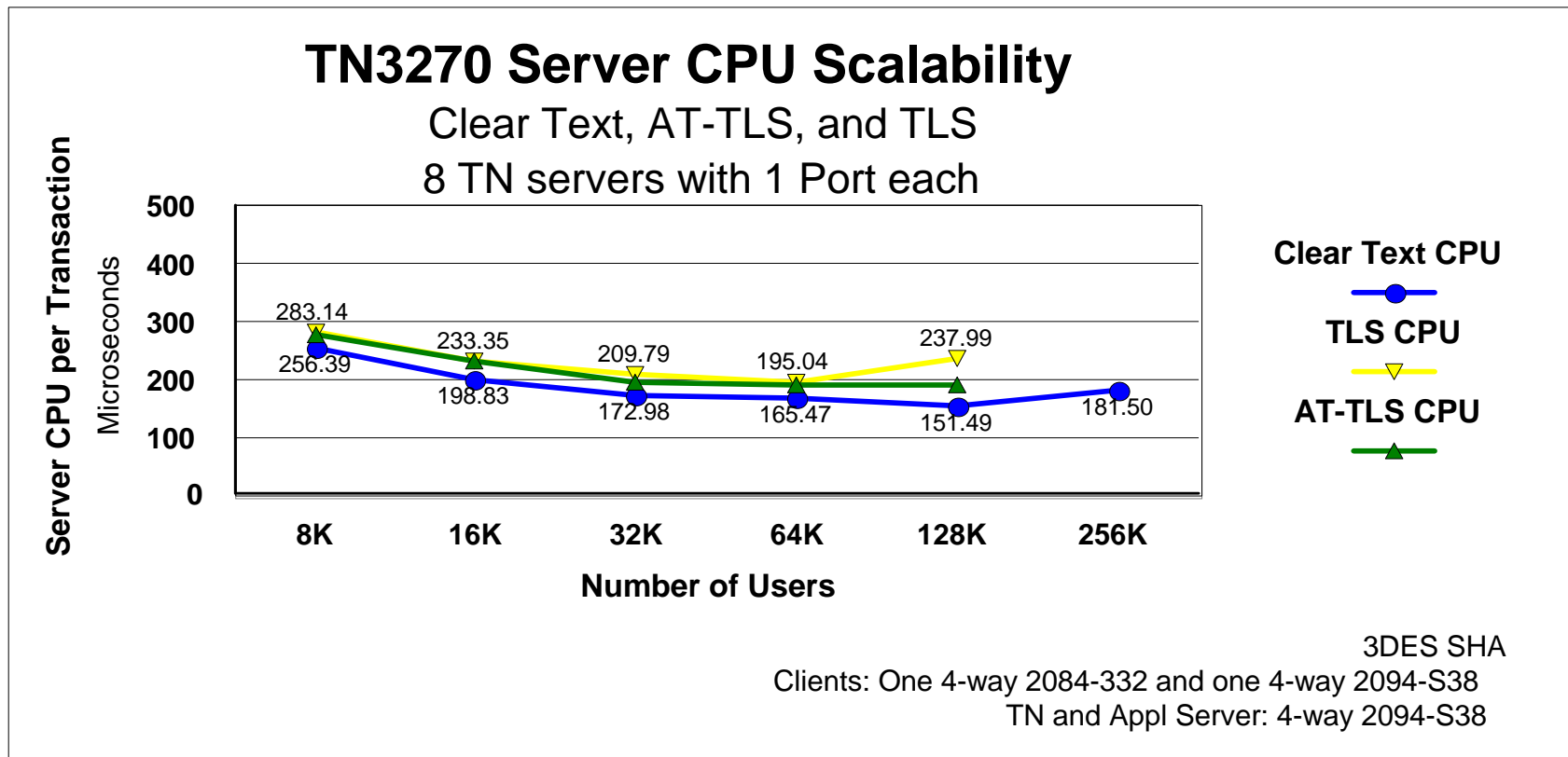
Telnet Server Scalability

- Four TN3270 servers with one port each



Telnet Server Scalability

- Eight TN3270 servers with one port each



Clear Text Measurements



Performance Metrics (clear text)

- One TN3270 server
- 256K users

Metric	1 TN3270 server address space; one port		1 TN3270 server address space; two ports	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	8275 tr/sec	8275 tr/sec	8221 tr/sec	8221 tr/sec
CPU per transaction	.176 ms/tr	.130 ms/tr	.173 ms/tr	.131 ms/tr
LPAR utilization	36.3%	27.0%	35.5%	26.9%
MIPS required	578	429	564	428
OSA GbE utilization for 3270 traffic	5.9%		8.6%	
OSA GbE utilization for EE traffic	17.8%		15.6%	
ECSA storage requirement	501 MB	326 MB	490 MB	328 MB
TN3270 private storage requirement	1.07 GB		1.05 GB	
Total storage requirement	2.09 GB	456 MB	2.07 GB	443 MB

Performance Metrics (clear text)

- Two TN3270 servers
- 256K users

Metric	2 TN3270 server address spaces; one port each		2 TN3270 server address spaces; four ports each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	7918 tr/sec	7918 tr/sec	8046 tr/sec	8046 tr/sec
CPU per transaction	.175 ms/tr	.139 ms/tr	.186 ms/tr	.139 ms/tr
LPAR utilization	34.6%	27.6%	37.5%	28.0%
MIPS required	549	439	596	445
OSA GbE utilization for 3270 traffic	8.31%		8.5%	
OSA GbE utilization for EE traffic	16.19%		15.3%	
ECSA storage requirement	499 MB	329 MB	499 MB	329 MB
TN3270 private storage requirement	1.36 GB		1.39 GB	
Total storage requirement	2.38 GB	472 MB	2.41 GB	444 MB

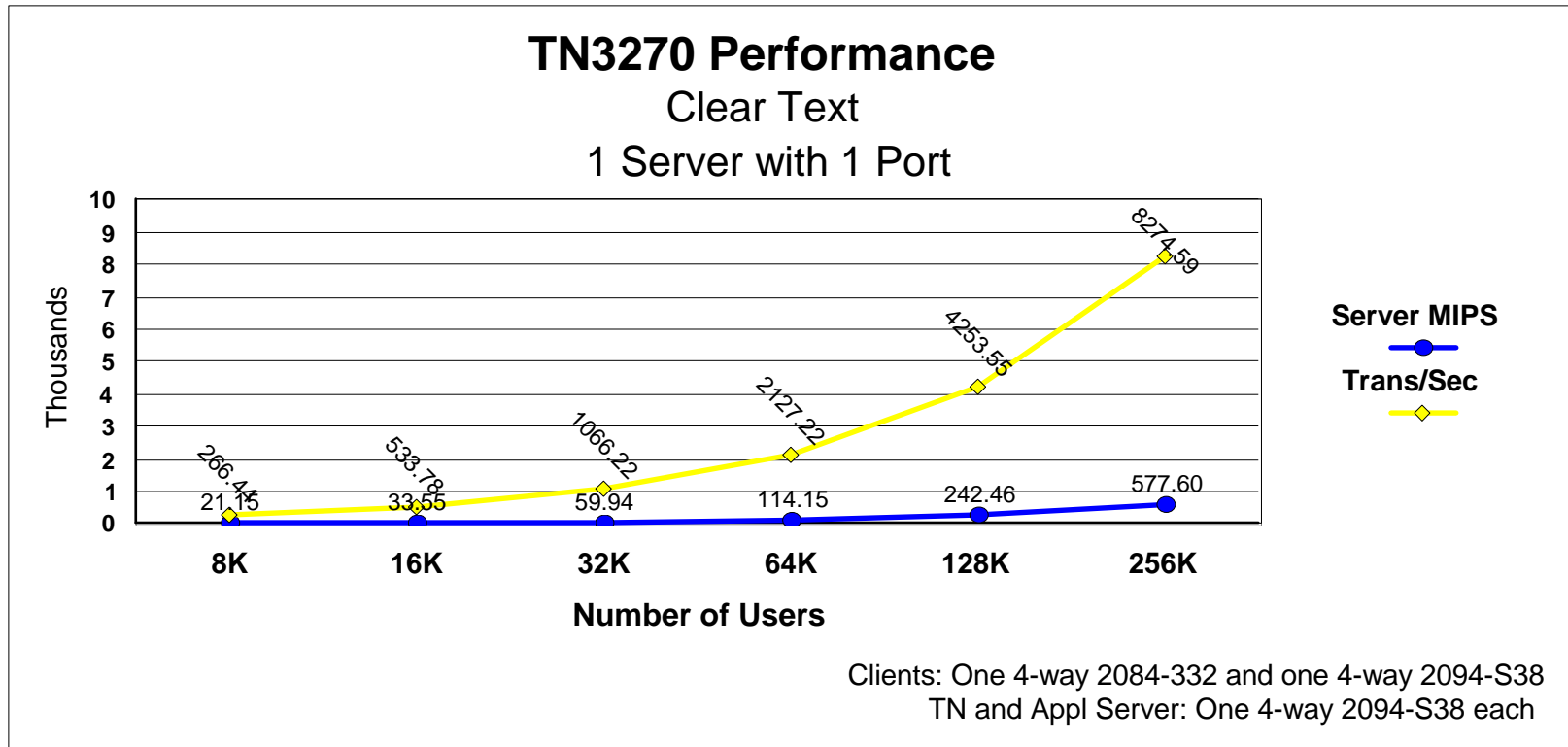
Performance Metrics (clear text)

- Four and eight TN3270 servers
- 256K users

Metric	4 TN3270 server address spaces; one port each		8 TN3270 server address spaces; one port each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	8014 tr/sec	8014 tr/sec	8306 tr/sec	8306 tr/sec
CPU per transaction	.166 ms/tr	.138 ms/tr	.181 ms/tr	.128 ms/tr
LPAR utilization	33.2%	27.6%	37.7%	26.5%
MIPS required	528	439	599	421
OSA GbE utilization for 3270 traffic	5.8%		4.8%	
OSA GbE utilization for EE traffic	15.1%		21.9%	
ECSA storage requirement	490 MB	329 MB	485 MB	330 MB
TN3270 private storage requirement	1.92 GB		3.05 GB	
Total storage requirement	2.93 GB	412 MB	4.06 GB	411 MB

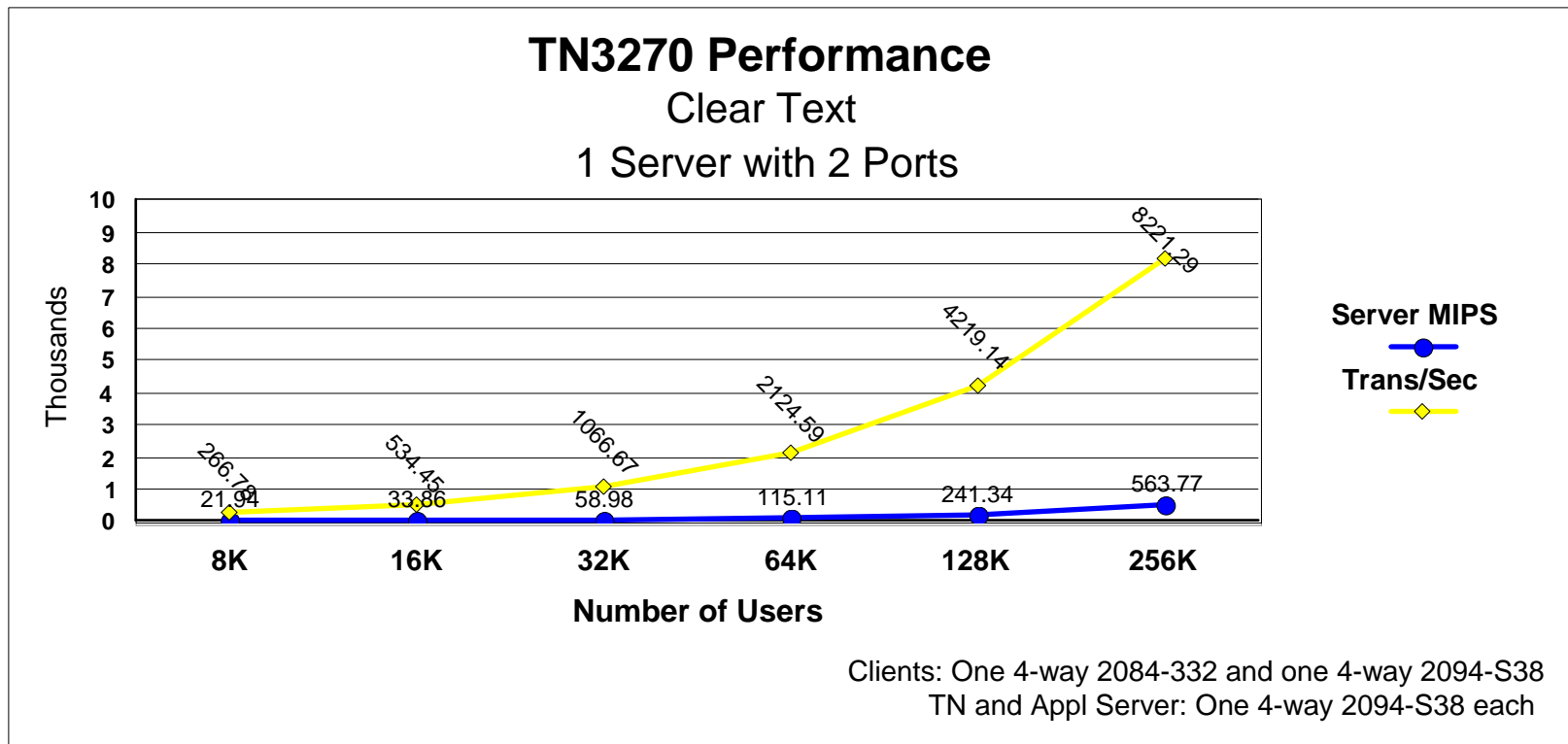
MIPS Requirements (clear text)

- One TN3270 server with one port



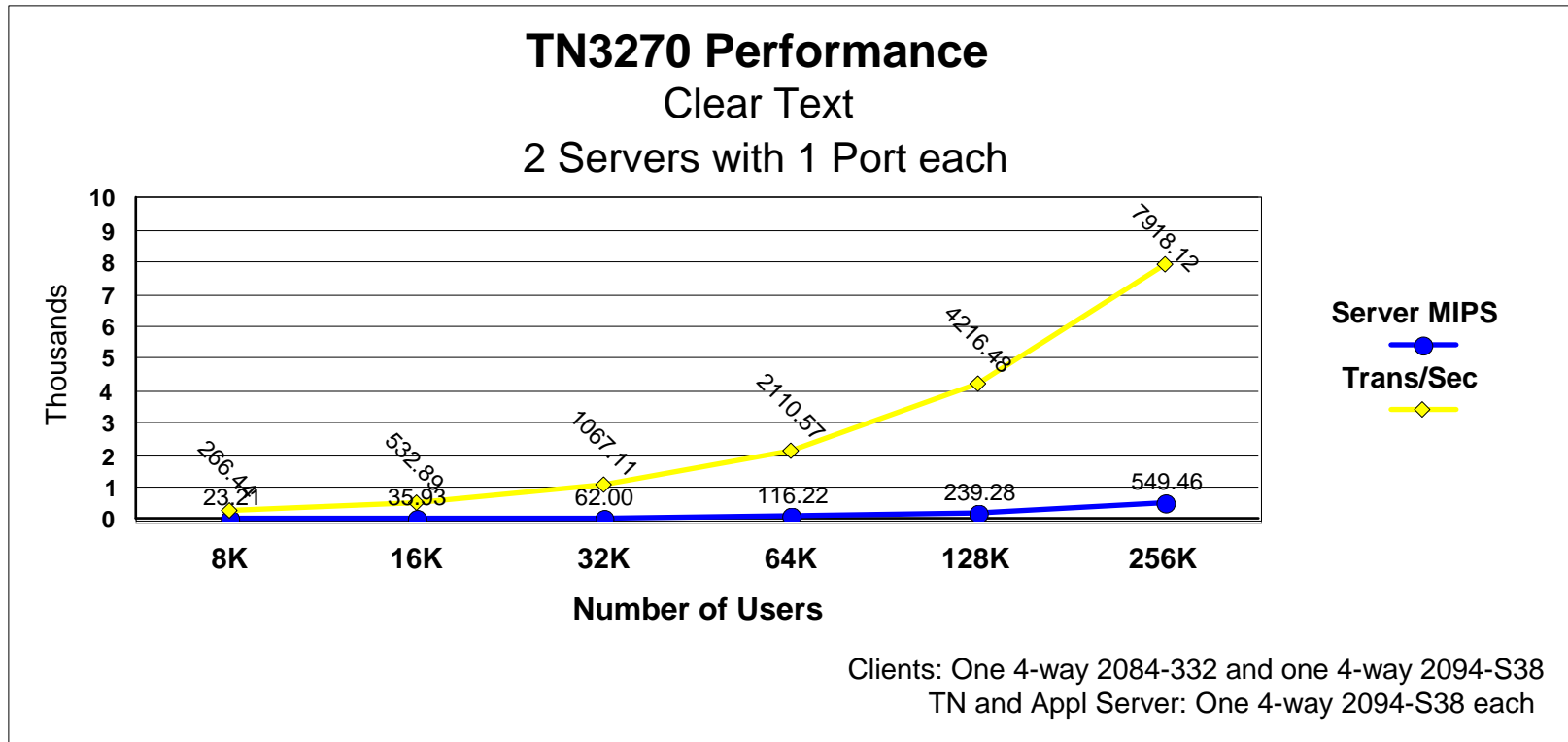
MIPS Requirements (clear text)

- One TN3270 server with two ports



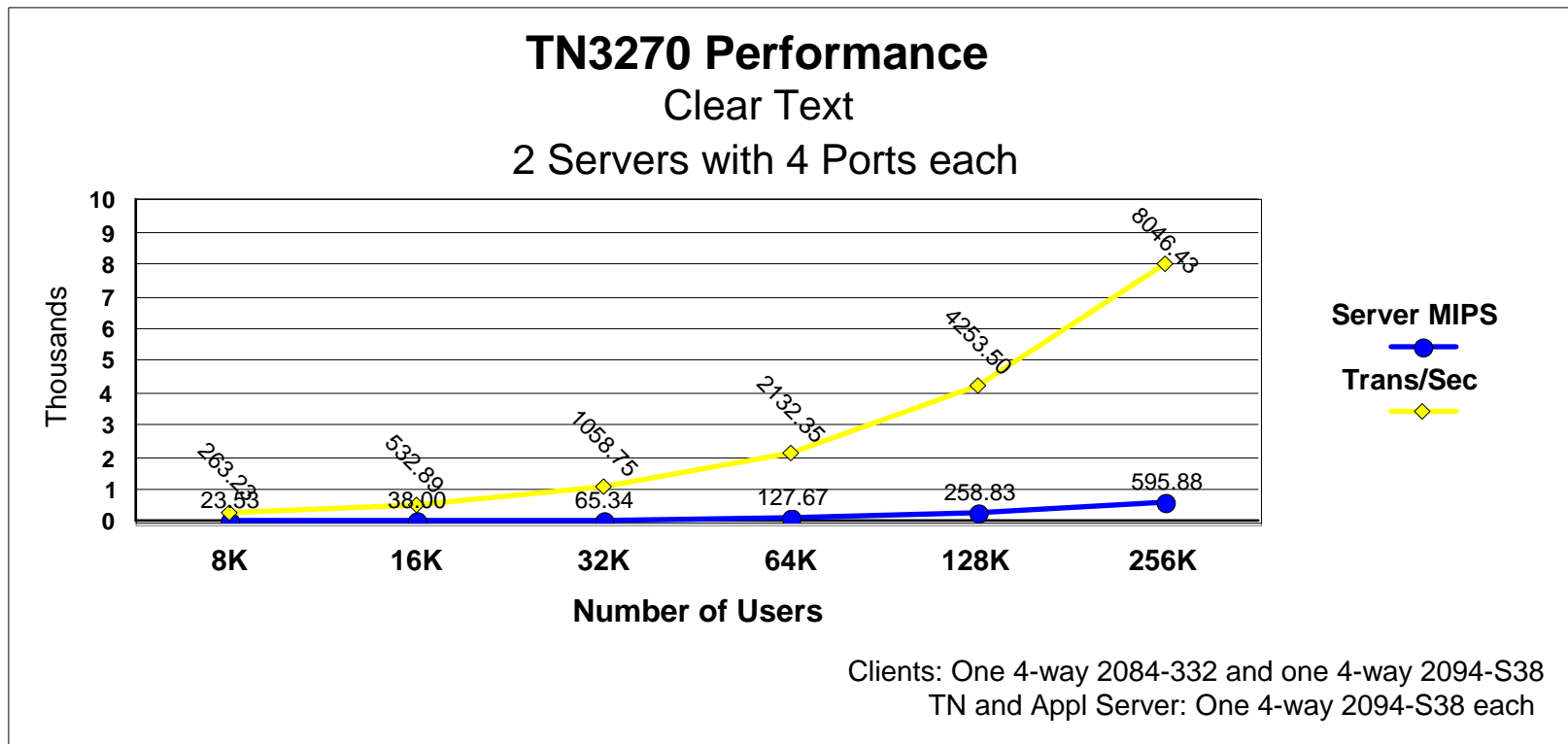
MIPS Requirements (clear text)

- Two TN3270 servers with one port each



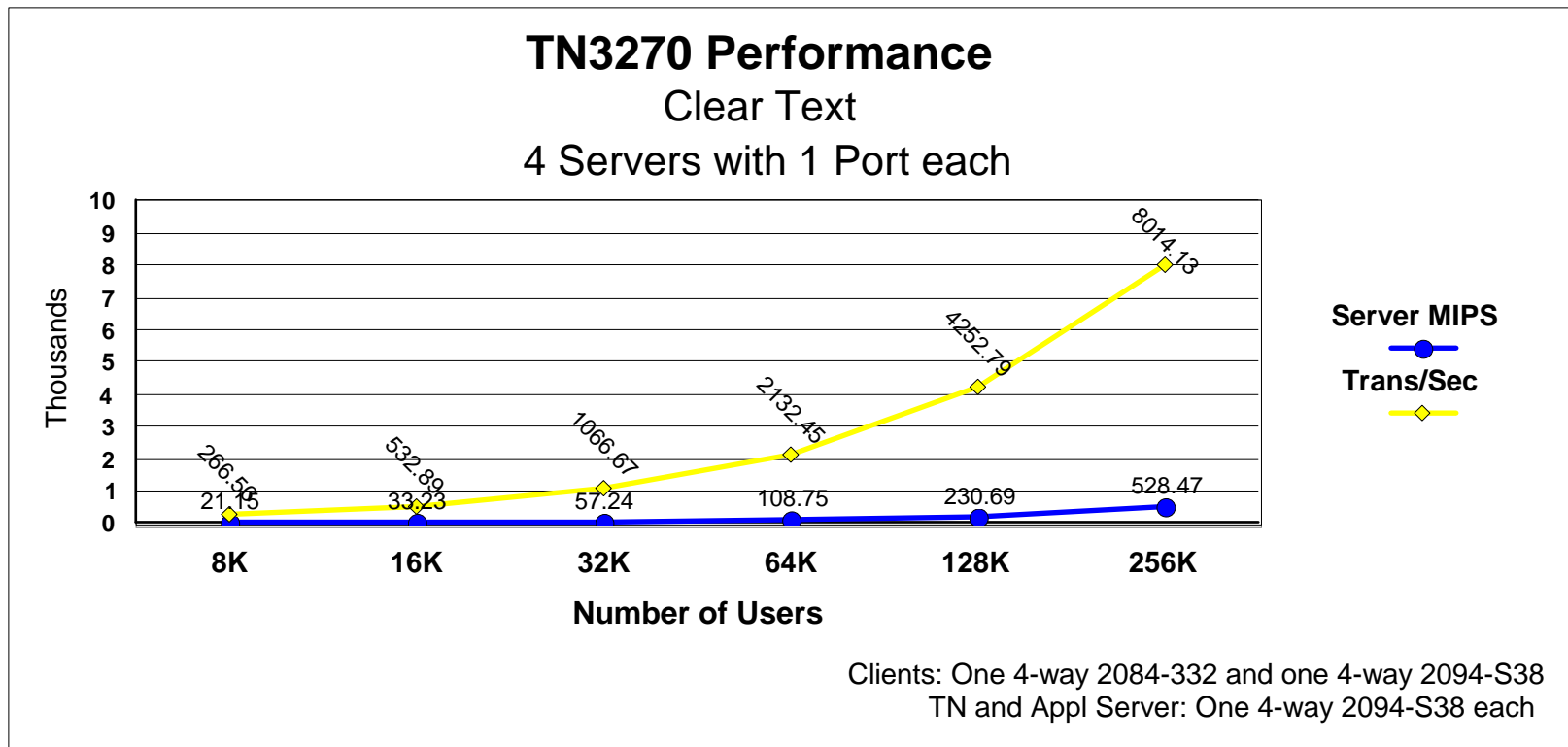
MIPS Requirements (clear text)

- Two TN3270 servers with four ports each



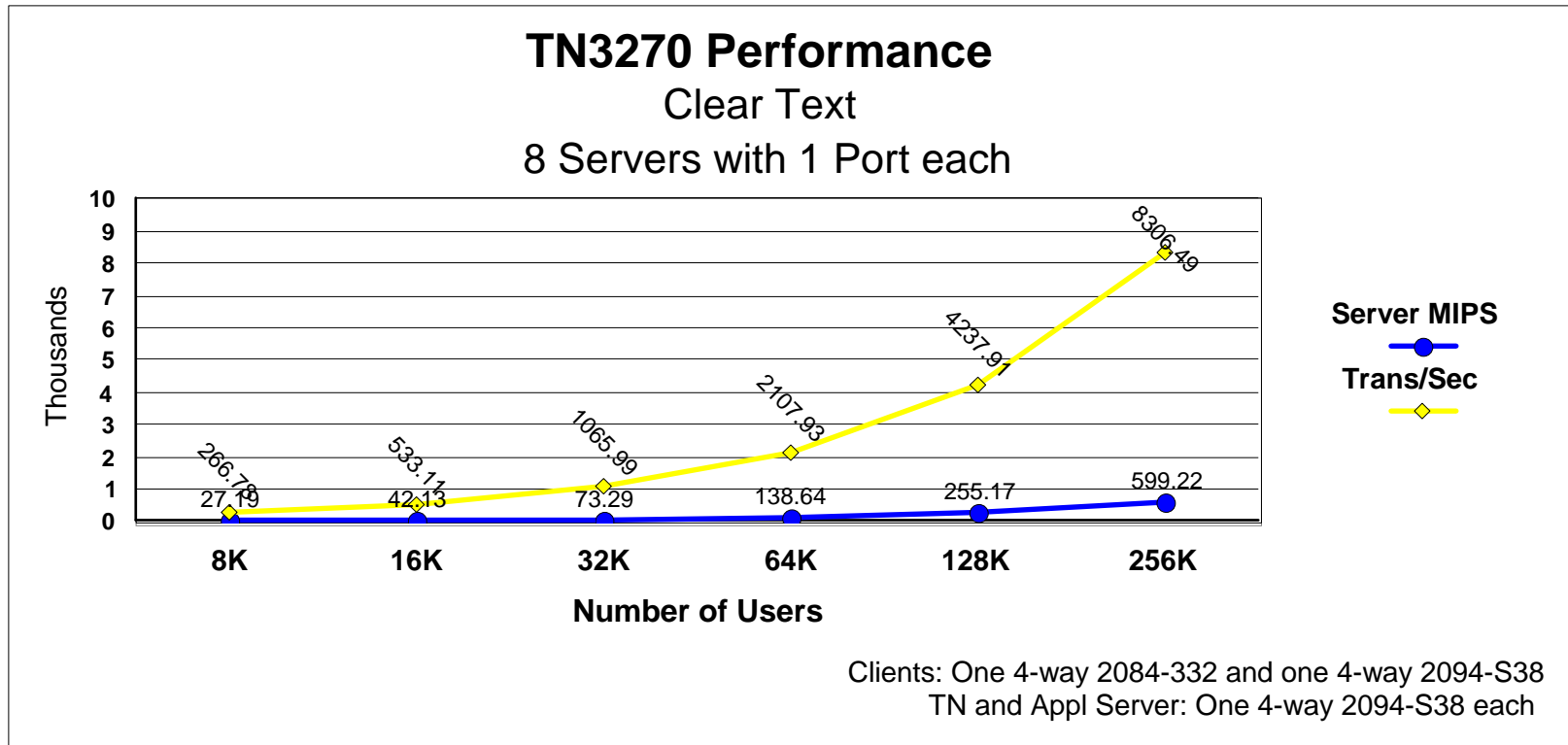
MIPS Requirements (clear text)

- Four TN3270 servers with one port each



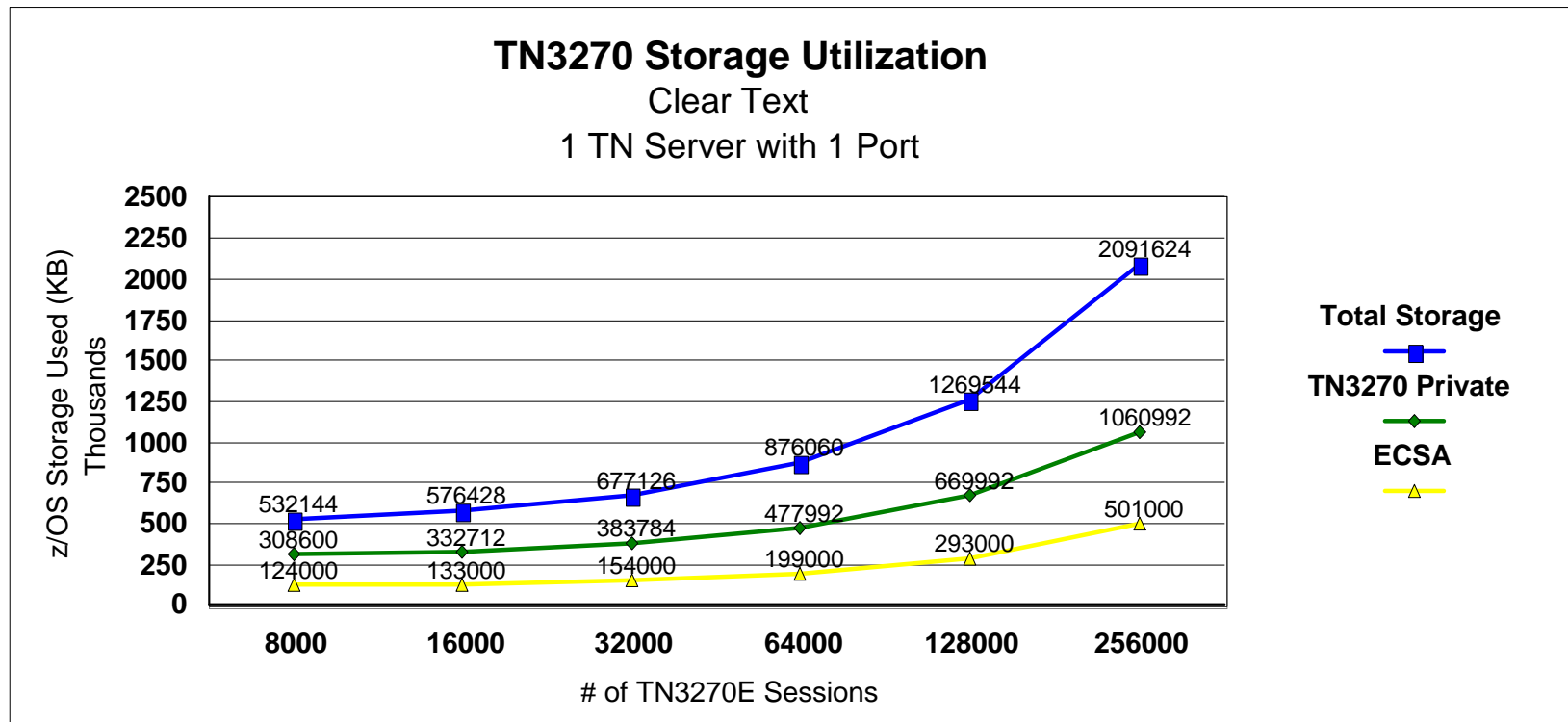
MIPS Requirements (clear text)

- Eight TN3270 servers with one port each



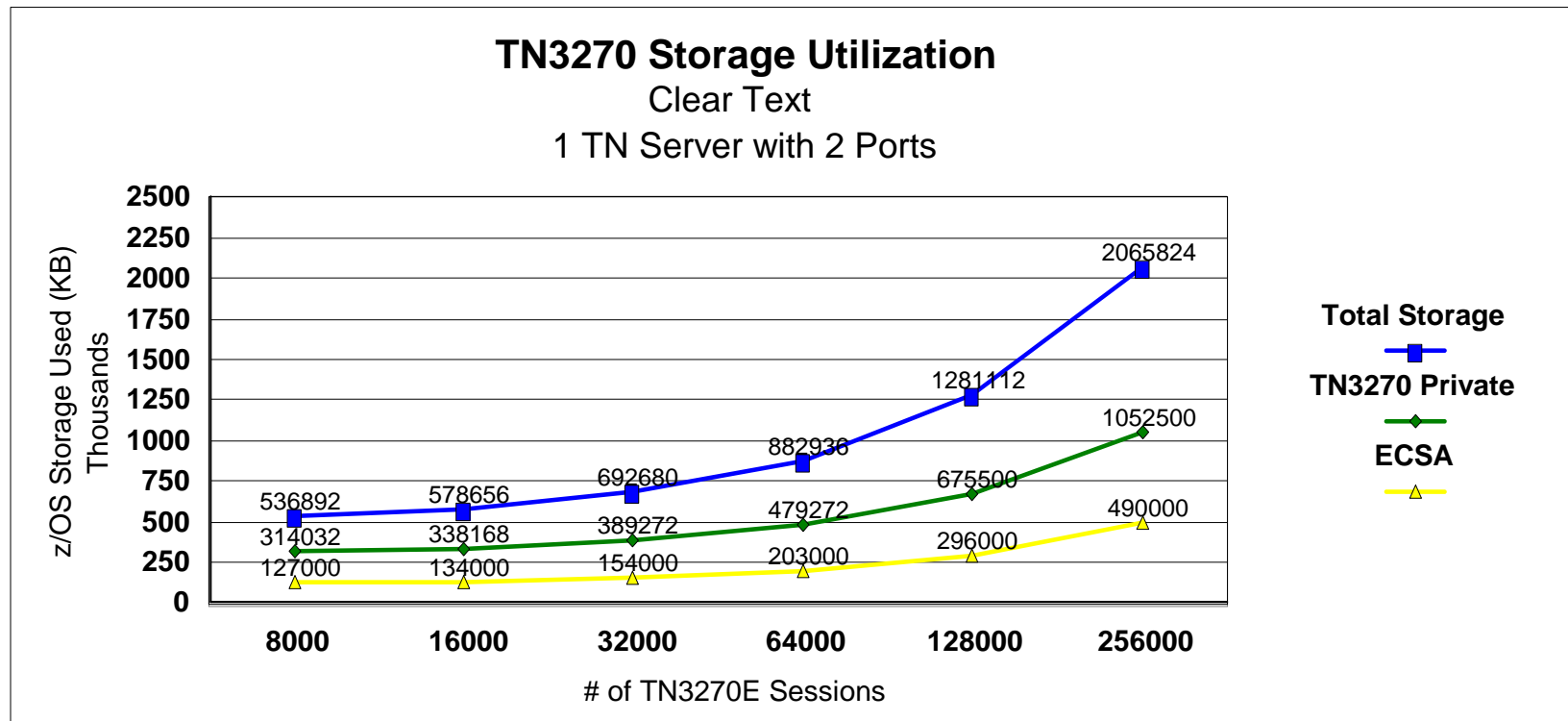
Storage Utilization (clear text)

- One TN3270 server with one port



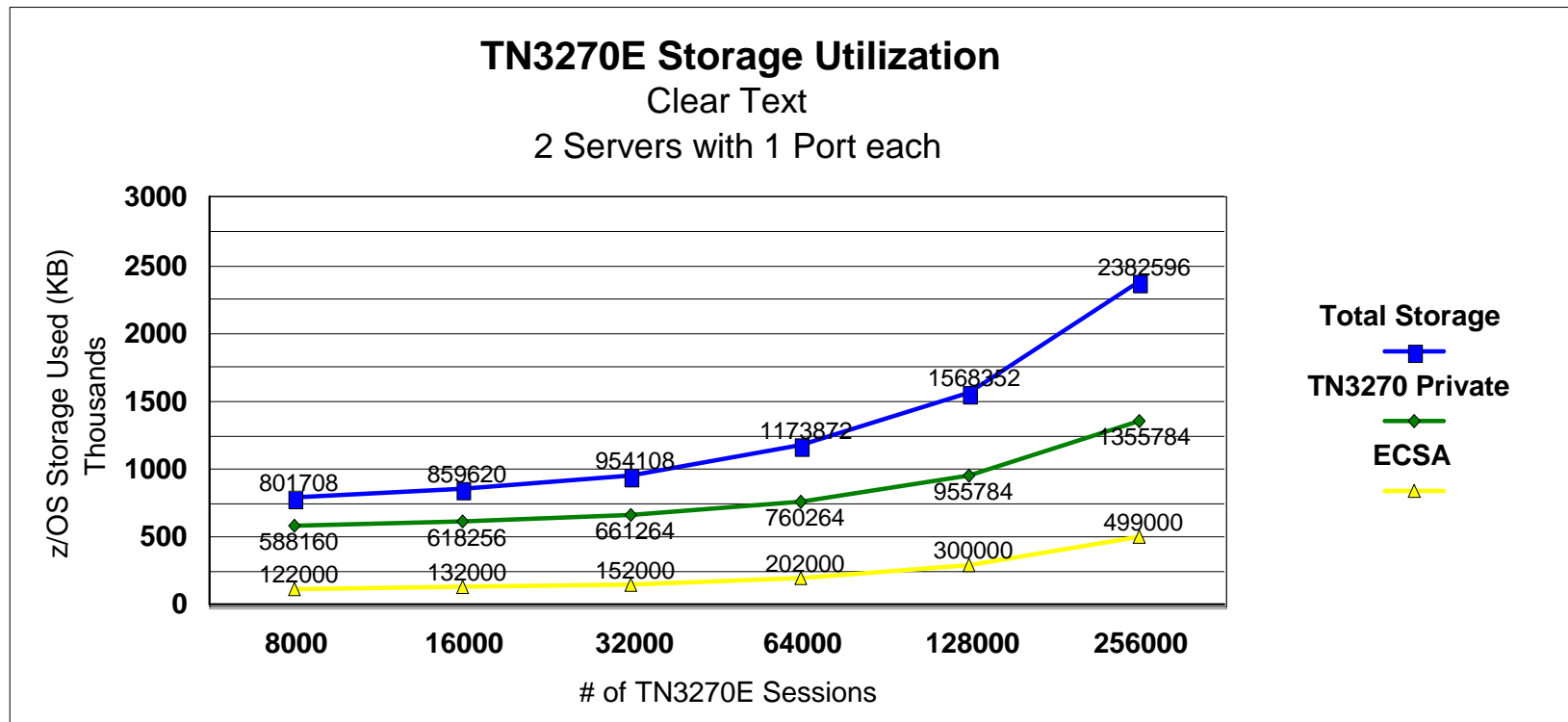
Storage Utilization (clear text)

- One TN3270 server with two ports



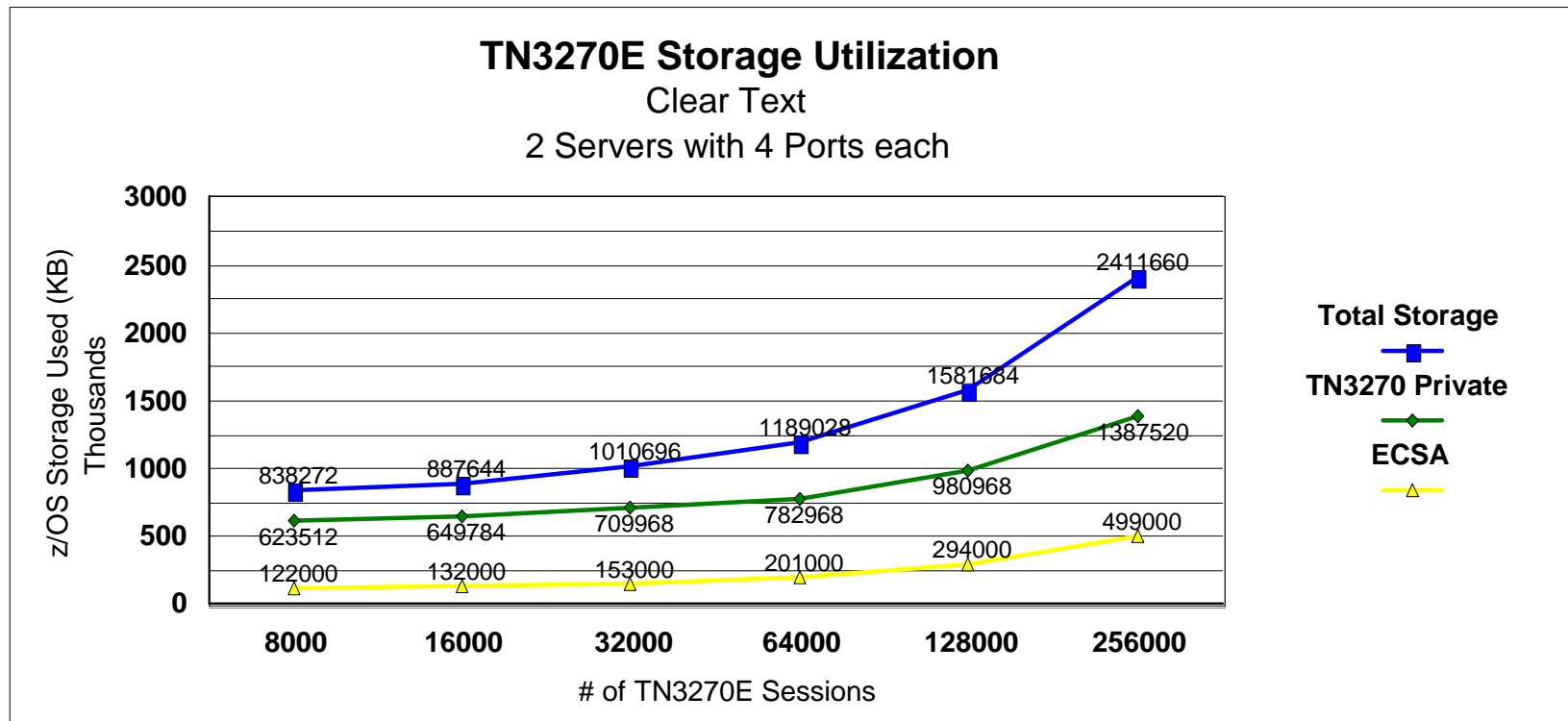
Storage Utilization (clear text)

- Two TN3270 servers with one port each



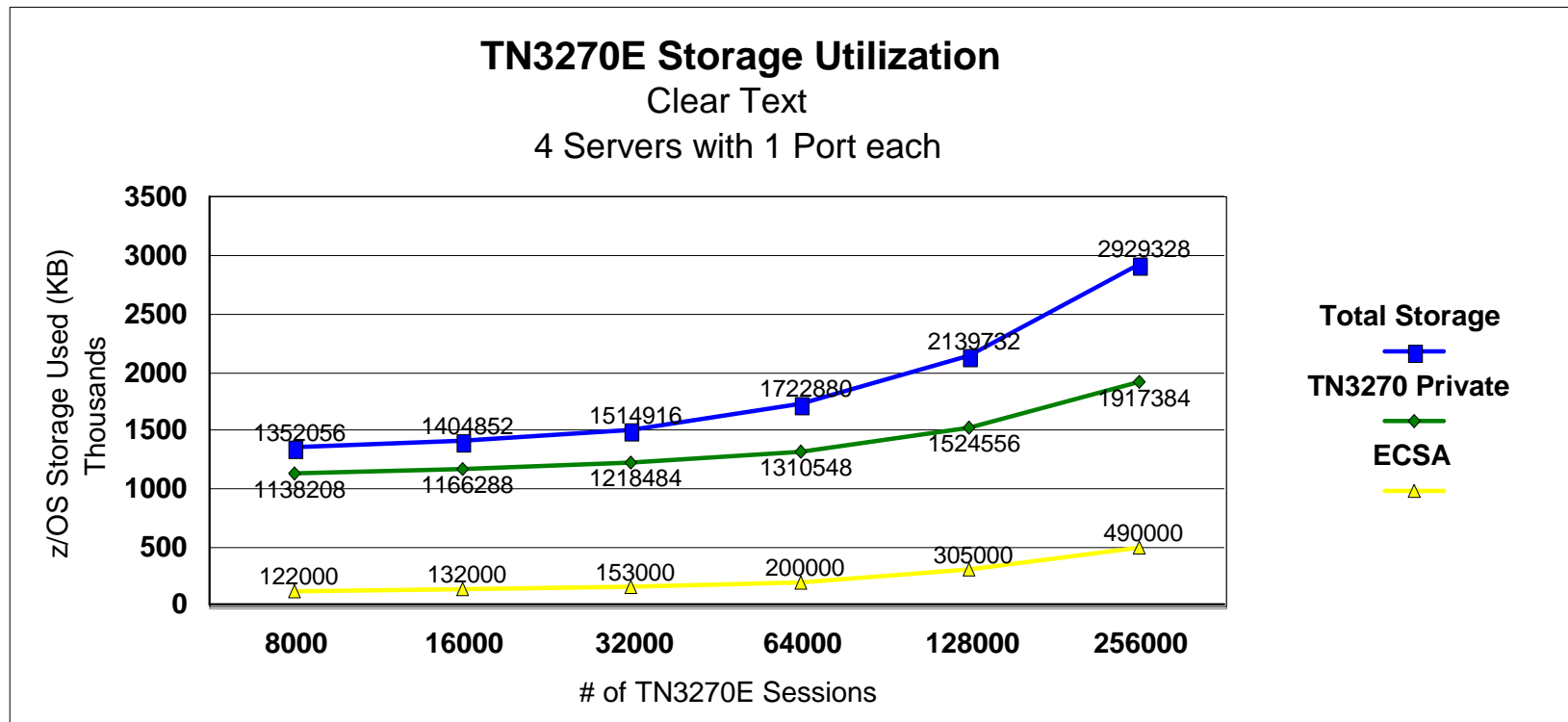
Storage Utilization (clear text)

- Two TN3270 servers with four ports each



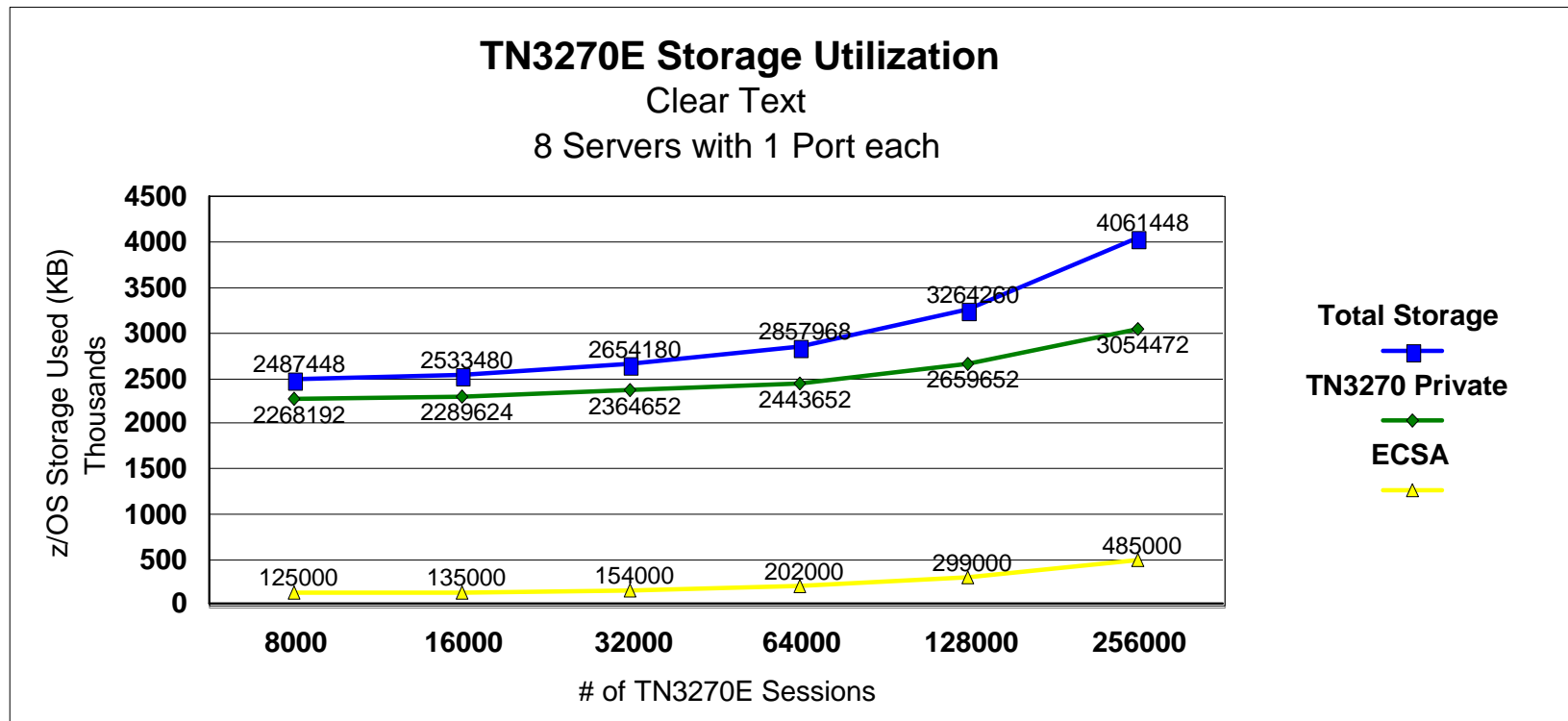
Storage Utilization (clear text)

- Four TN3270 servers with one port each



Storage Utilization (clear text)

- Eight TN3270 servers with one port each



TLS Measurements



Performance Metrics (TLS)

- One TN3270 server
- 128K users

Metric	1 TN3270 server address space; one port		1 TN3270 server address space; two ports	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	4021 tr/sec	4021 tr/sec	3695 tr/sec	3695 tr/sec
CPU per transaction	.195 ms/tr	.131 ms/tr	244 ms/tr	.128 ms/tr
LPAR utilization	19.6%	13.1%	22.5%	11.8%
MIPS required	312	208	358	188
OSA GbE utilization for 3270 traffic	5.3%		6.2%	
OSA GbE utilization for EE traffic	12.8%		8.2%	
ECSA storage requirement	306 MB	207 MB	303 MB	208 MB
TN3270 private storage requirement	1.46 GB		1.26 GB	
Total storage requirement	2.06 GB	287 MB	1.87 GB	283 MB

Performance Metrics (TLS)

- Two TN3270 servers
- 128K users

Metric	2 TN3270 server address spaces; one port each		2 TN3270 server address spaces; four ports each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	3922 tr/sec	3922 tr/sec	3837 tr/sec	3837 tr/sec
CPU per transaction	.191 ms/tr	.109 ms/tr	.204 ms/tr	.141 ms/tr
LPAR utilization	18.8%	10.6%	19.6%	13.4%
MIPS required	298	169	312	213
OSA GbE utilization for 3270 traffic	5.3%		3.4%	
OSA GbE utilization for EE traffic	11.8%		6.2%	
ECSA storage requirement	301 MB	206 MB	306 MB	207 MB
TN3270 private storage requirement	1.55 GB		1.60 GB	
Total storage requirement	2.16 GB	272 MB	2.22 GB	272 MB

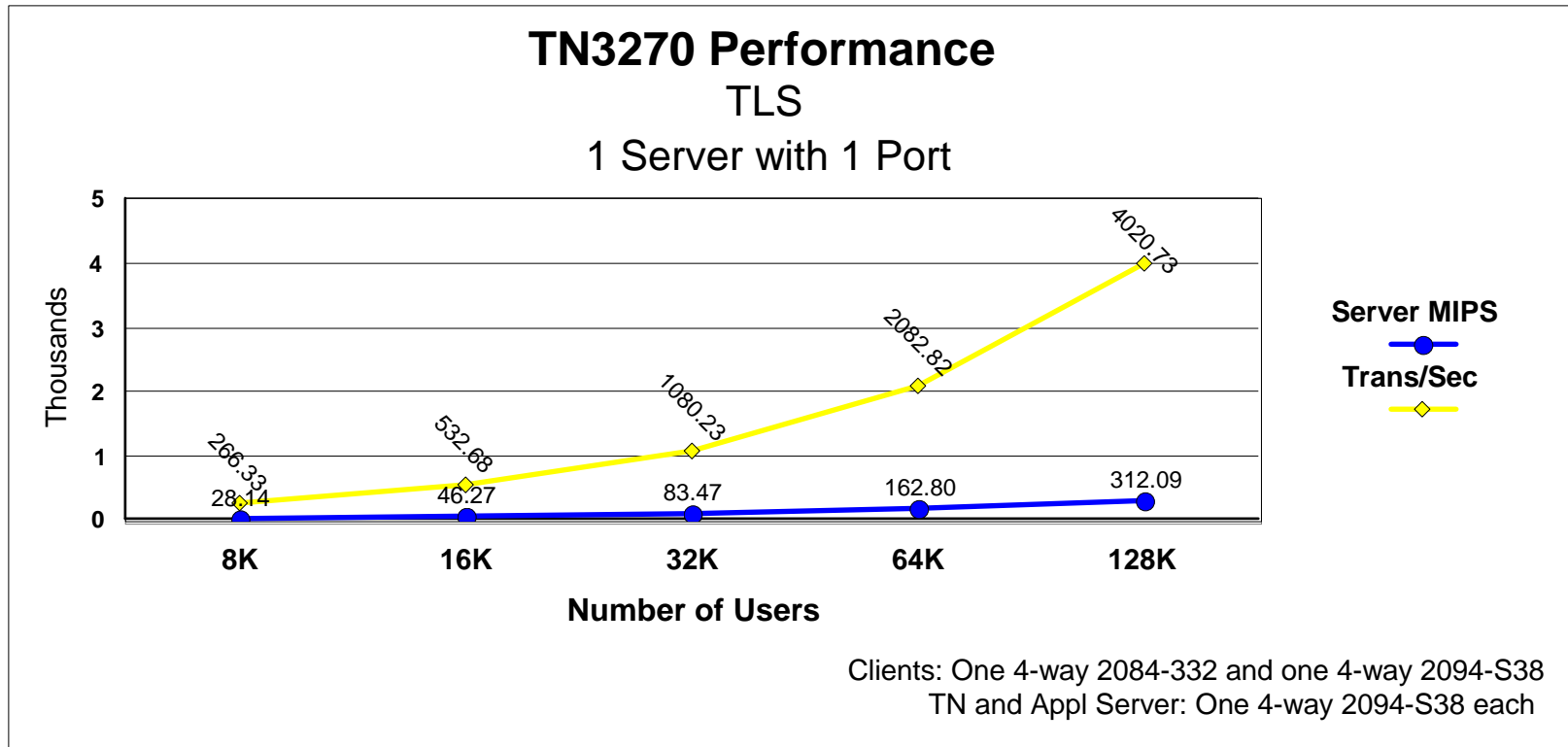
Performance Metrics (TLS)

- Four and eight TN3270 servers
- 128K users

Metric	4 TN3270 server address spaces; one port each		8 TN3270 server address spaces; one port each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	3906 tr/sec	3906 tr/sec	4095 tr/sec	4095 tr/sec
CPU per transaction	.226 ms/tr	.140 ms/tr	.238 ms/tr	.144 ms/tr
LPAR utilization	22.1%	13.7%	24.4%	14.8%
MIPS required	351	218	388	235
OSA GbE utilization for 3270 traffic	4.5%		2.8%	
OSA GbE utilization for EE traffic	13.9%		11.3%	
ECSA storage requirement	307 MB	207 MB	310 MB	208 MB
TN3270 private storage requirement	2.13 GB			
Total storage requirement	2.75 GB	288 MB	3.95 GB	272 MB

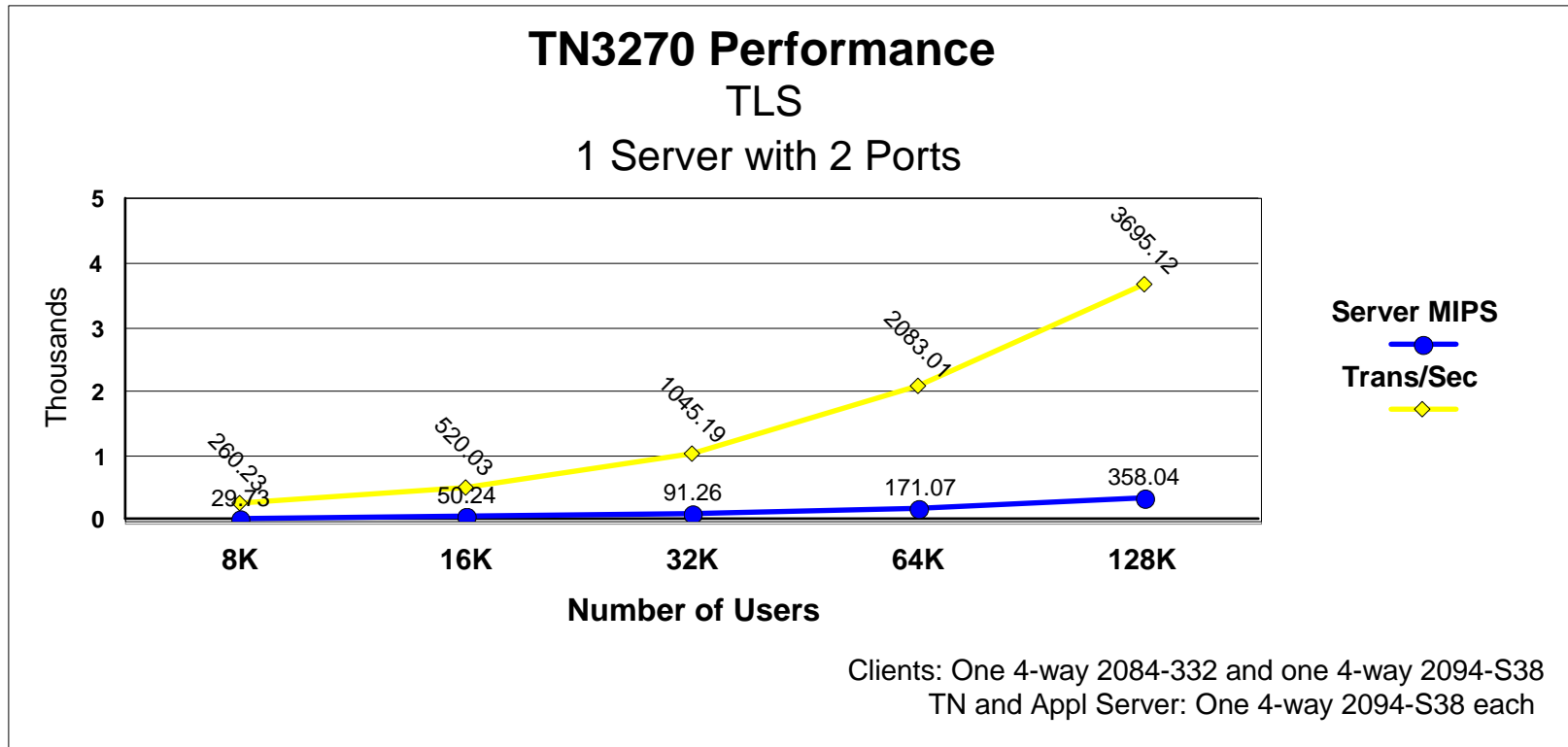
MIPS Requirements (TLS)

- One TN3270 server with one port



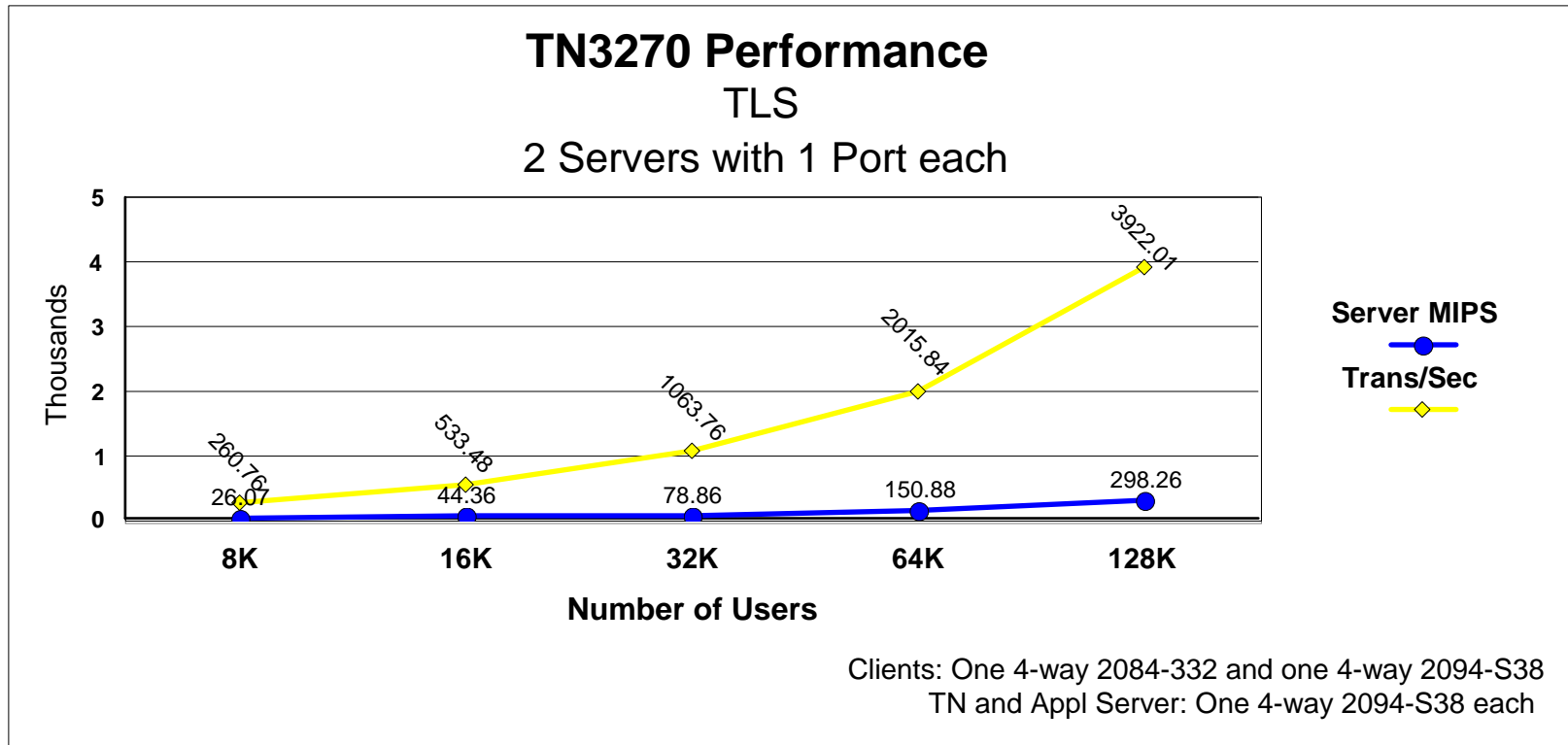
MIPS Requirements (TLS)

- One TN3270 server with two ports



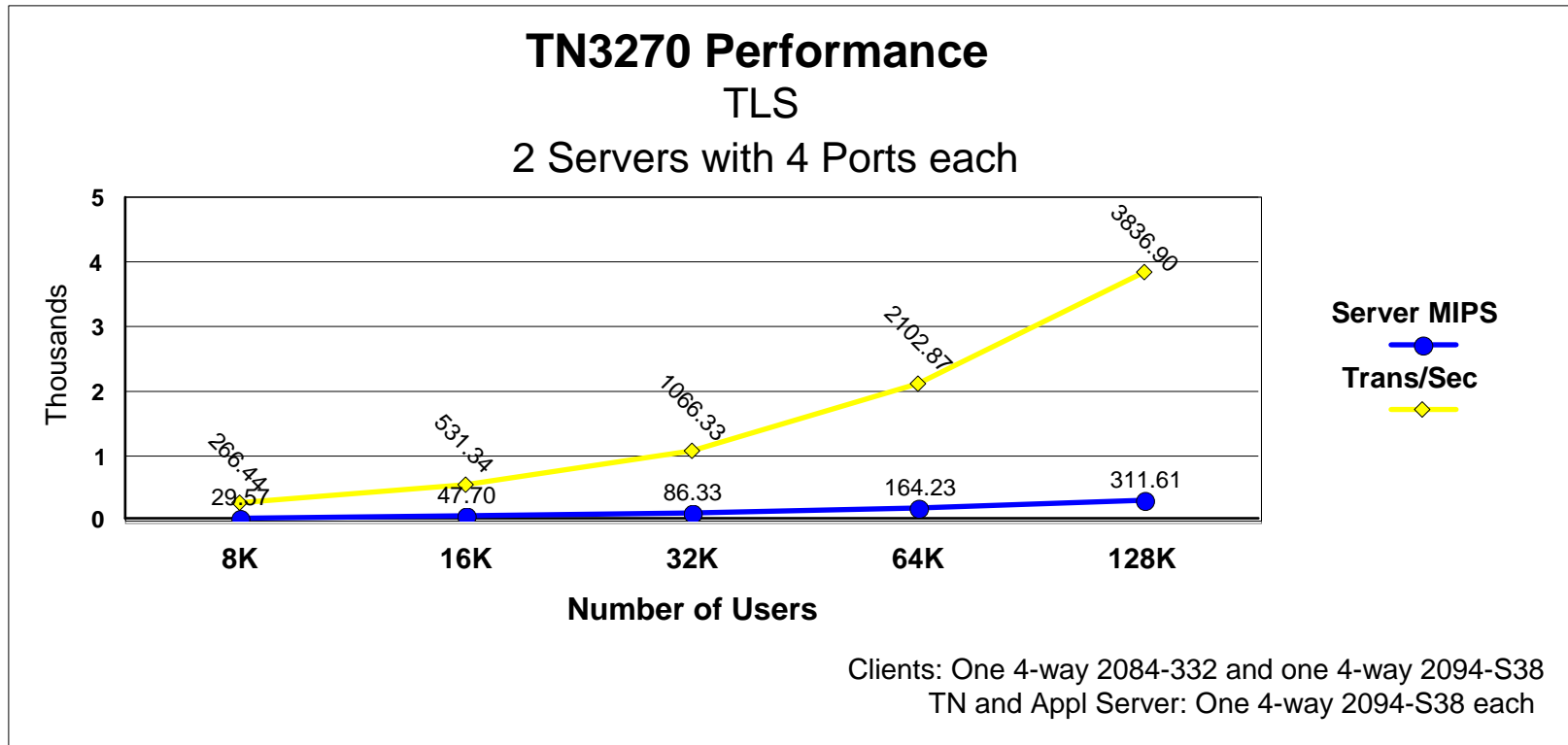
MIPS Requirements (TLS)

- Two TN3270 servers with one port each



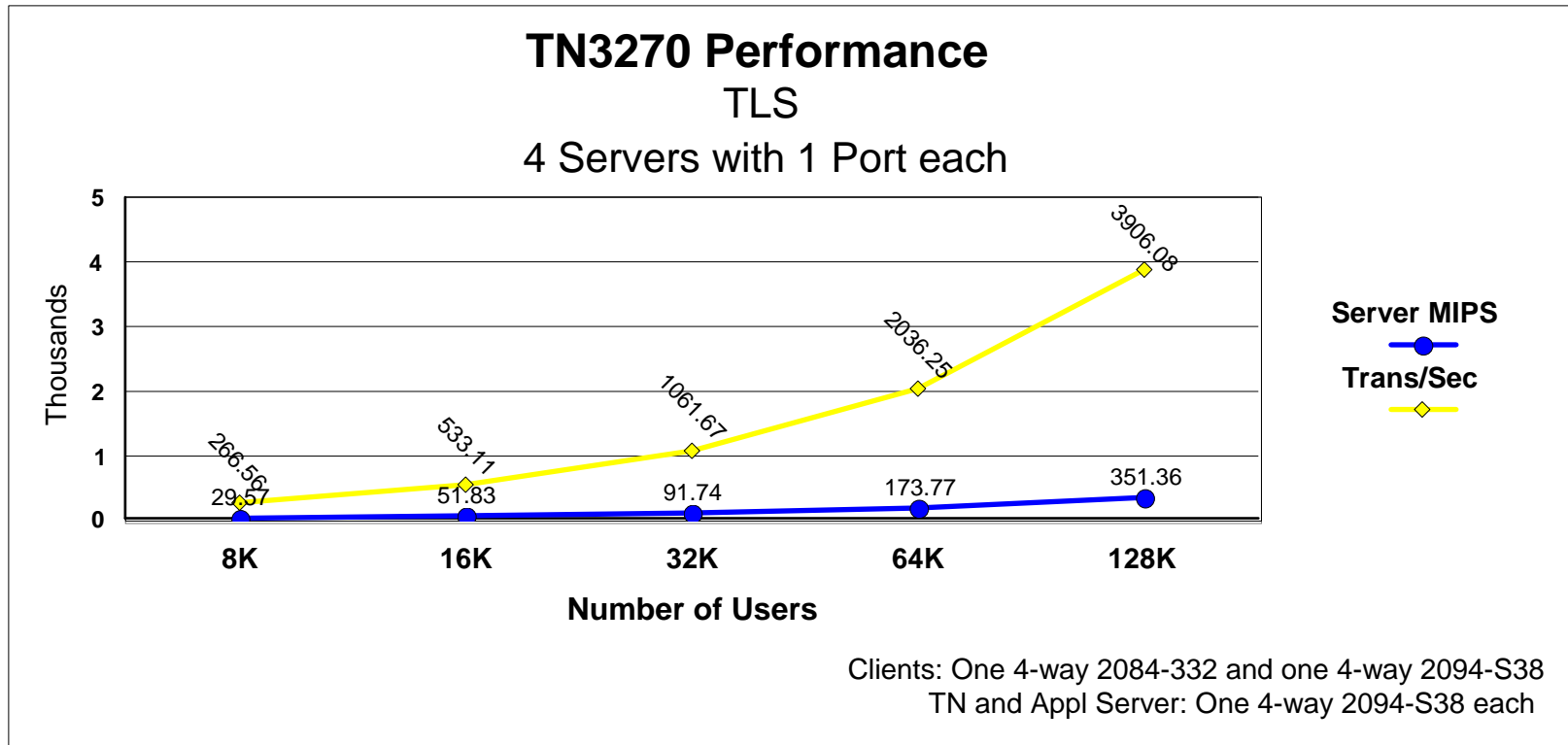
MIPS Requirements (TLS)

- Two TN3270 servers with four ports each



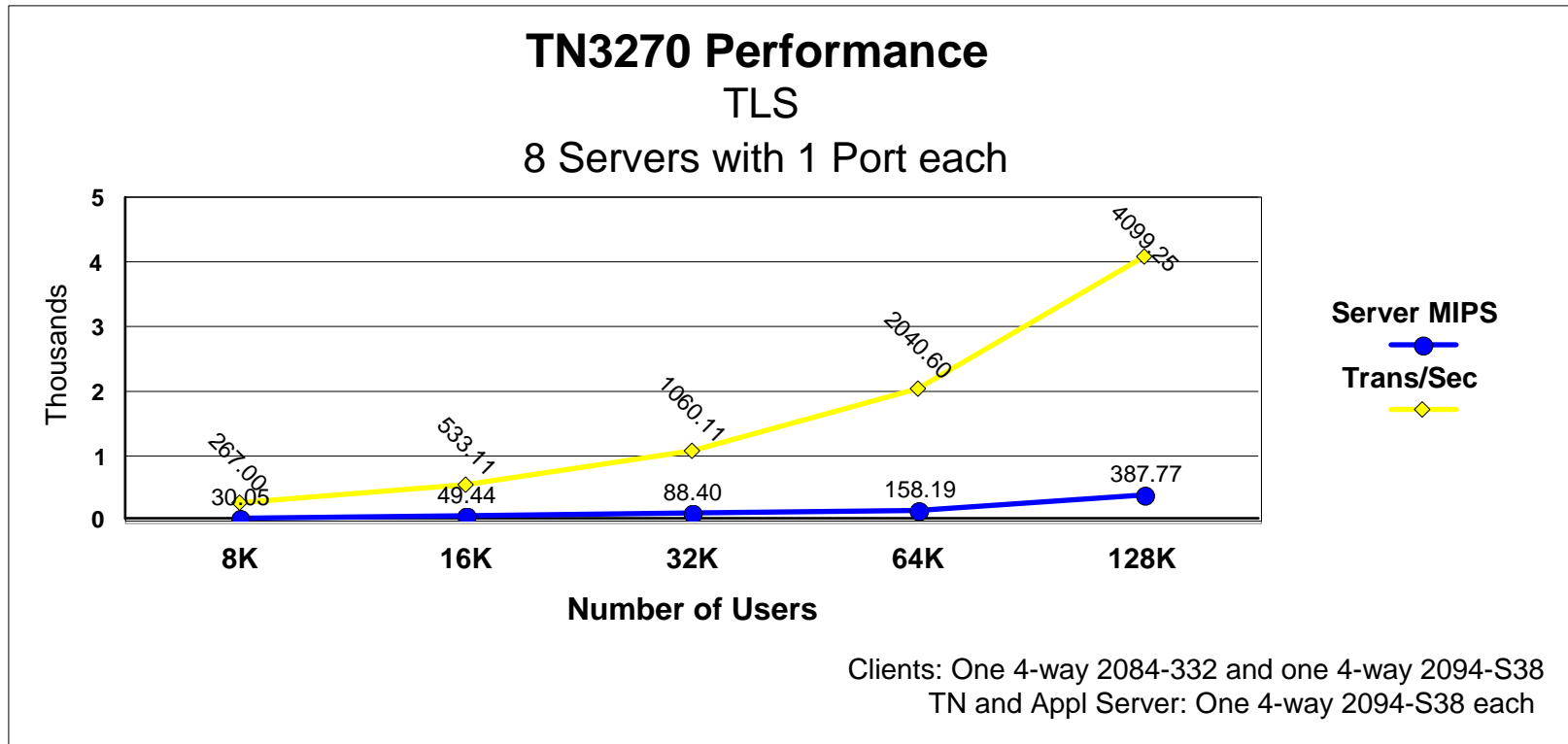
MIPS Requirements (TLS)

- Four TN3270 servers with one port each



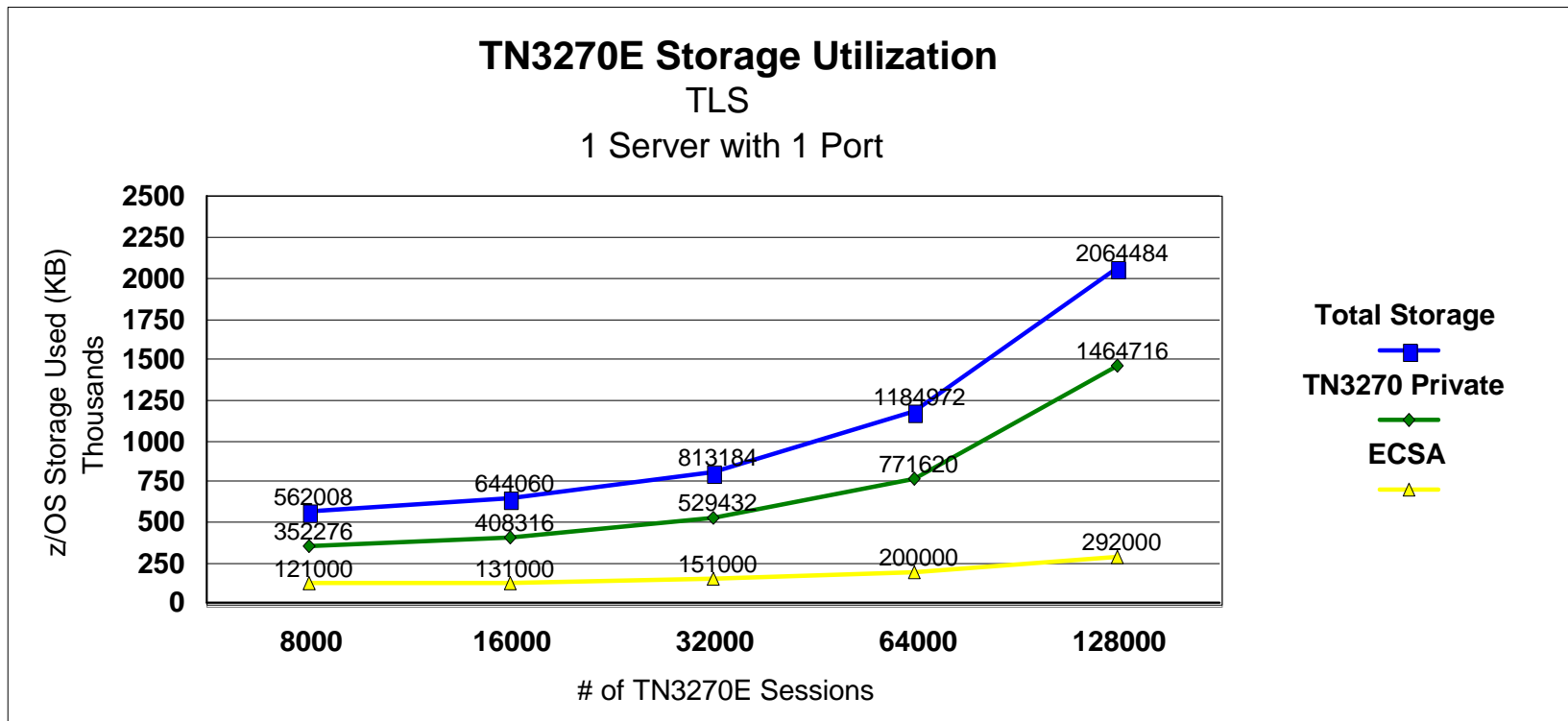
MIPS Requirements (TLS)

- Eight TN3270 servers with one port each



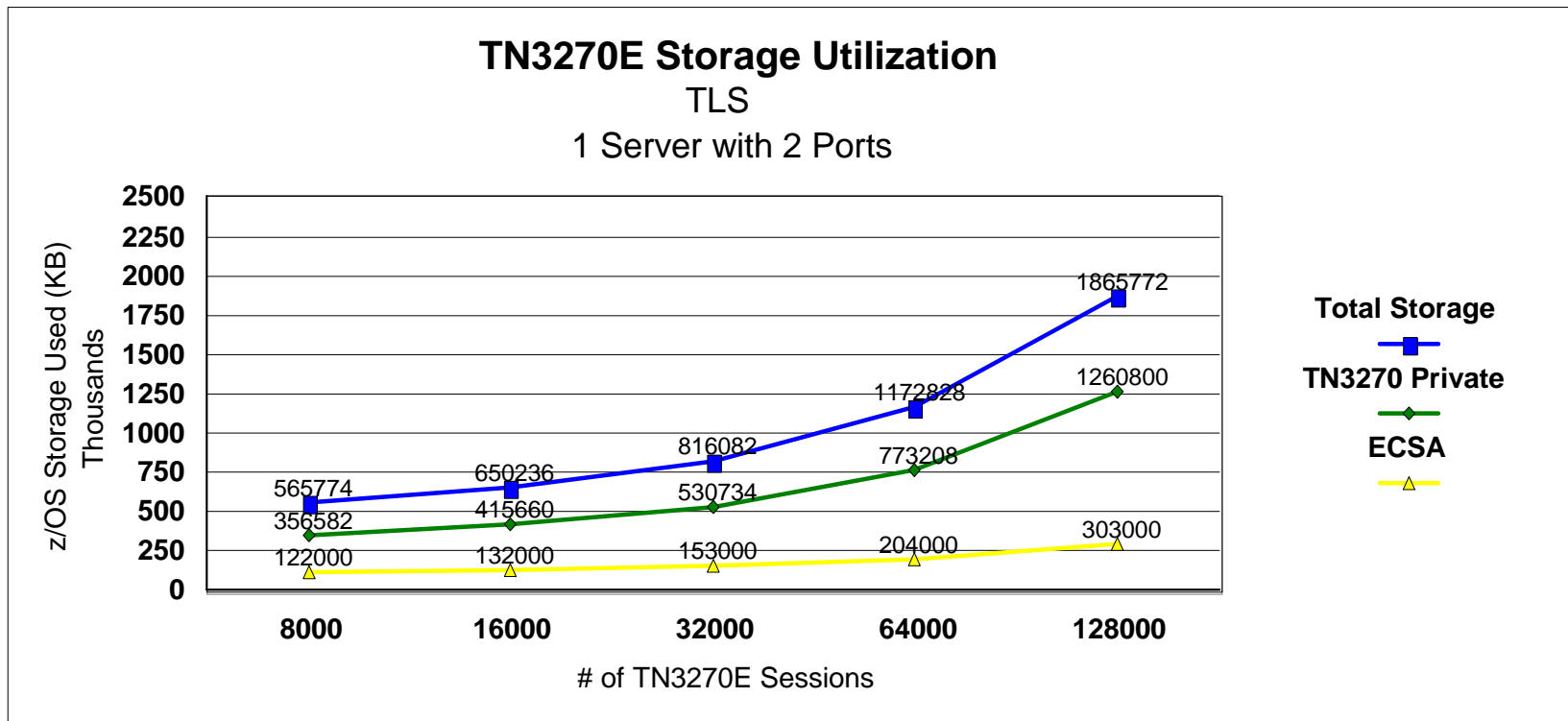
Storage Utilization (TLS)

- One TN3270 server with one port



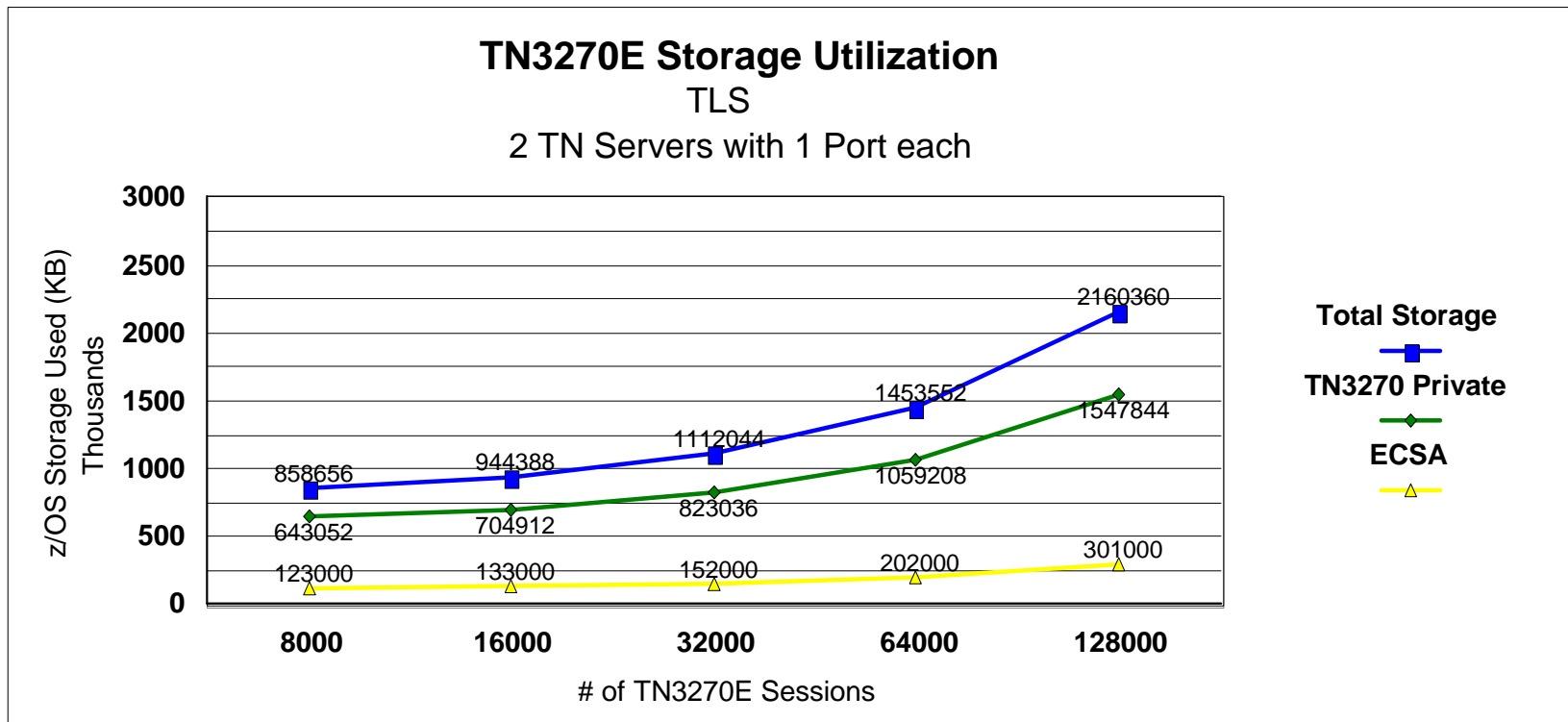
Storage Utilization (TLS)

- One TN3270 server with two ports



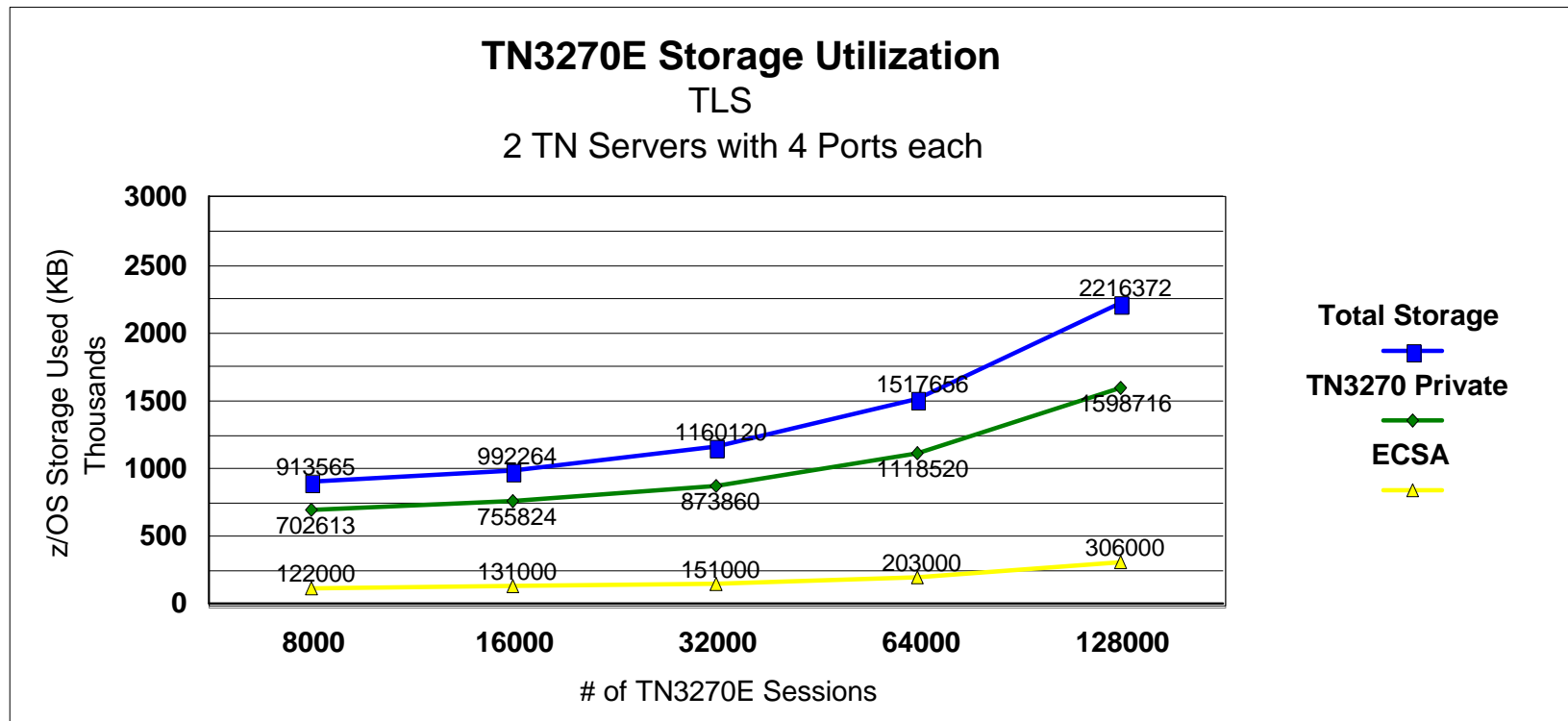
Storage Utilization (TLS)

- Two TN3270 servers with one port each



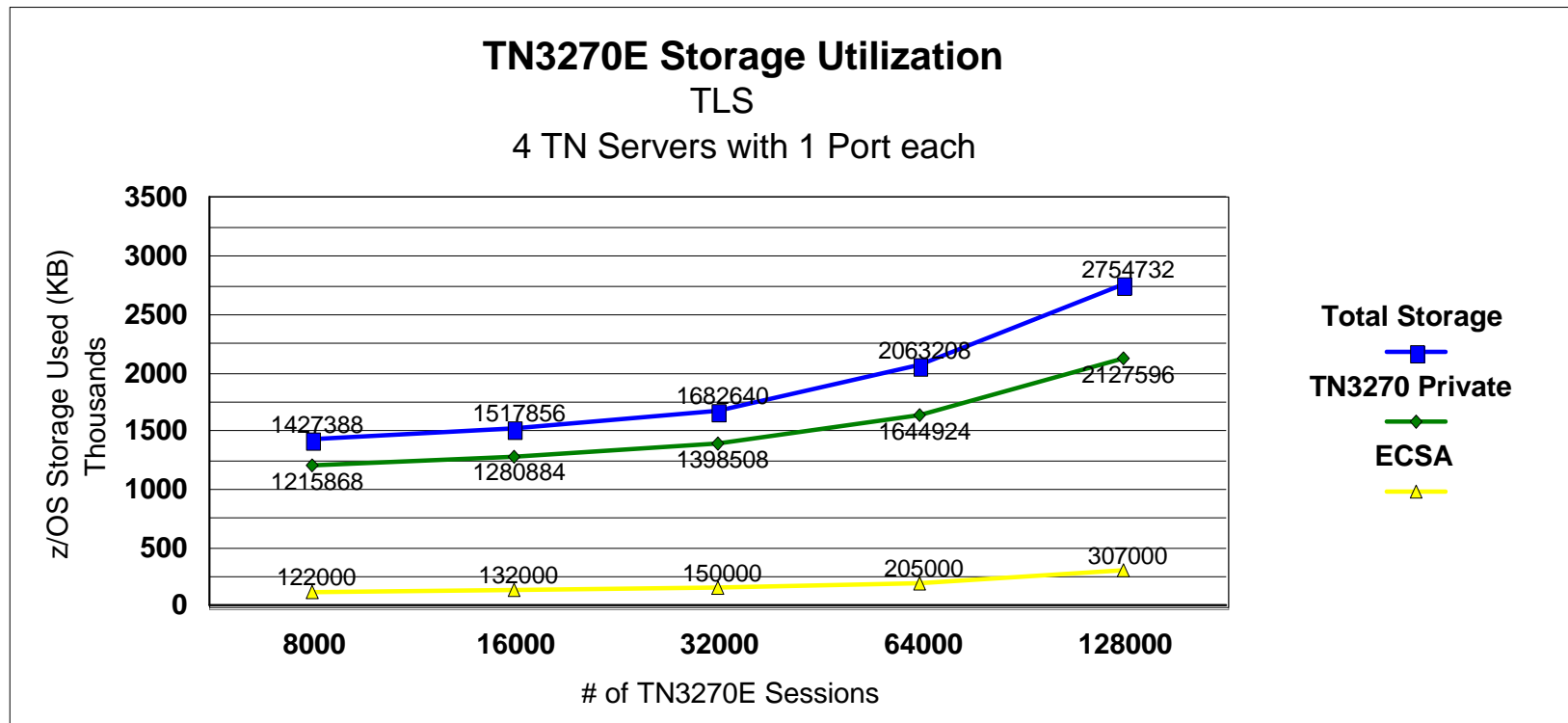
Storage Utilization (TLS)

- Two TN3270 servers with four ports each



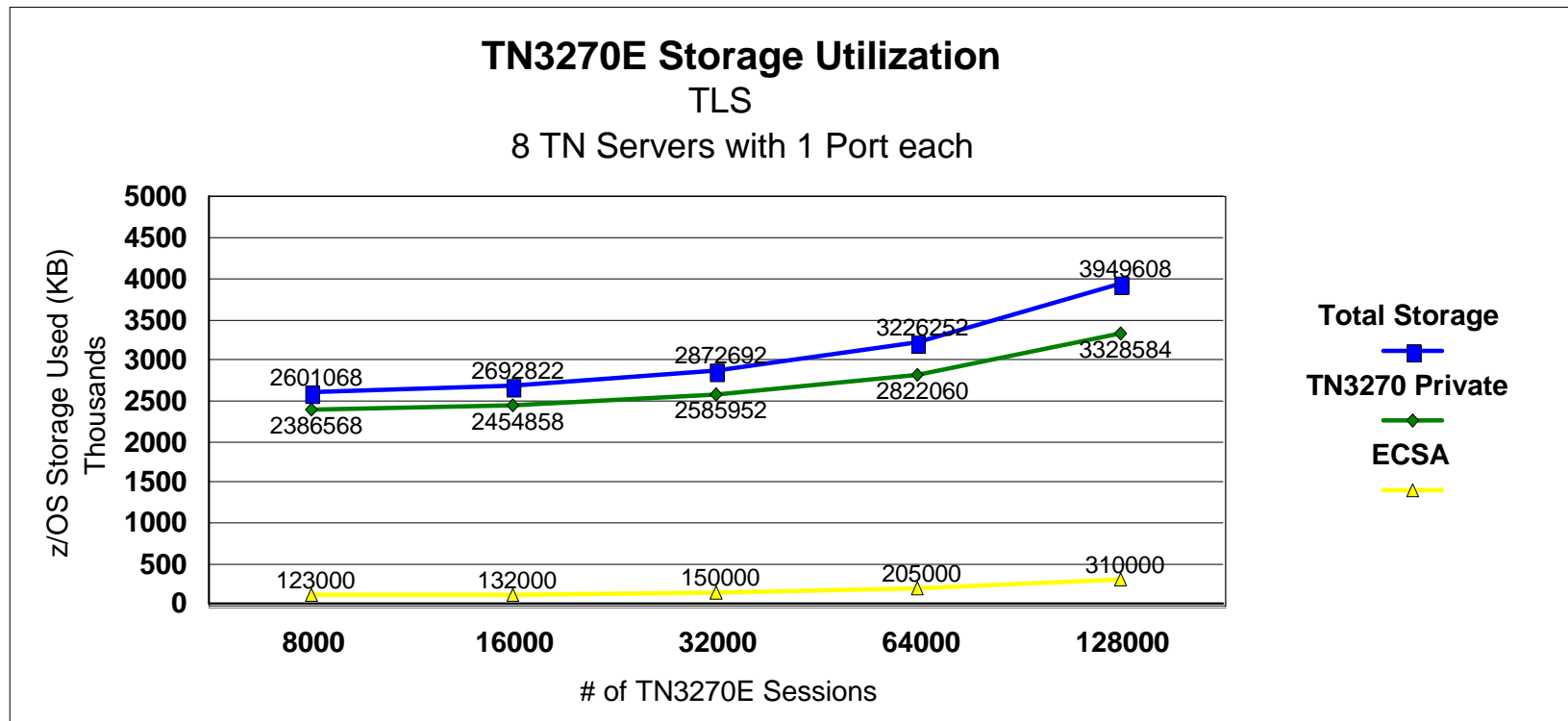
Storage Utilization (TLS)

- Four TN3270 servers with one port each



Storage Utilization (TLS)

- Eight TN3270 servers with one port each



AT-TLS Measurements



Performance Metrics (AT-TLS)

- One TN3270 server
- 128K users

Metric	1 TN3270 server address space; one port		1 TN3270 server address space; two ports	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	4019 tr/sec	4019 tr/sec	4215 tr/sec	4215 tr/sec
CPU per transaction	.193 ms/tr	.134 ms/tr	.189 ms/tr	.110 ms/tr
LPAR utilization	19.4%	13.5%	19.9%	11.6%
MIPS required	309	215	317	184
OSA GbE utilization for 3270 traffic	5.3%		7.2%	
OSA GbE utilization for EE traffic	9.4%		9.3%	
ECSA storage requirement	301 MB	209 MB	295 MB	207 MB
TN3270 private storage requirement	669 MB		673 MB	
Total storage requirement	2.06 GB	273 MB	2.05 GB	283 MB

Performance Metrics (AT-TLS)

- Two TN3270 servers
- 128K users

Metric	2 TN3270 server address spaces; one port each		2 TN3270 server address spaces; four ports each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	4070 tr/sec	4070 tr/sec	4008 tr/sec	4008 tr/sec
CPU per transaction	.184 ms/tr	.111 ms/tr	.189 ms/tr	.125 ms/tr
LPAR utilization	18.8%	11.2%	18.9%	12.6%
MIPS required	298	178	301	200
OSA GbE utilization for 3270 traffic	4.3%		4.4%	
OSA GbE utilization for EE traffic	10.0%		13.8%	
ECSA storage requirement	297 MB	208 MB	298 MB	206 MB
TN3270 private storage requirement	956 MB		996 MB	
Total storage requirement	2.33 GB	272 MB	2.38 GB	272 MB

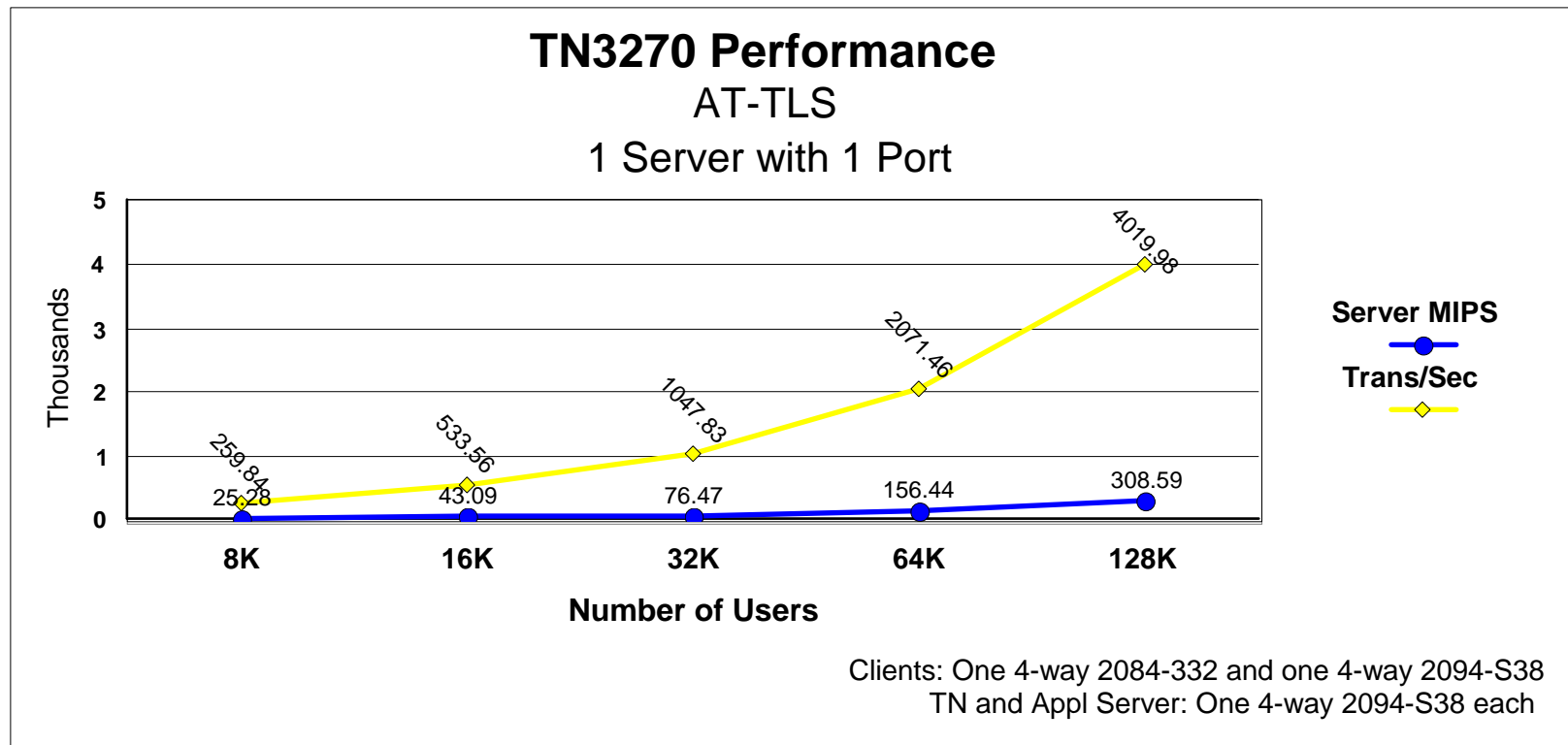
Performance Metrics (AT-TLS)

- Four and eight TN3270 servers
- 128K users

Metric	4 TN3270 server address spaces; one port each		8 TN3270 server address spaces; one port each	
	TN3270 server LPAR	Application host LPAR	TN3270 server LPAR	Application host LPAR
Transaction rate	3866 tr/sec	3866 tr/sec	4020 tr/sec	4020 tr/sec
CPU per transaction	.216 ms/tr	.112 ms/tr	.192 ms/tr	.109 ms/tr
LPAR utilization	20.9%	10.8%	19.3%	11.0%
MIPS required	332	172	306	175
OSA GbE utilization for 3270 traffic	5.1%		6.1%	
OSA GbE utilization for EE traffic	13.7%		10.9%	
ECSA storage requirement	301 MB	207 MB	299 MB	208 MB
TN3270 private storage requirement	1.52 GB		2.63 GB	
Total storage requirement	2.93 GB	272 MB	4.01 GB	272 MB

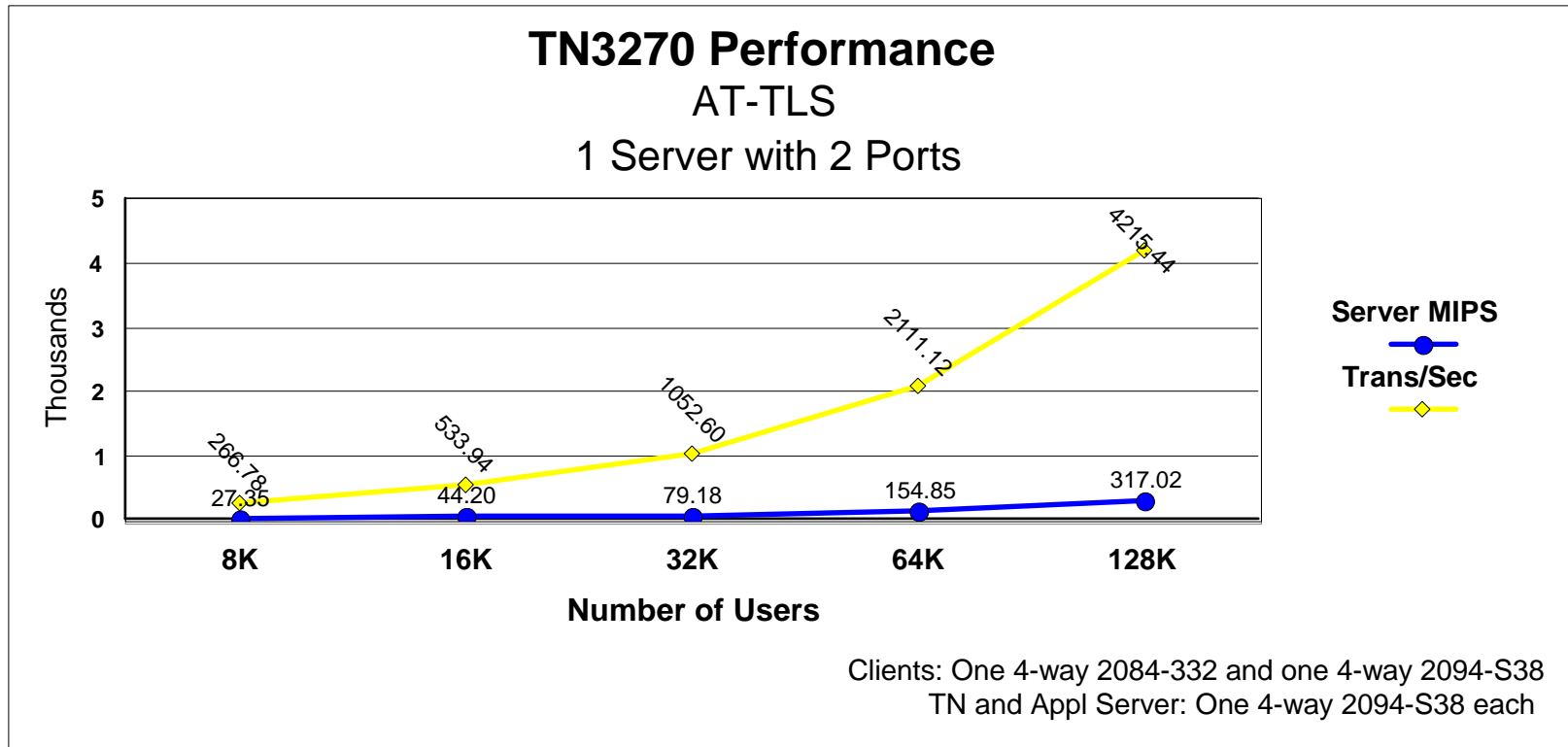
MIPS Requirements (AT-TLS)

- One TN3270 server with one port



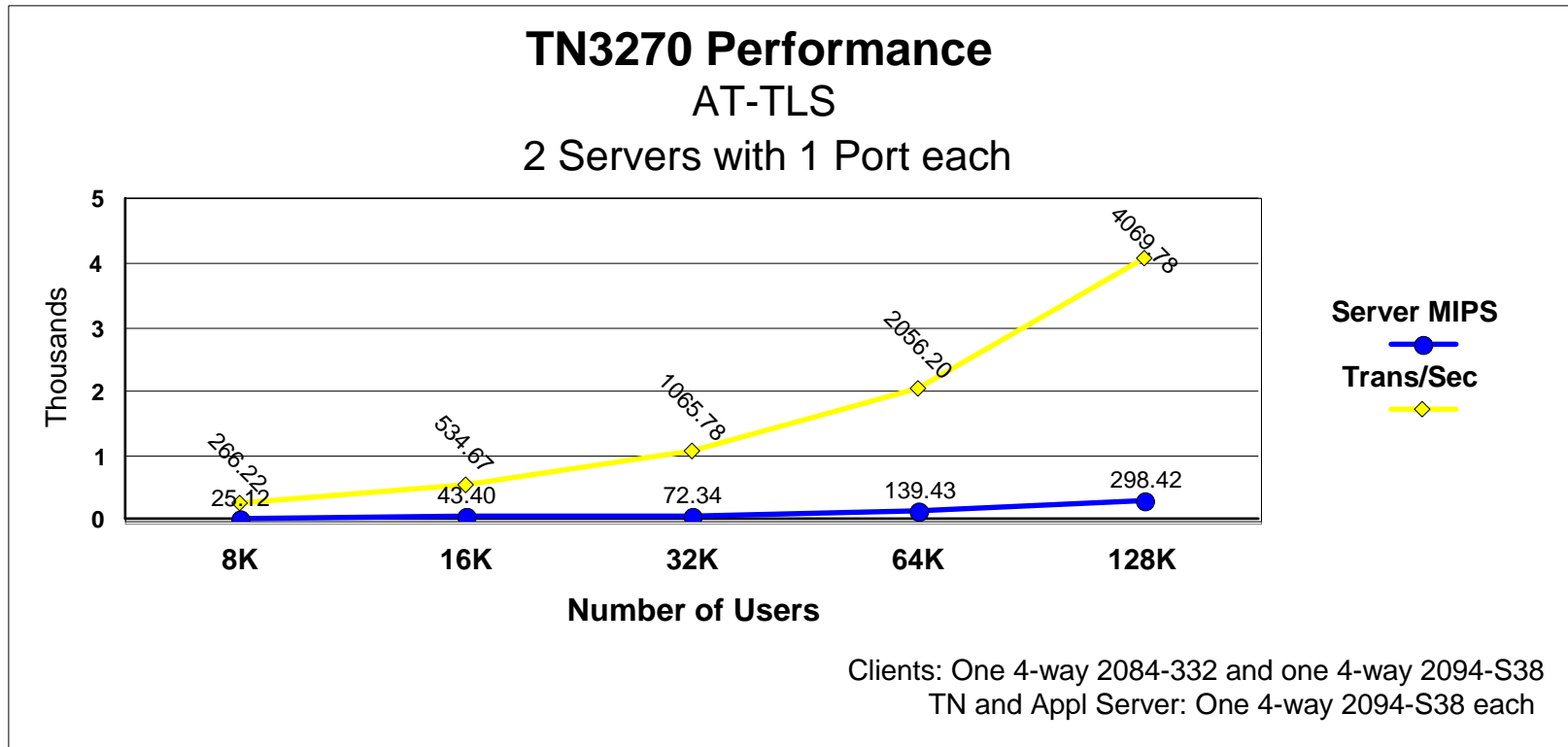
MIPS Requirements (AT-TLS)

- One TN3270 server with two ports



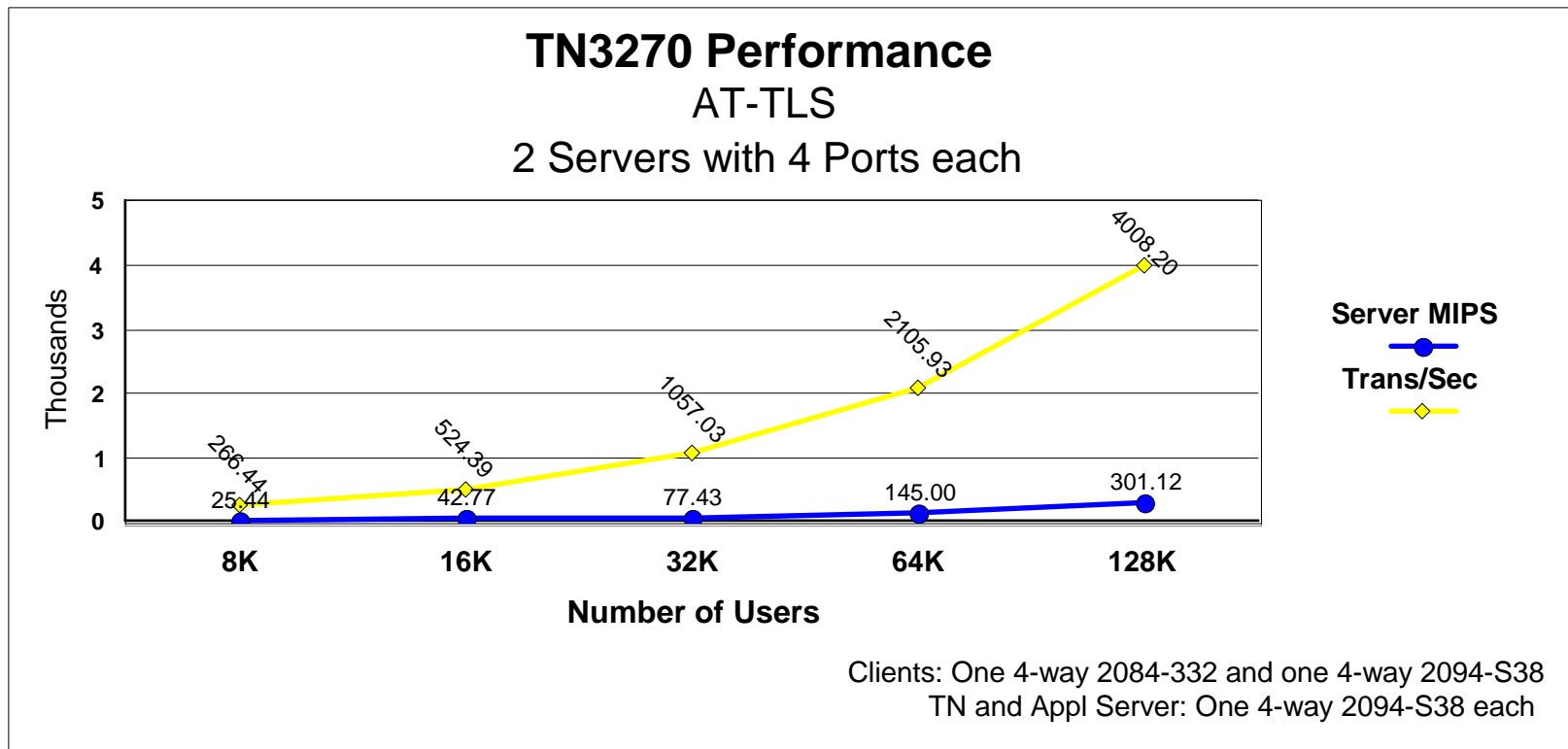
MIPS Requirements (AT-TLS)

- Two TN3270 servers with one port each



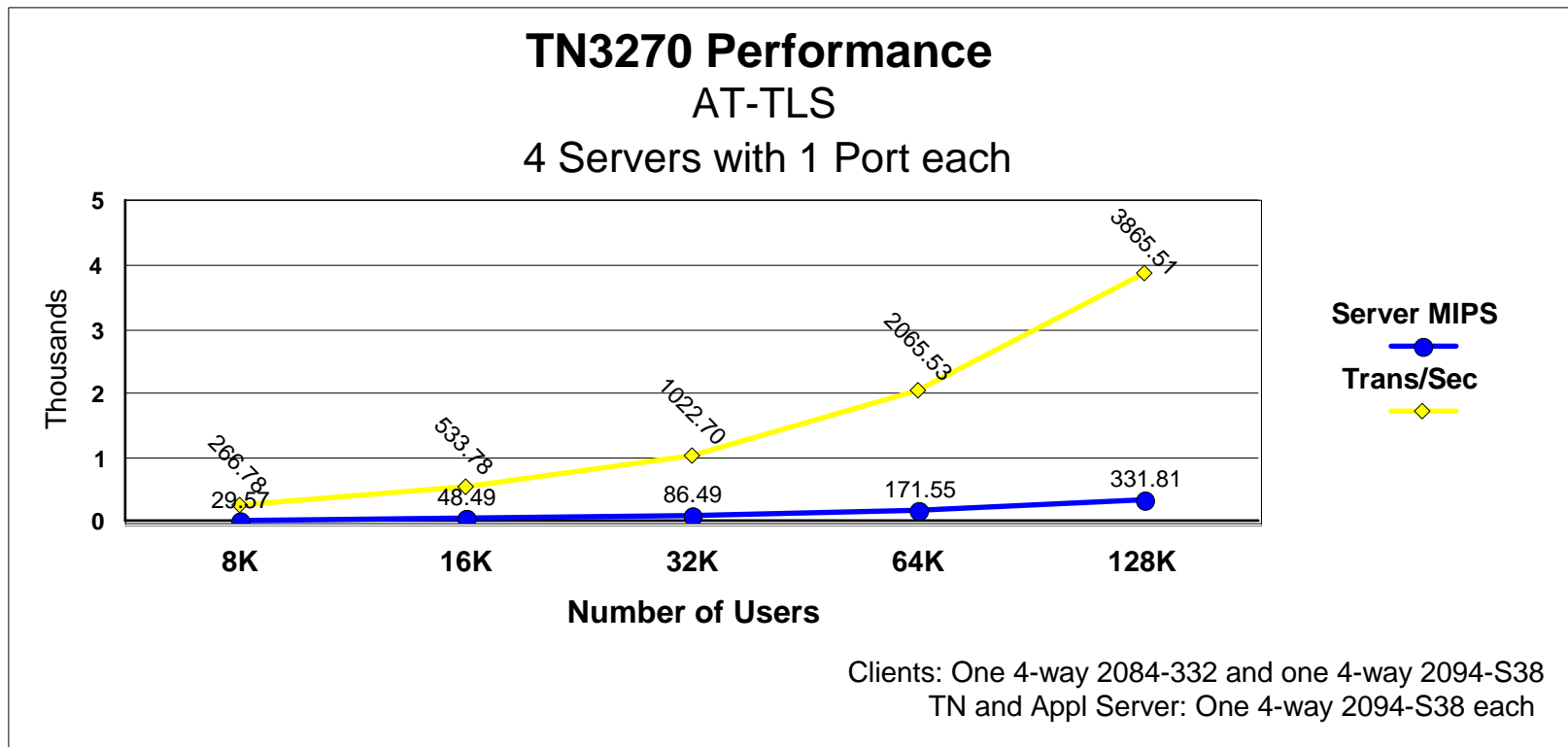
MIPS Requirements (AT-TLS)

- Two TN3270 servers with four ports each



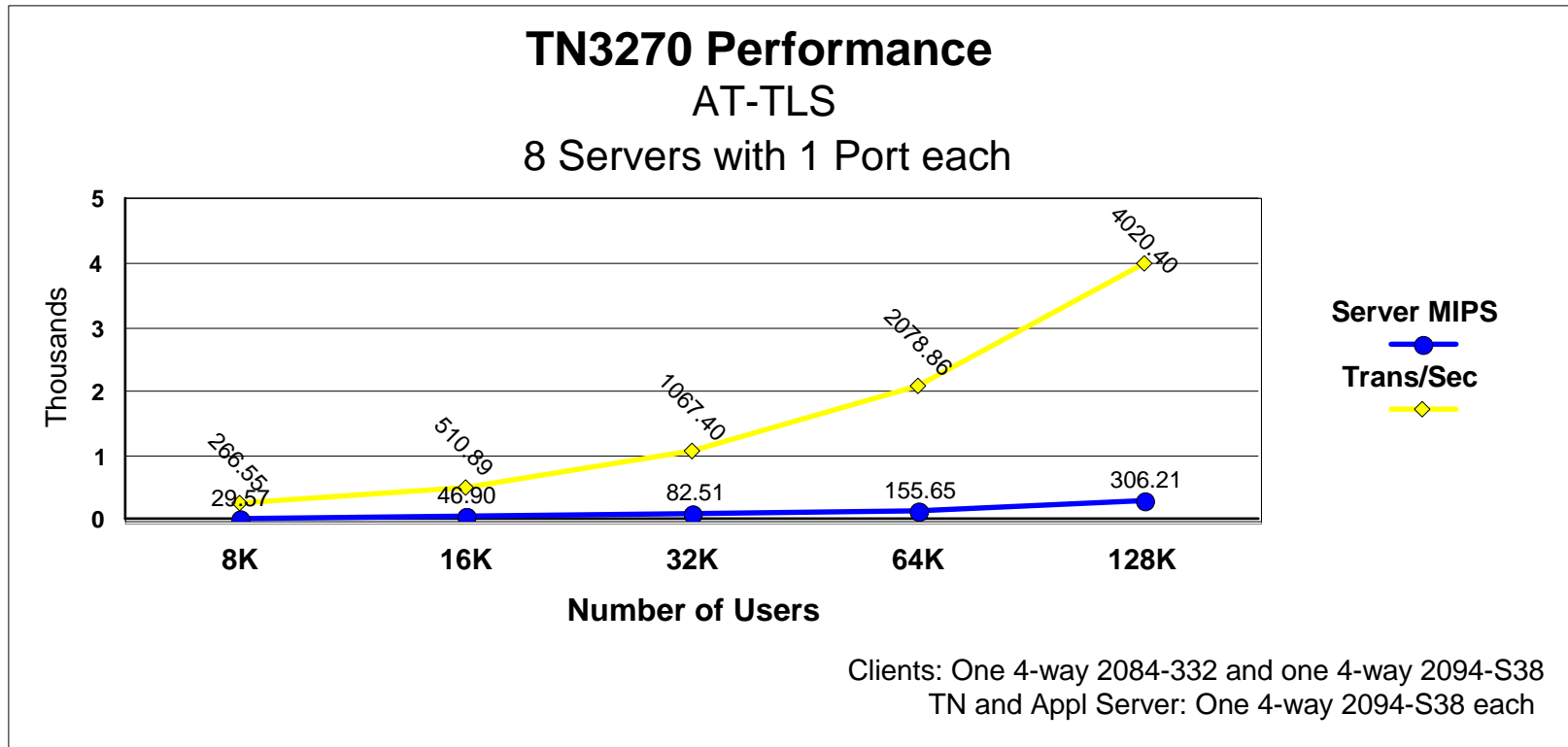
MIPS Requirements (AT-TLS)

- Four TN3270 servers with one port each



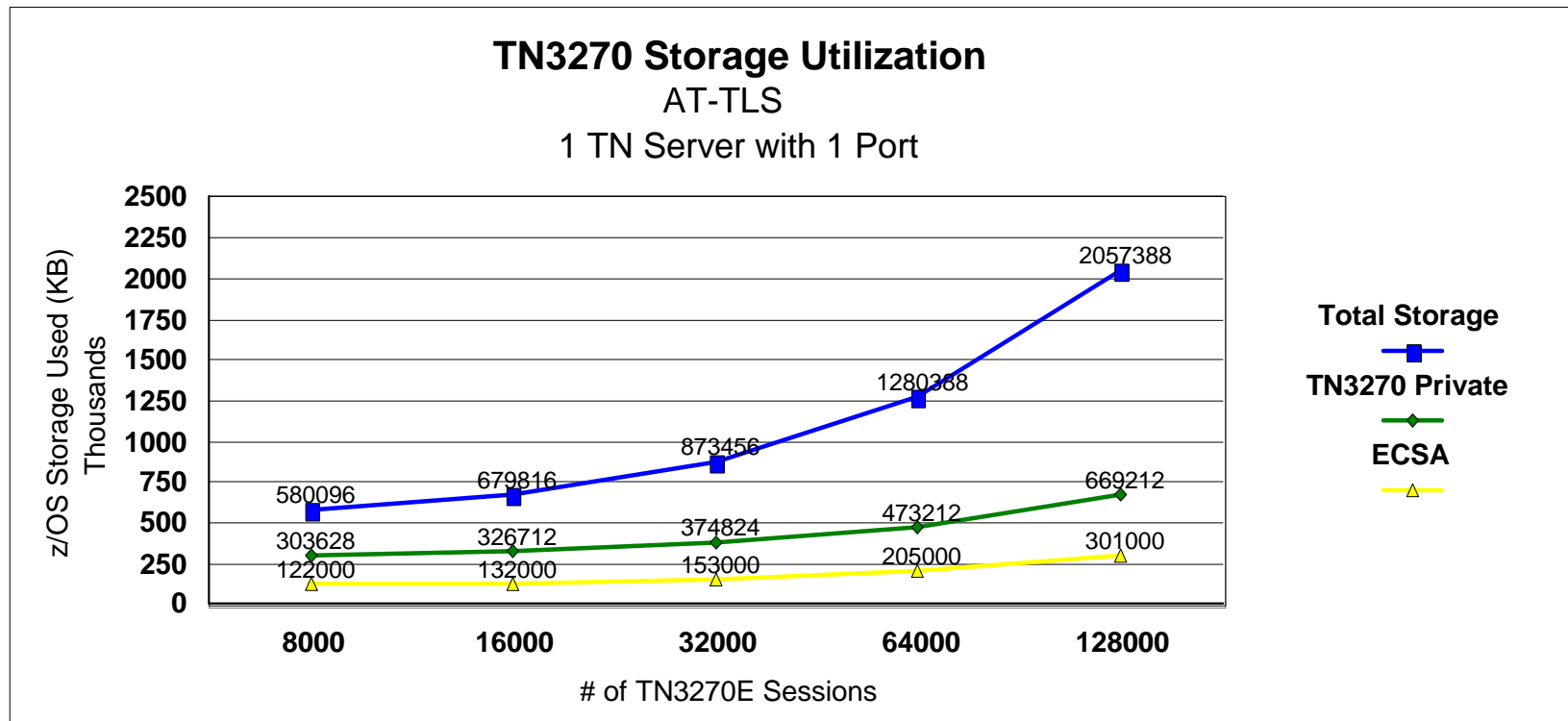
MIPS Requirements (AT-TLS)

- Eight TN3270 servers with one port each



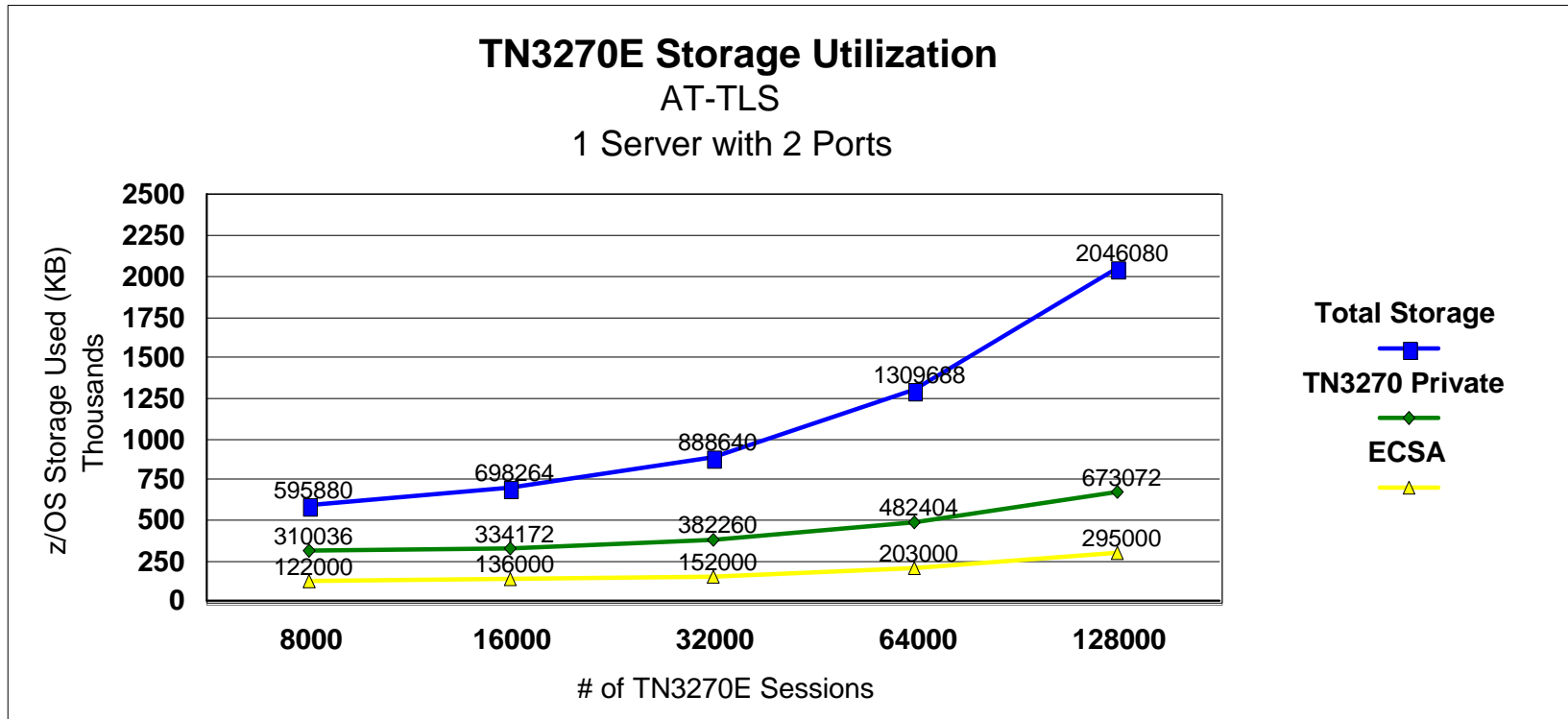
Storage Utilization (AT-TLS)

- One TN3270 server with one port



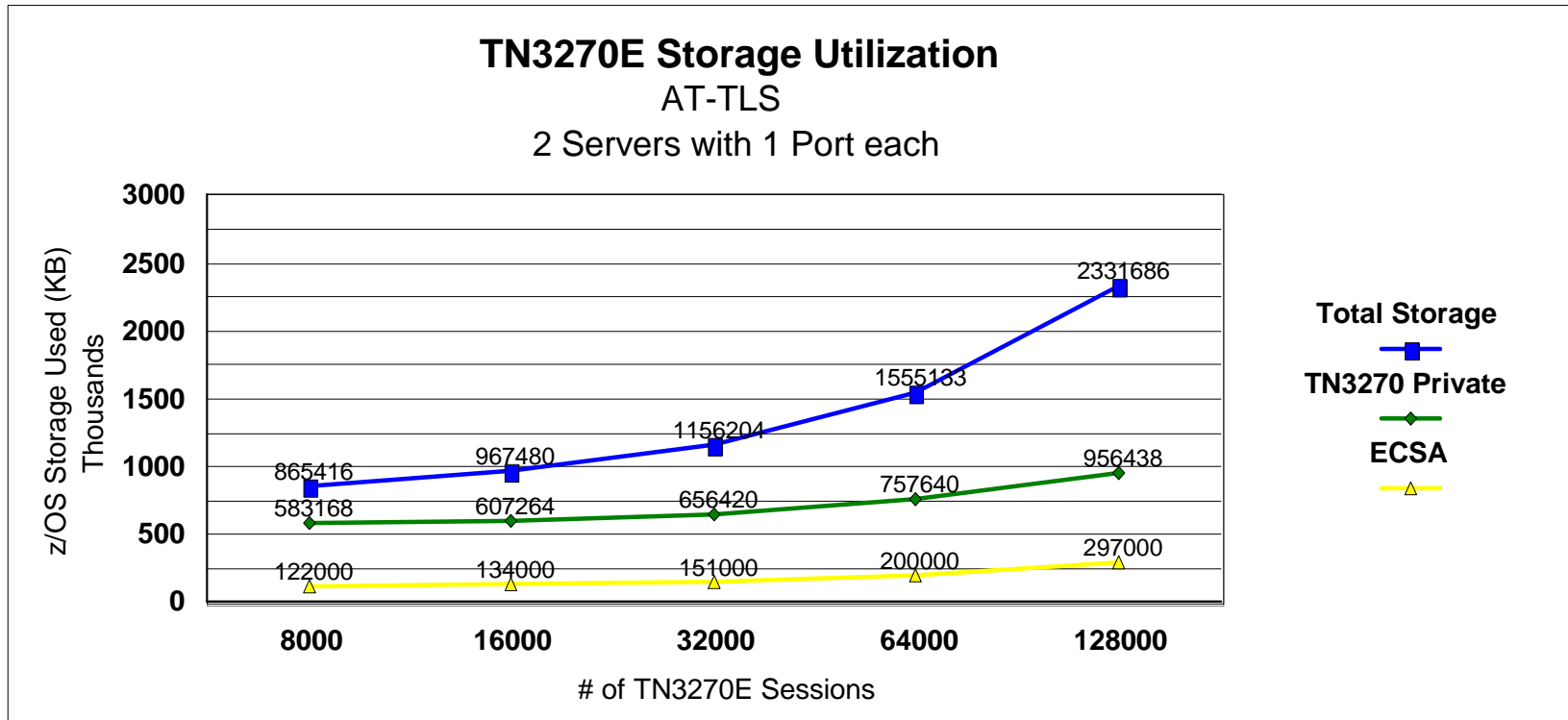
Storage Utilization (AT-TLS)

- One TN3270 server with two ports



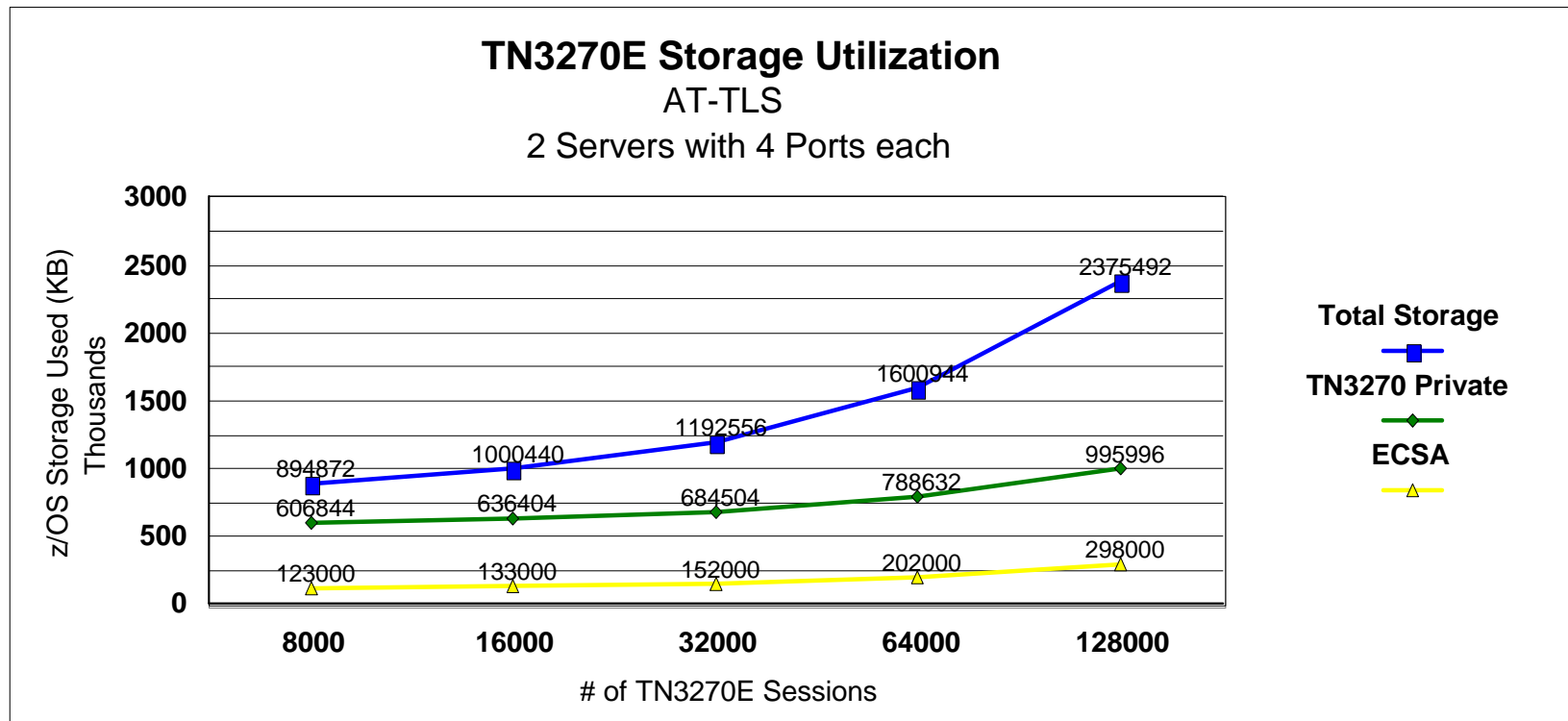
Storage Utilization (AT-TLS)

- Two TN3270 servers with one port each



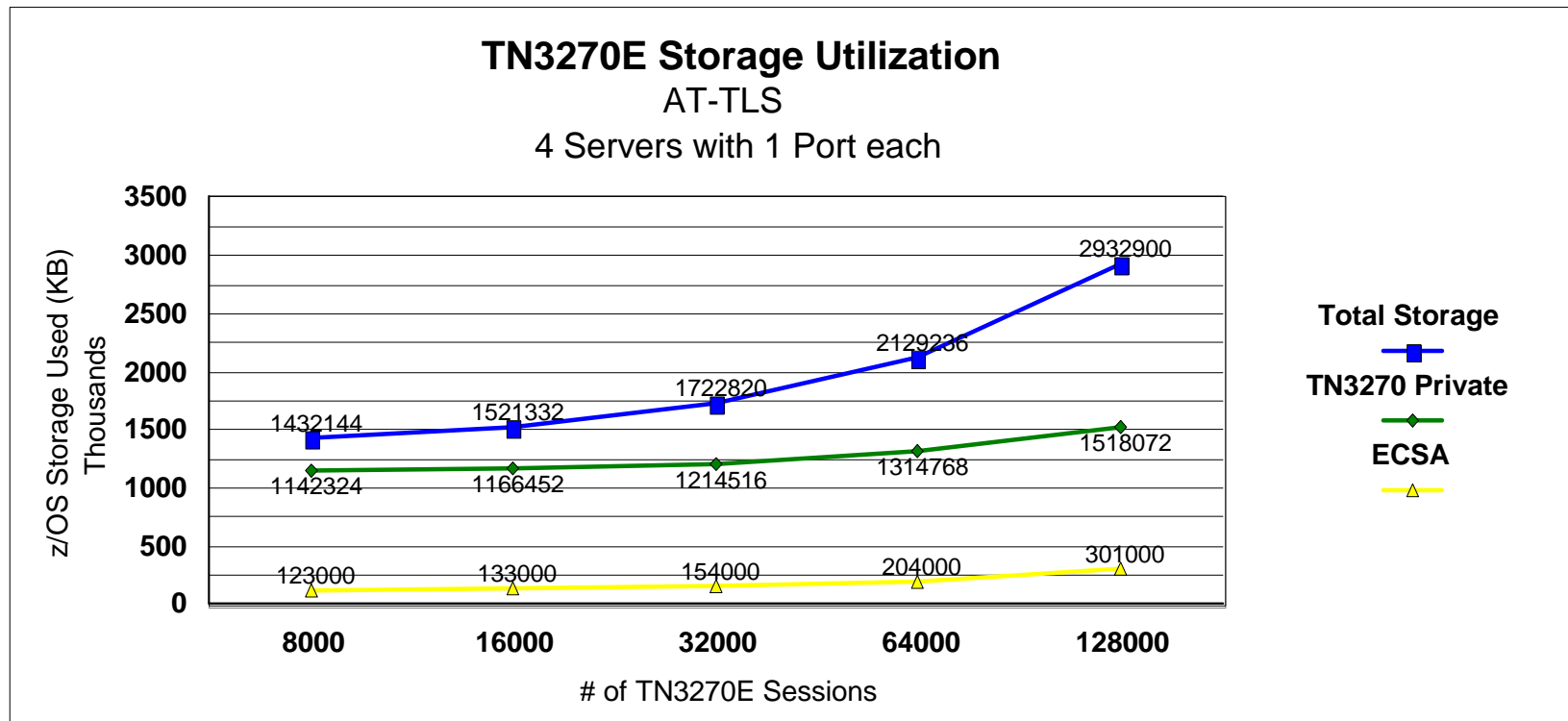
Storage Utilization (AT-TLS)

- Two TN3270 servers with four ports each



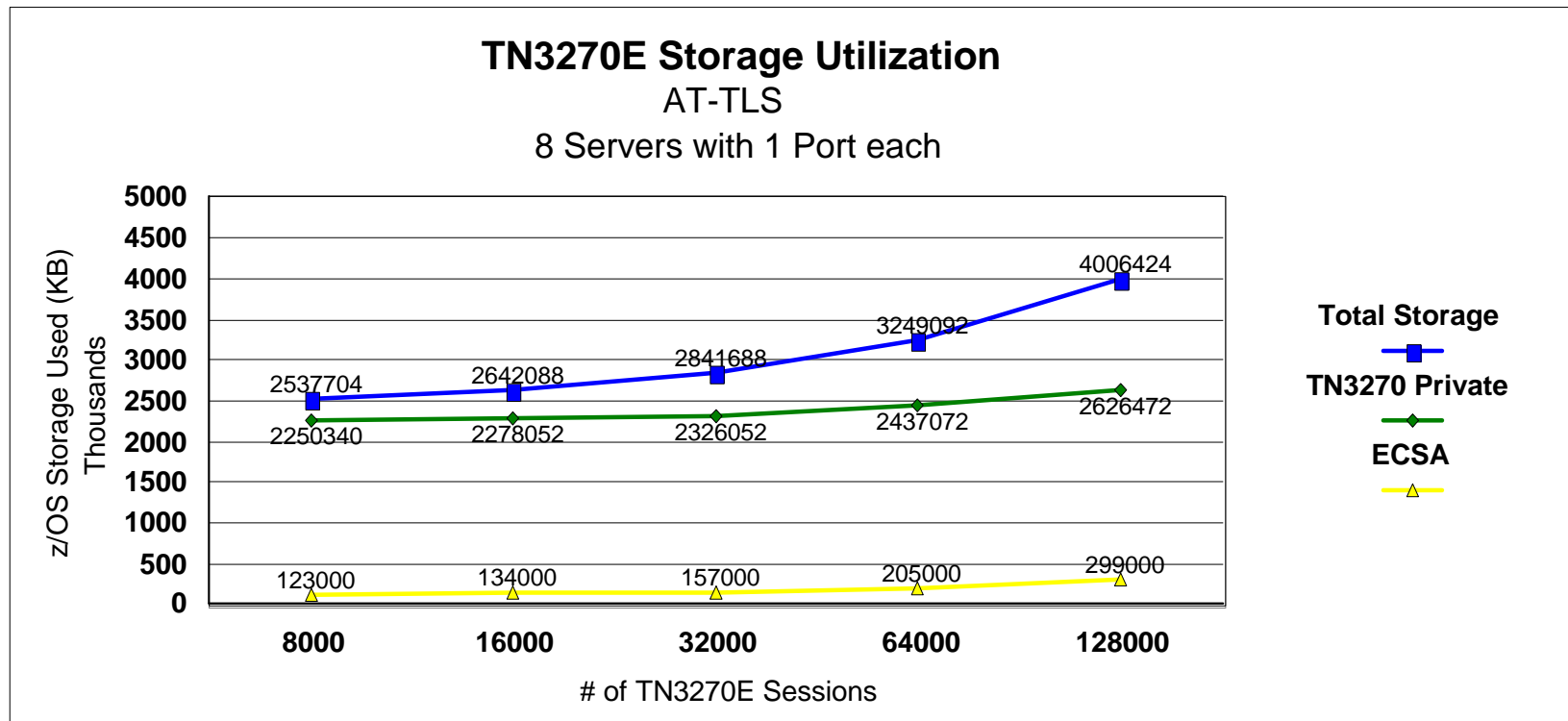
Storage Utilization (AT-TLS)

- Four TN3270 servers with one port each



Storage Utilization (AT-TLS)

- Eight TN3270 servers with one port each

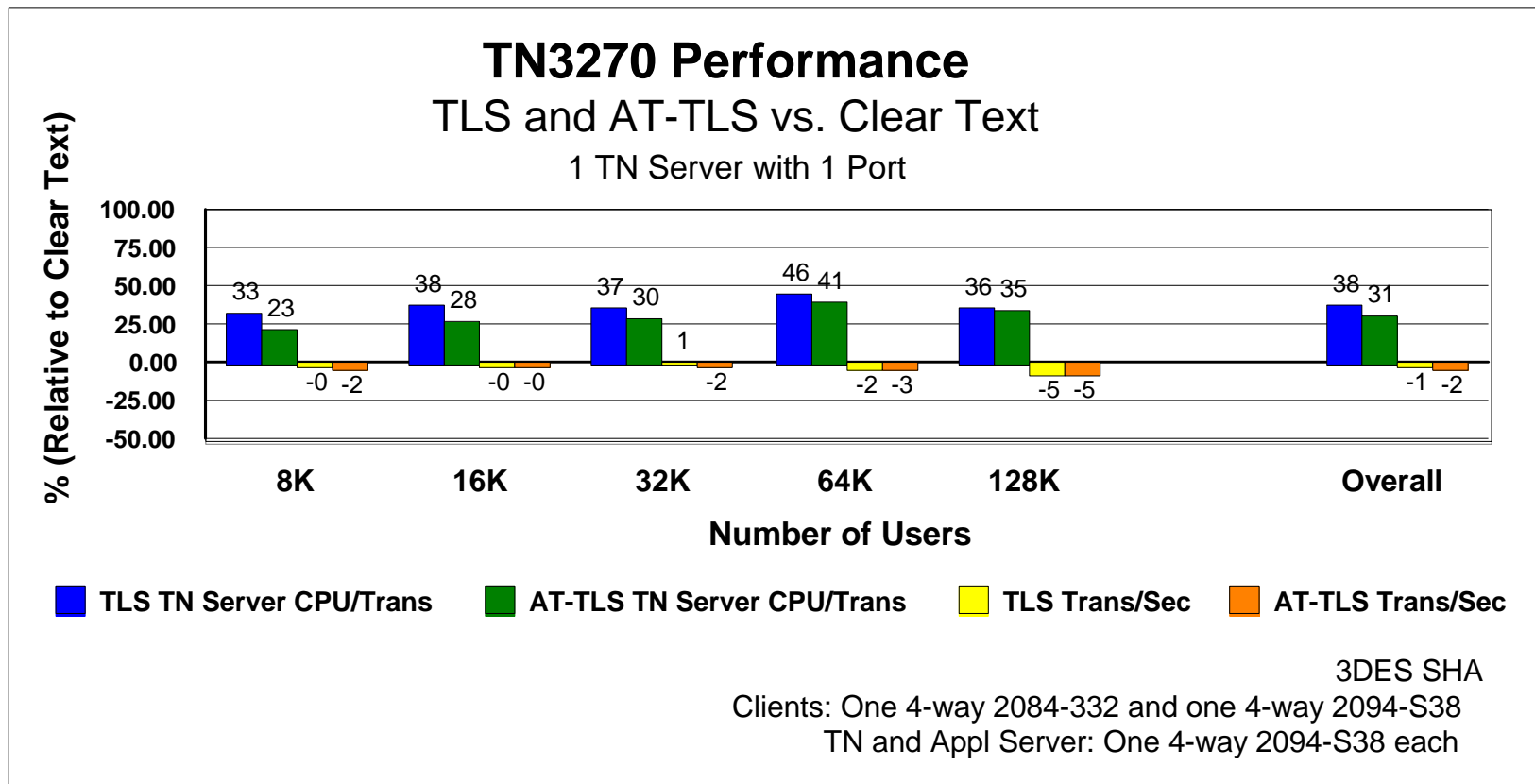


Secure Compared to Clear Text



Secure Compared to Clear Text

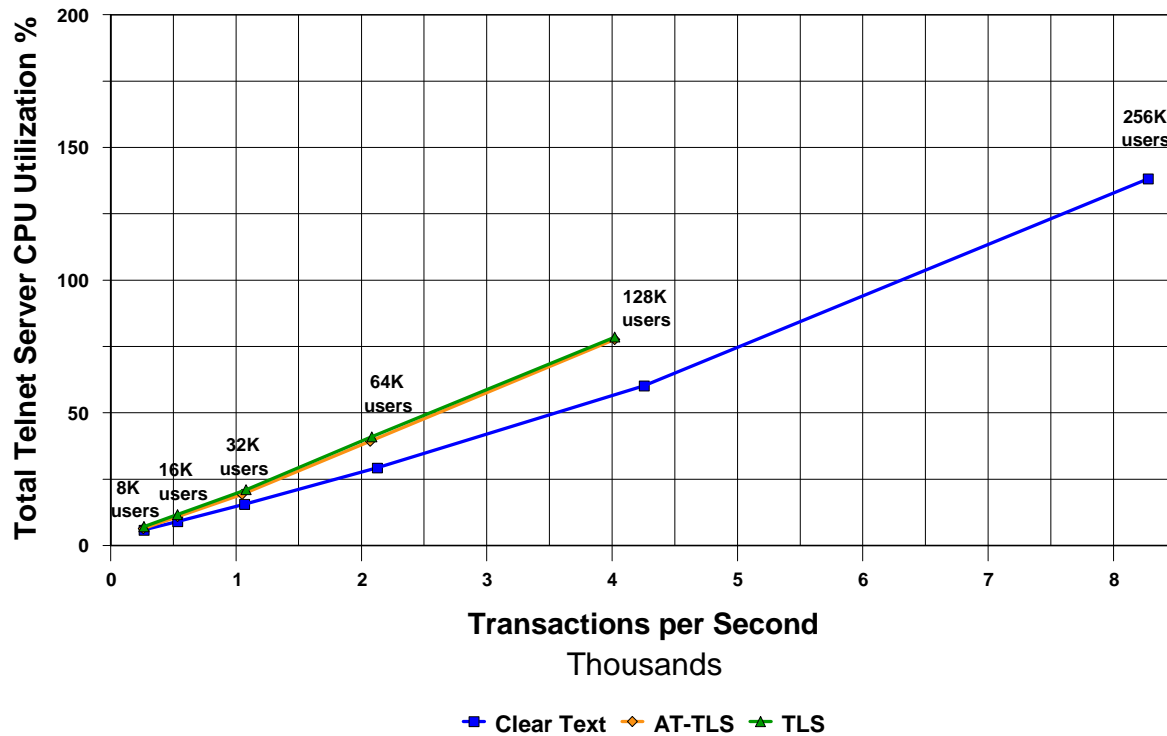
- One TN3270 server with one port



Secure Compared to Clear Text

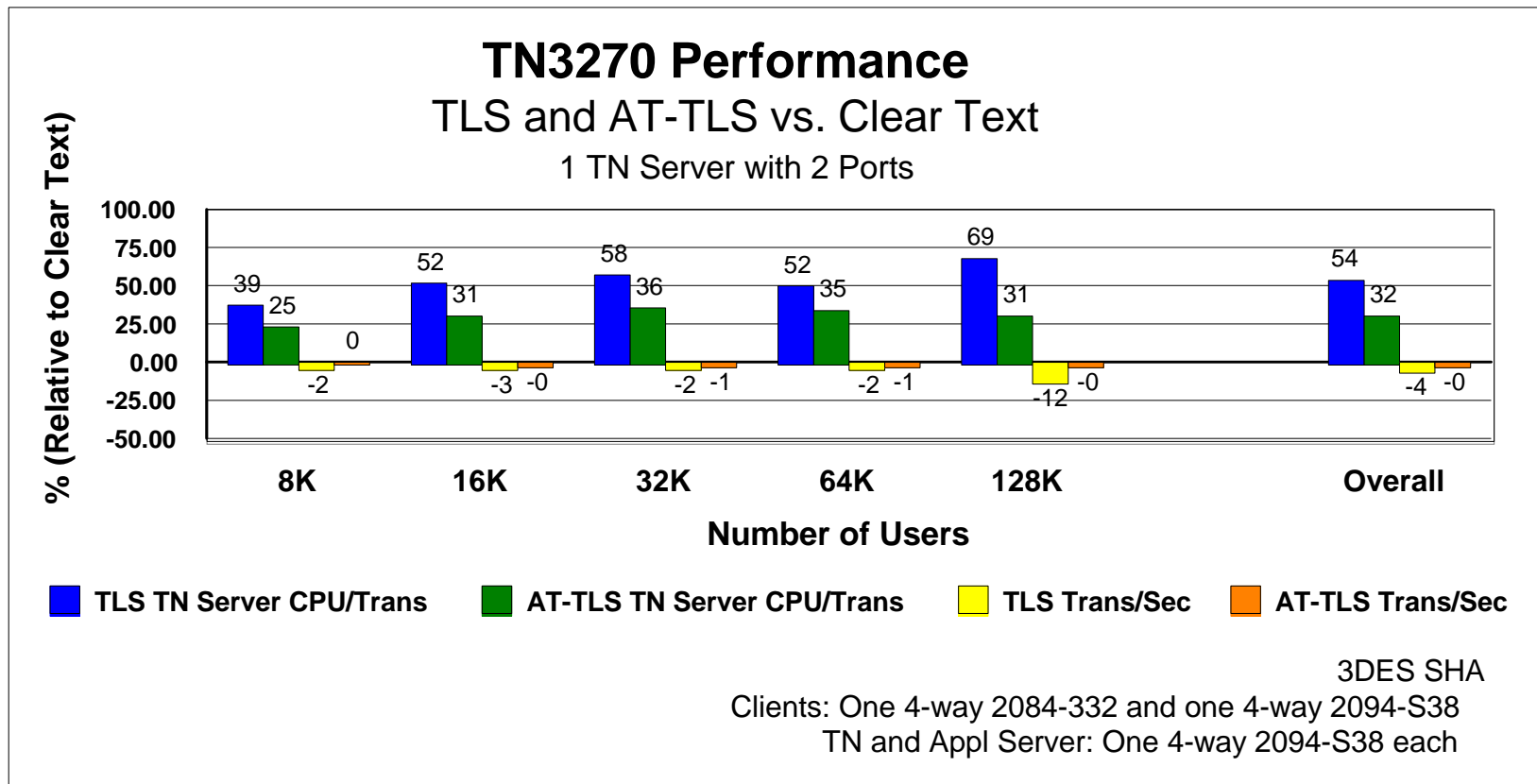
- One TN3270 server with one port

z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
 3DES encryption with SHA authentication



Secure Compared to Clear Text

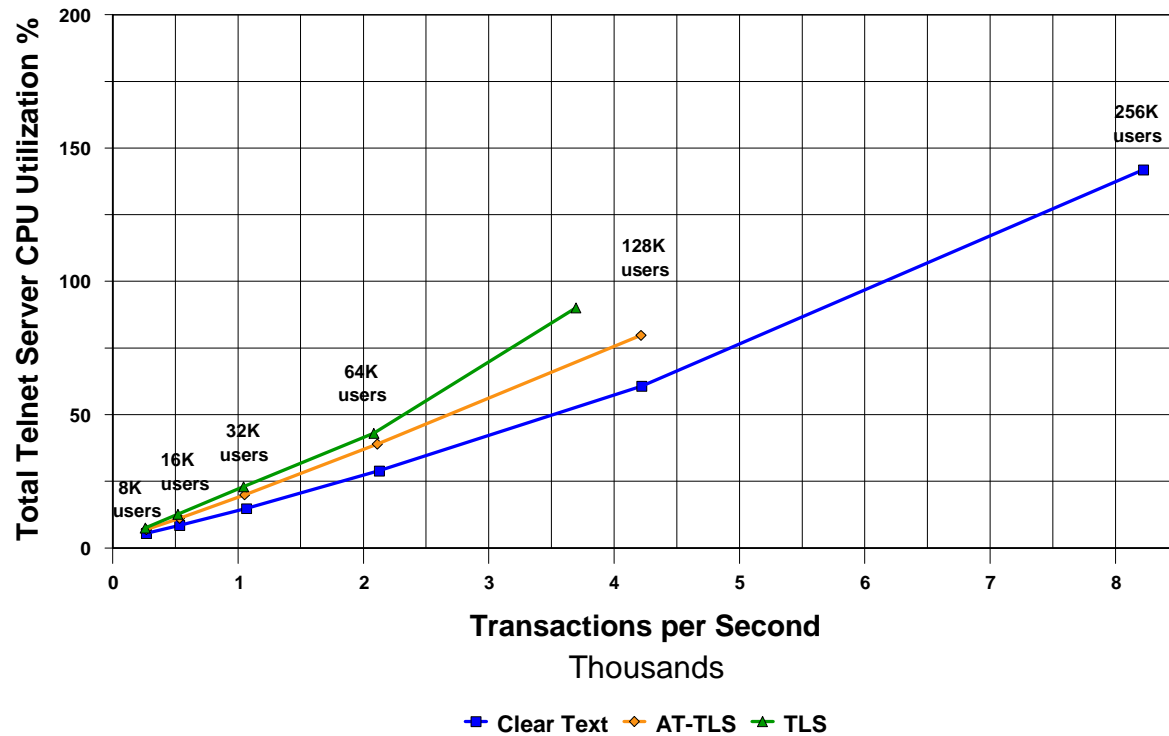
- One TN3270 server with two ports



Secure Compared to Clear Text

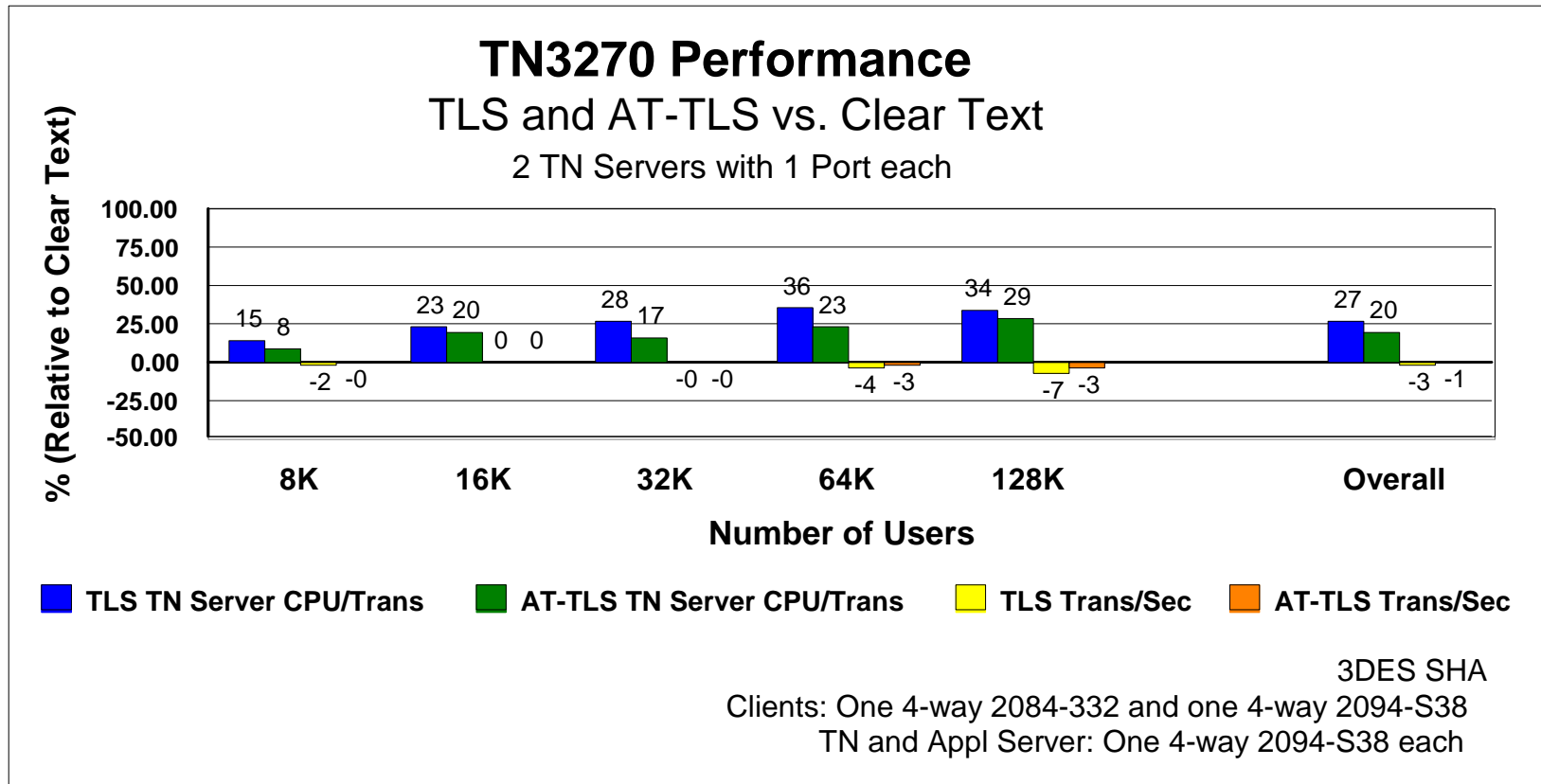
- One TN3270 server with two ports

z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
3DES encryption with SHA authentication



Secure Compared to Clear Text

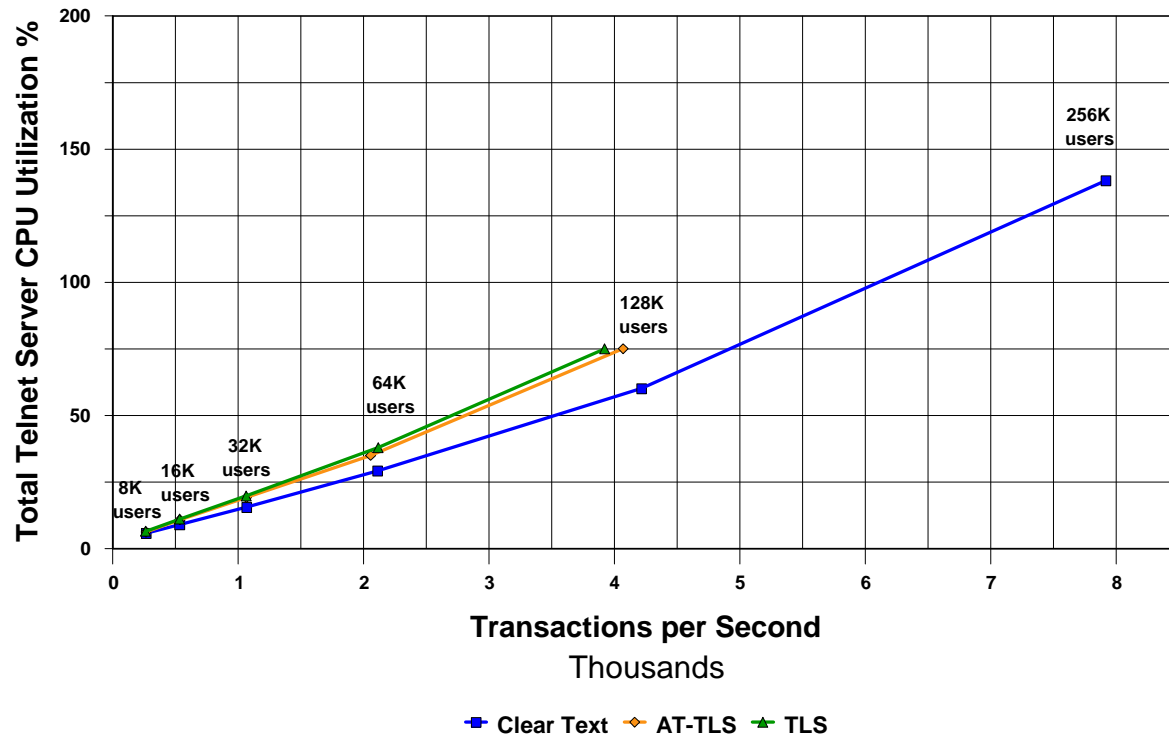
- Two TN3270 servers with one port each



Secure Compared to Clear Text

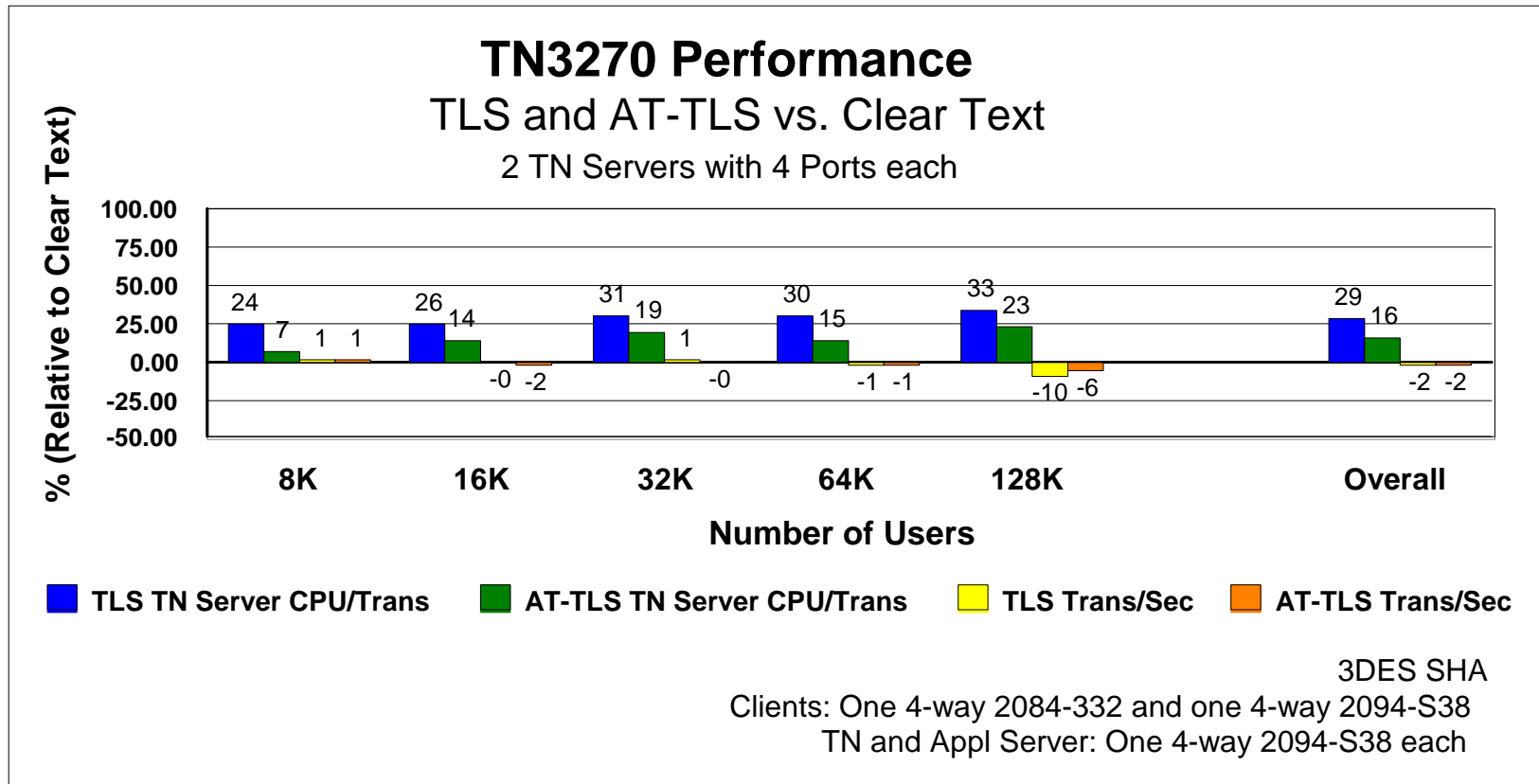
- Two TN3270 servers with one port each

z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
 3DES encryption with SHA authentication



Secure Compared to Clear Text

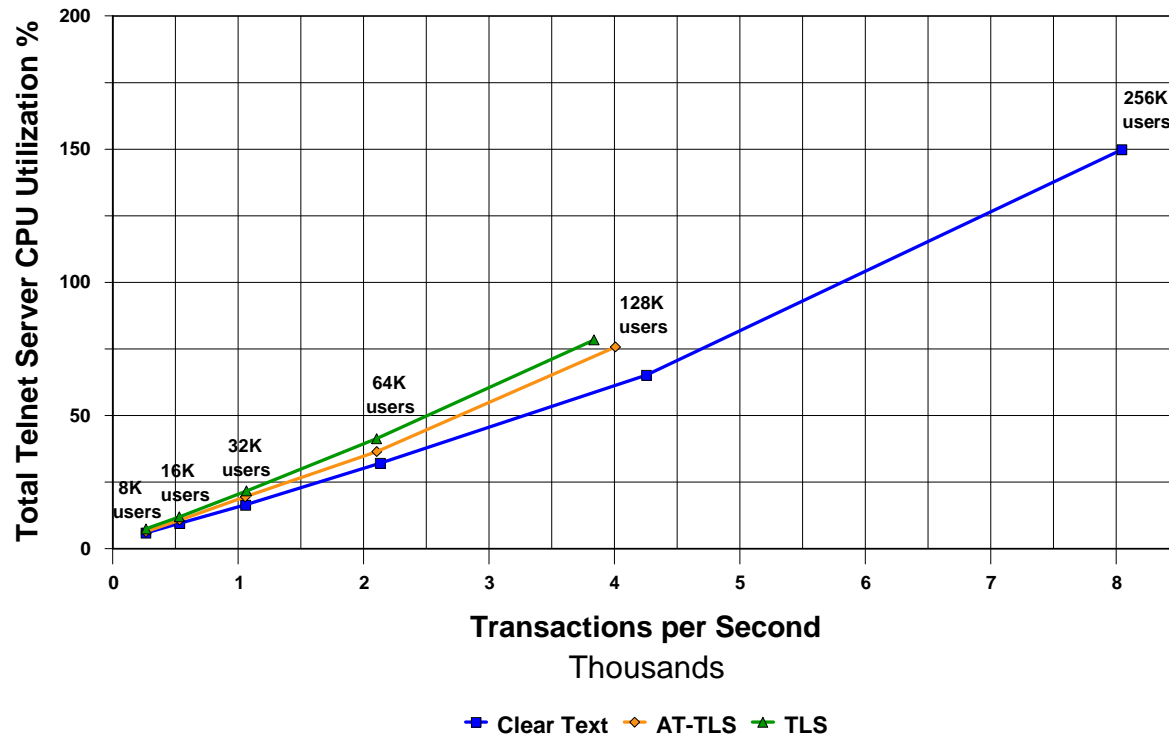
- Two TN3270 servers with four ports each



Secure Compared to Clear Text

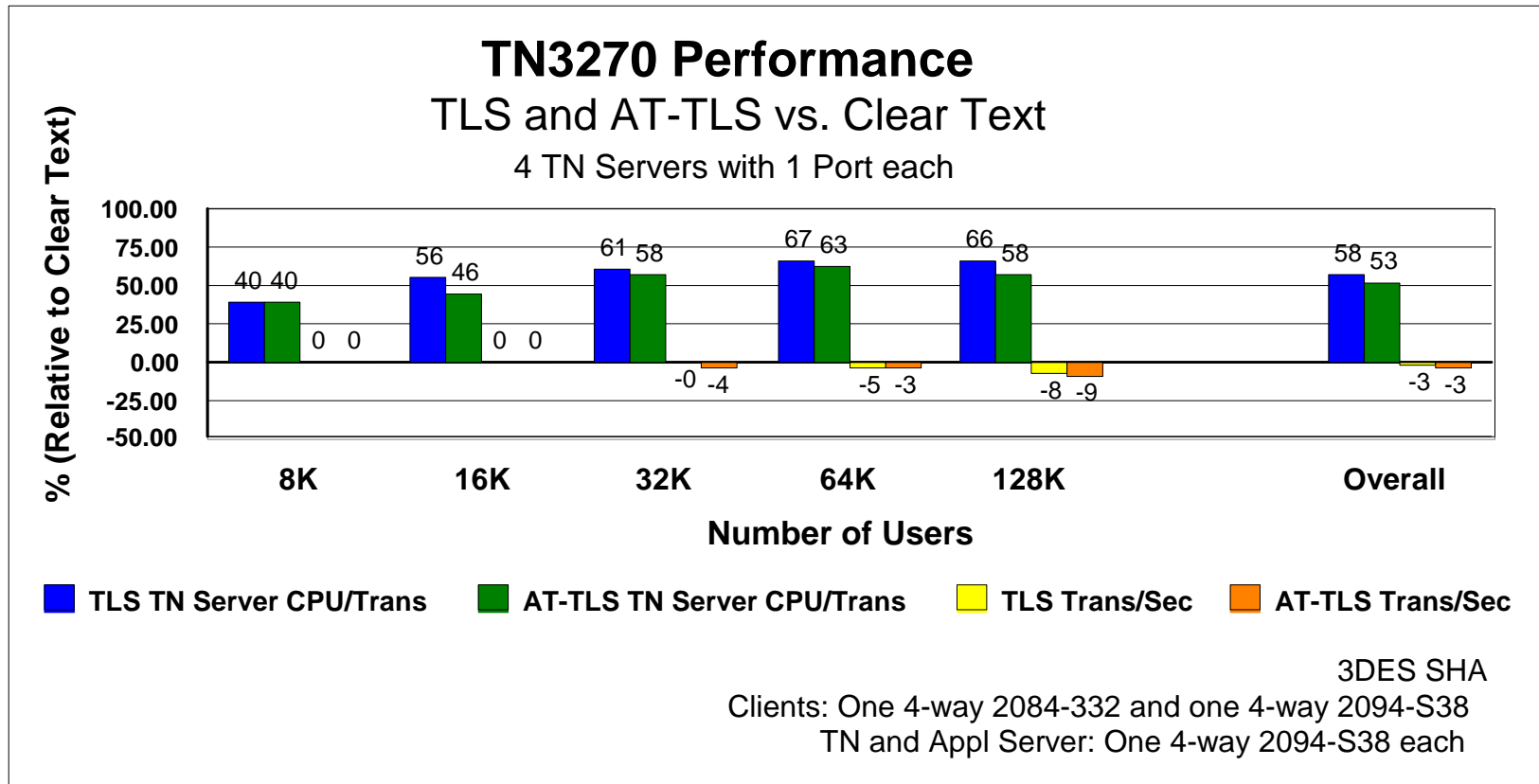
- Two TN3270 servers with four ports each

z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
 3DES encryption with SHA authentication



Secure Compared to Clear Text

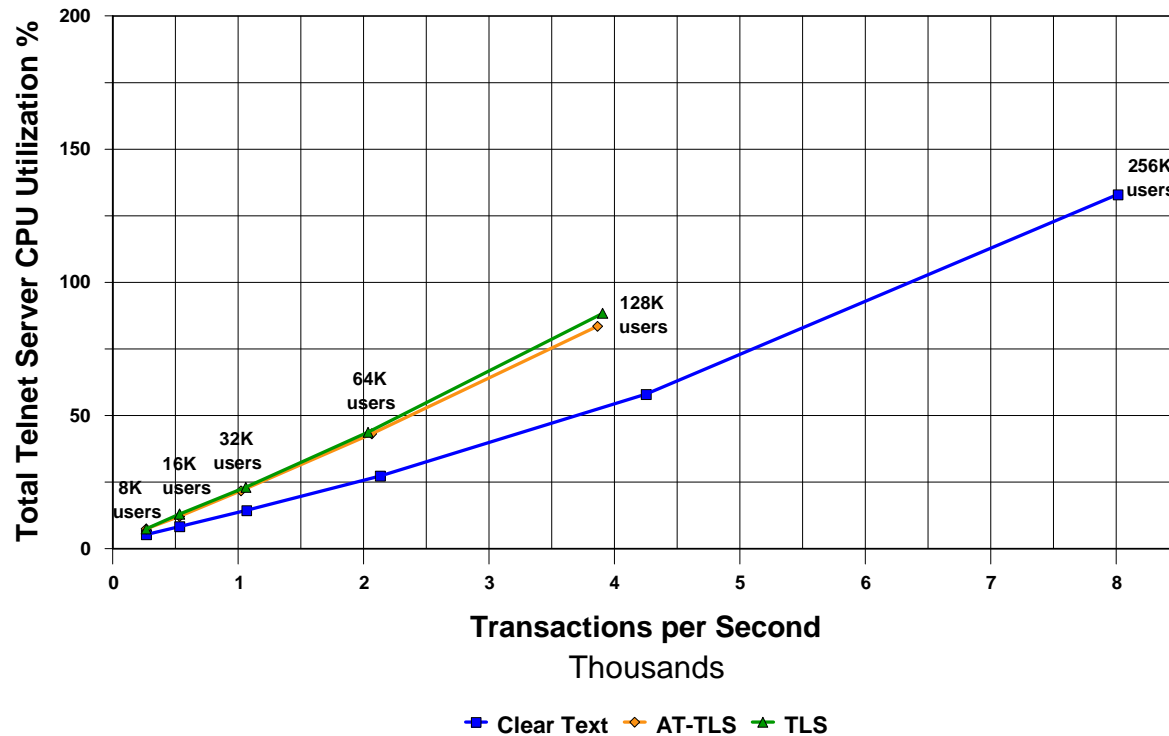
- Four TN3270 servers with one port each



Secure Compared to Clear Text

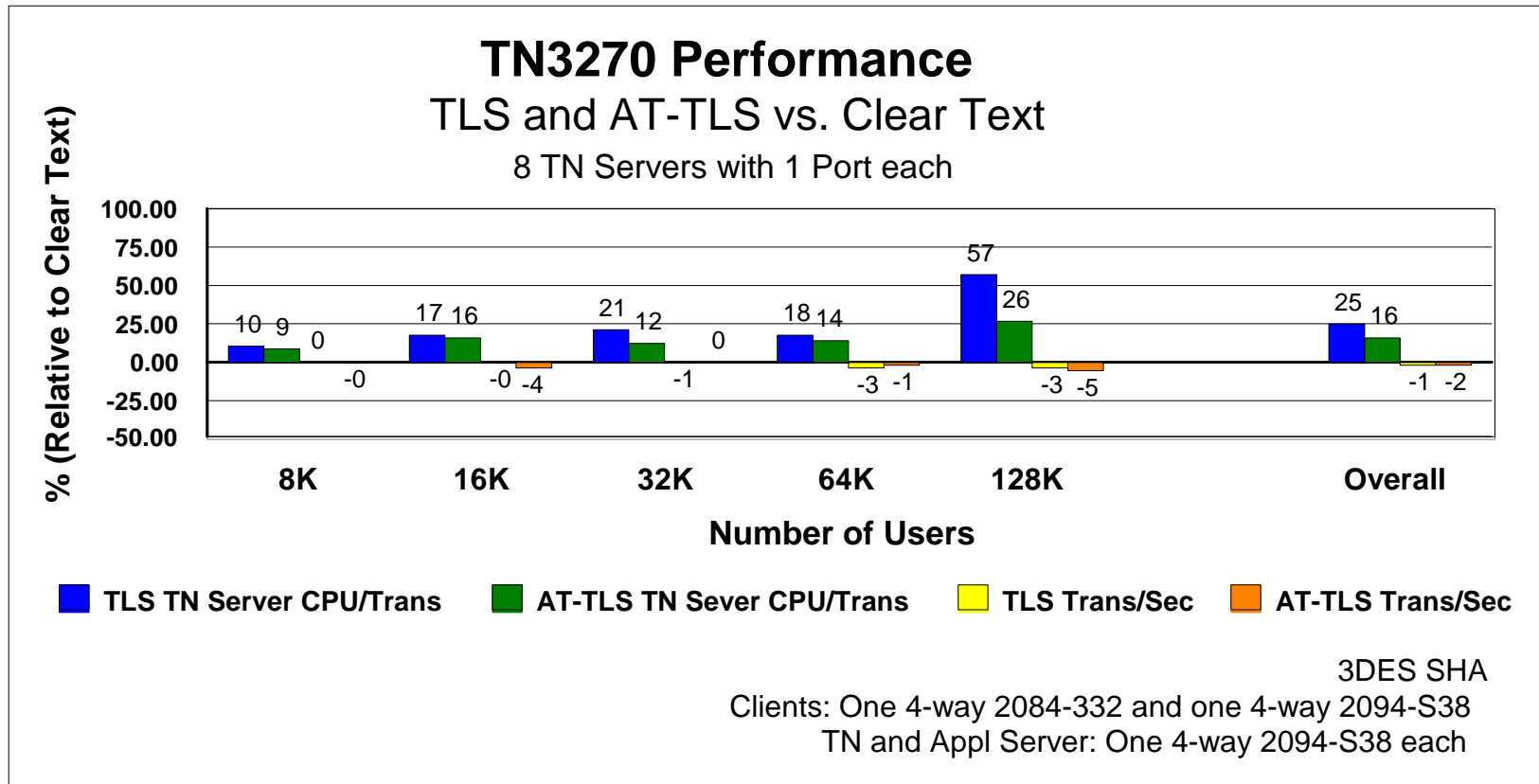
- Four TN3270 servers with one port each

z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
 3DES encryption with SHA authentication



Secure Compared to Clear Text

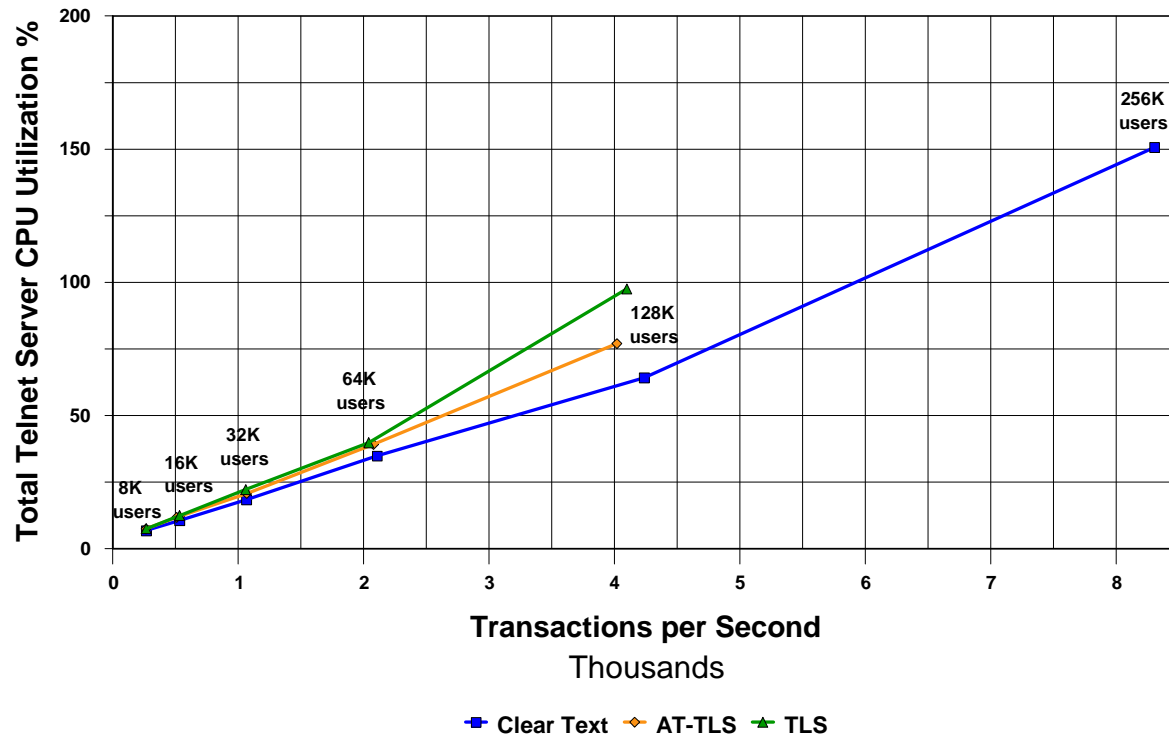
- Eight TN3270 servers with one port each




Secure Compared to Clear Text


- Eight TN3270 servers with one port each


z/OS CS V1R9 TN3270E Capacity Planning
TLS vs. AT-TLS vs. Clear Text
 3DES encryption with SHA authentication




Conclusions

-  **256K TN3270 users can be supported by a single TCP/IP stack and a single TN3270 server running on a zSeries LPAR.**
 - Some storage and buffer tuning is required.

-  **Multiple TN3270 servers and ports don't improve performance significantly. The only exception being that two TN3270 servers have less CPU penalty for secure connections than does one.**
 - However, for a large TN3270 installation, it is typically wise to define multiple servers in a fail over configuration.

-  **Multiple TN3270 servers require more storage than a single server due to increased private storage demands.**

-  **In general AT-TLS consumes about 10% less CPU than TLS. The total CPU consumed by the TN3270 server averages about 40% more than clear text when using TLS secure connections with 3DES SHA, and averages about 30% more when using AT-TLS secure connections.**

Appendix



TN3270 z/OS CPU Requirements

$$\frac{\# \text{ trans/user} \times \# \text{ users} \times \text{CPU secs/tran}}{\text{Elapsed secs}} = \frac{\text{CPU secs}}{\text{Elapsed secs}}$$

Example: z/OS V1R9, 8000 users, 2 tr/min/user, clear text ([data from page 15](#))

$$\frac{2 \text{ trans/user} \times 8000 \text{ users} \times 0.000199666 \text{ CPU secs/tr (N1)}}{60 \text{ Elapsed secs}} = \frac{0.0532 \text{ CPU secs}}{1 \text{ Elapsed secs}}$$

N1: z/OS TCP/IP + VTAM + TN3270 address spaces (z9-109, 2094-S38 four CP LPAR)

If the CPU secs/Elapsed secs ratio is greater than 1, more than one processor would be required.



TN3270 z/OS CPU Utilization

CPU secs/Elapsed secs
----- x 100 % = CPU Utilization %
of processors

Example: z/OS V1R9, 8000 users, 2 tr/min/user, clear text ([data from page 84](#))

0.0532 CPU secs/Elapsed secs
----- x 100% = 1.3%
4 processors

Thus, the CPU requirement for the z/OS TCP/IP + VTAM + TN3270 address spaces for 8000 TN3270 users running clear text with a 30 second think time is 1.3% of a four processor 2094-S38 LPAR.

LSPR can be used to adjust for other processors types.

Buffer Tuning

VTAM buffer tuning used for 256K user measurements:

➤ Buffers tuned specifically for 256K user Telnet

- CRA4BUF=(500,,,200,100)
- CRPLBUF=(32760,,,500,500)
- IOBUF=(32760,544,80,,500,500)
- LFBUF=(32760,,0,,300,60)
- TIBUF=(32760,,10,,1000,200)
- T1BUF=(5000,,10,,300,60)
- T2BUF=(2000,,10,,300,60)

➤ Other buffer settings used:

- APBUF=(16,,2,,1,3),
- BSBUF=(60,,,60,29),
- LPBUF=(30,,0,,6,2),
- SFBUF=(32,,0,,1,1),
- SPBUF=(2,,0,,1,1),
- XDBUF=(5,,0,,1,4),

Buffer Usage

VTAM buffer usage for the server LPAR (one TN3270 server with one port):

Buffer / Users	8K	16K	32K	64K	128K	256K
CRA4BUF	9	11	11	13	19	29
CRPLBUF	8004	17326	37134	48000	92000	> 100K
IOBUF	2571	3496	5831	5831	9403	21228
LFBUF	8003	16003	32003	48003	92003	> 100K
TIBUF	2591	3583	6147	6147	10044	26775
T1BUF	1134	1535	1535	1535	2340	2383
T2BUF	0	0	0	0	165	165

z/OS CS Performance Information

➤ z/OS CS Performance Index

- ▶ This is an index to all published performance information for the z/OS Communications Server. This index is updated when changes are made to existing documentation or additional documentation is added.

- www.ibm.com/support/docview.wss?rs=852&uid=swg27005524

➤ SHARE Presentations (www.share.org)

- ▶ z/OS Communications Server Performance Improvements (session 3901, 2/2007)
- ▶ What's New with z/OS Comm Server TN3270 (session 3936, 8/2007)
- ▶ Configuring FTP and Telnet Workloads with Application Transparent / Transport Layer Security (session 3921, 8/2007)
- ▶ Getting Started with IPv6 on z/OS (session 3951, 8/2007)
- ▶ zIIP-Assisted IPsec (session 3935, 8/2007)

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