



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**NETWORK APPLIANCE, INC.
NETAPP FAS3040**

SPC-1 V1.10.1

**Submitted for Review: January 29, 2008
Submission Identifier: A00057**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

| Test Sponsor and Contact Information | |
|---|--|
| Test Sponsor Primary Contact | Network Appliance, Inc. – http://www.netapp.com/ Saad Jafri – saad@netapp.com 7301 Kit Creek Road Building 1 Research Triangle Park, NC 27709 Phone (919) 476-5541 FAX: (919) 476-4272 |
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| Auditor | Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385 |

Revision Information and Key Dates

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|--|------------------|
| SPC-1 Specification revision number | V1.10.1 |
| SPC-1 Workload Generator revision number | V2.00.04a |
| Date Results were first used publicly | January 29, 2008 |
| Date the FDR was submitted to the SPC | January 29, 2008 |
| Date the TSC is available for shipment to customers | March 18, 2008 |
| Date the TSC completed audit certification | January 29, 2008 |

Tested Storage Product (TSP) Description

The NetApp FAS 3040 is the newest entry in the FAS3000 series of Enterprise Storage Systems. The NetApp FAS3000 series delivers outstanding value through excellent performance, best-in-class scalability, and proven lower TCO than other midrange storage systems.

These enterprise storage systems have the versatility to simultaneously meet diverse needs—SAN and NAS, primary and secondary storage—while providing high levels of availability. The FAS3040 system handles complex requirements in a way that actually simplifies the storage infrastructure and improves productivity.

The NetApp FAS3040 delivers excellent performance, whether the storage need is for SAN-based business applications, technical applications, or home directories. With large cache memory configurations, expandable high-performance I/O, 4-gigabit FC SAN support, and support for 10-Gigabit Ethernet, the FAS3040 delivers exceptional midrange systems performance

Summary of Results

| SPC-1 Results | |
|---|-----------------------|
| Tested Storage Configuration (TSC) Name: NetApp FAS3040 | |
| Metric | Reported Result |
| SPC-1 IOPS™ | 30,985.90 |
| SPC-1 Price-Performance | \$13.61/SPC-1 IOPS™ |
| Total ASU Capacity | 12,586.586GB |
| Data Protection Level | Other Data Protection |
| Total TSC Price (including three-year maintenance) | \$421,730 |

SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

Total ASU (Application Storage Unit) Capacity represents the total storage capacity read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of “Other Protection Level” utilized NetApp’s RAID-DP™, a RAID 6 implementation, which provides double-parity RAID protection against data loss with negligible performance overhead and no cost penalty compared to single-parity RAID. Additional information is available at the following location:

<http://www.netapp.com/products/software/raid-dp.html>

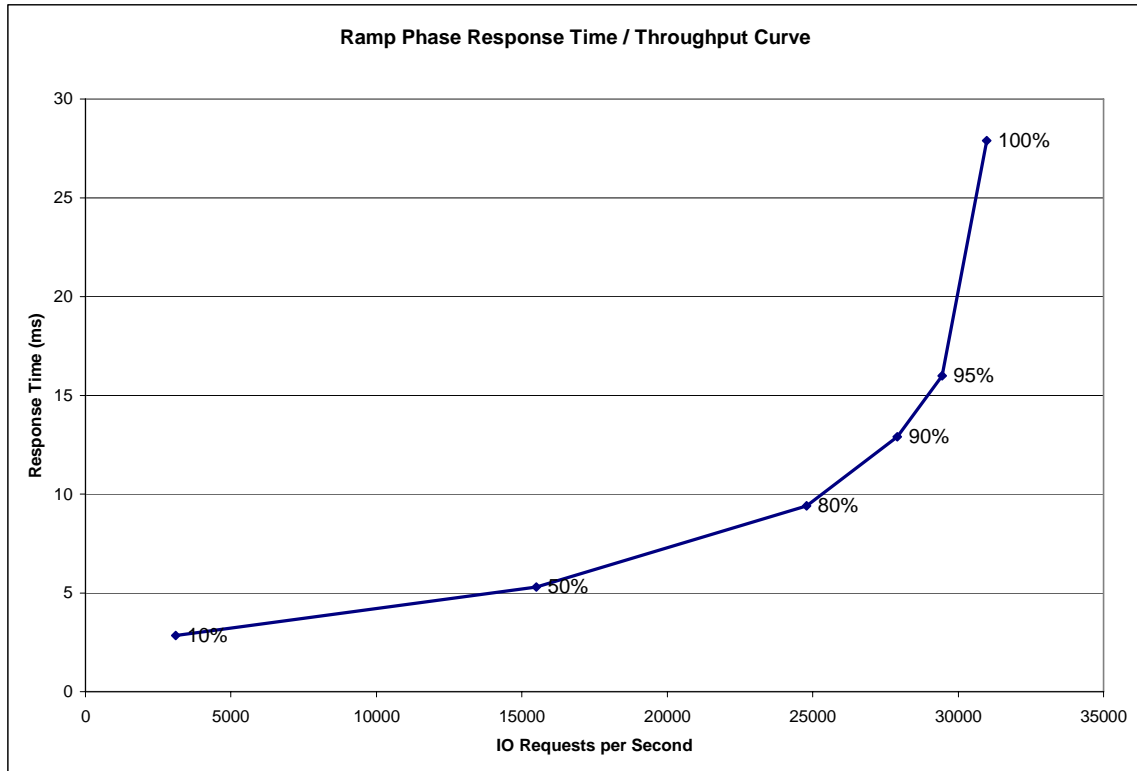
Storage Capacities and Relationships

The following diagram documents the various storage capacities, used in this benchmark, and their relationships.

Response Time - Throughput Curve

The Response Time-Throughput Curve illustrates the Average Response Time (milliseconds) and I/O Request Throughput at 100%, 95%, 90%, 80%, 50%, and 10% of the workload level used to generate the SPC-1 IOPS™ metric.

The Average Response Time measured at the any of the above load points cannot exceed 30 milliseconds or the benchmark measurement is invalid.



Response Time - Throughput Data

| | 10% Load | 50% Load | 80% Load | 90% Load | 95% Load | 100% Load |
|------------------------------------|----------|-----------|-----------|-----------|-----------|-----------|
| I/O Request Throughput | 3,102.74 | 15,491.57 | 24,794.39 | 27,912.17 | 29,455.20 | 30,985.90 |
| Average Response Time (ms): | | | | | | |
| All ASUs | 2.85 | 5.30 | 9.42 | 12.90 | 15.99 | 27.89 |
| ASU-1 | 3.79 | 6.72 | 11.48 | 15.39 | 18.87 | 33.27 |
| ASU-2 | 3.72 | 6.88 | 12.09 | 16.21 | 19.63 | 29.58 |
| ASU-3 | 0.47 | 1.61 | 3.86 | 6.18 | 8.27 | 15.73 |
| Reads | 6.09 | 10.33 | 16.99 | 21.98 | 26.08 | 39.97 |
| Writes | 0.74 | 2.02 | 4.48 | 7.00 | 9.41 | 20.02 |

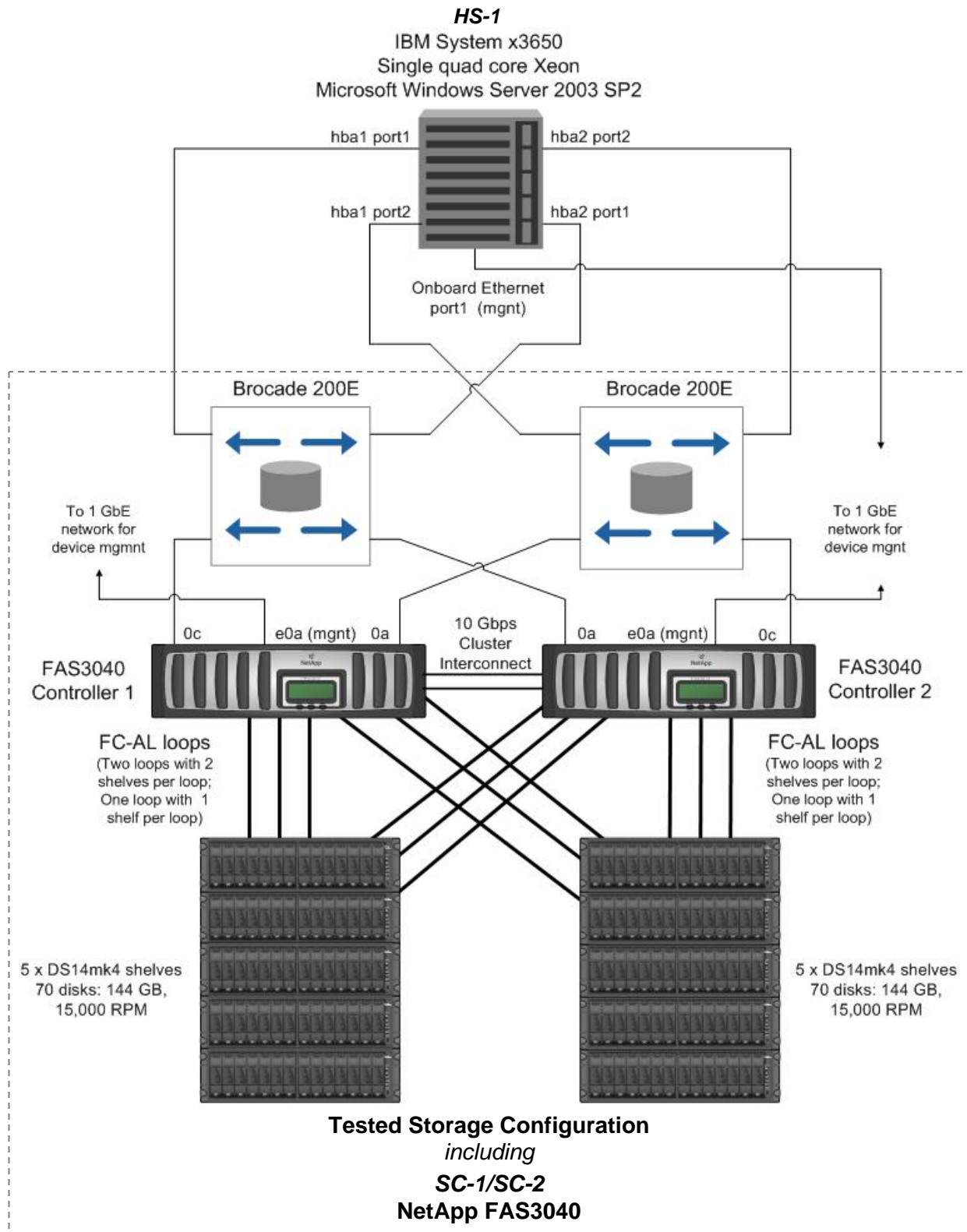
Tested Storage Configuration Pricing (Priced Storage Configuration)

| Storage System | | Ext Qty | List Price | Disc % | Net Price | Ext Net Price | |
|--|---|----------|-------------|-------------|-------------|---------------------|-------------|
| SES-SYSTEM | Support Edge Services Attach PN | 1 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| X1941A-R6-C | Cable,Cluster 4X,Copper,5M,-C,R6 | 2 | \$97.00 | 0 | \$97.00 | \$194.00 | |
| X2055A-R6-C | HBA,FC,2-Port,4Gb,Disk,Optical,PCIe,-C,R6 | 4 | \$2,300.00 | 0 | \$2,300.00 | \$9,200.00 | |
| X505-R6-C | System Lift Handle,Detachable,-C,R6 | 2 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| X5515A-R6-C | Rackmount Kit,4N2,DS14-Middle,-C,R6 | 12 | \$100.00 | 0 | \$100.00 | \$1,200.00 | |
| X6530-R6-C | Cable,Patch,FC SFP to SFP,0.5M,-C,R6 | 16 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| X6536-R6-C | Cable,Optical,50u,2GHz/KM/MM,LC/LC,5M,-C,R6 | 12 | \$150.00 | 0 | \$150.00 | \$1,800.00 | |
| X6539-R6-C | SFP,Optical,4.25Gb,-C,R6 | 8 | \$120.00 | 0 | \$120.00 | \$960.00 | |
| X800E-R6-C | Power Cable North America,-C,R6 | 24 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| DOC-3XXX-C | Documents,3XXX,-C | 1 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| FAS3040AS-BASE-R5-C | FAS3040A,IB,ACT-ACT,SAN,OS,-C,R5 | 2 | \$16,700.00 | 0 | \$16,700.00 | \$33,400.00 | |
| FCP | Onboard Target Ports,Quantity | 4 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| LOOPS | Storage Loops Attached Quantity | 4 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| MULTIPATH-C | Multipath configuration | 1 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| X74015B-ESH4-R5-C | DS14MK4 SHLF,AC,14x144GB,15K,B,ESH4,-C,R5 | 10 | \$27,418.00 | 0 | \$27,418.00 | \$274,180.00 | |
| SW-T4C-CLUSTERSAN-C | CFO Software,T4C,SAN Bndl | 2 | \$4,175.00 | 0 | \$4,175.00 | \$8,350.00 | |
| SW-T4C-FCPSAN-C | FCP Software,T4C,SAN Bndl | 2 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| SW-T4C-ISCSISAN-C | iSCSI Software,T4C,SAN Bndl | 2 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| SW-ONTAP4-3XXX | SW,DataONTAP4,3XXX | 2 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| SVC-A-IN-NBR-Z | HW Support,Premium,4hr,z | Mths: 36 | 1 | \$64,775.49 | 0 | \$64,775.49 | \$64,775.49 |
| SW-SSP-A-IN-NBR-Z | SW Subs,Standard Replace,Inst,NBD,z | Mths: 36 | 1 | \$3,006.00 | 0 | \$3,006.00 | \$3,006.00 |
| Storage Subtotal | | | | | | \$397,065.49 | |
| Host Attach Hardware and Software | | | | | | | |
| SW-DSM-MPIO-WINDOWS | | 1 | \$0.00 | 0 | \$0.00 | \$0.00 | |
| X6518A-R6 | Cable,Optical,LC/LC,5M,R6 | 4 | \$150.00 | 0 | \$150.00 | \$600.00 | |
| X1089A-R6 | HBA,QLogic QLE2462,2-Port,4Gb,PCI-e,R6 | 2 | \$2,615.00 | 0 | \$2,615.00 | \$5,230.00 | |
| SW-DSM-MPIO-WIN | Software,Data ONTAP DSM for Windows MPIO | 1 | \$1,000.00 | 0 | \$1,000.00 | \$1,000.00 | |
| SW-FAK-WIN | FCP Windows Host Utilities | 1 | \$75.00 | 0 | \$75.00 | \$75.00 | |
| SW-SSP-DSM-MPIO-WIN | SW Subs,Data ONTAP DSM for Windows MPIO | Mths: 36 | 1 | \$360.00 | 0 | \$360.00 | \$360.00 |
| X1611A-R5-C | Brocade 16-Port 200e FC Full Fab Switch,-C,R5 | 2 | \$8,700.00 | 0 | \$8,700.00 | \$17,400.00 | |
| Host Subtotal | | | | | | \$24,665.00 | |
| Total | | | | | | \$421,730.49 | |

Differences between the Tested Storage Configuration (TSC) and Priced Storage Configuration

There were no differences between the Tested Storage Configuration and the Priced Storage Configuration.

Benchmark Configuration/Tested Storage Configuration Diagram



Benchmark Configuration/Tested Storage Configuration Components

| Host System: | Tested Storage Configuration (TSC): |
|--|--|
| HS-1: IBM System x3650 | 2 – Qlogic QLE2462, 2-Port 4Gb PCIe, R6 HBAs (Host System) |
| Single quad core Xeon processor | 4 – Qlogic QLE2462, 2-Port 4Gb PCIe, R6 HBAs (2 per FAS3040 controller) |
| 2.33 GHz CPUs, 4096 KB cache per CPU | |
| 16 GB main memory | 2 – Brocade 16-Port 200e FC switches |
| Windows Server 2003 with SP2 | SC-1/SC-2: NetApp FAS3040 |
| Priced Host System Software: FCP Windows Host Utilities 3.0 for Native OS Data ONTAP® DSM 3.2 for Windows MPIO | 2 – FAS3040 Storage Controllers each with: 2 – AMD 2.5 GHz Opteron CPUs 4 GB main memory 512 KB L2 cache 512 MB NVRAM |
| PCIe | 2 FCP front-end connections |
| WG | 6 FCP backend connections |
| | 140 – 144 GB 15K RPM disk drives |