SPC BENCHMARK 1™

EXECUTIVE SUMMARY

NETWORK APPLIANCE, INC.

NETAPP FAS3040

SPC-1 V1.10.1

Submitted for Review: January 29, 2008
Submission Identifier: A00057
Revised: January 31, 2008

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Network Appliance, Inc. – http://www.netapp.com/ Steve Daniel – daniel@netapp.com 7301 Kit Creek Road Building 1 Research Triangle Park, NC 27709 Phone (919) 476-5726 FAX: (919) 476-
Test Sponsor Alternate Contact	Network Appliance, Inc. – http://www.netapp.com/ 4272Saad Jafri – saad@netapp.com 7301 Kit Creek Road Building 1 Research Triangle Park, NC 27709 Phone (919) 476-5541 FAX: (919) 476-4272
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

Revision Information and Key Dates	
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 revised FDR was submitted to the SPC **Inclusion of omitted capacities diagram: page 4**	January 31, 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.

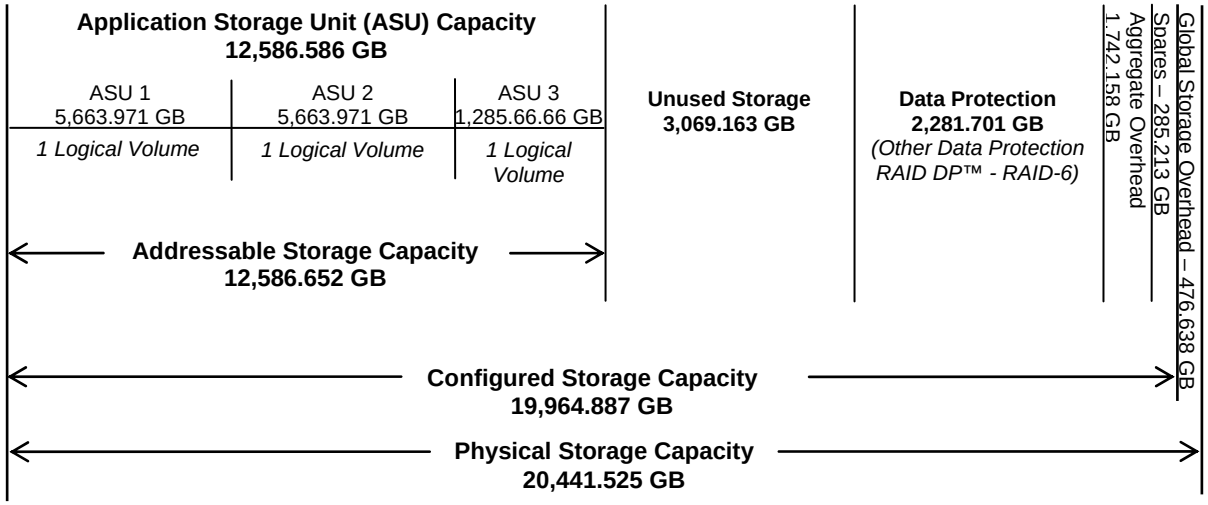
Total ASU (Application Storage Unit) **Capacity** represents the total storage capacity read and written in the course of executing the SPC-1 benchmark.

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

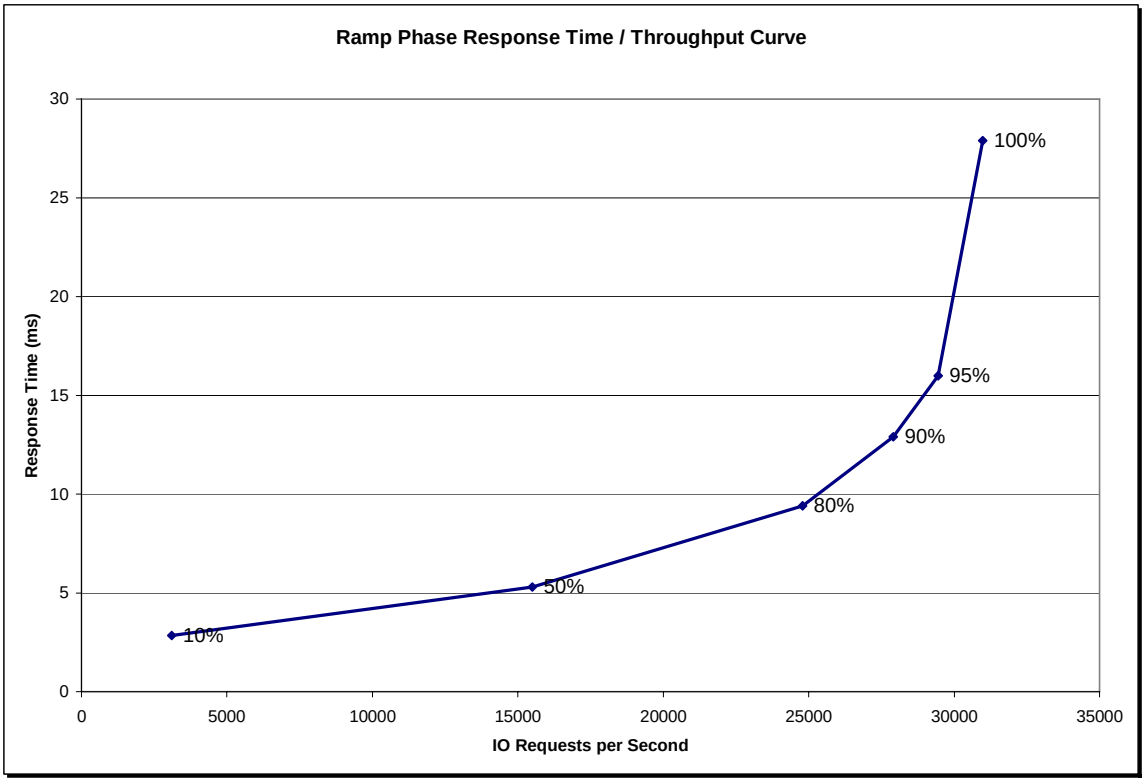
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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

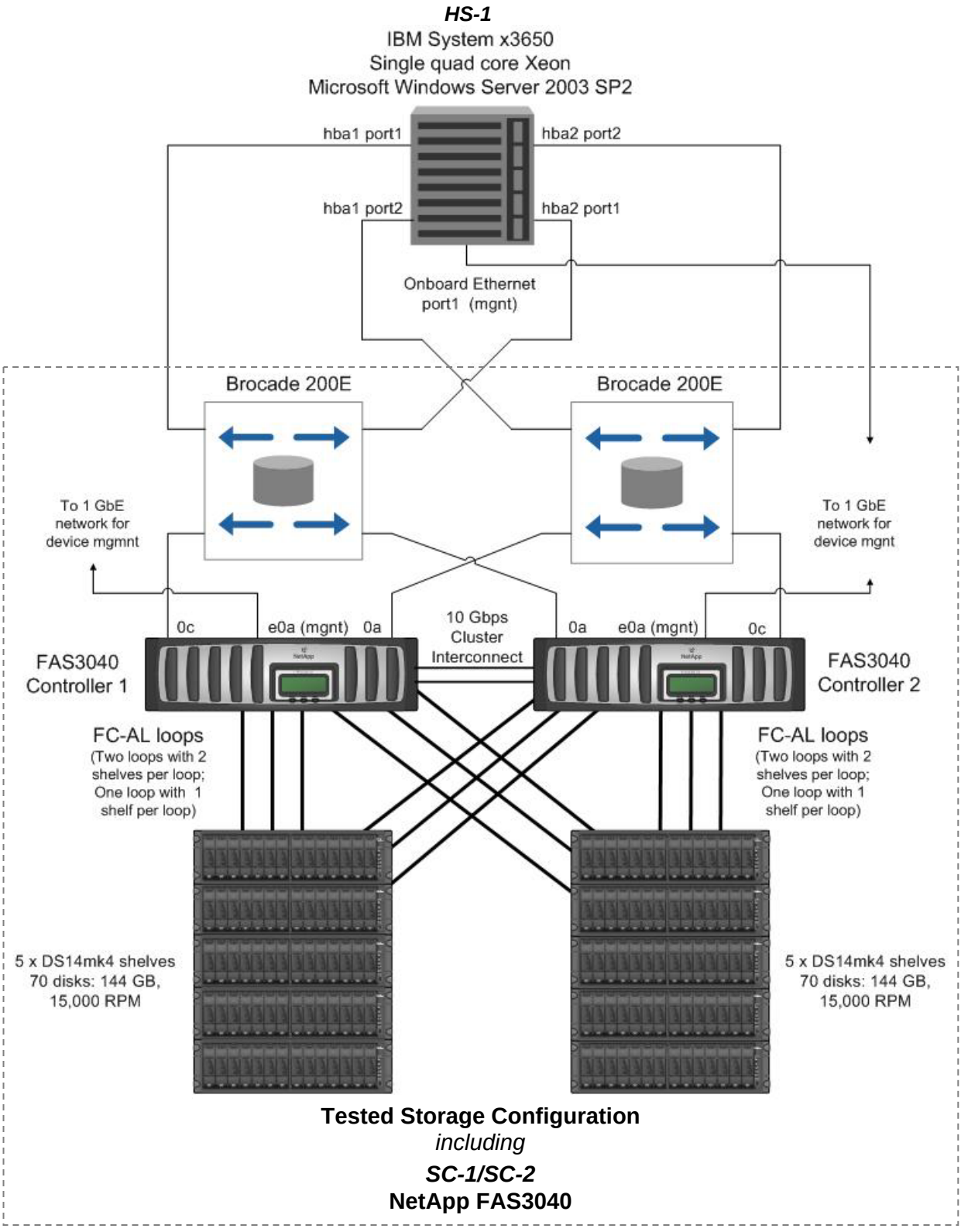
Tested Storage Configuration Pricing *(Priced Storage Configuration)*

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



Tested Storage Configuration
including
SC-1/SC-2
NetApp FAS3040

Benchmark Configuration/Tested Storage Configuration Components

<table>
<tr><th>Host System:</th><th>Tested Storage Configuration (TSC):</th></tr>
<tr><td>HS-1: IBM System x3650</td><td rowspan="3">2 – Qlogic QLE2462, 2-Port 4Gb PCIe, R6 HBAs
(Host System)
4 – Qlogic QLE2462, 2-Port 4Gb PCIe, R6 HBAs
(2 per FAS3040 controller)</td></tr>
<tr><td>Single quad core Xeon processor</td></tr>
<tr><td>2.33 GHz CPUs, 4096 KB cache per CPU</td></tr>
<tr><td>16 GB main memory</td><td>2 – Brocade 16-Port 200e FC switches</td></tr>
<tr><td>Windows Server 2003 with SP2</td><td rowspan="4">SC-1/SC-2: NetApp FAS3040
2 – FAS3040 Storage Controllers each with:
2 – AMD 2.5 GHz Opteron CPUs
4 GB main memory
512 KB L2 cache
512 MB NVRAM
2 FCP front-end connections
6 FCP backend connections</td></tr>
<tr><td>Priced Host System Software:
FCP Windows Host Utilities 3.0 for Native OS
Data ONTAP® DSM 3.2 for Windows MPIO</td></tr>
<tr><td>PCIe</td></tr>
<tr><td>WG</td></tr>
<tr><td></td><td>140 – 144 GB 15K RPM disk drives</td></tr>
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