SPC BENCHMARK 1™
EXECUTIVE SUMMARY

NETAPP, INC.
NETAPP FAS6240 *(CLUSTER)*

SPC-1 V1.12

Submitted for Review: June 18, 2012
Submission Identifier: A00115

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

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SPC-1 Specification revision number	V1.12
SPC-1 Workload Generator revision number	V2.3.0.0
Date Results were first used publicly	June 18, 2012
Date the FDR was submitted to the SPC	June 18, 2012
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	June 18, 2012

Tested Storage Product (TSP) Description

The NetApp FAS6200 Series is an enterprise-class storage system combining powerful scalability, availability, and performance. The FAS6240 is the middle of three high-end models *(FAS6210, FAS6240, FAS6280)*, which are differentiated by performance and scalability. These systems help customers to confidently meet service levels, drive operational excellence, and respond to future growth.

With NetApp® Data ONTAP® 8 operating in Cluster-Mode, FAS6200 systems deliver storage that is always on and massively scalable, with superior operational efficiency to help manage data, application, and infrastructure growth. Plus, NetApp's unified storage architecture with Data ONTAP's industry-leading storage efficiency enable the efficient consolidation of SAN, NAS, primary, and secondary storage on a single platform, helping lower costs. These FAS6200 systems can handle demanding business and technical applications as well as rapidly changing virtualized and cloud environments.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: NetApp FAS6240 *(cluster)*	
Metric	**Reported Result**
SPC-1 IOPS™	250,039.67
SPC-1 Price-Performance	$6.69/SPC-1 IOPS™
Total ASU Capacity	71,521.976 GB
Data Protection Level	Protected *(RAID DP™)*
Total TSC Price (including three-year maintenance)	$1,672,602.00

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

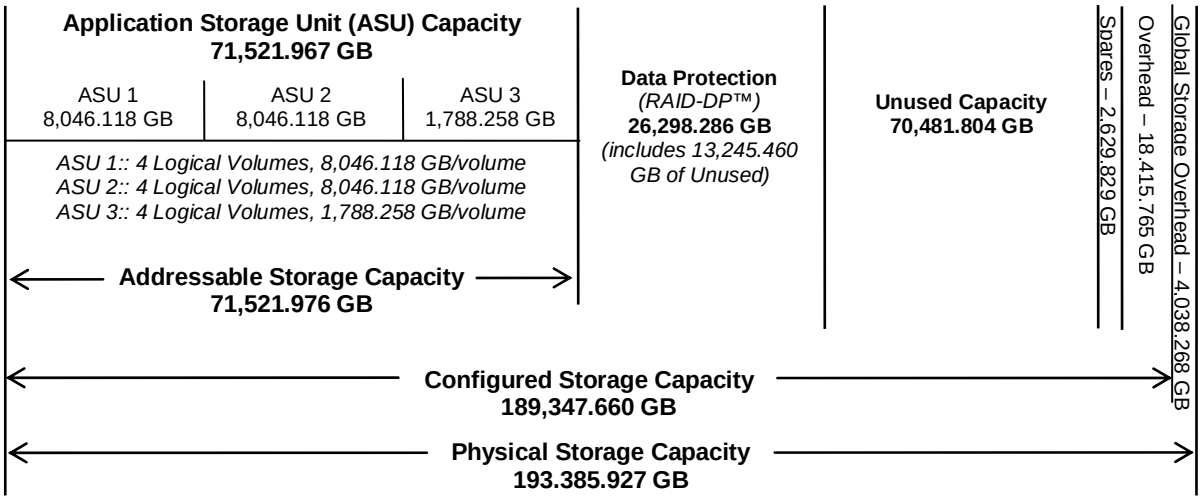
Total ASU (Application Storage Unit) **Capacity** represents the total storage capacity read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of **Protected** using 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, Relationships, and Utilization

The following diagram and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.



SPC-1 Storage Capacity Utilization	
Application Utilization	36.98%
Protected Application Utilization	43.83%
Unused Storage Ratio	43.20%

Application Utilization: Total ASU Capacity *(71,521.976 GB)* divided by Physical Storage Capacity *(193,385.927 GB)*

Protected Application Utilization: Total ASU Capacity *(71,521.976 GB)* plus total Data Protection Capacity *(26,298.286 GB)* minus unused Data Protection Capacity *(13,053.826 GB)* divided by Physical Storage Capacity *(193,385.927 GB)*

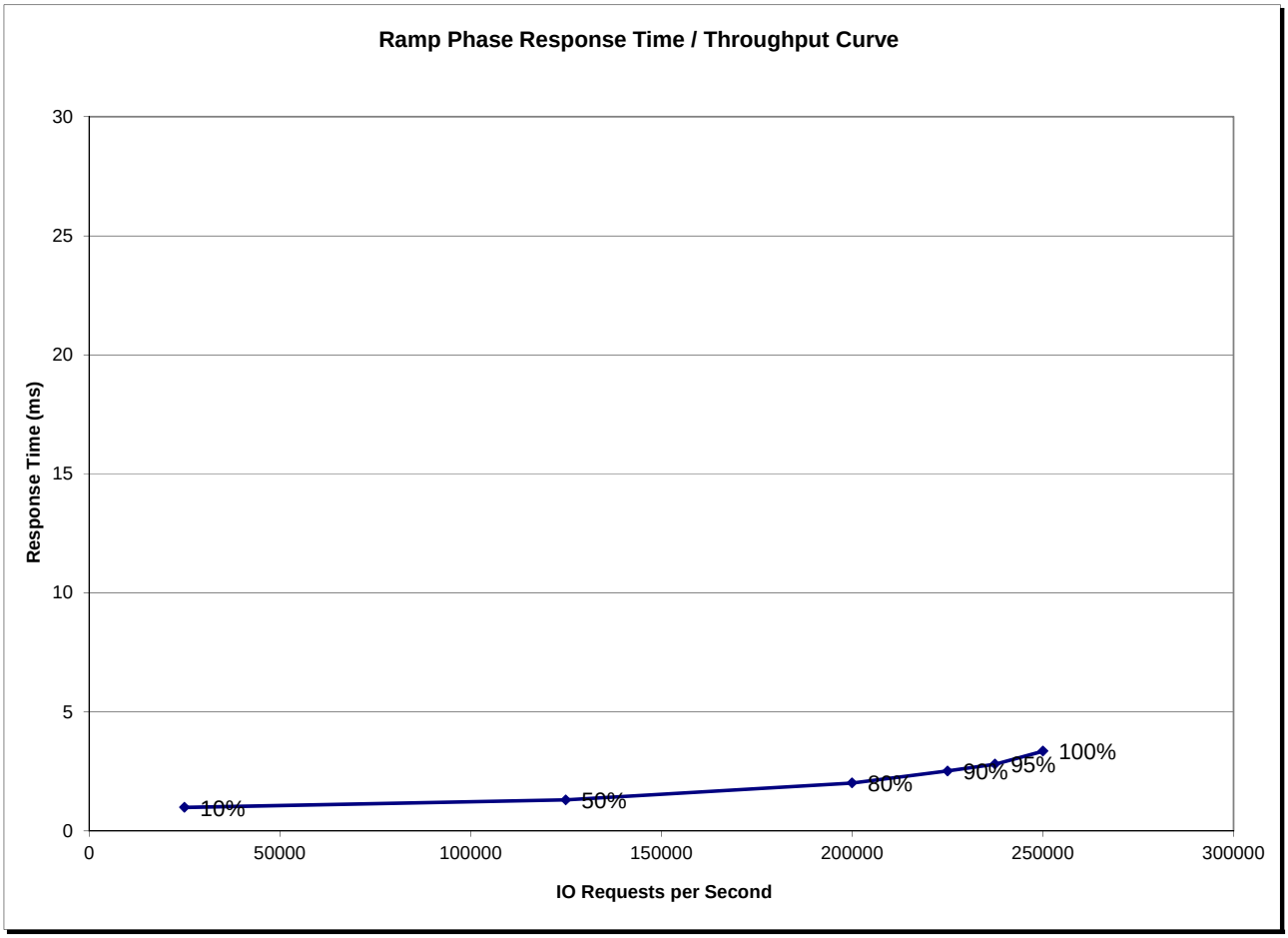
Unused Storage Ratio: Total Unused Capacity *(83,534.630 GB)* divided by Physical Storage Capacity *(193,385.927 GB)* and may not exceed 45%

Detailed information for the various storage capacities and utilizations is available on pages 21-22 in the Full Disclosure Report.

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	25,009.20	125,001.07	199,989.66	225,030.60	237,487.76	250,039.67
Average Response Time (ms):						
All ASUs	0.99	1.31	2.02	2.52	2.81	3.35
ASU-1	1.18	1.58	2.44	3.06	3.42	4.11
ASU-2	1.27	1.65	2.42	2.91	3.19	3.64
ASU-3	0.48	0.59	0.95	1.21	1.35	1.63
Reads	1.77	2.38	3.52	4.30	4.76	5.58
Writes	0.48	0.61	1.04	1.36	1.54	1.91

Priced Storage Configuration Pricing

	Description	Quantity	List Price	Extended List
FAS6240 (Cluster-Mode)	includes 512 GB FlashCache	6	$ 89,215	$ 535,290
DS4243-1507-24S-R5	DSK SHLF, 24x450GB, 15K, 3Gb SAS, IOM3, -C, R5	18	$ 48,489	$ 872,802
X-320-0008-R5	24-Pt Brocade 300 Full Fab FC 8Gbps, -C, R5 (FC Switch)	2	$ 2,939	$ 5,878
X1968-R5	ClusterNet Interconnect,20Pt,10Gb	2	$ 1	$ 2
X-SFP-H10GB-CU1M-R6	Cisco N5020 10GBase Copper SFP+cable, 1m, -C, R6 (for Cluster interconnect)	20	$ 80	$ 1,600
X1095A-R6	HBA,QLogic QLE2562,2-Port,8Gb,PCIe,R6	6	$ 2,005	$ 12,030
X6524-R6	LC-LC Optical cable connecting Host Qlogic HBA to FC switch (pair)	6	$ 125	$ 750
X6524-R6	LC-LC Optical cable connecting controller onboard FC target port to FC switch (pair)	6	$ 125	$ 750
X2065	4-port SAS cards connecting controller to DS4243 shelves	12	$ 2,000	$ 24,000
X6558-R6	Cable, SAS Cntlr-Shelf/Shelf-Shelf/HA, 2m, -C	48	$ 125	$ 6,000
X6559-R6	Cable, SAS Cntlr-Shelf/Shelf-Shelf/HA, 5m, -C	24	$ 170	$ 4,080
X8712C-R6	PDU, 1-Phase, 24 Outlet, 30A, NEMA, -C, R6	6	$ 550	$ 3,300
X870C-R6	Cab, Deep, Empty, No PDU, No Rails, -C	3	$ 3,550	$ 10,650
X8778-R6	Mounting Bracket, Tie-Down, 32X0, -C, R6	40	$ 50	$ 2,000
CS-A-INST-4R	3-years SupportEdge Standard Replace 4hr, Hardware Support			$ 149,097
PS install				$ 44,374
Total ($)				**$ 1,672,602**

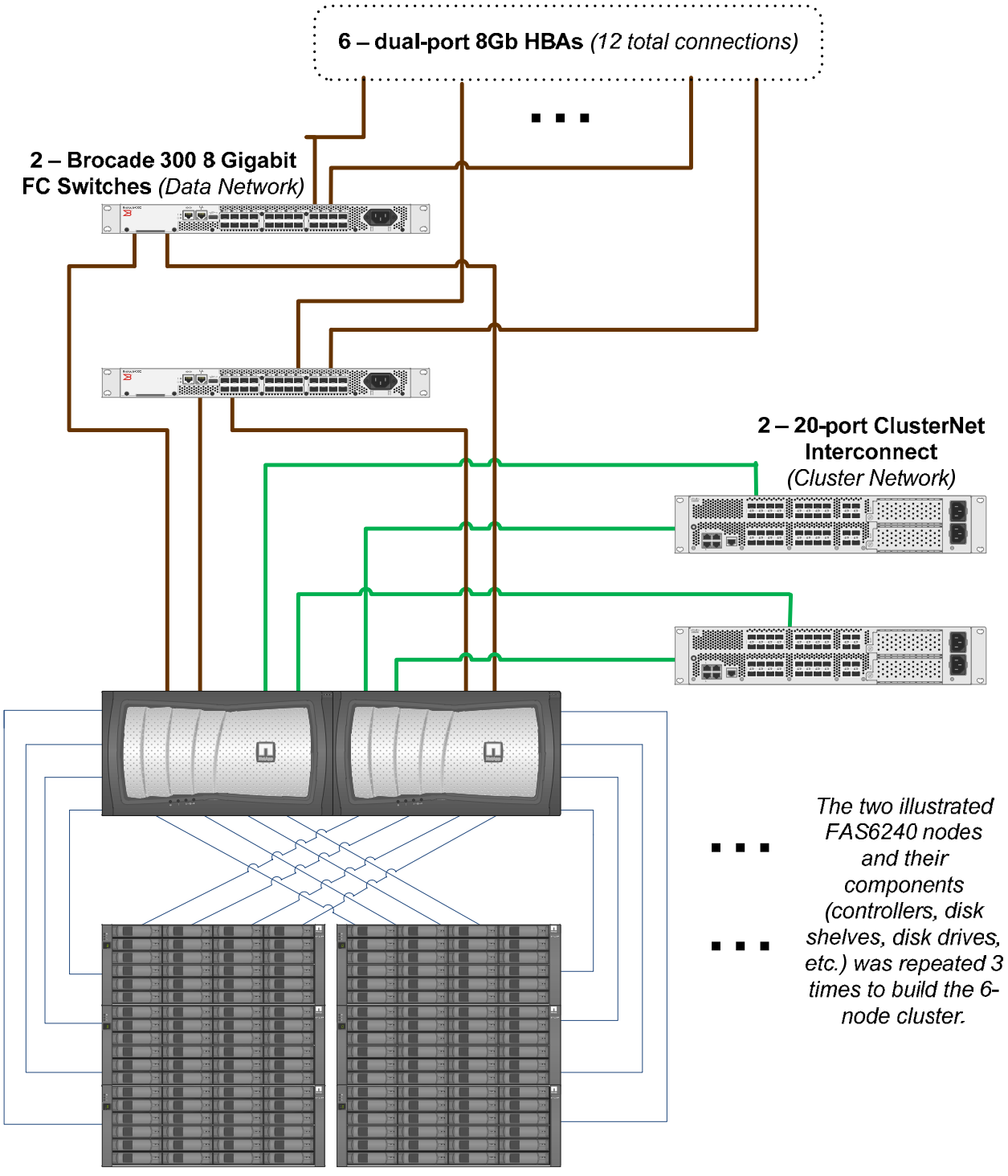
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems with four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration that can be remedied by the repair or replacement of a Priced Storage Configuration component.

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

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

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Priced Storage Configuration
6 – dual port 8 Gb FC HBAs
NetApp FAS6240 *(cluster)*   6 – controller nodes each with: 48 GB memory/cache   512 GB FlashCache   2 – FC 8Gb FC front-end connections *(12 total)*   8 – SAS backend connections *(48 total)*   *(in a Multipath High Availability (HA) configuration)*
Data ONTAP® 8.1.1
2 – 20-port 10Gb ClusterNet Interconnects *(Cluster Network)*
2 – Brocade 300 8 Gb 24-port switches *(Data Network)*,
12 – 4-port SAS cards *(controller nodes to DS4243 shelves)*
18 – DS4243 Disk Shelves
432 – 450 GB, 15K RPM SAS disk drives   24 disk drives per DS4243 Disk Shelf