



SPC BENCHMARK 1™
EXECUTIVE SUMMARY

NETWORK APPLIANCE, INC. (*TEST SPONSOR*)
EMC CLARION CX3 MODEL 40

SPC-1 V1.10.1

Submitted for Review: January 29, 2008

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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) 476-4272
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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 3	January 31, 2008
Date the TSC is available for shipment to customers	currently available
Date the TSC completed audit certification	January 29, 2008

Tested Storage Product (TSP) Description

The CX3-40 is the performance workhorse of EMC's CLARiiON CX3 UltraScale series. Featuring quad Xeon processors, 8 GB memory, quad 4 Gb/s back-end loops, and support for up to 240 drives, the CX3-40 appeals to commercial and enterprise customers with OLTP and messaging (e.g., Microsoft Exchange) workloads, and with larger requirements for array-based replication. Enterprise-class business continuance features include hot-pluggable redundant hardware, hot spare disk drives, multi-path failover, snapshots, cloning, local/remote mirroring, and non-disruptive firmware upgrades.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: EMC CLARiiON CX3 Model 40	
Metric	Reported Result
SPC-1 IOPS™	24,997.49
SPC-1 Price-Performance	\$20.72/SPC-1 IOPS™
Total ASU Capacity	8,465.016 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$517,851

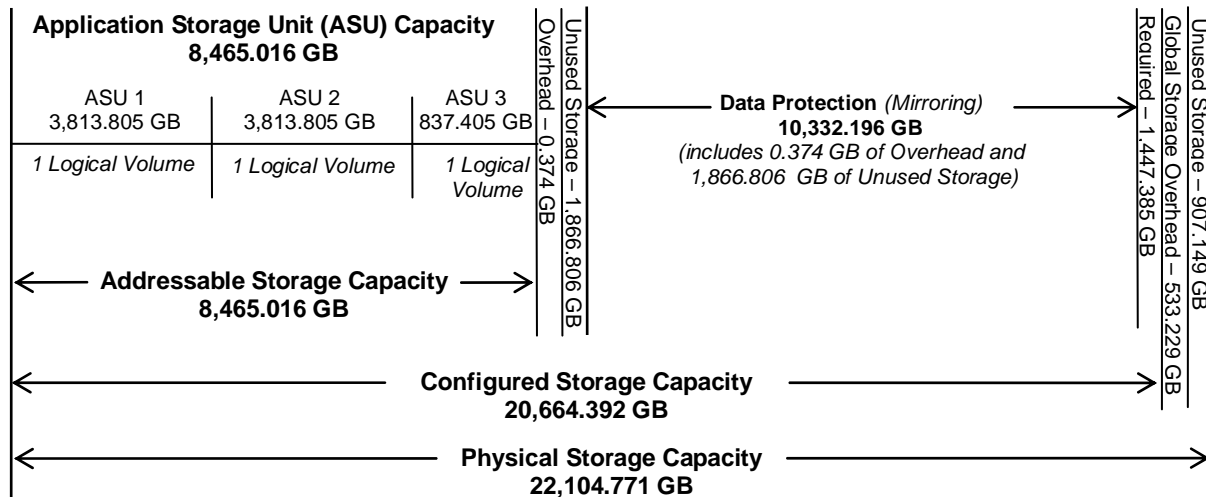
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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 Mirroring configures two or more identical copies of user data.

Storage Capacities and Relationships

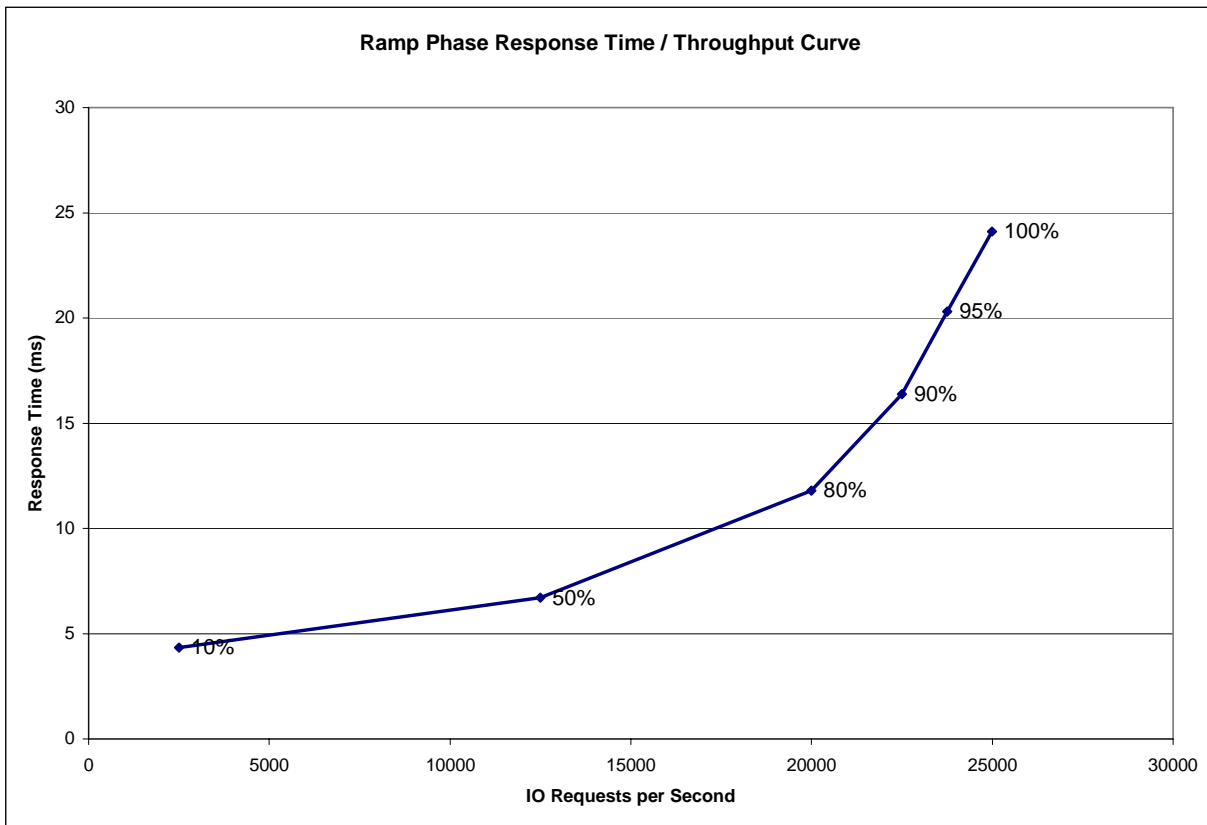
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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	2,498.36	12,498.52	20,001.97	22,497.69	23,757.01	24,997.49
Average Response Time (ms):						
All ASUs	4.34	6.72	11.79	16.37	20.31	24.12
ASU-1	5.71	8.68	14.72	20.22	25.21	30.06
ASU-2	5.69	9.14	17.46	23.59	28.43	32.41
ASU-3	0.83	1.50	3.12	5.04	6.37	7.88
Reads	4.23	6.34	10.87	15.25	19.32	23.35
Writes	4.41	6.96	12.39	17.10	20.95	24.61

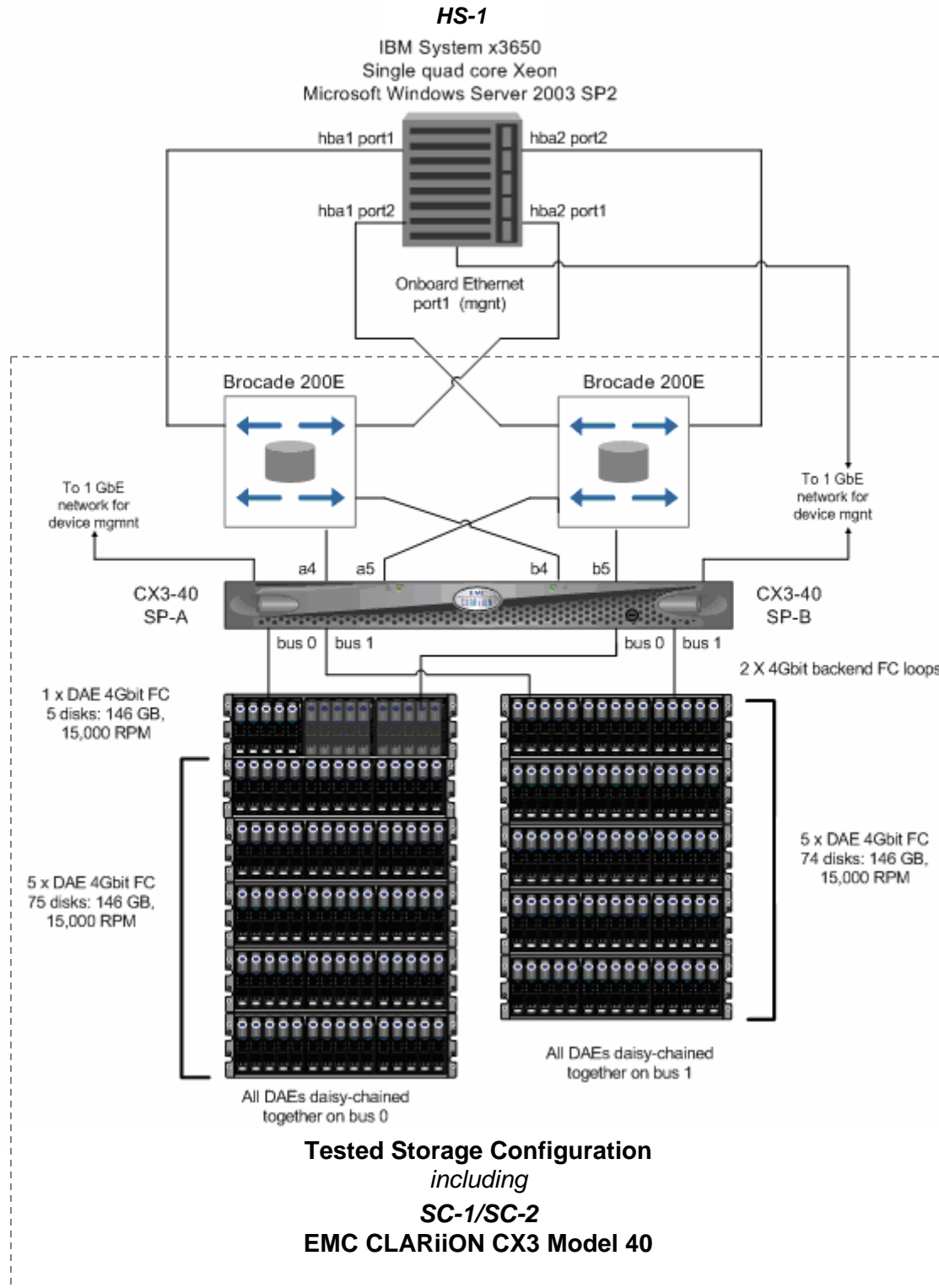
Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Qty	Product	U/M	Unit List	Discount	Total	Vendor
1	CX3-40C-FD - SPE-FIELD INSTALL	EA	\$42,300	0%	\$42,300	see attached third party quotation
11	CX-4PDAE-FD - 4G DAE FIELD INSTALL	EA	\$5,900	0%	\$64,900	see attached third party quotation
150	CX-4G15-146 - 146GB 15K 4GB FC	EA	\$1,645	0%	\$246,750	see attached third party quotation
1	V-CX4014615K - VAULT PACK CX3-40 146GB 15K 4GB DRIVES QTY 5	EA	\$8,225	0%	\$8,225	see attached third party quotation
4	FC2-HSSDC-8M - 8M HSSDC2 to HSSDC2 bus cbl	EA	\$600	0%	\$2,400	see attached third party quotation
1	PP-WN-KIT - POWERPATH WINDOWS KIT	EA	\$0	0%	\$0	see attached third party quotation
1	NAV-ENKIT - NAVI ENTERPRISE MEDIA	EA	\$0	0%	\$0	see attached third party quotation
8	NAVAGT-WINKIT - NAVI AGENT WINDOWS MEDIA	EA	\$0	0%	\$0	see attached third party quotation
8	UTIL-WIN - Windows Software Utilities	EA	\$40	0%	\$320	see attached third party quotation
1	CX34C-KIT - CS3-40C DOCS AND RTU KIT	EA	\$0	0%	\$0	see attached third party quotation
1	C-MODEM-US - CLARIION SERVICE MODEM-US	EA	\$0	0%	\$0	see attached third party quotation
1	NAV34-EN - NAVI MGR CX3-40 ENTPR LIC	EA	\$58,000	0%	\$58,000	see attached third party quotation
1	PP-WN-WG - PPATH WINDOWS WGR	EA	\$1,440	0%	\$1,440	see attached third party quotation
1	PS-BAS-PP1 - POWERPATH 1HOST QS	EA	\$1,330	0%	\$1,330	see attached third party quotation
1	PS-BAS-PMBLK - POWERPATH 1HOST QS	EA	\$1,970	0%	\$1,970	see attached third party quotation
1	M-PRESW-001- premium software support	EA	\$33,929	0%	\$33,929	see attached third party quotation
1	M-PRESW-004 - premium software support - open SW	EA	\$777	0%	\$777	see attached third party quotation
1	WU-PREHW-001- premium hardware support	EA	\$31,317	0%	\$31,317	see attached third party quotation
2	QLA2462-E-SP - 2 PORT 4GB PCI-X	EA	\$1,700	0%	\$3,400	see attached third party quotation
2	Brocade 16-Port 200e FC Full Fab Switch,-C,R5	EA	\$8,700	0%	\$17,400	Network Appliance, Inc.
2	BSWITCH-16PORT-R5 HW Support,Premium,4hr,y mths:36	EA	\$1,697	0%	\$3,393	Network Appliance, Inc.
2	BSWITCH-16PORT-R5 SW Subs,Premium,4hr,y mths:36	EA	\$0	0%	\$0	Network Appliance, Inc.
Hardware Total					\$385,375	
Software Total					\$59,760	
Services Total					\$3,300	
prepaid software maintenance (3YR-4HOUR)					\$34,706	
hardware warranty upgrade summary (3YR 4HOUR)					\$34,710	
Total Price					\$517,851	

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

The Tested Storage Configuration contained 154 disk drives and the Priced Storage Configuration contained 155 disk drives.

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 QLA2462-E, 2-Port, 4Gb, PCI-X HBAs
Single quad core Xeon processor	2 – Brocade 16-Port 200e FC switches
3 GHz CPUs, 8 MB cache per CPU	SC-1/SC-2: EMC CLARiiON CX3 Model 40
18 GB main memory	2 – storage controllers each with:
Windows Server 2003 with SP2	2 – Intel Xeon 2.8 GHz processors
Priced Host System Software: Navisphere Powerpath Windows Kit 5.0	FLARE 03.26.040.5.005
PCI-X	4 GB main memory and cache
WG	2 – 4Gb/s front-end ports
	2 – 4Gb/s backend ports
	154 – 146 GB 15K RPM disk drives