



**SPC BENCHMARK 1C™
EXECUTIVE SUMMARY**

**LSI CORPORATION
LSI MEGARAID SAS 8888ELP (24 DISKS)**

SPC-1C™ V1.1

**Submitted for Review: December 10, 2008
Submission Identifier: C00008**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Test Sponsor Primary Contact	LSI Corporation – http://www.lsi.com Charles Gimarc – charles.gimarc@lsi.com 4420 ArrowsWest Dr. Colorado Springs, CO 80907 Phone: (719) 533-7427 FAX: (719) 533-7183
Test Sponsor Alternate Contact	LSI Corporation – http://www.lsi.com Mark Regester – mark.regester@lsi.com 3718 N. Rock Road Wichita, KS 67226 Phone: (316) 636-8340 FAX: (316) 636-8554
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-1C Specification revision number	V1.1
SPC-1C Workload Generator revision number	V1.0
Date Results were first used publicly	December 10, 2008
Date the FDR was submitted to the SPC	December 10, 2008
Date the TSC is available for shipment to customers	currently available
Date the TSC completed audit certification	December 8, 2008

Tested Storage Product (TSP) Description

The MegaRAID SAS 8888ELP, a second generation SAS RAID product, addresses the business demands of data availability, data protection, and performance. The adapter features the LSI SAS 1078, an I/O storage engine that performs data protection, data checking, and data restoration. The adapter employs selectable connectors, enabling it to serve three deployment scenarios: two internal, two external, or one of each. Up to 240 disks can be attached, all SAS, all SATA, or a combination of both. A RAID data cache of 512 MB is available with two battery backup options. The adapter uses a 500 MHz Power PC embedded processor, 667 MHz data cache, 8 lanes of PCI express, and eight 3 Gb/s SAS links to provide class-leading I/O performance. RAID levels 0, 1, 5, and 6 are configurable, as are RAID spans 10, 50, and 60.

Summary of Results

SPC-1C Results	
Tested Storage Configuration (TSC) Name: LSI MegaRAID SAS 8888ELP (24 disks)	
Metric	Reported Result
SPC-1C IOPS™	4,234.44
Total ASU Capacity	293.618 GB
Data Protection Level	Protected (RAID-5)
Total Price	\$9,597.13

SPC-1C 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-1C benchmark.

A **Data Protection Level of Protected (RAID-5)** provides data protection by distributing check data corresponding to user data across multiple disks in the form of bit-by-bit parity.

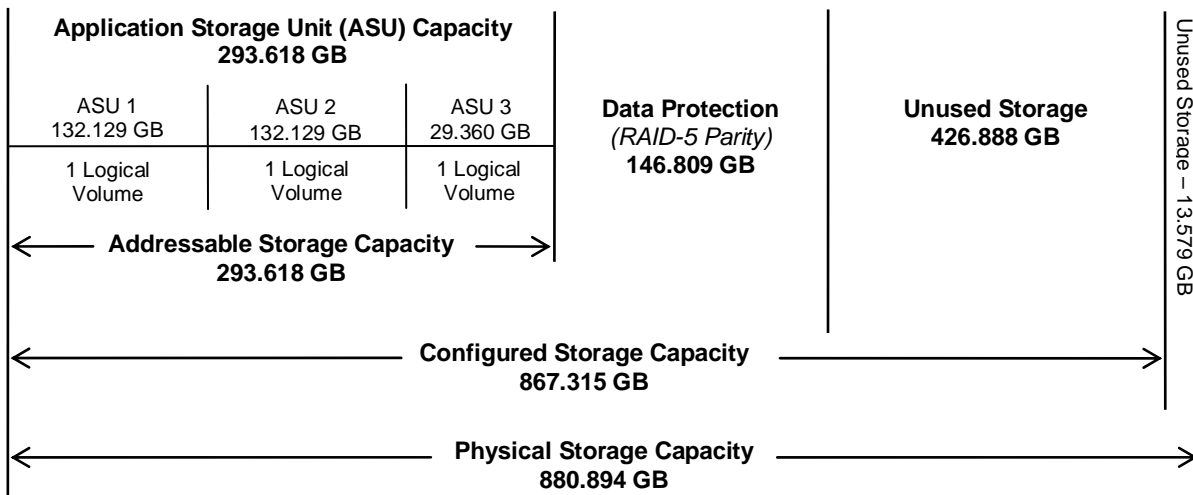
Storage Capacities and Relationships

The Tested Storage Configuration (TSC) must be configured so that there is either no Unused Storage or that the sum of Total ASU Capacity and storage required for data protection equals 50% (+-1 GiB) of the Physical Storage Capacity. This configuration meets the 50% requirement as documented below:

$$880.894 \text{ GB (Physical Storage Capacity)} * 0.5 = 440.447 \text{ GB}$$

$$293.618 \text{ GB (Total ASU Capacity)} + 146.809 \text{ GB (data protection)} = 440.427 \text{ GB}$$

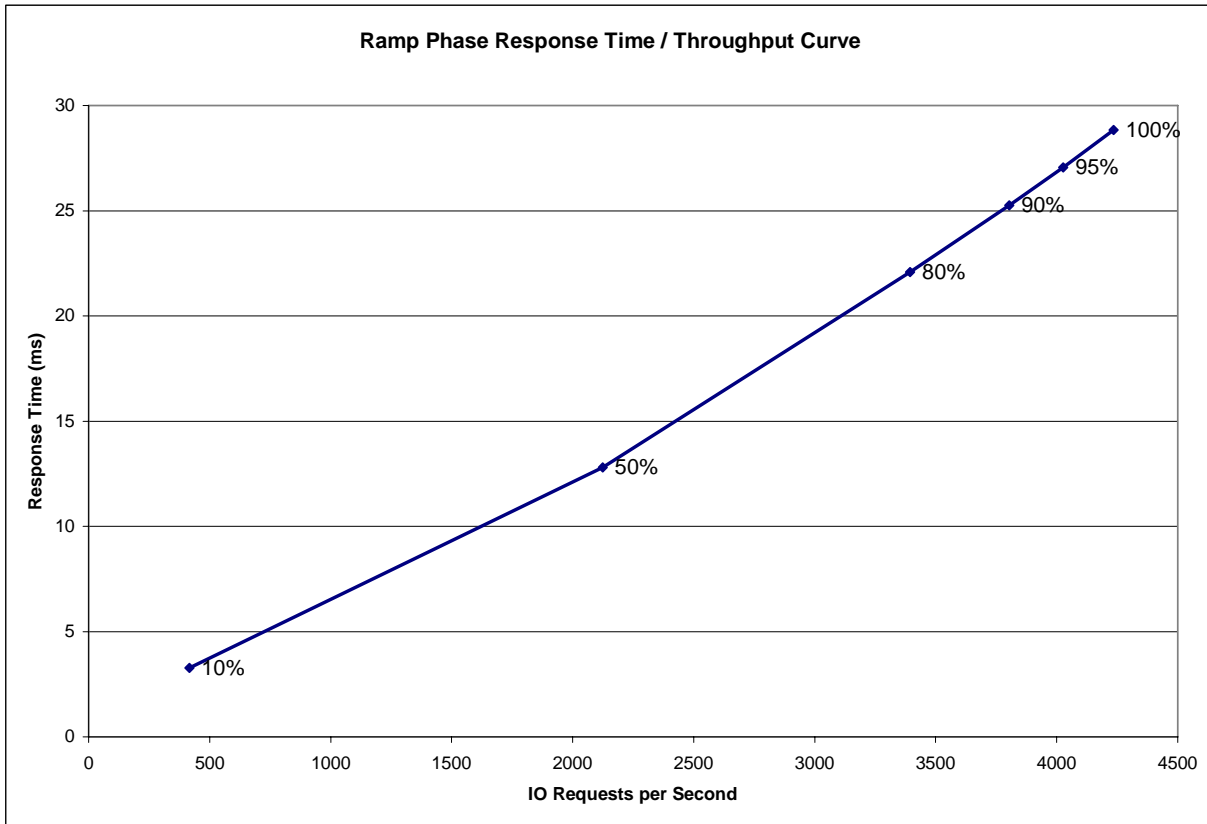
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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	416.69	2,124.08	3,394.49	3,803.27	4,025.56	4,234.44
Average Response Time (ms):						
All ASUs	3.27	12.80	22.09	25.26	27.06	28.83
ASU-1	4.00	14.10	24.29	27.69	29.71	31.56
ASU-2	4.90	21.44	37.75	43.72	46.40	50.09
ASU-3	1.02	6.27	10.57	12.01	12.92	13.72
Reads	7.03	25.05	42.77	48.71	52.19	55.54
Writes	0.81	4.82	8.63	9.96	10.64	11.45

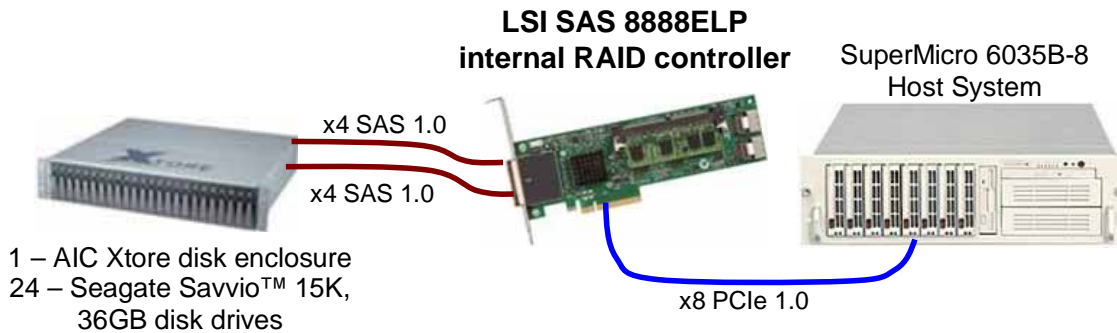
Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Component Description	Part Number	Qty	Price	Extd Price
MegaRAID Adapter	SAS 8888ELP	1	789.99	789.99
AIC 24-disk Enclosure	XJ-SA26-224R	1	2,087.14	2,087.14
Seagate Savvio 15K.1 disk	ST936751SS	24	276.00	6,624.00
External mini SAS Cable	SA-8888-1m	2	48.00	96.00
			Total Cost	9,597.13

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):
SuperMicro 6035B-8 2 – 2.66 GHz Intel Xeon x5355 processors 32+32 KB L1 cache per core 4 MB L2 cache per die	1 – LSI MegaRAID SAS 8888ELP internal RAID controller with: 512 MB cache 1 - x8 PCIe 1.0 host connect 2 - x8 3 Gb/s SAS 1.0 disk connect
8 GB main memory	
Windows 2003 Enterprise Edition	1 – AIC Xtore XJ-SA260224R-s disk enclosure
PCIe 1.0	24 – Seagate Savvio™ 15K, 36 GB SAS disks
	2 – x4 external SAS cables