



**SPC BENCHMARK 1™  
EXECUTIVE SUMMARY**

**IBM CORPORATION  
IBM SYSTEM STORAGE  
DS4700 EXPRESS MODEL**

**SPC-1 V1.10**

**Submitted for Review: August 21, 2006**

**Submission Identifier: A00046**

**Accepted: October 20, 2006**

**Revised: June 27, 2007**



**EXECUTIVE SUMMARY****Test Sponsor and Contact Information**

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**Revision Information and Key Dates**

<b>Revision Information and Key Dates</b>	
<b>SPC-1 Specification revision number</b>	V1.10
<b>SPC-1 Workload Generator revision number</b>	V2.00.04a
<b>Date Results were first used publicly</b>	August 21, 2006
<b>Date the FDR was submitted to the SPC</b>	August 21, 2006
<b>Date revised FDR was submitted to the SPC</b> Revised pricing and SPC-1 Price-Performance	June 27, 2007
<b>Date the TSC is available for shipment to customers</b>	currently available
<b>Date the TSC completed audit certification</b>	August 21, 2006

### Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: IBM System Storage DS4700 Express Model	
Metric	Reported Result
SPC-1 IOPS™	17,195.84
SPC-1 Price-Performance	\$11.67/SPC-1 IOPS™
Total ASU Capacity	1,963.270 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$200,666

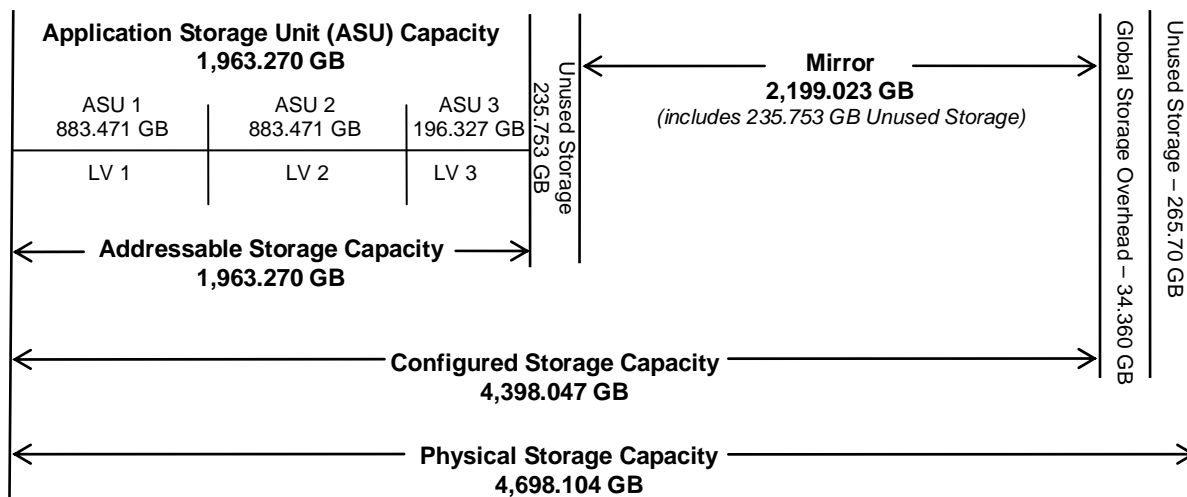
**SPC-1 IOPS™** represents the maximum I/O Request Throughput at the 100% load point.

**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

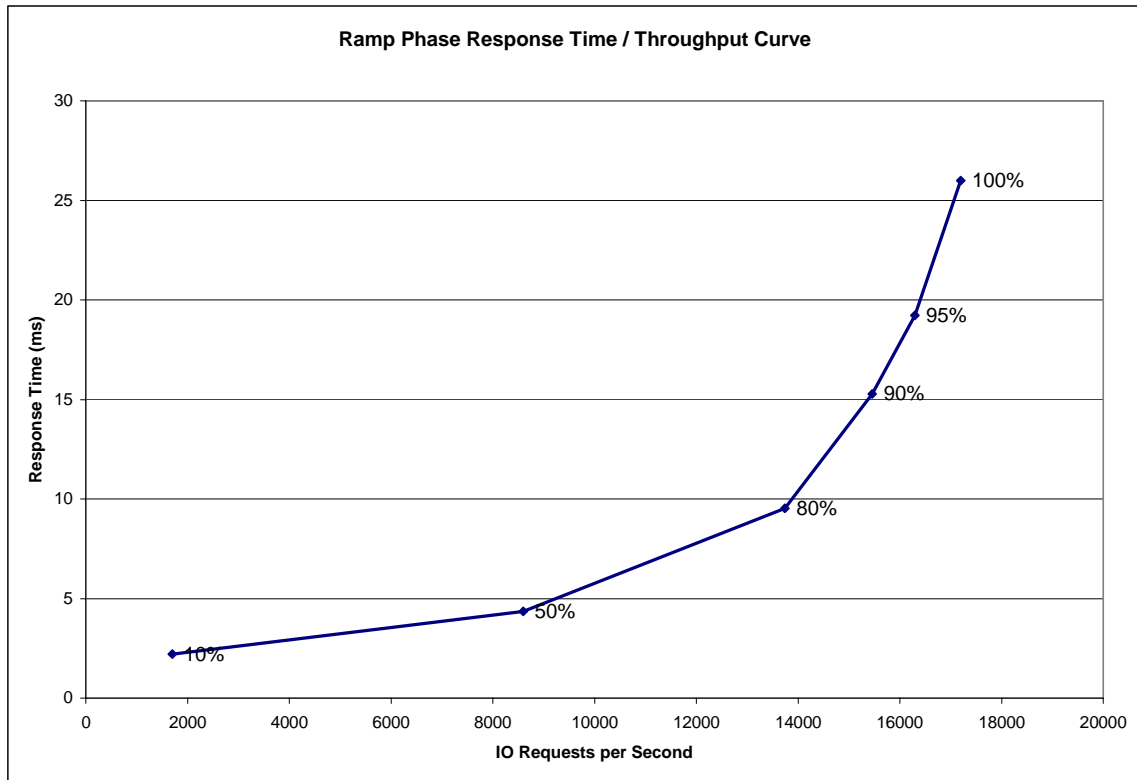
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



### 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
<b>I/O Request Throughput</b>	1,699.56	8,598.17	13,742.20	15,457.48	16,293.51	17,195.84
<b>Average Response Time (ms):</b>						
All ASUs	2.20	4.35	9.54	15.27	19.22	26.00
ASU-1	2.71	5.30	10.43	15.59	19.07	25.30
ASU-2	3.31	6.57	14.93	22.72	27.89	36.34
ASU-3	0.62	1.34	5.29	11.34	15.74	22.95
Reads	4.70	9.06	16.34	21.95	25.50	32.26
Writes	0.57	1.27	5.11	10.93	15.13	21.92

### Tested Storage Configuration Pricing (*Priced Storage Configuration*)

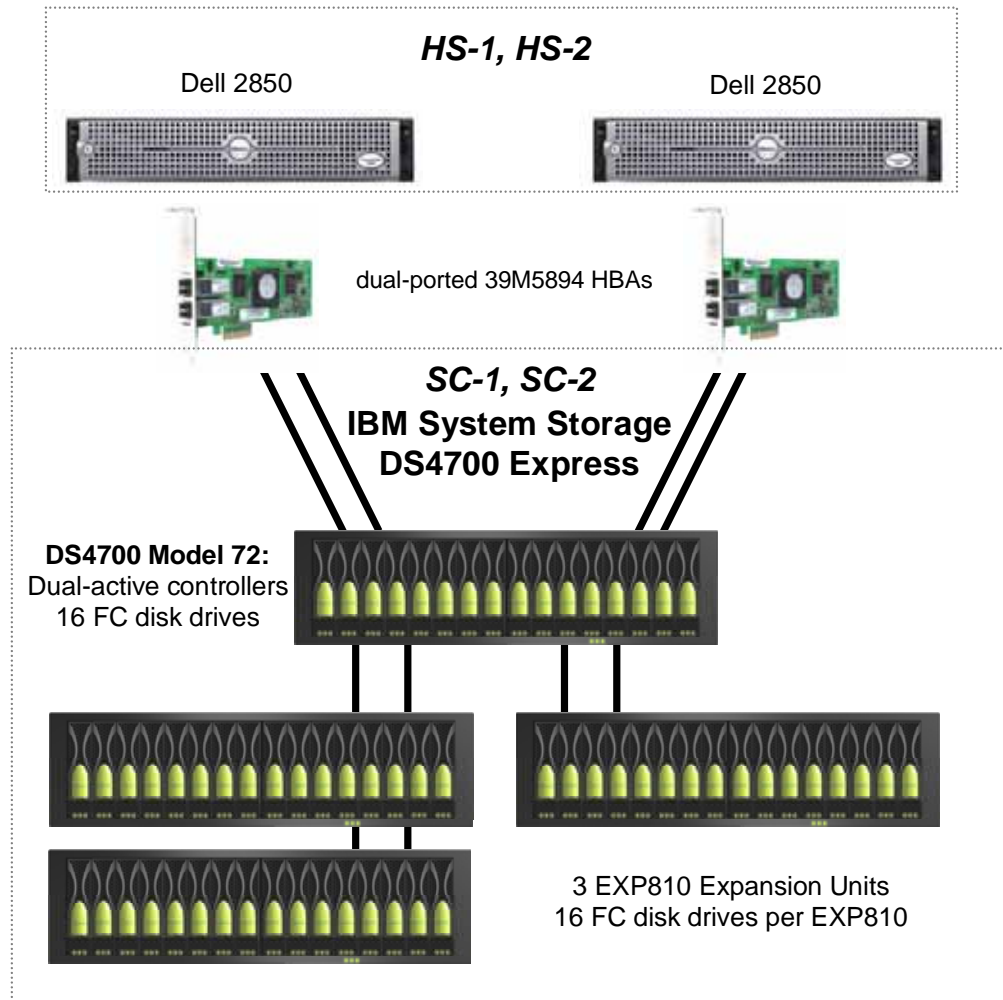
Product	Quantity	List Price each	extended list price
DS4700 Model 72 with: 8 storage partitions Windows Host Kit	1	\$44,250	\$44,250
DS4000 EXP810 Expansion Unit	3	\$6,000	\$18,000
Dual ported 39M5894 HBAs	2	\$2,485	\$4,970
73 GB x15K RPM disk drives	64	\$1,679	\$107,456
1m Fiber Optic Cable LC-LC	10	\$79	\$790
annual 24x7x4hr upgrade	3	\$8,400	\$25,200
<b>TOTAL</b>			<b>\$200,666</b>

Maintenance/support is provided 24 hours per day, 7 days per week for three years with four hour acknowledgement and four hour subsequent response (support engineer onsite or customer replaceable part available).

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

Each disk drive in the Priced Storage Configuration is mounted in an IBM drive carrier and configured to self-identify as a DS4000 brand.

**Benchmark Configuration/Tested Storage Configuration Diagram**



Host System:	Tested Storage Configuration (TSC):
<b>UID=HS-1, HS-2</b>	2 – 39M5894 HBAs (1 per Host System)
2 – Dell 2850 Servers each server configured with:	<b>UID=SC-1, SC-2:</b> <b>IBM System Storage DS4700 Express Model</b>
2 – 3.6 GHz Pentium 4 Xeon CPUs 2 MB L2 cache per CPU	Dual active RAID Controller 2 GB RAM per controller
3 GB main memory	8 – 4Gb Fibre Channel host connections (4 used)
Windows 2003 Enterprise Edition SP1	4 – 4Gb Fibre Channel drive connections
PCI-X	3 – DS4000 EXP810 Expansion Units
WG	64 – 73 GB 15K RPM disk drives