



**SPC BENCHMARK 1™  
EXECUTIVE SUMMARY**

**IBM CORPORATION  
IBM SYSTEM STORAGE DS8300 TURBO**

**SPC-1 V1.10.1**

**Submitted for Review: December 5, 2006  
Submission Identifier: A00049**

**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>	V1.10.1
<b>SPC-1 Workload Generator revision number</b>	V2.00.04a
<b>Date Results were first used publicly</b>	December 5, 2006
<b>Date the FDR was submitted to the SPC</b>	December 5, 2006
<b>Date the TSC is available for shipment to customers</b>	currently available
<b>Date the TSC completed audit certification</b>	December 4, 2006

## **Tested Storage Product (TSP) Description**

The IBM System Storage DS8300 Turbo is a high-performance, high capacity storage system designed to deliver scalability, resiliency and total value. Created specifically for the mission-critical workloads of medium and large enterprises, the DS8300 Turbo can help consolidate system storage, support tiered storage requirements, simplify storage management, and support system availability to address the need of businesses operating in an on demand world.

The DS8300 Turbo supports non-disruptive microcode changes, designed to help maintain data availability, and uses 64-bit IBM POWER5 microprocessors in a dual 4-way processor complex to help reduce cycle time and accelerate response times, giving users fast access to vital information. It also features many redundant, hot-swappable components to help support continuous operations. Furthermore, each system is built to monitor its internal functions. If a potential problem is detected, the DS8300 Turbo can automatically “call home” to alert service personnel that a potential problem could be developing.

The DS8300 Turbo supports 4 Gbps FC/IBM FICON® high bandwidth connectivity for fast access to data and scales up to 320 TB of physical capacity that can be accessed by a wide variety of servers. To help accommodate ongoing workload fluctuations, the DS8300 Turbo supports the addition or deletion of volumes “on-the-fly” to help meet sudden spikes in demand or to react to other changes.

The DS8300 Turbo is a modular system that is designed to be built upon and upgraded from one model to another in the field, helping organizations respond swiftly to changing business requirements. Additional information for the IBM System Storage DS8300 Turbo is available at <http://www-03.ibm.com/servers/storage/disk/ds8000/index.html>.

### Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: IBM System Storage DS8300 Turbo	
Metric	Reported Result
SPC-1 IOPS™	123,033.40
SPC-1 Price-Performance	\$18.99/SPC-1 IOPS™
Total ASU Capacity	9,103.360 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$2,336,626.45

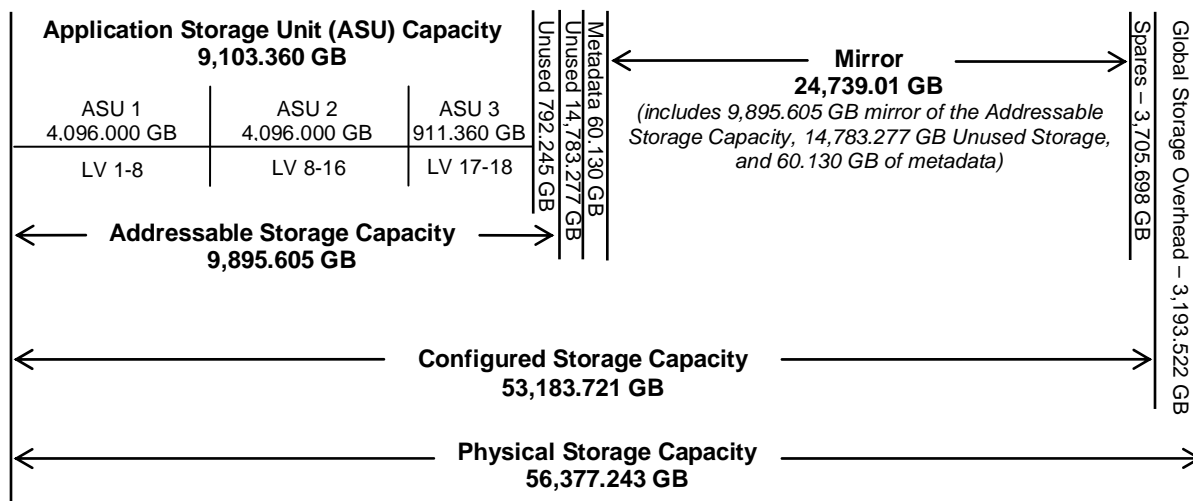
**SPC-1 IOPS™** represents the maximum I/O Request Throughput at the 100% load point.

**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

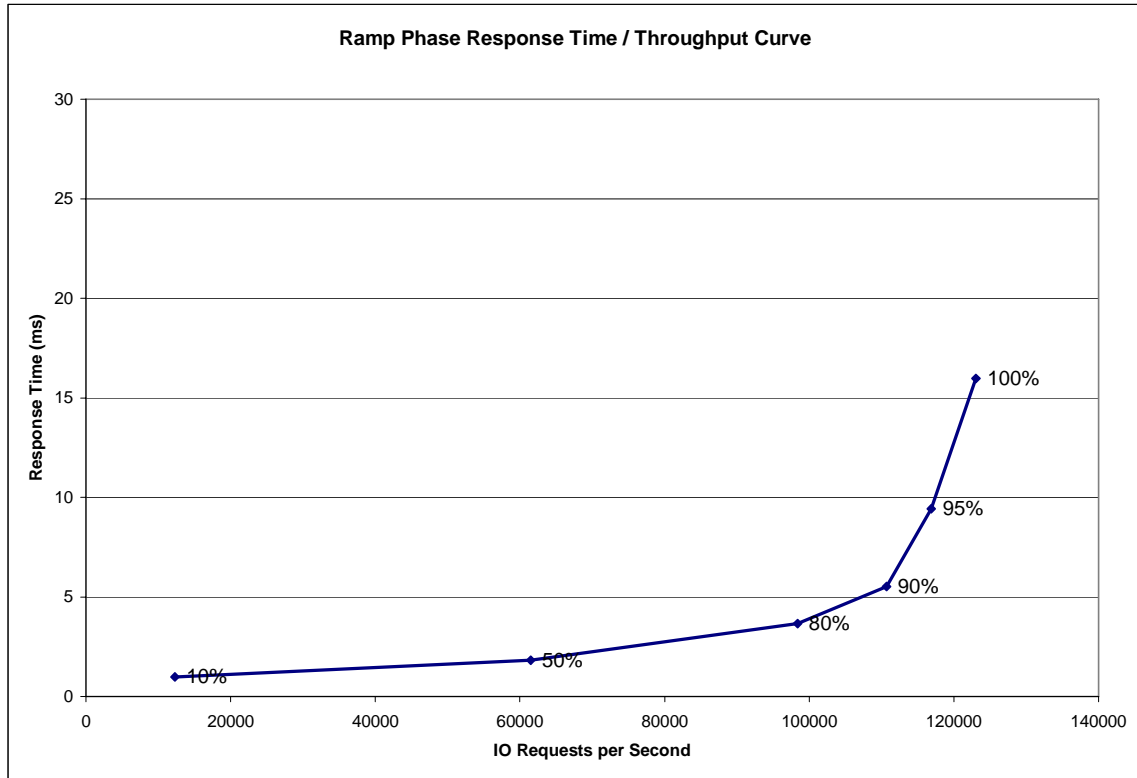
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



### 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>	12,298.48	61,518.29	98,394.87	110,690.96	116,868.86	123,033.40
<b>Average Response Time (ms):</b>						
All ASUs	0.99	1.83	3.67	5.53	9.44	15.96
ASU-1	1.19	1.92	3.43	5.23	8.96	15.35
ASU-2	1.35	2.22	3.99	5.89	9.60	15.55
ASU-3	0.40	1.47	4.04	5.99	10.36	17.45
Reads	1.99	3.29	5.60	7.65	11.51	17.88
Writes	0.34	0.88	2.42	4.14	8.08	14.71

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

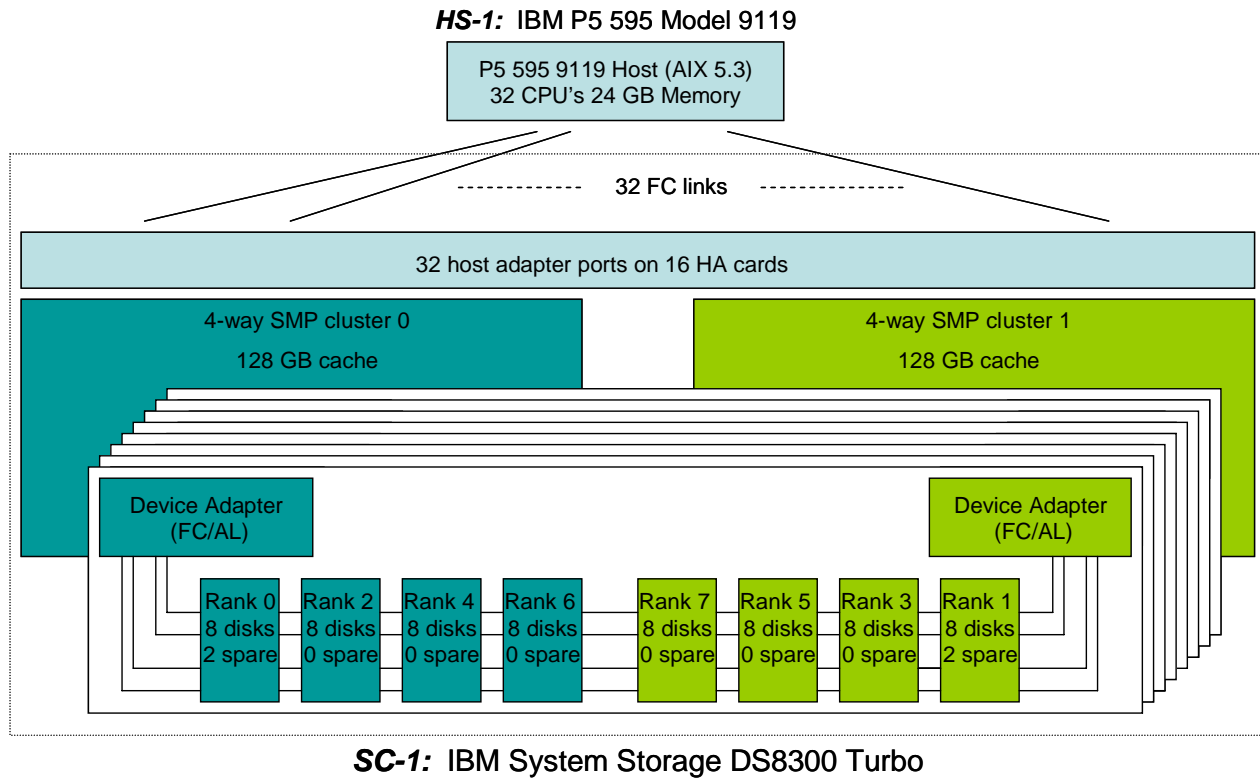
Product	Description	Quantity	Unit Price	Unit Maint/mo.	Ext. Price	w/ 3yr maint	% discount	w/ discount
2421-932	System Storage DS8300	1	\$114,945.00	\$1,200.00	\$114,945.00	\$143,745.00	25	\$107,808.75
	1 9xE factory merge	2	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	321 932 - 92E Position 1	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	322 932 - 92E Position 2	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	700 OEL Indicator	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	820 50.1 to 75.0 TB capacity	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	900 Non-Standby CoD	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	1050 Battery Assembly	3	\$1,700.00	\$0.00	\$5,100.00	\$5,100.00	25	\$3,825.00
	1090 Line Cord (US/LA/AP/Canada)	1	\$1,900.00	\$0.00	\$1,900.00	\$1,900.00	25	\$1,425.00
	1100 Management Console Internal	1	\$7,480.00	\$70.00	\$7,480.00	\$9,160.00	25	\$6,870.00
	1210 Disk Enclosure Pair	4	\$10,000.00	\$0.00	\$40,000.00	\$40,000.00	25	\$30,000.00
	1211 Disk Drive Cable Group 1	1	\$1,000.00	\$0.00	\$1,000.00	\$1,000.00	25	\$750.00
	1300 I/O Enclosure Pair	2	\$10,340.00	\$60.00	\$20,680.00	\$23,560.00	25	\$17,670.00
	1313 RIO-G Cable Group 3	1	\$1,600.00	\$0.00	\$1,600.00	\$1,600.00	25	\$1,200.00
	1421 9 um Fibre Cable (LC/SC)	8	\$100.00	\$0.00	\$800.00	\$800.00	25	\$600.00
	2016 73 GB 15K Drive Set (16 drives per drive set)	8	\$22,220.00	\$105.00	\$177,760.00	\$197,920.00	25	\$148,440.00
	3011 Device Adapter Pair	4	\$10,000.00	\$0.00	\$40,000.00	\$40,000.00	25	\$30,000.00
	3111 2Gb SW FCP/FICON Adapter	8	\$18,880.00	\$45.00	\$151,040.00	\$159,680.00	25	\$119,760.00
	4115 256 GB Processor Memory	1	\$753,920.00	\$1,280.00	\$753,920.00	\$784,640.00	25	\$588,480.00
	7001 OEL - 1 TB indicator	2	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	7002 OEL - 5 TB indicator	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	7005 OEL - 50 TB indicator	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	9090 AC Voltage: 200V - 240V	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	9100 MC Keyboard - US English	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
2396-LFA	DS8000 Function Authorization	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	7001 OEL - 1 TB Unit	2	\$6,497.65	\$0.00	\$12,995.30	\$12,995.30	25	\$9,746.48
	7002 OEL - 5 TB Unit	1	\$25,988.27	\$0.00	\$25,988.27	\$25,988.27	25	\$19,491.20
	7005 OEL - 50 TB Unit	1	\$132,382.69	\$0.00	\$132,382.69	\$132,382.69	25	\$99,287.02
2421-92E	System Storage DS8000 Enclosure Unit	1	\$70,500.00	\$125.00	\$70,500.00	\$73,500.00	25	\$55,125.00
	1 9xE factory merge	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	321 932 - 92E Position 1	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	1020 Power Module second pair	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	1050 Battery Assembly	3	\$1,700.00	\$0.00	\$5,100.00	\$5,100.00	25	\$3,825.00
	1090 Line Cord (US/LA/AP/Canada)	1	\$1,900.00	\$0.00	\$1,900.00	\$1,900.00	25	\$1,425.00
	1210 Disk Enclosure Pair	8	\$10,000.00	\$0.00	\$80,000.00	\$80,000.00	25	\$60,000.00
	1212 Disk Drive Cable Group 2	1	\$1,900.00	\$0.00	\$1,900.00	\$1,900.00	25	\$1,425.00
	1300 I/O Enclosure Pair	2	\$10,340.00	\$60.00	\$20,680.00	\$23,560.00	25	\$17,670.00
	1314 RIO-G Cable Group 4	1	\$2,300.00	\$0.00	\$2,300.00	\$2,300.00	25	\$1,725.00
	1411 50 um Fibre Cable (LC/SC)	8	\$100.00	\$0.00	\$800.00	\$800.00	25	\$600.00
	2216 146 GB 15K Drive Set (16 drives per drive set)	16	\$41,228.00	\$202.00	\$659,648.00	\$737,216.00	25	\$552,912.00
	3011 Device Adapter Pair	4	\$10,000.00	\$0.00	\$40,000.00	\$40,000.00	25	\$30,000.00
	3111 2Gb SW FCP/FICON Adapter	8	\$18,880.00	\$45.00	\$151,040.00	\$159,680.00	25	\$119,760.00
	9090 AC Voltage: 200V - 240V	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
2421-92E	System Storage DS8000 Enclosure Unit	1	\$70,500.00	\$125.00	\$70,500.00	\$73,500.00	25	\$55,125.00
	1 9xE factory merge	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	322 932 - 92E Position 2	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
	1090 Line Cord (US/LA/AP/Canada)	1	\$1,900.00	\$0.00	\$1,900.00	\$1,900.00	25	\$1,425.00
	1210 Disk Enclosure Pair	4	\$10,000.00	\$0.00	\$40,000.00	\$40,000.00	25	\$30,000.00
	1214 Disk Drive Cable Group 4	1	\$2,400.00	\$0.00	\$2,400.00	\$2,400.00	25	\$1,800.00
	2016 73 GB 15K Drive Set (16 drives per drive set)	8	\$22,220.00	\$105.00	\$177,760.00	\$197,920.00	25	\$148,440.00
	9090 AC Voltage: 200V - 240V	1	\$0.00	\$0.00	\$0.00	\$0.00	25	\$0.00
9119-5716	P5 595 adapter (2 Gbps, PCI-X)	32	\$1,999.00	\$0.00	\$63,968.00	\$63,968.00	0	\$63,968.00
1249-19K	short wave FC cable (25 m)	32	\$189.00	\$0.00	\$6,048.00	\$6,048.00	0	\$6,048.00
<b>TOTAL</b>								<b>\$2,336,626.45</b>

The above pricing provides maintenance/support for 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). In addition, the above pricing includes a 25% IBM Field Delegation Discount, which is generally available.

### **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):
<u>UID=HS-1</u>	32 – P5 595 adapters (2 Gb, PCI-X)
<b>IBM P5 595 Model 9119</b>	<u>UID=SC-1</u>
CPU: 32 – 1.9 GHz CPUs: 2 CPUs/POWER5 chip 32 KB L1 cache, 960 KB L2 cache, and 18 MB L3 cache per CPU	IBM System Storage DS8300 Turbo
Main memory: 24 GB	Each cluster contains: 4 – POWER5 CPUs 128 GB of processor memory (256 GB total)
Operating System: AIX 5.3 (32 bit)	16 – 2 Gb SW FCP/FICON adapters 32 host side, front-end ports
Host System interconnect: PCI-X/RIO	8 – 4 port, 2 Gb/s, FC-AL device adapter pairs 32 drive side, backend ports
WG (SPC-1 Workload Generator)	16 – disk enclosure pairs (16 disk drives per enclosure)
	256 – 73 GB, 15K RPM disk drives
	256 – 146 GB, 15K RPM disk drives