



THE POSSIBILITIES ARE INFINITE

SPC BENCHMARK 1™ EXECUTIVE SUMMARY

**FUJITSU LIMITED
FUJITSU STORAGE SYSTEMS
ETERNUS6000 MODEL 800**

SPC-1 V1.8

Submitted for Review: March 4, 2004

Submission Identifier: A00026

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EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
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Revision Information and Key Dates

Revision Information and Key Dates	
SPC-1 Specification revision number	V1.8
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	March 4, 2004
Date FDR was submitted to the SPC	March 4, 2004
Date revised FDR was submitted to the SPC Pricing and Price/Performance revised.	August 9, 2004
Date the TSC is/was available for shipment to customers	May 31, 2004
Date the TSC completed audit certification	March 3, 2004

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Fujitsu Storage Systems ETERNUS6000 Model 800	
Metric	Reported Result
SPC-1 IOPS™	69,241.73
SPC-1 Price-Performance	\$13.56/SPC-1 IOPS™
Total ASU Capacity	7,967.078 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$939,183

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, maintained on separate disks.

Storage Capacities and Relationships

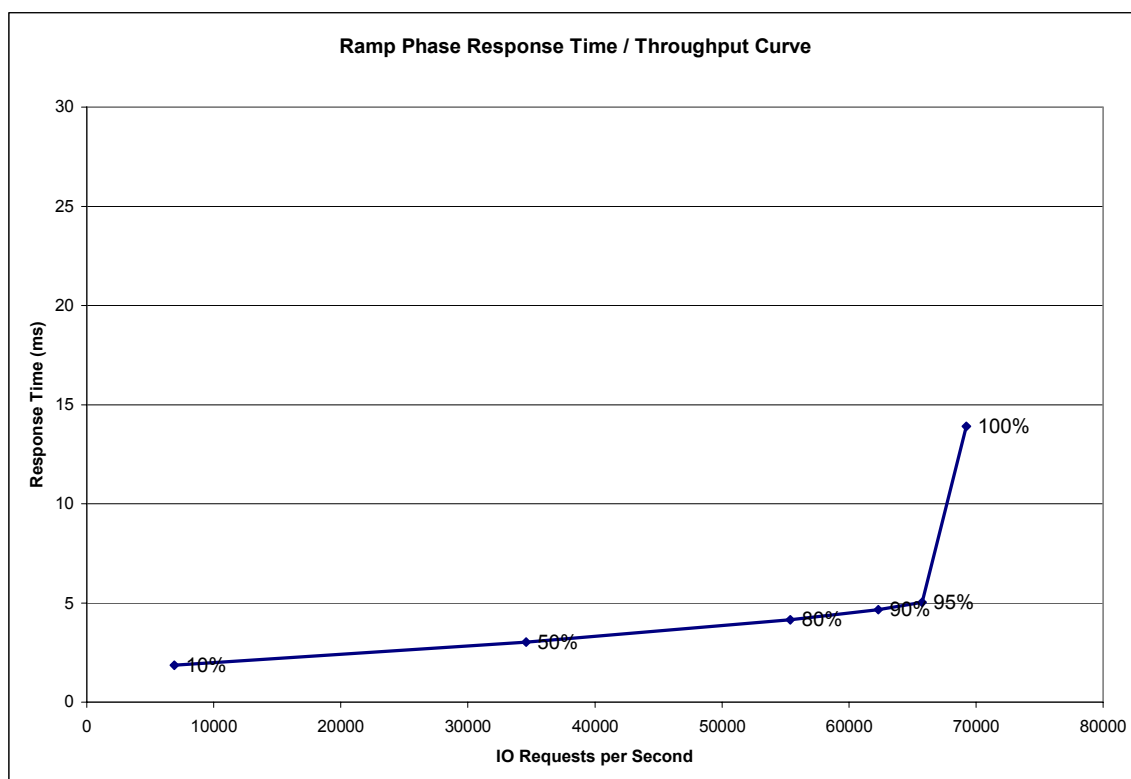
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.

Physical Capacity (GB)						
16,534.450						
Configured Capacity (GB)					Global Ovrhd	Unused
15,992.814						
Addressable Capacity (GB)			Addressable (Mirror, GB)		Required Storage	
7,967.148			7,967.148			
ASU Capacity (GB)			ASU Mirror (GB)		58,518	539,991
7,419.920			7,419.920			
Unused			Unused			
ASU1	ASU2	ASU3	547.228	547.228	58,518	1,644
3,338.960	3,338.960	742.000				
8 LVs @ 448.152/LV	8 LVs @ 448.152/LV	2 LVs @ 398.35/LV				

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 100% load point 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	6,900.42	34,598.85	55,385.55	62,306.34	65,753.66	69,241.73
Average Response Time (ms):						
All ASUs	1.85	3.03	4.15	4.65	5.04	13.90
ASU-1	2.36	3.76	5.13	5.80	6.33	18.87
ASU-2	1.80	2.95	4.34	4.97	5.45	14.54
ASU-3	0.79	1.52	1.98	2.08	2.12	3.08
Reads	3.58	5.48	7.62	8.74	9.65	30.63
Writes	0.73	1.44	1.89	1.99	2.03	3.00

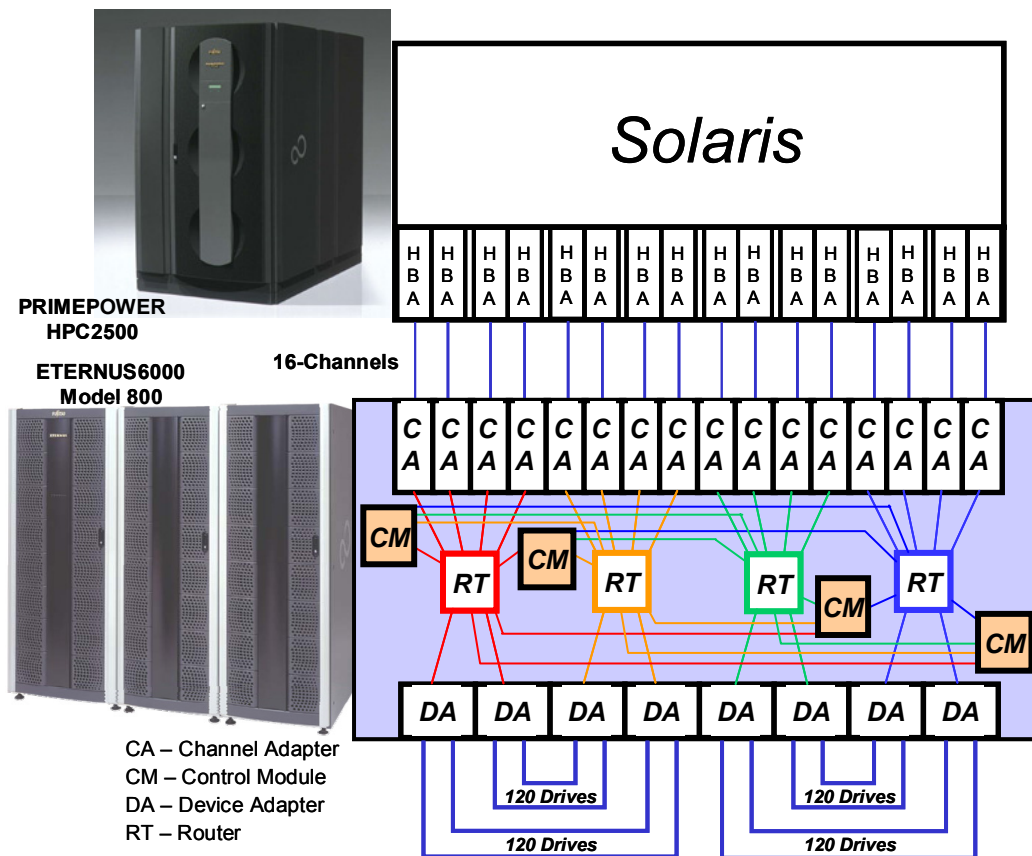
Tested Storage Configuration Pricing (Priced Storage Configuration)

Item	Product Id	Description	Qty	Unit \$	Extd \$
1	E680S01AU	ETERNUS6000 Model 800 Base Unit (with door) including Controller Enclosure, 2x Controllers (CM), 2x Interface Units (RT), 4x Drive Interface (DA), 2x power supplie units, 4x battery units, 8x drive enclosures (DE), 4x 36GB System disk drives 1800mm (36U) rack, 4x power distribution (200VAC) 4x FC cables (5m), 2x LAN cables (5m) rack mount kit, ETERNUSmgr & drivers slots for up to 120 disk drives	1	\$147,047	\$147,047
2	E600CR2U	ETERNUS6000 Expansion Rack (with door) including Expansion 1800mm (36U) rack 2x power distribution (200 VAC)	2	\$7,450	\$14,900
3	E680SE12U	Drive Enclosure (4x DE), with 2x Drive Interface (DA) with slots for up to 60 disk drives	2	\$37,944	\$75,888
4	E600CE11U	Drive Enclosure (4x DE) with slots for up to 60 disk drives	4	\$37,944	\$151,775
5	E600CJ1U	Third Controller (CM) with 2x 36GB System disk drives	1	\$11,194	\$11,194
6	E600CF2U	Fourth Controller (CM) with 2x 36GB System disk drives	1	\$11,194	\$11,194
7	E600CM45	Additional cache memory (4x 8GB)	2	\$123,520	\$247,040
8	E600CH14	Fibre Channel Host Interface (dual port) x2	8	\$7,180	\$57,437
9	E600CC2L	36GB/15krpm Disk Drives RAID(4+4)	56	\$7,782	\$435,779
10	CBL-MLLB15	Fibre Channel Cable	16	\$290	\$4,632
11	LP9002L	Emulex LP9802 HBA	16	\$1,862	\$29,799
12		Enhanced Plus ETERNUS6000 Model 800 Base Unit Phone 24x7, On-site 24x7, maintenance service with 4 hour response - 3 year Warranty Uplift w/ 8 DEs	1	\$55,440	\$55,440
13		Enhanced Plus ETERNUS6000 Model 800 additional DE Set Phone 24x7, On-site 24x7, maintenance service with 4 hour response - 3 year Warranty Uplift per DE set	6	\$26,928	\$161,568
Total Product List Price					\$1,186,684
				Product Discount	30%
					Net Product Price
					\$830,679
Total Service List Price					\$217,008
				Service Discount	50%
					Net Service Price
					\$108,504
Total Sell Price, including 3 years Service					\$939,183

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

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

Benchmark Configuration/Tested Storage Configuration Diagram



Host System:	Tested Storage Configuration (TSC):
UID=HS1 Fujitsu PRIMEPOWER HPC2500	16 – Emulex LP9802 Fibre Channel Host Bus Adapters (2 Gbit)
32 – 1.3 GHz SPARC64 V CPUs each with 128KB L1 Instruction cache 128KB L1 Data Cache, 2 MB L2 Cache	UID=SC-1 Fujitsu ETERNUS6000 Model 800
64 GB Main Memory	4 – Controller Modules (CM) each with 2.8 GHz Intel Xeon CPU 16 GB Cache
Solaris 9	4 – Router Modules (RT)
WG	16 – Front side Fibre Channels (CA) – 2 Gbit each
	8 – Drive side Fibre Channel Switched Loops (DA) 2 Gbit each
	32 – Drive Enclosure Modules each with dual FC-AL interfaces 15 Hot Swap drive slots
	456 – 36 GB 15k RPM disks (including 8 reserved for system use)