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**SPC BENCHMARK 2™  
EXECUTIVE SUMMARY**

**FUJITSU LIMITED  
FUJITSU STORAGE SYSTEMS  
ETERNUS6000 MODEL 900**

**SPC-2™ V1.0**

**Submitted for Review: December 14, 2005**

**Submission Identifier: B00003**

## **EXECUTIVE SUMMARY**

### **Test Sponsor and Contact Information**

<b>Test Sponsor and Contact Information</b>	
<b>Test Sponsor Primary Contact</b>	Fujitsu Limited – <a href="http://www.fujitsu.com/services/computing/storage/">http://www.fujitsu.com/services/computing/storage/</a> Fujitsu Computer Systems Corp. C.A. (Sandy) Wilson <a href="mailto:Sandy.Wilson@us.fujitsu.com">Sandy.Wilson@us.fujitsu.com</a> 1250 East Arques Ave PO Box 3470 Sunnyvale, CA 94088-3470 Phone: (916) 434-8593
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### **Revision Information and Key Dates**

<b>Revision Information and Key Dates</b>	
<b>SPC-2 Specification revision number</b>	V1.0
<b>SPC-2 Workload Generator revision number</b>	spc2rc9f
<b>Date Results were first used publicly</b>	December 14, 2005
<b>Date FDR was submitted to the SPC</b>	December 14, 2005
<b>Date the TSC will be available for shipment to customers</b>	December 22, 2005
<b>Date the TSC completed audit certification</b>	December 5 2005

## SPC-2 Reported Data

SPC-2 Reported Data consists of three groups of information:

- The following SPC-2 Primary Metrics, which characterize the overall benchmark result:
  - SPC-2 MBPS™
  - SPC-2 Price Performance
  - Application Storage Unit (ASU) Capacity
- Supplemental data to the SPC-2 Primary Metrics.
  - Total Price
  - Data Protection Level
- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

SPC-2 Reported Data				
Fujitsu Storage Systems ETERNUS6000 Model 900				
SPC-2 MBPS™	SPC-2 Price-Performance	ASU Capacity (GB)	Total Price	Data Protection Level
2,129.47	\$415.37	6,854.768	\$884,520.00	RAID5
<i>The above SPC-2 MBPS™ value represents the aggregate data rate of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video On Demand (VOD)</i>				
SPC-2 Large File Processing (LFP) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
LFP Composite	1,875.53			\$471.61
Write Only:				
1024 KiB Transfer	1,452.97	64	22.70	
256 KiB Transfer	1,453.18	64	22.71	
Read-Write:				
1024 KiB Transfer	2,034.14	64	31.78	
256 KiB Transfer	1,958.71	64	30.60	
Read Only:				
1024 KiB Transfer	2,089.03	64	32.64	
256 KiB Transfer	2,265.17	64	35.39	
<i>The above SPC-2 Data Rate value for LFP Composite represents the aggregate performance of all three LFP Test Phases: (Write Only, Read-Write, and Read Only).</i>				
SPC-2 Large Database Query (LDQ) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
LDQ Composite	2,273.09			\$389.13
1024 KiB Transfer Size				
4 I/Os Outstanding	2,241.61	64	35.03	
1 I/O Outstanding	2,369.96	64	37.03	
64 KiB Transfer Size				
4 I/Os Outstanding	2,154.39	64	33.66	
1 I/O Outstanding	2,326.42	64	36.35	
<i>The above SPC-2 Data Rate value for LDQ Composite represents the aggregate performance of the two LDQ Test Phases: (1024 KiB and 64 KiB Transfer Sizes).</i>				
SPC-2 Video On Demand Delivery (VOD) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
	2,239.77	2,848	0.79	\$394.92

### Storage Capacities and Relationships

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

Physical Capacity (GB)						
10,195.326						
Configured Capacity (GB)						Global Ovhd
9,711.033						
Addressable Capacity (GB)			Parity Capacity (GB)		Metadata & Hot Spares	Unused
6,854.768			2,282.638			
ASU Capacity (GB)		Unused	ASU Parity (GB)		573.627	443.665
6,854.768		0.000	2,282.638			
64 LVs		0.000	0.000		443.665	40.629
@ 107.106 each						

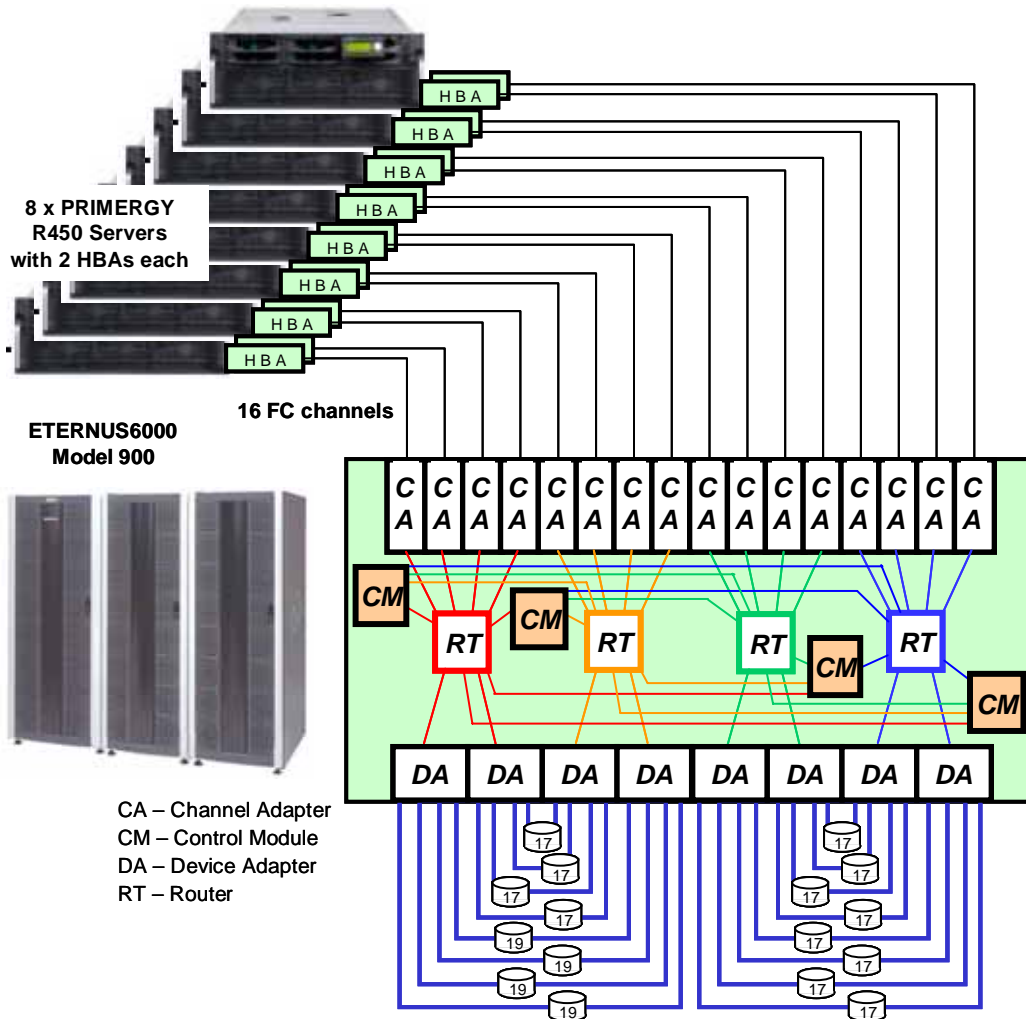
**Tested Storage Configuration Pricing (Priced Storage Configuration)**

Item	Product Id	Description	Qty	Unit \$	Extd \$
1	E690S01AU	ETERNUS6000 Model 900 Base Unit (with door) including Controller Enclosure, 2x Controllers (CM), 4x Interface Units (RT), 4x Drive Interface (DA), 2x power supply units, 4x battery units, 8x drive enclosures (DE), 4x 36GB System disk drives, 1x Base 1800mm (36U) rack, 2x Expansion 1800mm (36U) rack, 4x power distribution (200VAC), rack mount kit, ETERNUSmgr & drivers slots for up to 120 disk drives	1	\$195,000	\$195,000
2	E600CR3U	ETERNUS6000 Expansion Rack (with door) including Expansion 1800mm (36U) rack 2x power distribution (200 VAC)	2	\$8,000	\$16,000
3	E690SE22U	Drive Enclosure (4x DE) including 1x DA pair, with slots for up to 60 disk drives	2	\$39,400	\$78,800
4	E600CE21U	Drive Enclosure (4x DE) with slots for up to 60 disk drives	4	\$31,000	\$124,000
5	E600CJ3U	ETERNUS6000 Controller #3, w/ 2x 36GB System disk drives	1	\$16,000	\$16,000
6	E600CJ4U	ETERNUS6000 Controller #4, w/ 2x 36GB System disk drives	1	\$16,000	\$16,000
7	E600CM47	Additional cache memory (4x 16GB)	2	\$163,800	\$327,600
8	E600CHA4	Fibre Channel Host Interface (dual port) x2	8	\$12,800	\$102,400
9	E600CD2L	36GB/15krpm Disk Drives RAID5(3+1)	64	\$4,000	\$256,000
10	E600CA2	36GB/15krpm Disk Drive (Hot Spare)	16	\$1,000	\$16,000
11	CBL-MLLB15	Fibre Channel Cable	16	\$132	\$2,112
12	LP11000-M4	Emulex 4Gb PCI-X Single HBA (per quote from InfoX)	16	\$861	\$13,776
13	ETE6M9-P004122-092	Enhanced Plus ETERNUS6000 Model 900 Phone 24x7, On-site 24x7, maintenance service with 4 hour response - 2 year Warranty Included with 4 hour response - 1 year Extended Service	1	\$94,008	\$94,008
<b>Total Fujitsu Product List Price</b>					<b>\$1,149,912</b>
				<b>Product Discount</b>	<b>30%</b>
<b>Net Product Price</b>					<b>\$804,938</b>
<b>Total Service List Price</b>					<b>\$94,008</b>
				<b>Service Discount</b>	<b>30%</b>
<b>Net Service Price</b>					<b>\$65,806</b>
<b>Outside Quoted Product Price</b>					<b>\$13,776</b>
<b>Total Sell Price, including 3 years Service</b>					<b>\$884,520</b>

**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(s) and Tested Storage Configuration Components

Host Systems:	Tested Storage Configuration (TSC):
<b>UID=HS-1/2/3/4/5/6/7/8</b>	16 – Emulex LP11000 M4 FC HBAs (4 Gbps)
8 – Fujitsu PRIMERGY R450 Host Systems	<b>UID=SC-1:</b>
<b>HS-1/2/3/4, each with:</b> 4 – Intel Xeon™ 2.0 GHz CPUs, each with: 1 MB iL3 cache	Fujitsu ETERNUS6000 Model 900 4 – Controller Modules (CM), each with 24 GB cache
<b>HS-5/6, each with:</b> 4 – Intel Xeon™ 1.9 GHz CPUs, each with: 1 MB iL3 cache	16 – Channel Adapter (CA) Modules 8 – Device Adapter (DA) Modules 4 – Router (RT) Modules
<b>HS-7/8, each with:</b> 4 – Intel Xeon™ 1.6 GHz CPUs, each with: 1 MB iL3 cache	32 – Front side Fibre Channel ports (4 Gbps each) 16 ports connected directly to HBAs
4 GB main memory	32 – Drive side Fibre Channel switched FC-AL loops (2 Gbit each)
Windows 2003 Server v5.2 w/SP1	32 – Drive enclosure modules, each with dual switched FC-AL interfaces and 15 hot swap drive slots
Sun Java 1.5.0.30	
SPC-2 Workload Generator: spc2rc9f <i>with multi-host time tolerance and and slave complete non-heartbeat patches</i>	280 – 36 GB 15K RPM disk drives