



SPC BENCHMARK 2™
EXECUTIVE SUMMARY

FUJITSU LIMITED
FUJITSU STORAGE SYSTEMS ETERNUS DX80 S2

SPC-2™ V1.3

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EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

Revision Information and Key Dates	
SPC-2 Specification revision number	V1.3
SPC-2 Workload Generator revision number	V1.0
Date Results were first used publicly	August 19, 2011
Date FDR was submitted to the SPC	August 19, 2011
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	August 19, 2011

Tested Storage Product (TSP) Description

The Fujitsu ETERNUS DX80 S2 is a flexible, highly reliable storage array, equipped with redundant components to provide uncompromised availability to the SMB Market requirements. A mixture of 300GB, 450GB, and 600GB disk drives in either 2.5" 10krpm or 3.5" 15krpm SAS are available. There are also 1TB and 2TB 7200rpm Nearline SAS drives and 100GB or 200GB SSD drives available. The product is offered with a choice of host interface connections, including Fibre Channel (as tested), iSCSI (1Gbps & 10Gbps), SAS (6Gbps), and FCoE (10Gbps). Up to 8 host ports can be provided, 4 on each of the two Control Modules. A number of different snapshot and replication facilities are available along with native disk data encryption, and MAID capabilities.

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 ETERNUS DX80 S2				
SPC-2 MBPS™	SPC-2 Price-Performance	ASU Capacity (GB)	Total Price	Data Protection Level
2,685.50	\$28.48	17,231.409	\$76,474.20	Protected (Mirroring)
<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	2,045.61			\$37.38
Write Only:				
1024 KiB Transfer	1,135.08	64	17.74	
256 KiB Transfer	1,111.67	64	17.37	
Read-Write:				
1024 KiB Transfer	1,692.26	64	26.44	
256 KiB Transfer	1,775.66	64	27.74	
Read Only:				
1024 KiB Transfer	3,262.86	64	50.98	
256 KiB Transfer	3,296.10	76	43.37	
<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	3,101.09			\$24.66
1024 KiB Transfer Size				
4 I/Os Outstanding	3,083.83	32	96.37	
1 I/O Outstanding	3,092.62	32	96.64	
64 KiB Transfer Size				
4 I/Os Outstanding	3,037.25	32	94.91	
1 I/O Outstanding	3,190.66	40	79.77	
<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 (VOD) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
	2,909.80	3,700	0.79	\$26.28

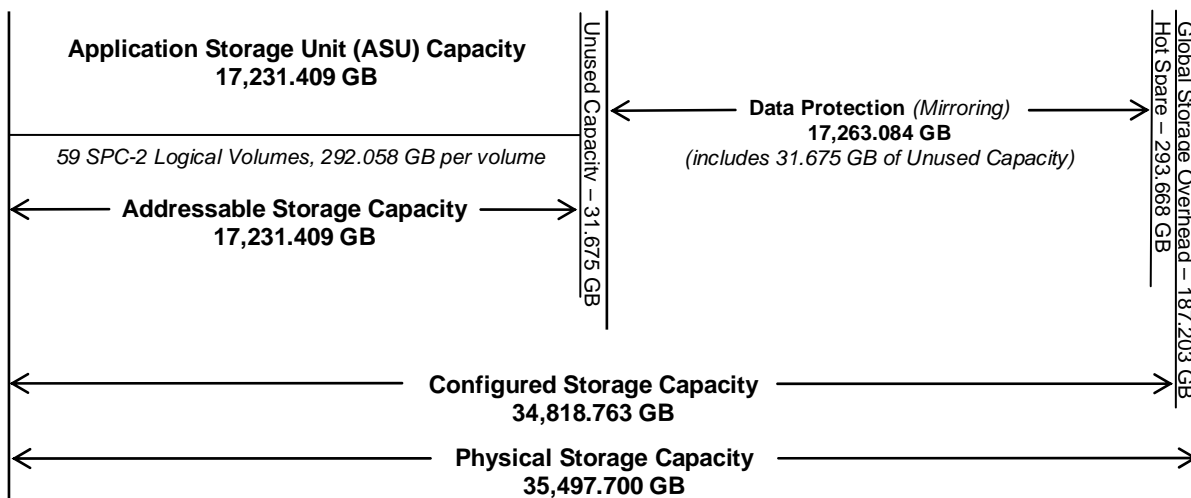
SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

ASU (Application Storage Unit) Capacity represents the total storage capacity read and written in the course of executing the SPC-2 benchmark.

A **Data Protection Level of Protected** using *Mirroring* configures two or more identical copies of user data.

Storage Capacities and Relationships

The following diagram (*not to scale*) and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.



SPC-1 Storage Capacity Utilization	
Application Utilization	48.54%
Protected Application Utilization	97.08%
Unused Storage Ratio	0.18%

Application Utilization: Total ASU Capacity (17,231.409 GB) divided by Physical Storage Capacity (35,497.700 GB)

Protected Application Utilization: (Total ASU Capacity (17,231.409 GB) plus total Data Protection Capacity (17,263.084 GB) minus unused Data Protection Capacity (31.675 GB) divided by Physical Storage Capacity (35,497.700 GB).

Unused Storage Ratio: Total Unused Capacity (63.351 GB) divided by Physical Storage Capacity (35,497.700 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 22-23 in the Full Disclosure Report.

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

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

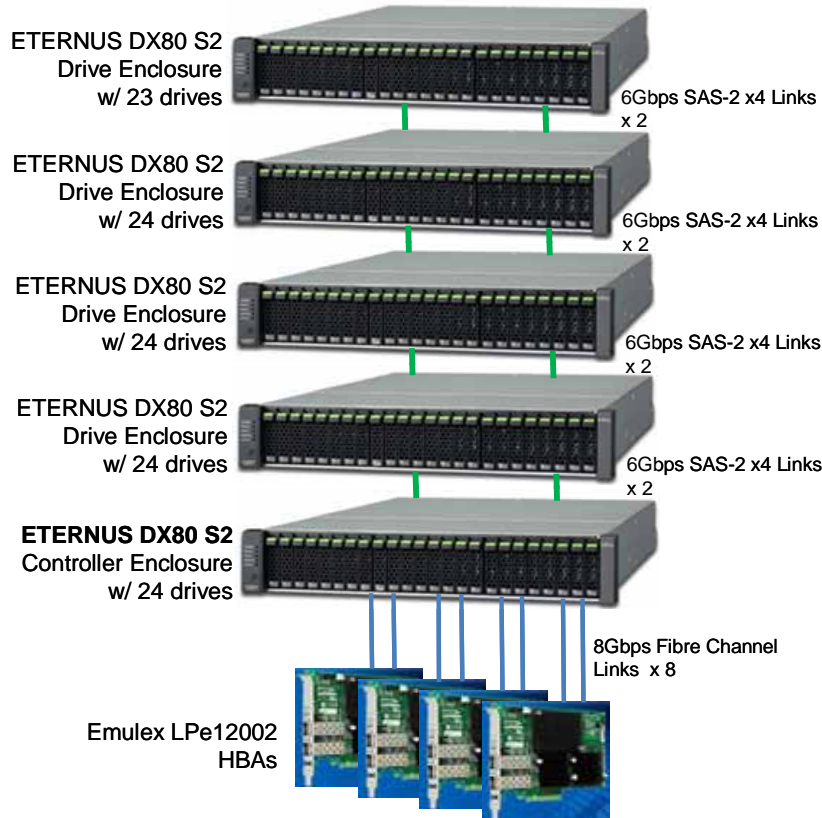
Priced Storage Configuration Pricing

Product ID	Product Name	Qty	Unit List Price	Extended LP	Discount %	Discounted Price
ET082DCU	DX80 S2 Base System Rackmount (AC200V, 2RU) (2.5" HDD, Dual CM type)	1	\$8,250.00	\$8,250.00	30%	\$5,775.00
ETEAD2CU	Drive Enclosure Rackmount (AC200V, 2RU) (2.5" HDD, Dual CM type)	4	\$3,900.00	\$15,600.00	30%	\$10,920.00
ETEHF12	FC Host Interface, 2 ports (2/4/8Gbps, Host/Remote Connect)	4	\$850.00	\$3,400.00	30%	\$2,380.00
ETED3HC	300GB/10krpm 2.5" Disk Drives	119	\$460.00	\$54,740.00	30%	\$38,318.00
LPe12002 (Third-Party)	Emulex 8Gbps Dual Port Fibre Channel Host Bus Adapter	4	\$1,785.00	\$7,140.00	10%	\$6,426.00
61-343827-003	Fibre Channel Cable LC-LC 3 m	8	\$132.00	\$1,056.00	30%	\$739.20
	(Provide 24 hour per day / 7days per week 4 hour response maintenance for 36 months)					
ET082DCU	Base (36 mos, Enhanced Plus)	1	\$3,276.00	\$3,276.00		\$3,276.00
ETEAD2CU	DE (36 mos, Enhanced Plus) ea.	4	\$2,160.00	\$8,640.00		\$8,640.00
SFPs and SAS cables are included				Total:		\$76,474.20

The following pricing includes the following:

- Acknowledgement of new and existing hardware and/or software problems within four hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration component.

Priced Storage Configuration Diagram



Priced Configuration Components

Priced Storage Configuration
4 – Emulex LPe12002-M8 FC dual port FC HBAs (8 Gbps)
Fujitsu Storage Systems ETERNUS DX80 S2 2 – Controller Modules, each with: 2 GB cache (4 GB total) Flash Memory power fail protection 2 – Channel Adapter modules, each with 2 –8 Gbps Fibre Channel ports (front-end Host connections, 8 total, 8 used) SAS 2 x4 Expander Drive interface (backend connections to first drive enclosure)
4 –ETERNUS DX80 S2 Drive Enclosures, each with 2 – I/O Modules, each with SAS 2 x 4 Expander Drive interface (2 total, 2 used)
119 – 300 GB 10K RPM 2.5" SAS Disk Drives 24 – ETERNUS DX80 S2 Controller Enclosure 24 – ETERNUS DX80 S2 Drive Enclosure x 3 23 – ETERNUS DX80 S2 Drive Enclosure x 1 1 – Spare