



# SPC BENCHMARK 2™

# EXECUTIVE SUMMARY

## FUJITSU LIMITED

## FUJITSU STORAGE SYSTEMS ETERNUS DX80

**SPC-2™ V1.3**

**Submitted for Review: March 15, 2010**
**Submission Identifier: B00050**

# EXECUTIVE SUMMARY

## Test Sponsor and Contact Information

| Test Sponsor and Contact Information | |
|---|---|
| **Test Sponsor Primary Contact** | Fujitsu Limited – http://www.fujitsu.com/services/computing/storage/<br>Fujitsu Computer Systems Corp.<br>C.A. (Sandy) Wilson Sandy_Wilson@us.fujitsu.com<br>1250 East Arques Ave PO Box 3470<br>Sunnyvale, CA 94088-3470<br>Phone: (916) 434-8593 |
| **Test Sponsor Alternate Contact** | Fujitsu Limited – http://www.fujitsu.com/services/computing/storage/<br>Fujitsu Computer Systems Corp.<br>Kun Katsumata Kun_Katsumata@us.fujitsu.com<br>1250 East Arques Ave PO Box 3470<br>Sunnyvale, CA 94088-3470<br>Phone: (408) 746-6415 |
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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** | March 15, 2010 |
| **Date FDR was submitted to the SPC** | March 15, 2010 |
| **Date the TSC will be available for shipment to customers** | currently available |
| **Date the TSC completed audit certification** | March 15, 2010 |

## Tested Storage Product (TSP) Description

The Fujitsu ETERNUS DX80 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 15krpm SAS drives, as well as 750GB and 1TB Nearline SAS drives may be used, up to a maximum of 120 drives. The drives may be arranged in a variety of RAID groups, including RAID1, RAID1+0(10), RAID5, RAID5+0(50), and RAID6. The product is offered with Fibre Channel (as tested), iSCSI, and SAS host connection versions, with 4 channels offered (2 channels per controller) in each version. SMI-S Version 1.2 is supported in the ETERNUS DX80 array. In addition, a number of different snapshot and replication facilities, native disk data encryption, MAID capabilities, and power consumption monitoring features are available.

## 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** | | | | |
| **SPC-2 MBPS™** | **SPC-2 Price-Performance** | **ASU Capacity (GB)** | **Total Price** | **Data Protection Level** |
| 1,357.55 | $26.70 | 4,681.514 | $36,246.40 | Protected *(Mirroring)* |
| *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)* | | | | |
| **SPC-2 Large File Processing (LFP) Reported Data** | | | | |
| | **Data Rate *(MB/second)*** | **Number of Streams** | **Data Rate per Stream** | **Price-Performance** |
| LFP Composite | 1,077.88 | | | $33.63 |
| Write Only: | | | | |
| 1024 KiB Transfer | 643.38 | 32 | 20.11 | |
| 256 KiB Transfer | 646.64 | 32 | 20.21 | |
| Read-Write: | | | | |
| 1024 KiB Transfer | 961.21 | 32 | 30.04 | |
| 256 KiB Transfer | 957.73 | 32 | 29.93 | |
| Read Only: | | | | |
| 1024 KiB Transfer | 1,637.30 | 32 | 51.17 | |
| 256 KiB Transfer | 1,621.01 | 32 | 50.66 | |
| *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).* | | | | |
| **SPC-2 Large Database Query (LDQ) Reported Data** | | | | |
| | **Data Rate *(MB/second)*** | **Number of Streams** | **Data Rate per Stream** | **Price-Performance** |
| LDQ Composite | 1,618.51 | | | $22.39 |
| 1024 KiB Transfer Size | | | | |
| 4 I/Os Outstanding | 1,643.49 | 32 | 51.36 | |
| 1 I/O Outstanding | 1,642.19 | 32 | 51.32 | |
| 64 KiB Transfer Size | | | | |
| 4 I/Os Outstanding | 1,612.30 | 32 | 50.38 | |
| 1 I/O Outstanding | 1,576.07 | 32 | 49.25 | |
| *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).* | | | | |
| **SPC-2 Video On Demand (VOD) Reported Data** | | | | |
| | **Data Rate *(MB/second)*** | **Number of Streams** | **Data Rate per Stream** | **Price-Performance** |
| | 1,376.26 | 1,750 | 0.79 | $26.34 |

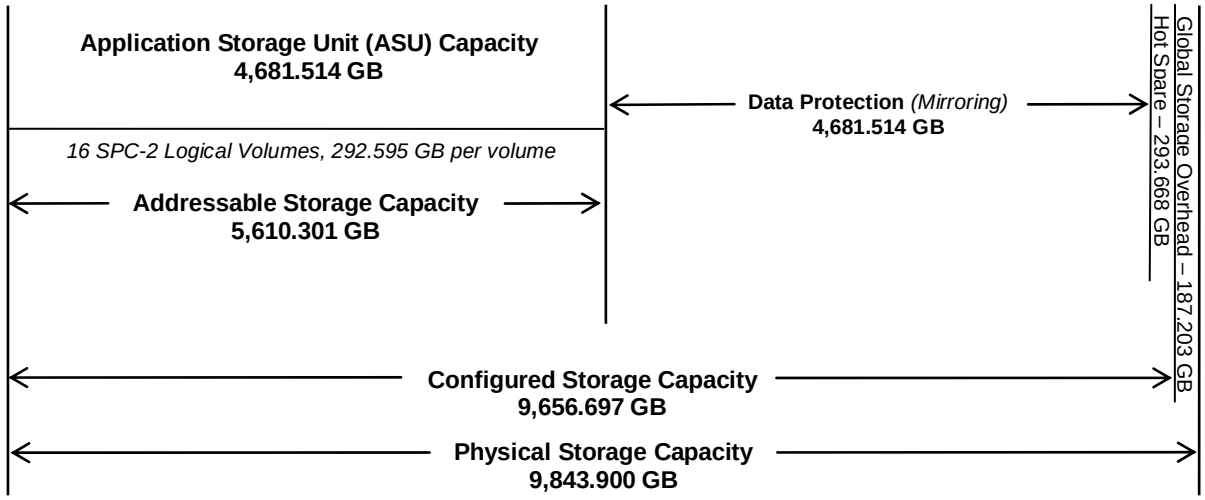
**SPC-2 MBPS™** represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

**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)* documents the various storage capacities, used in this benchmark, and their relationships.



| SPC-1 Storage Capacity Utilization | |
|---|---|
| Application Utilization | 47.56% |
| Protected Application Utilization | 95.12% |
| Unused Storage Ratio | 0.00% |

**Application Utilization:** Total ASU Capacity *(4,681.514 GB)* divided by Physical Storage Capacity *(9,843.900 GB)*.

**Protected Application Utilization:** (Total ASU Capacity *(4,681.514 GB)* plus total Data Protection Capacity *(4,681.514 GB)* minus unused Data Protection Capacity *(0.000 GB)*) divided by Physical Storage Capacity *(9,843.900 GB)*.

**Unused Storage Ratio:** Total Unused Capacity *(34.360 GB)* divided by Physical Storage Capacity *(9,843.900 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 20-21 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.

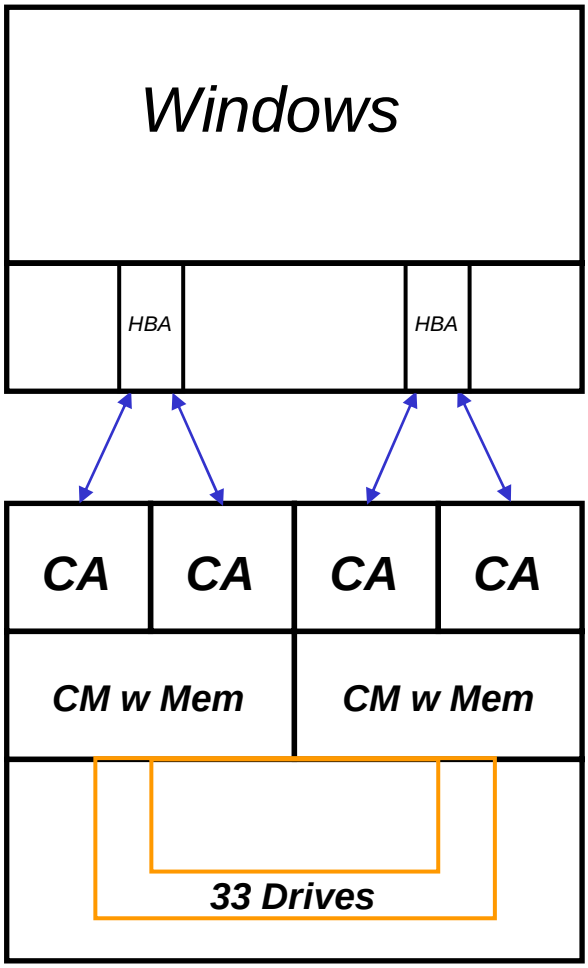
## Tested Storage Configuration Pricing (Priced Storage Configuration)

| Product ID | Product name | Qty | Unit LP | Extended LP | Discount % | Discounted Price |
|---|---|---|---|---|---|---|
| ET08F22AU | ETERNUS DX80 Base unit (FC 4Gbps 4 ports) | 1 | $8,500.00 | $8,500.00 | 30% | $5,950.00 |
| ETLDE2AU | Additional drive enclosure for 2CM DX80 | 2 | $3,000.00 | $6,000.00 | 30% | $4,200.00 |
| ETLSA3MAU | 300GB/15KRPM (SAS) DISK DRIVES (SET OF 2) RAID1 | 16 | $1,480.00 | $23,680.00 | 30% | $16,576.00 |
| ETLSA3HAU | 300GB/15Krpm (SAS) disk drive (single) | 1 | $740.00 | $740.00 | 30% | $518.00 |
| ETLAC2U2U | Power distribution unit (2U) | 1 | $1,410.00 | $1,410.00 | 30% | $987.00 |
| LPE11002-M4 | Emulex 4Gb PCIe 2.5GGhz Dual Channel Fibre Channel HBA | 2 | $2,565.00 | $5,130.00 | 40% | $3,078.00 |
| ETDX-EPLUPLT-BASE | ETDX2000, 1 Month; 24 x 7, 4-hour On-Site Resp.(Sev-1), Uplift Maintenance for Base Unit | 36 | $91.00 | $3,276.00 | 35% | $2,129.40 |
| ETDX-EPLUPLT-DE | ETDX2000, 1 Month; 24 x 7, 4-hour On-Site Resp.(Sev-1), Uplift Maintenance for DE | 72 | $60.00 | $4,320.00 | 35% | $2,808.00 |
| | | | | **Total** | | **$36,246.40** |

## Tested Storage Configuration (TSC) /Priced Storage Configuration Diagram

**Fujitsu PRIMERGY RX600 S4**

**Fujitsu ETERNUS DX80**


CA – Channel Adapter
CM – Control Module
Mem – Cache Memory
HBA – Host Bus Adapter

## Tested Storage Configuration (TSC)/ Priced Configuration Components

| Host System: | Tested Storage Configuration (TSC) / Priced Storage Configuration: |
|---|---|
| **Fujitsu PRIMERGY RX600 S4**<br>2 – Intel Xeon™ 2.93 GHz MP<br>with 8 MB L2 cache | 2 – Emulex LPe12002-M8 FC dual port HBAs *(8 Gbps)* |
| 64 GB main memory | **Fujitsu Storage Systems ETERNUS DX80**<br>2 – Controller Modules, each with:<br>2 GB cache *(4 GB total)*<br>2 – Channel Adapter modules, each with<br>1 – Fibre Channel port<br>*(4 ports total, 4 ports used)*<br>2 – SAS Expander Drive interfaces |
| Windows 2003 Enterprise Server (64-bit) with SP2 | 4 – Front side Fibre Channels *(set to 4 Gbit each)*<br>2 – Back side SAS channels |
| PCIe | 3 – Drive Enclosure Modules, each with:<br>dual SAS interfaces, 12 – Hot Swap drive slots |
| WG | 33 – 300 GB 15K RPM disk drives<br>*(32 drives in 32 RAID Groups and 1 Hot Spare)* |