SPC BENCHMARK 1™
EXECUTIVE SUMMARY

FUJITSU LIMITED
FUJITSU STORAGE SYSTEMS ETERNUS DX100 S3

SPC-1 V1.14

Submitted for Review: October 6, 2014
Submission Identifier: A00148

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	V1.14
SPC-1 Workload Generator revision number	V2.3.0
Date Results were first used publicly	October 6, 2014
Date the FDR was submitted to the SPC	October 6, 2014
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	October 3, 2014

Tested Storage Product (TSP) Description

The scalable and unified Fujitsu Storage ETERNUS DX100 S3 delivers enterprise-class functionality to small and medium-sized companies and subsidiaries with an excellent price/performance ratio. It is the perfect solution when consolidating data for server virtualization, e-mail, databases and business applications as well a centralized file services. Simple, intuitive system management, highly flexible network connectivity and the option of field upgrades to higher system classes significantly reduce operational and migration costs. The ETERNUS DX family architecture lets customers benefit from software options, such as thin provisioning, automatic storage tiering and quality of service management even as early as the entry-level class. This all contributes to better business support.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: Fujitsu Storage Systems ETERNUS DX100 S3	
Metric	**Reported Result**
SPC-1 IOPS™	55,235.28
SPC-1 Price-Performance™	$0.99/SPC-1 IOPS™
Total ASU Capacity	1,120.000 GB
Data Protection Level	Protected 2 *(mirroring)*
Total Price	$54,892.68
Currency Used	U.S. Dollars
Target Country for availability, sales and support	USA

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

SPC-1 Price-Performance™ is the ratio of **Total Price** to **SPC-1 IOPS™**.

Total ASU (Application Storage Unit) **Capacity** represents the total storage capacity available to be read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of **Protected 2** using ***Mirroring*** configures two or more identical copies of user data..

> ***Protected 2:*** *The single point of failure of any* ***component*** *in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

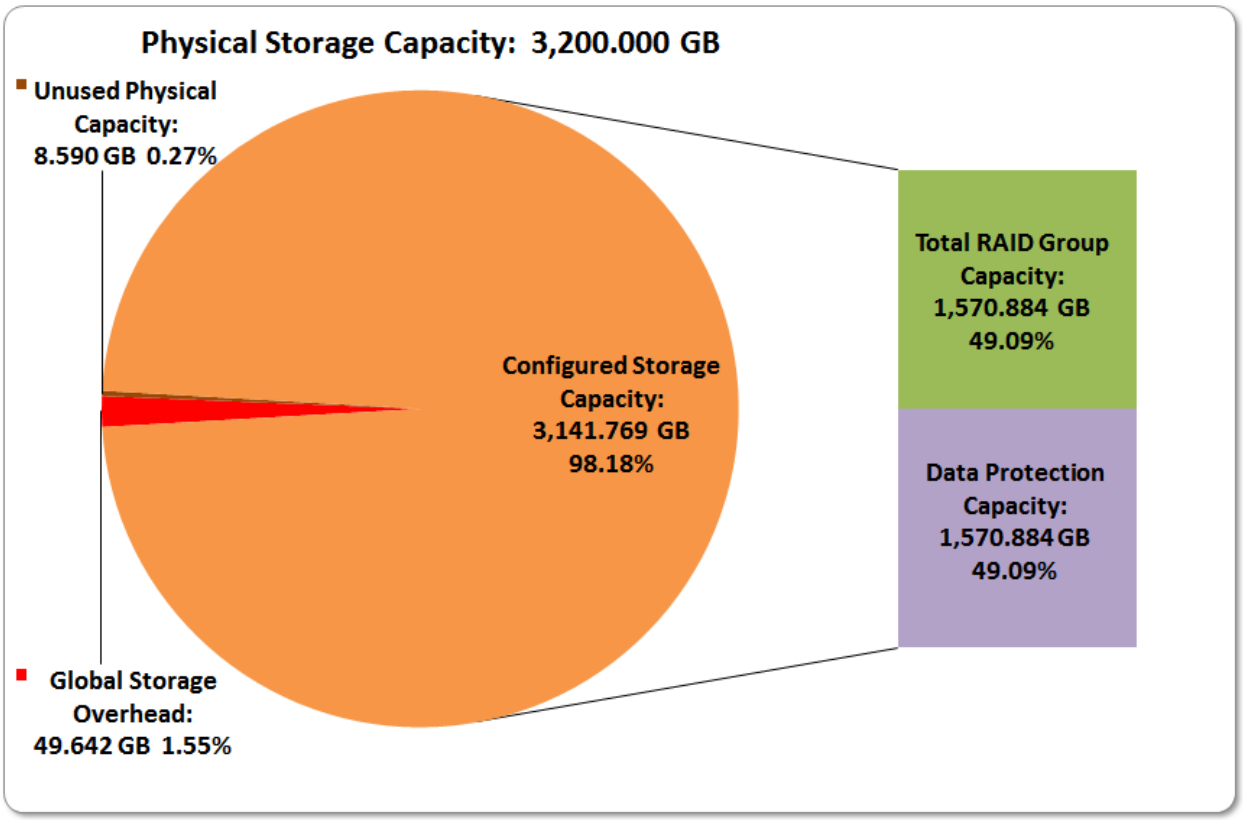
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 8.

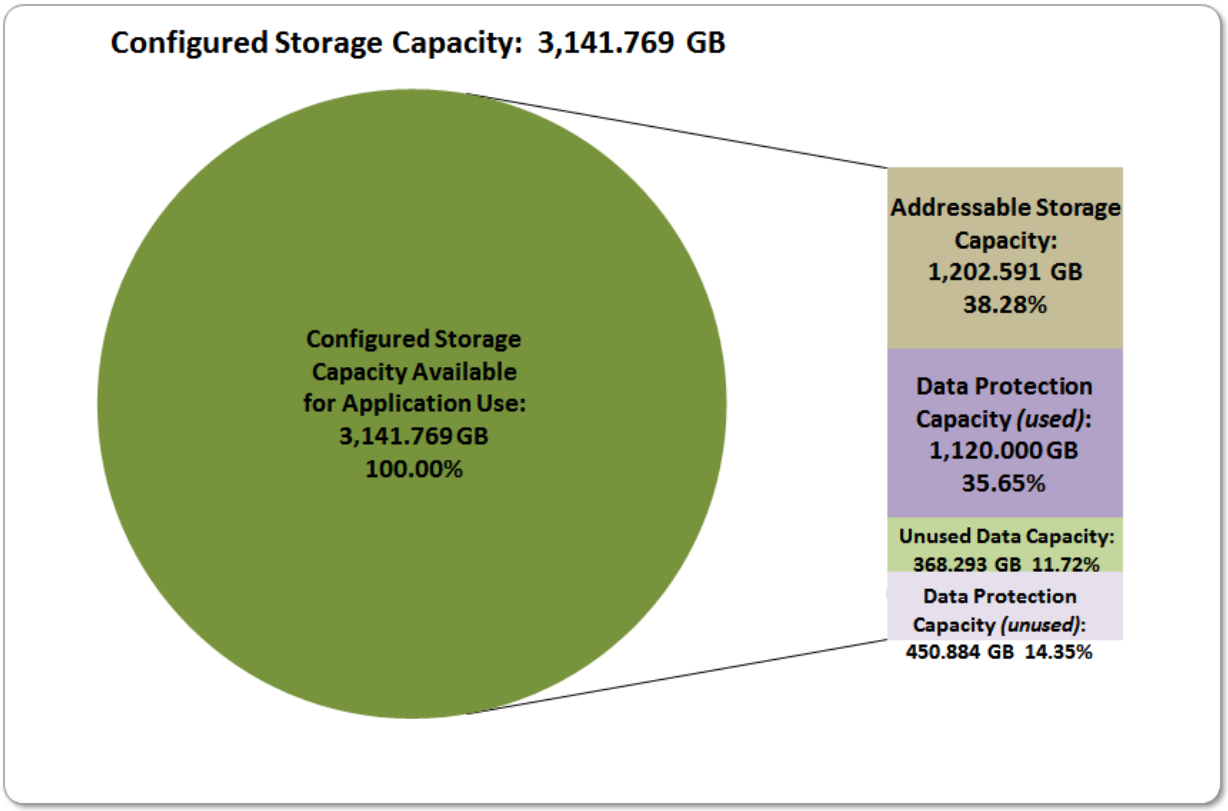
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency).*

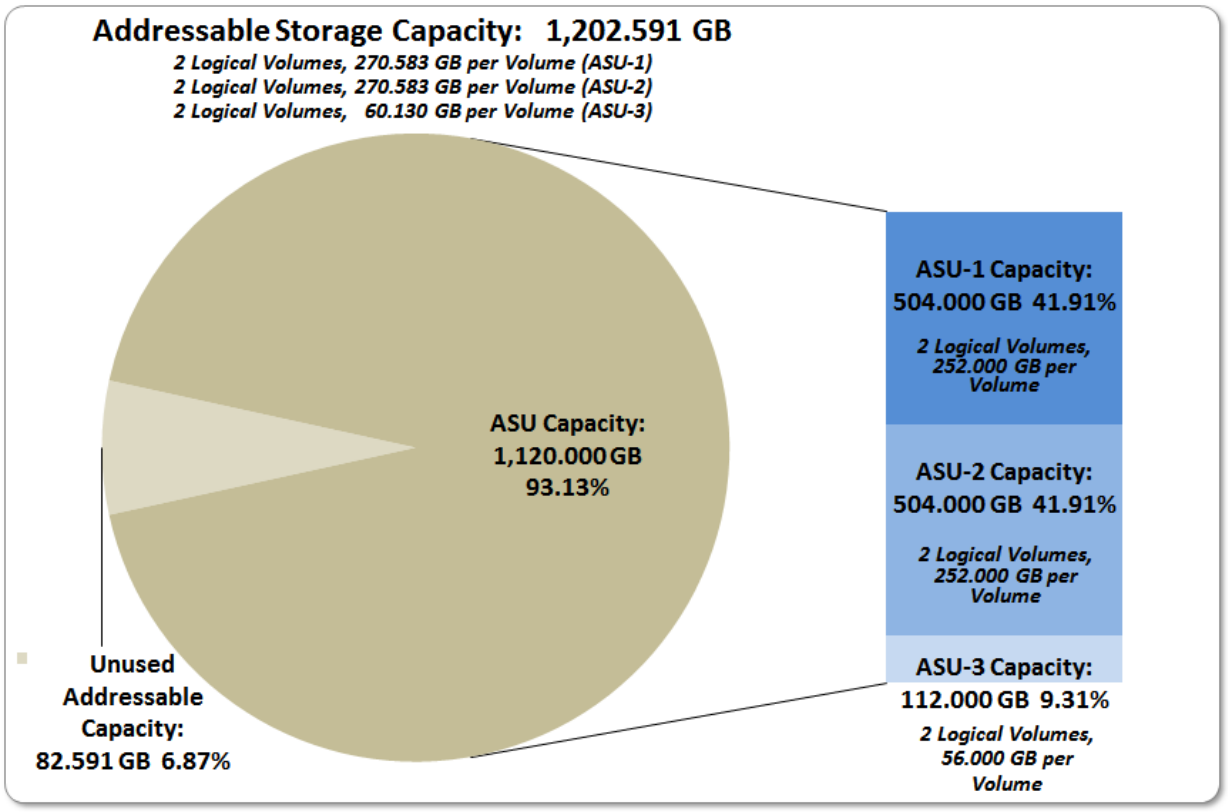
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

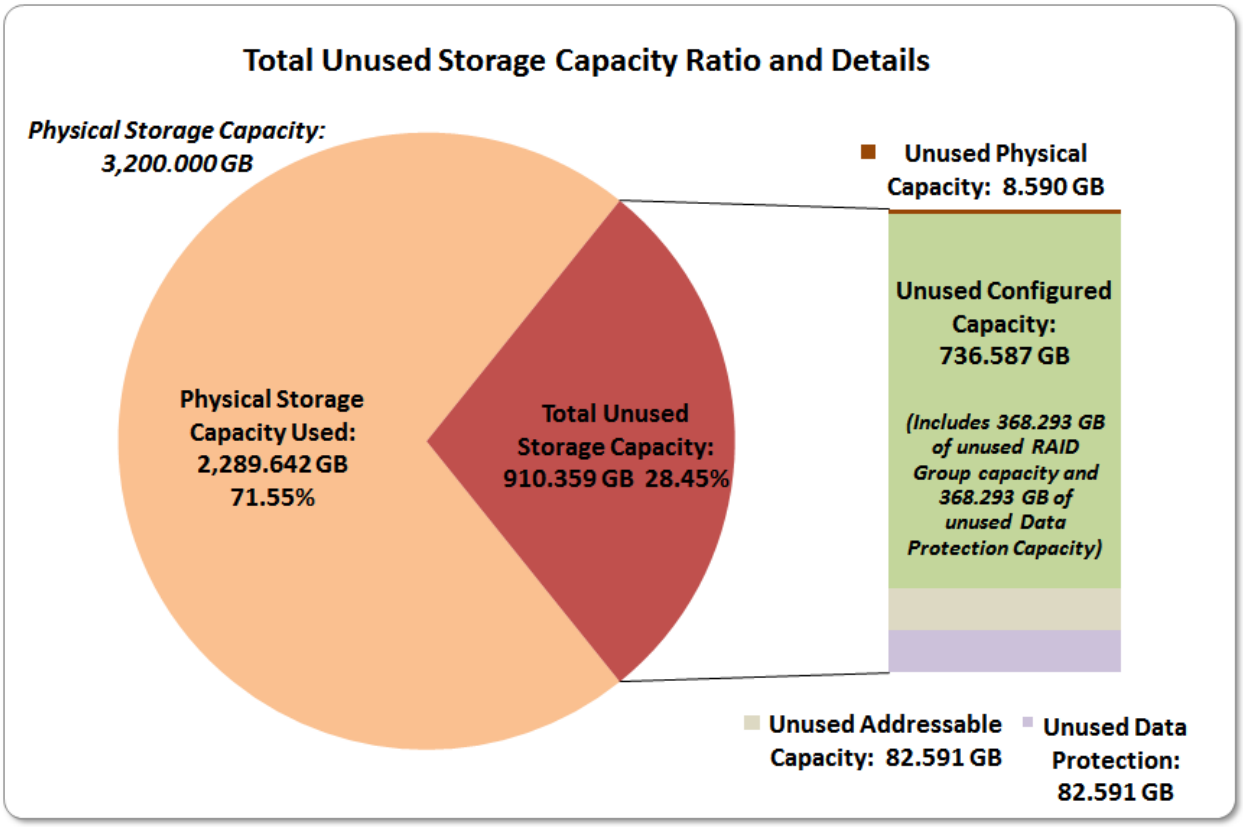
Storage Capacities, Relationships, and Utilization

The following four charts 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.




Configured Storage Capacity: 3,141.769 GB
Configured Storage Capacity Available for Application Use: 3,141.769 GB 100.00%
Addressable Storage Capacity: 1,202.591 GB 38.28%
Data Protection Capacity (used): 1,120.000 GB 35.65%
Unused Data Capacity: 368.293 GB 11.72%
Data Protection Capacity (unused): 450.884 GB 14.35%


Addressable Storage Capacity: 1,202.591 GB
2 Logical Volumes, 270.583 GB per Volume (ASU-1)
2 Logical Volumes, 270.583 GB per Volume (ASU-2)
2 Logical Volumes, 60.130 GB per Volume (ASU-3)
ASU Capacity: 1,120.000 GB 93.13%
Unused Addressable Capacity: 82.591 GB 6.87%
ASU-1 Capacity: 504.000 GB 41.91%
2 Logical Volumes, 252.000 GB per Volume
ASU-2 Capacity: 504.000 GB 41.91%
2 Logical Volumes, 252.000 GB per Volume
ASU-3 Capacity: 112.000 GB 9.31%
2 Logical Volumes, 56.000 GB per Volume



SPC-1 Storage Capacity Utilization	
Application Utilization	35.00%
Protected Application Utilization	70.00%
Unused Storage Ratio	28.45%

Application Utilization: Total ASU Capacity *(1,120.000 GB)* divided by Physical Storage Capacity *(3,200.000 GB)*.

Protected Application Utilization: (Total ASU Capacity *(1,120.000 GB)* plus total Data Protection Capacity *(1,570.884 GB)* minus unused Data Protection Capacity 450.884 *GB)*) divided by Physical Storage Capacity *(3,200.000 GB)*.

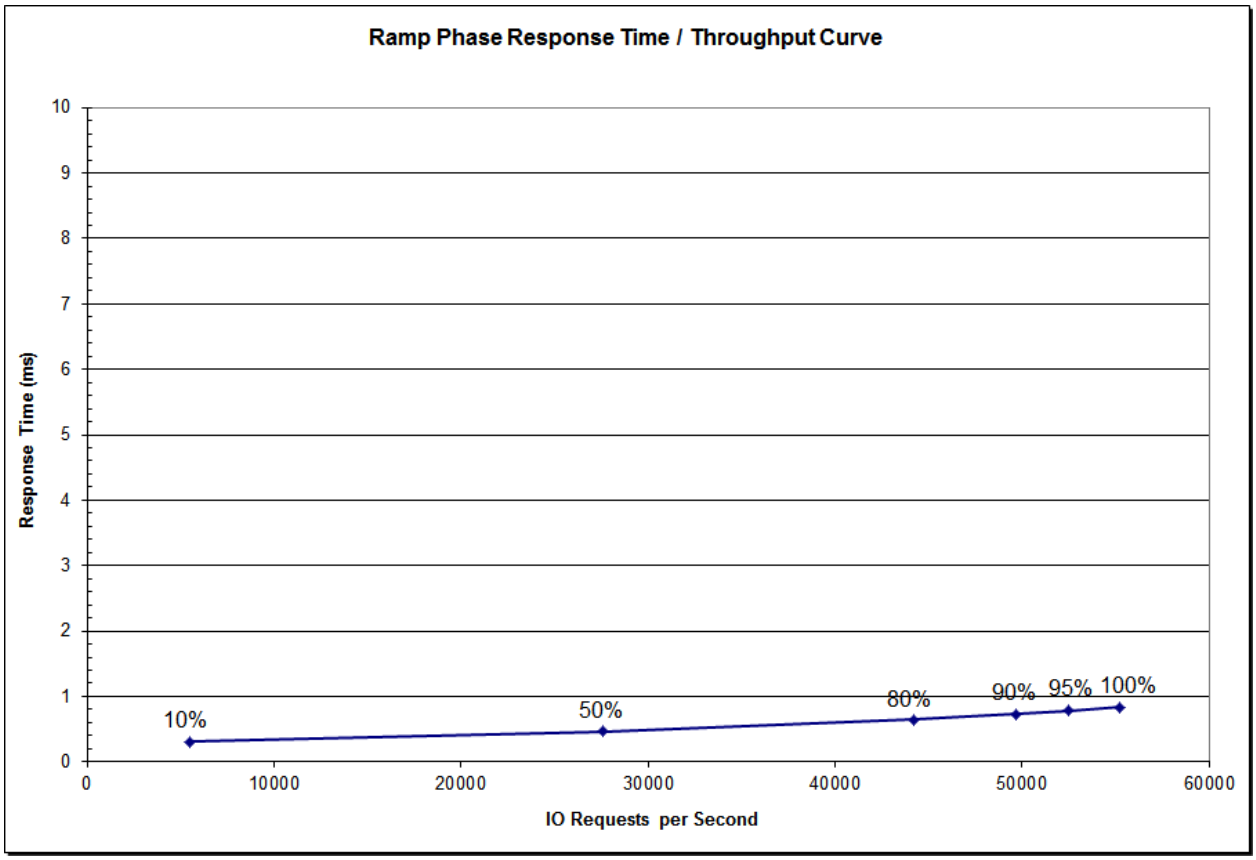
Unused Storage Ratio: Total Unused Capacity *(910.359 GB)* divided by Physical Storage Capacity *(3,200.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 24-25 in the Full Disclosure Report.

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
I/O Request Throughput	5,500.12	27,601.70	44,209.62	49,702.35	52,465.11	55,235.28
Average Response Time (ms):						
All ASUs	0.30	0.46	0.65	0.73	0.79	0.84
ASU-1	0.33	0.55	0.77	0.86	0.93	1.00
ASU-2	0.33	0.61	0.89	1.00	1.07	1.09
ASU-3	0.24	0.23	0.29	0.33	0.35	0.38
Reads	0.43	0.85	1.22	1.37	1.46	1.54
Writes	0.22	0.21	0.28	0.32	0.35	0.38

Priced Storage Configuration Pricing

Product ID	Product Name	Qty	Unit List Price	Extended LP	Discount %	Discounted Price
ET103AU_System	**ETERNUS DX100 S3 Storage Array**	**1**	**$56,381.00**	**$56,381.00**	**30%**	**$39,466.70**
ET103AU	DX100 S3 Base System Rackmount (AC200V, 2RU) (2.5" type)	1				
ETFM41U	Cache Memory - DX100 S3 4GB per CM	2				
ETFCH2E	FC Host Interface, 2 ports DX100 S3 CM & CA#0 (4/8/16Gbps, Host/Remote)	2				
ETFHH2	FC Host Interface, 2 ports DX100/200 S3 CA1 (4/8/16Gbps, Host/Remote)	2				
ETFSA4	MLC-SSD 400GB 2.5" x1 SAS for DX100/200 S3	8				
ETFKF30U	AC Power Cords (125V - NEMA 5-15, 3m)	1				
QLE2562	**QLogic 8Gbps Dual Port Fibre Channel Host Bus Adapter**	**4**	**$2,597.85**	**$10,391.40**	**30%**	**$7,273.98**
61-343827-003	**Fibre Channel Host IF Cable LC/LC - 3m**	**6**	**$132.00**	**$792.00**	**30%**	**$554.40**
	(Provide 24 hour per day / 7days per week 4 hour response maintenance for 36 months)					
ETD100-W025360-AJA	Warranty Service, 36 months Standard, 9x5 phone, NBD response	1	$0.00	$0.00		$0.00
ETD100-U004361-AJA	Warranty Uplift, 36 months Enhanced plus, 24x7 4hr Onsight	1	$9,497.00	$9,497.00	20%	$7,597.60
	SFPs are included.			**Total:**		**$54,892.68**

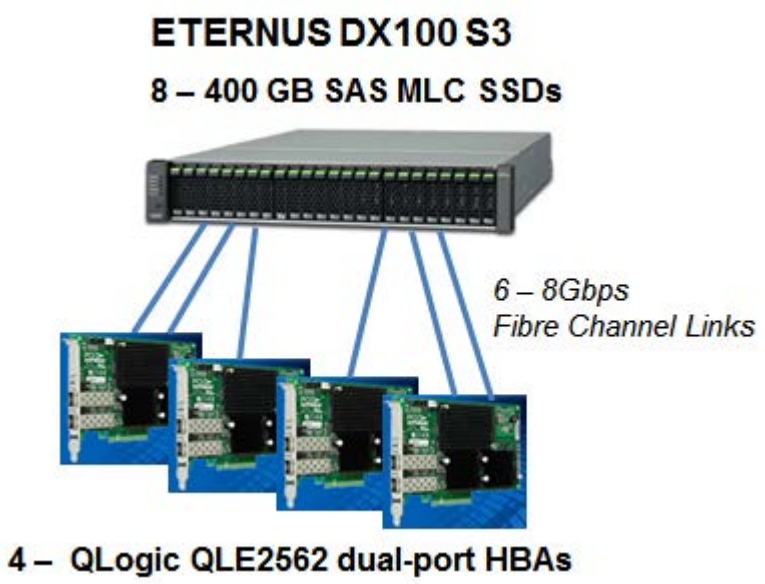
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems within four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration that can be remedied by the repair or replacement of a Priced Storage Configuration component.

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 Diagram



Priced Storage Configuration Components

Priced Storage Configuration
4 – QLogic QLE2562 dual-port HBAs
Fujitsu Storage Systems ETERNUS DX100 S3 1 – DX100 S3 Control Enclosure with 2 – Controllers (CMs) each with 4 GB cache (8 GB total) 2 – FC Channel Adapters (CAs) each with 2 – 16 Gbps FC host ports *(4 ports per CM, 8 ports total,* *3 ports used per CM, 6 ports total used)* 1 – SAS Expander Drive Interface with QSFP 12 Gbps SAS-3 *(1 – SAS-3 x4 link per interface,* *1 – SAS-3 x4 link used)* 8 – 400 GB SAS MLC 2.5” SSD storage devices