

SPC BENCHMARK 1™

EXECUTIVE SUMMARY

FUJITSU LIMITED

FUJITSU STORAGE SYSTEMS ETERNUS AF650

SPC-1 V1.14

SUBMITTED FOR REVIEW: JANUARY 4, 2017

SUBMISSION IDENTIFIER: A02001

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	V2.5.0
Date Results were first used publicly	January 4, 2017
Date the FDR was submitted to the SPC	January 4, 2017
Date the Priced Storage Configuration is available for shipment to customers	Currently Available
Date the TSC completed audit certification	December 29, 2016

Tested Storage Product (TSP) Description

Fujitsu Storage ETERNUS AF650 system delivers leading storage performance and automated quality of service management enabling a maximum of system utilization and contributing to a fast ROI. It is the perfect solution when consolidating data in large-scale databases, business critical applications and business analytics / big data - all into one system. It provides ample headroom for demanding server/desktop virtualization environments and enterprise file services. Extensive high-availability and disaster recovery capabilities make ETERNUS AF650 an ideal storage system for business-critical data.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: Fujitsu Storage Systems ETERNUS AF650	
Metric	Reported Result
SPC-1 IOPS™	605,992.03
SPC-1 Price-Performance™	\$0.40/SPC-1 IOPS™
Total ASU Capacity	6,578.00GB
Data Protection Level	Protected 2
Total Price	\$239,911.50
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.

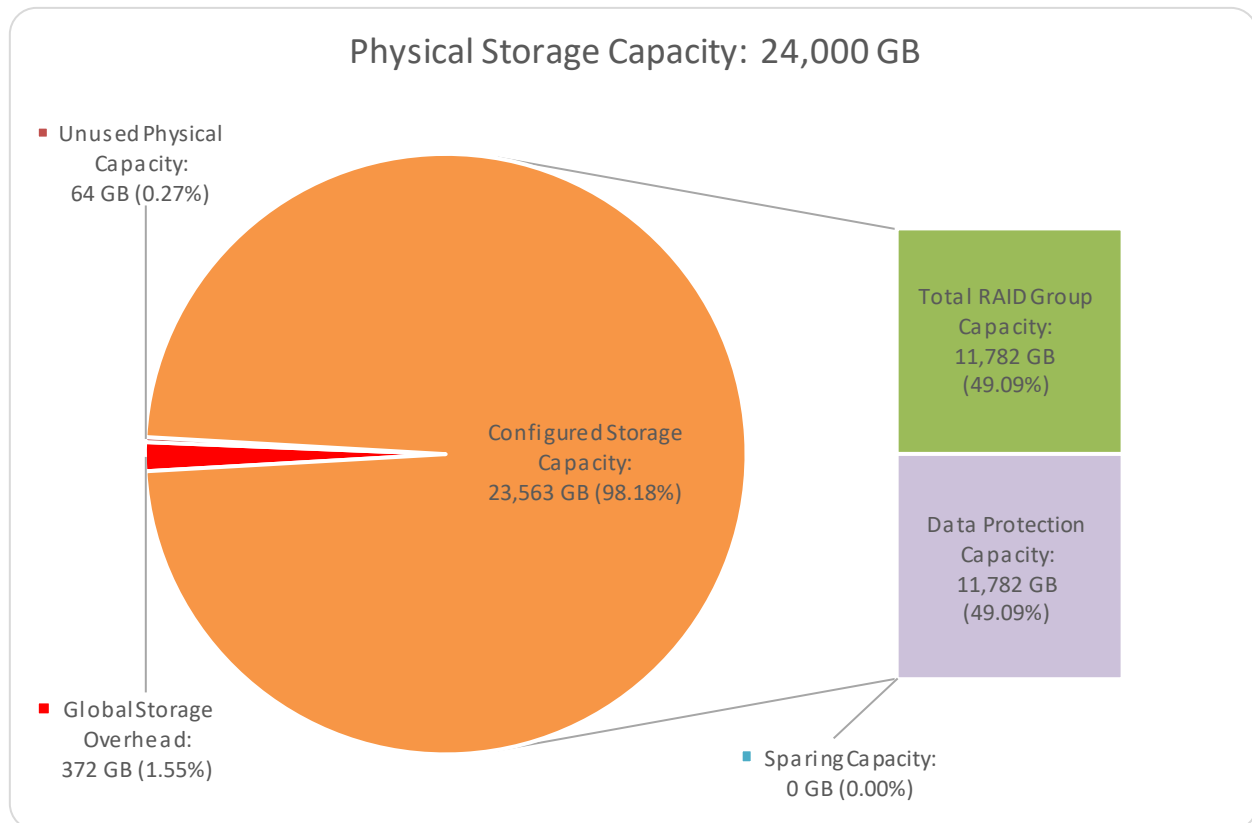
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

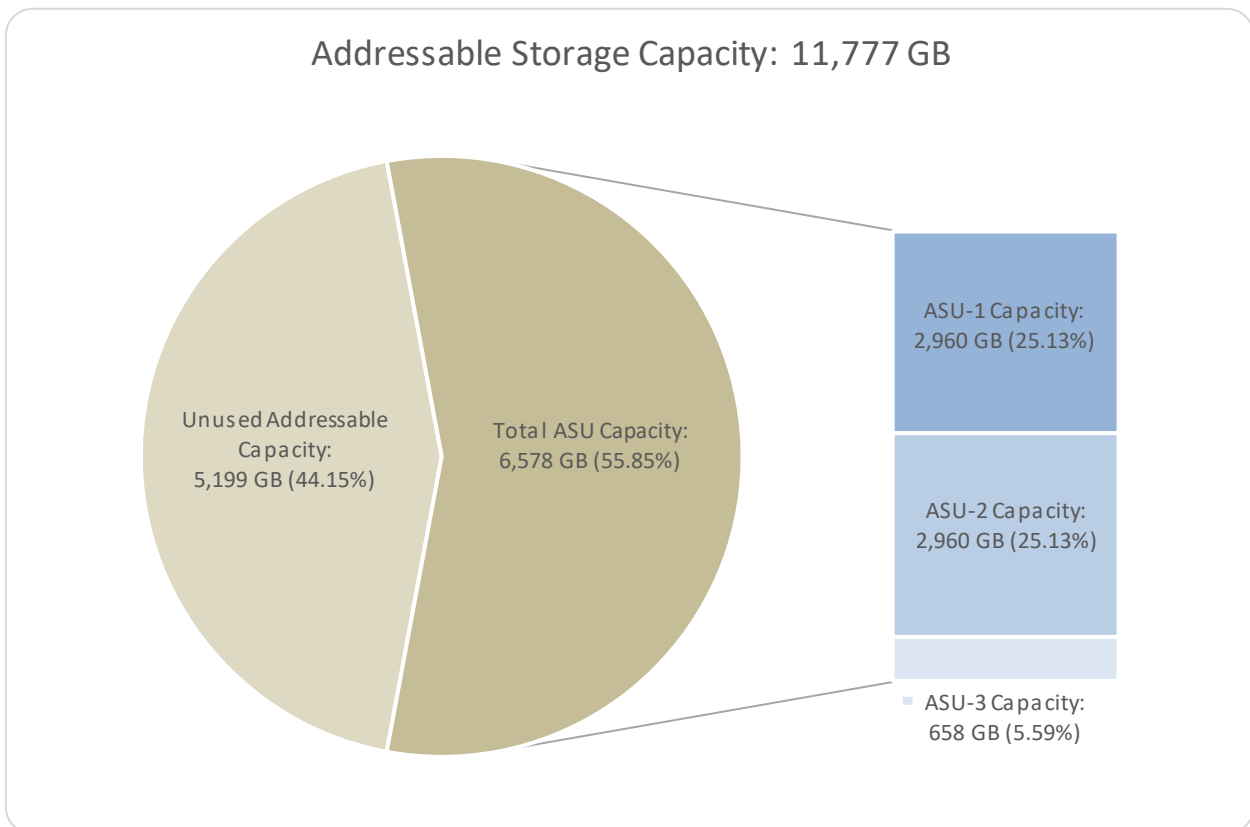
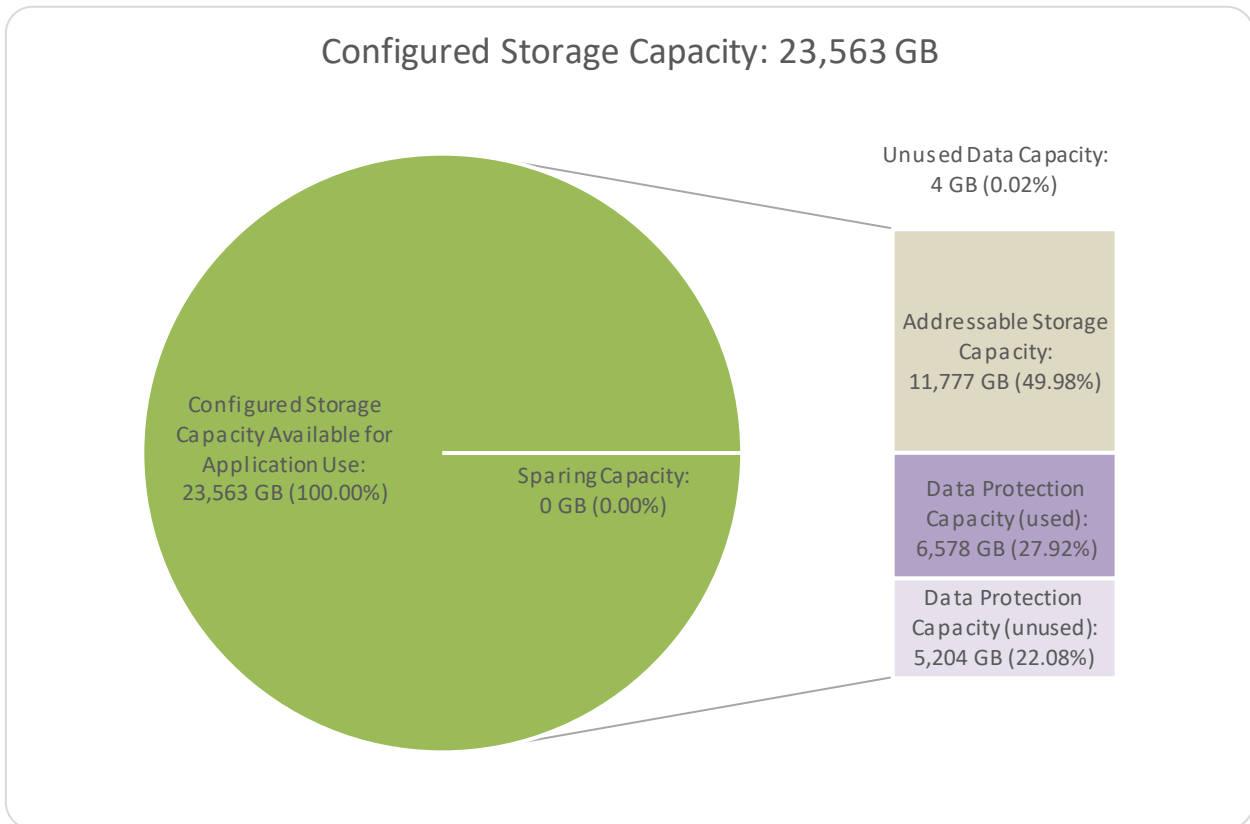
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

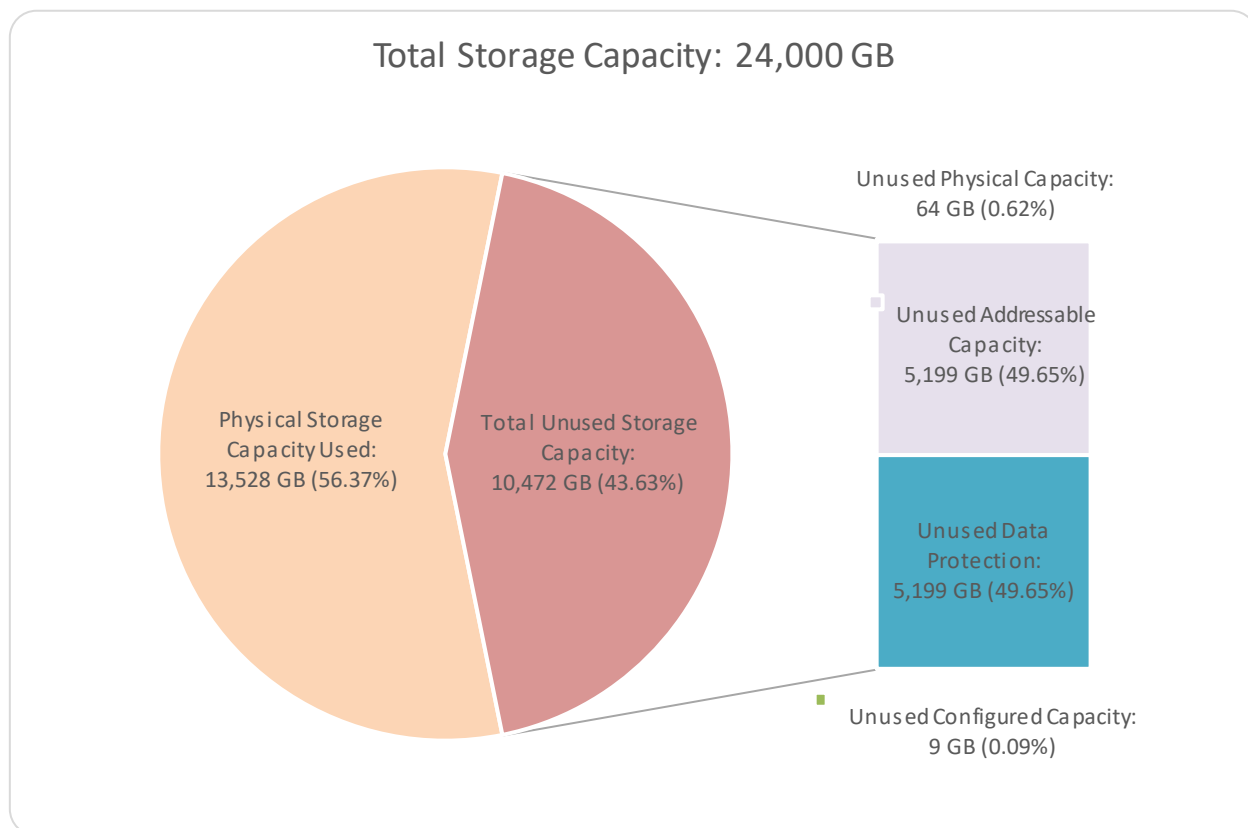
Storage Capacities, Relationships, and Utilization

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.

The capacity values in each of the following four charts are listed as integer values, for readability, rather than the decimal values listed elsewhere in this document.







SPC-1 Storage Capacity Utilization	
Application Utilization	27.41%
Protected Application Utilization	54.84%
Unused Storage Ratio	43.63%

Application Utilization: Total ASU Capacity (6,578.00 GB) divided by Physical Storage Capacity (24,000.000 GB).

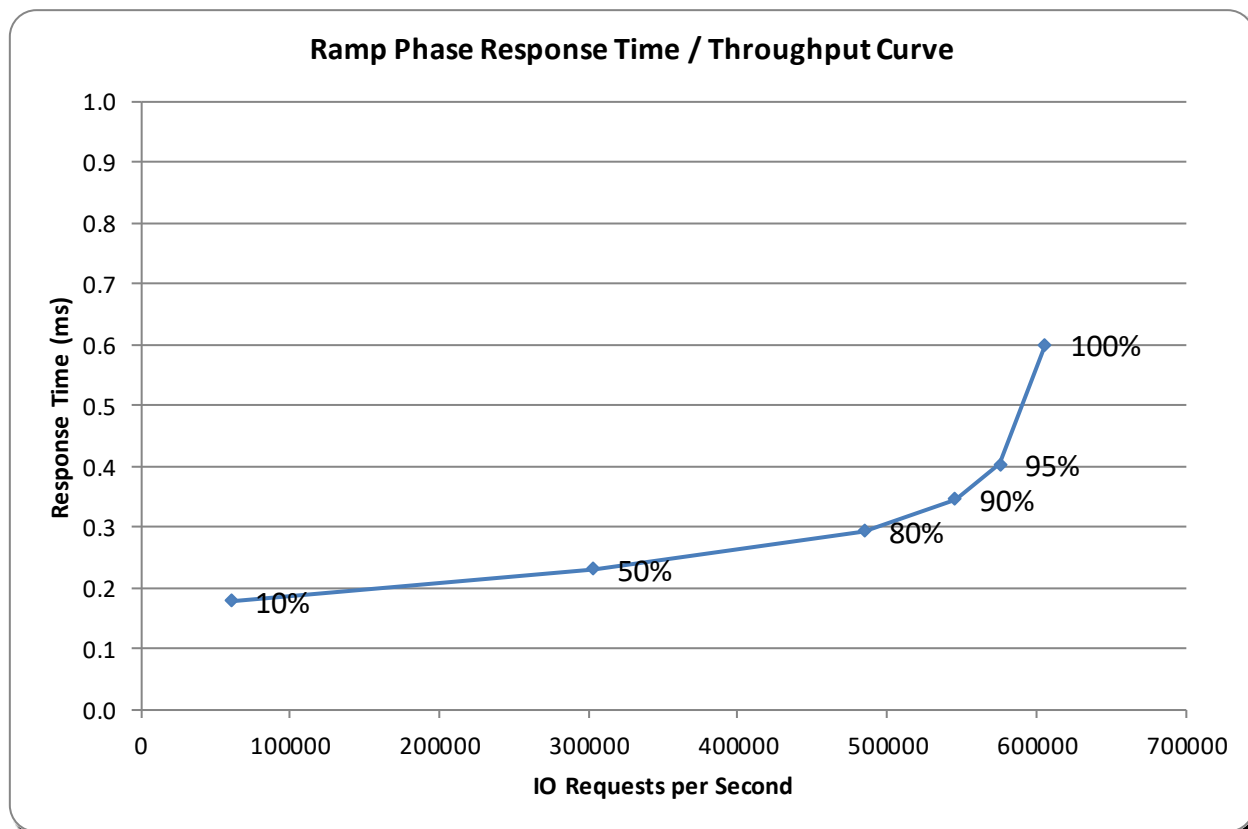
Protected Application Utilization: (Total ASU Capacity (6,578.00 GB) plus total Data Protection Capacity (11,781.632 GB) minus unused Data Protection Capacity (5,203.632 GB)) divided by Physical Storage Capacity (24,000.000 GB).

Unused Storage Ratio: Total Unused Capacity (10,471.689 GB) divided by Physical Storage Capacity (24,000.000 GB) and may not exceed 45%.

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 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	60,584.28	303,011.99	484,781.26	545,383.81	575,745.17	605,992.03
Avg. Response Time (ms)						
All ASUs	0.18	0.23	0.29	0.35	0.40	0.60
ASU-1	0.19	0.24	0.31	0.36	0.41	0.65
ASU-2	0.19	0.25	0.31	0.36	0.42	0.54
ASU-3	0.15	0.20	0.26	0.31	0.38	0.52
Reads	0.23	0.29	0.36	0.41	0.46	0.66
Writes	0.15	0.19	0.25	0.31	0.37	0.56

Priced Storage Configuration Pricing

Product ID	Product Name	Qty	Unit List Price	Extended LP	Discount %	Discounted Price
ET651SAU	ETERNUS AF650	1	\$84,770.00	\$84,770.00	50%	\$42,385.00
ETPEADAU	Drive enclosure for AF650	4	\$4,700.00	\$18,800.00	50%	\$9,400.00
ETPHH8A	Host interface for AF650 (FC 16Gbps, 4port) x 2	2	\$8,310.00	\$16,620.00	50%	\$8,310.00
ETPSA41	SSD(2.5inch) 400GB x1 for AF650	60	\$3,810.00	\$228,600.00	50%	\$114,300.00
S26361-F4994-L502	PFC EP LPe16002	16	\$2,114.00	\$33,824.00	50%	\$16,912.00
ETPKC10U	AC Power Cords (125V - IEC320-C14, 0.5m)	5	\$130.00	\$650.00	50%	\$325.00
ETPP12U-L	Power Distribution Unit for DX (AC240V, 6 enclosures, 2RU)	1	\$2,170.00	\$2,170.00	50%	\$1,085.00
PYRACK_S26361-K827-V340_206528-02	PRIMECENTER M1 RACK 642S (42U, 1050x600mm) with Front & Rear Doors, side panels	1	\$3,277.00	\$3,277.00	50%	\$1,638.50
61-343827-005	LC-LC 10 GIGABIT MULTIMODE OM3 LASER OPTIMIZED DUPLEX 50/125 FIBER PATCH CABLE RISER RATED AQUA - 5M	16	\$140.00	\$2,240.00	50%	\$1,120.00

ETAFA65-W025360-AAI	ETERNUS AF650 Warranty, 36 Months, Standard Level, 9x5 Phone Support, NBD Response	1	\$0.00	\$0.00		\$0.00
ETAFA65-U004361-AAI	ETERNUS AF650 Warranty Uplift, 36 Months, Enhanced Plus Level, 24x7 4hr Onsite, Prepaid billing (Provide 24 hour per day / 7days per week 4 hour response maintenance for 36 months)	1	\$53,115.00	\$53,115.00	20%	\$42,492.00
ETAFA65-N067005-AAI	ETERNUS AF650 Installation, during normal business hours, One Time billing	1	\$2,430.00	\$2,430.00	20%	\$1,944.00

Total:

\$239,911.50

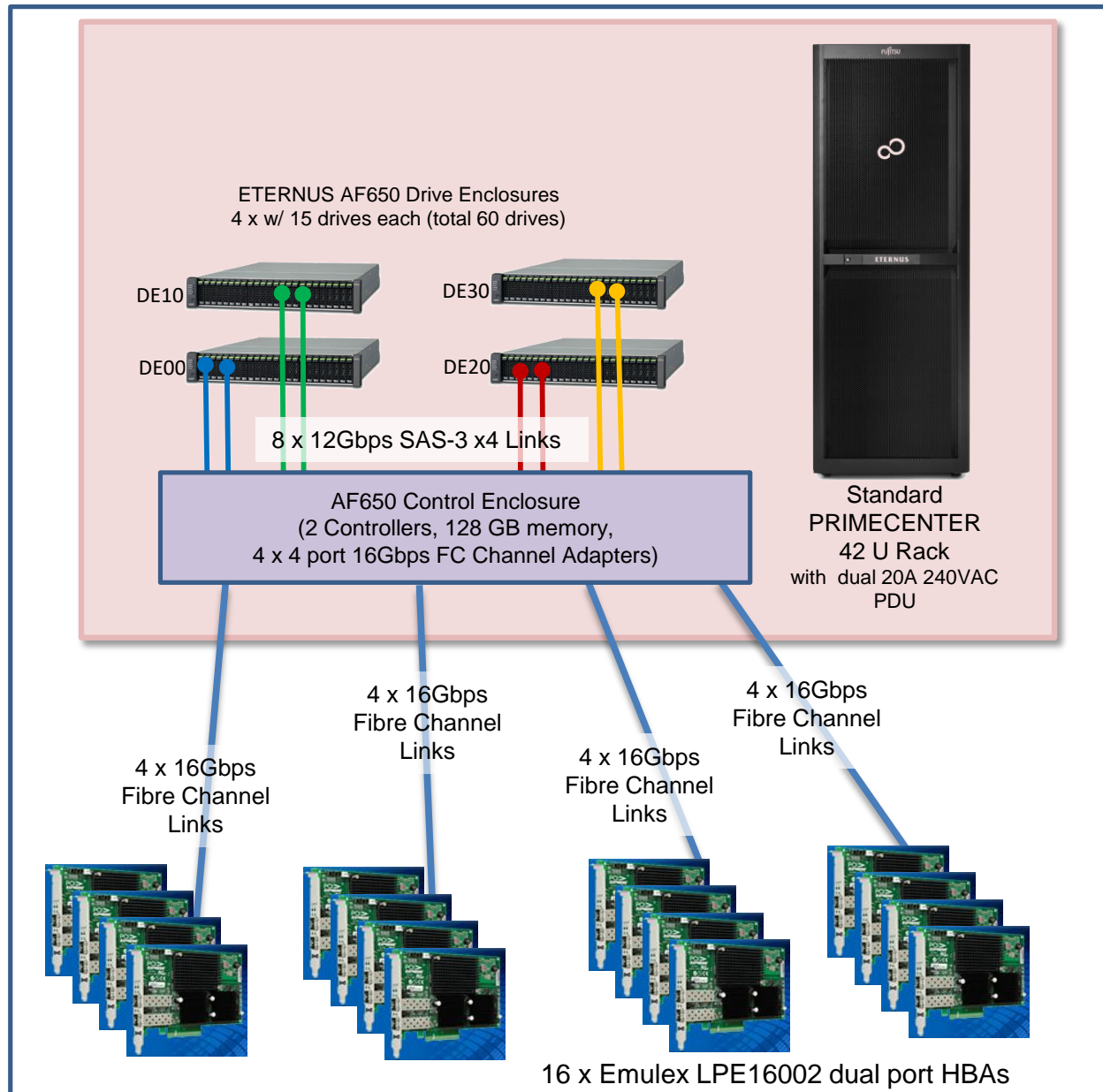
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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 Price 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

The TSC was configured with a Fujitsu Standard 42 U Rack. The PSC has a Standard PRIMECENTER 42 U Rack. If the TSC had been configured with a Standard PRIMECENTER 42 U Rack there would not have been a difference in the reported SPC-1 performance.

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Priced Storage Configuration
16 – Emulex LPE16002 dual-port HBAs
Fujitsu Storage Systems ETERNUS AF650 1x AF650 Control Enclosure with: 2x Controllers (CMs) each with: <ul style="list-style-type: none"> • 128GB Cache • 1x Channel Adapter (CA) with 4x 16 Gbps Fibre Channel Host Ports • 2x SAS Expander Drive Interfaces with QSFP 12Gbps SAS-3
60 – 400 GB SSD devices (w ithout Hot Spare)
4x Drive Enclosure Module with: 24 – Hot Sw ap drive slots 2 – SAS Interface/Expander Modules with QSFP 12 Gbps SAS-3
1 – Standard PRIMECENTER 42U Rack with a dual 20A 240VAC PDU