SPC BENCHMARK 1™
EXECUTIVE SUMMARY

INFORTREND TECHNOLOGY, INC.
INFORTREND EONSTOR DS3024B

SPC-1 V1.14

Submitted for Review: June 12, 2015
Submission Identifier: A00158

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Infortrend Technology, Inc. – http://www.infortrend.com Jeff Lin – Jeff.Lin@infortrend.com 8F, No. 102, Sec. 3, Jhongshan Rd. Jhonge District , New Taipei City 23544, Taiwan Phone: +866 (2) 2226 0020 x7082
Test Sponsor Alternate Contact	Infortrend Technology, Inc. – http://www.infortrend.com Albert Yen – albert.yen@infortrend.com 8F, No. 102, Sec. 3, Jhongshan Rd. Jhonge District , New Taipei City 23544, Taiwan Phone: +866 (2) 2226 0020 x8020
Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

Revision Information and Key Dates

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SPC-1 Specification revision number	V1.14
SPC-1 Workload Generator revision number	V2.3.0
Date Results were first used publicly	June 12, 2015
Date the FDR was submitted to the SPC	June 12, 2015
Date the Priced Storage Configuration is available for shipment to customers	July 13, 2015
Date the TSC completed audit certification	June 11, 2015

Tested Storage Product (TSP) Description

EonStor DS 3024B is a small form factor (SFF) and high density 2U 24-bay storage designed for 2.5" drives and all-SSD arrays. The EonStor DS 3024B is well suited for SMB and enterprise SAN/IP SAN/DAS applications while providing outstanding price-performance. Additional details about the EonStor DS 3024B are available at http://www.infortrend.com/global/products/models/ESDS 3024B.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: Infortrend EonStor DS3024B	
Metric	**Reported Result**
SPC-1 IOPS™	218,007.79
SPC-1 Price-Performance™	$0.24/SPC-1 IOPS™
Total ASU Capacity	2,000.000 GB
Data Protection Level	Protected 2 *(mirroring)*
Total Price	$52,185.00
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* ***storage device*** *in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

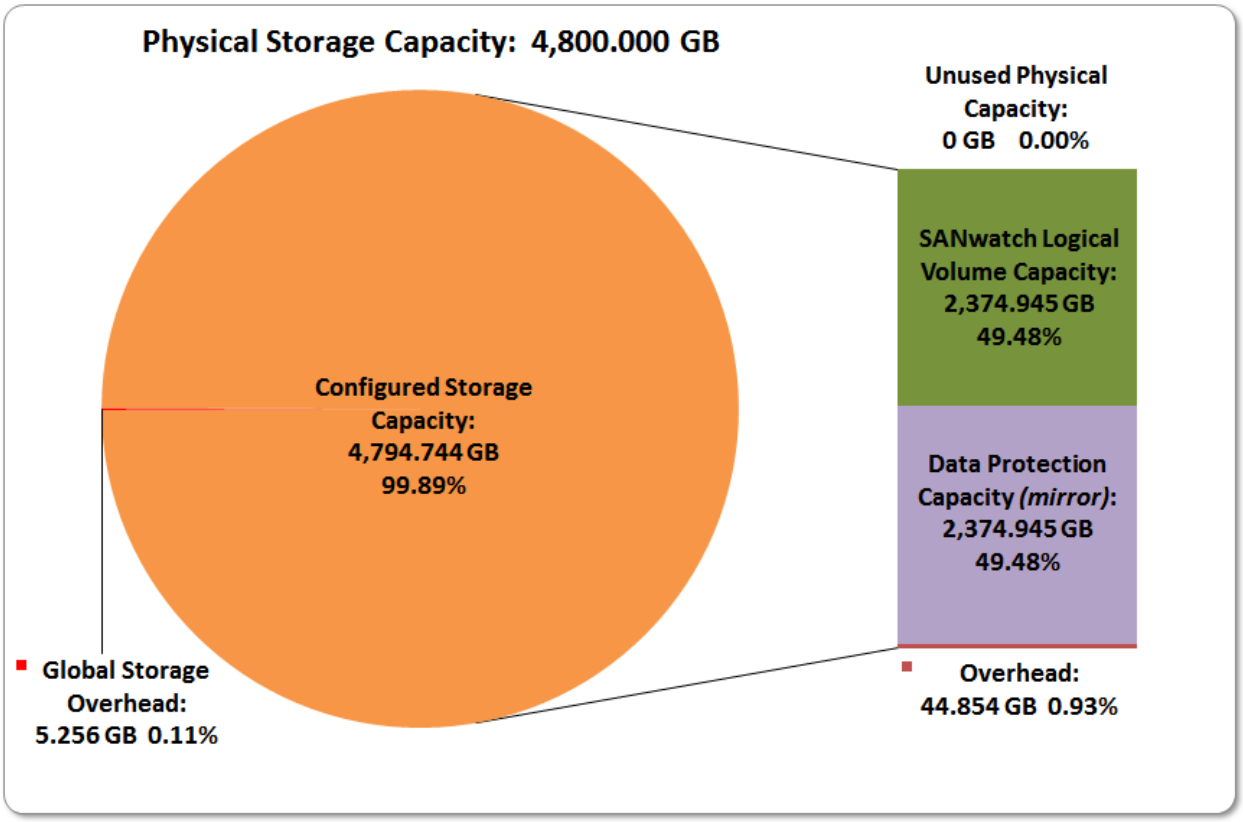
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 8.

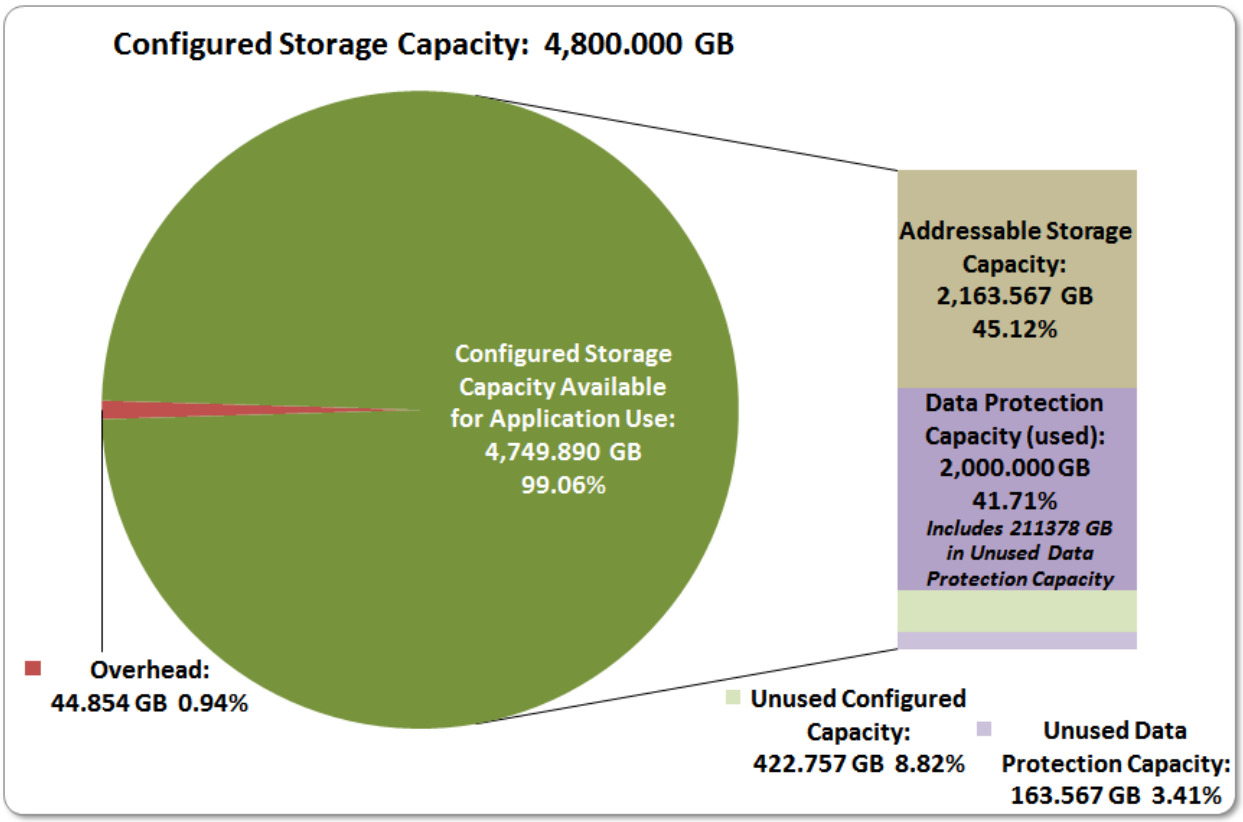
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

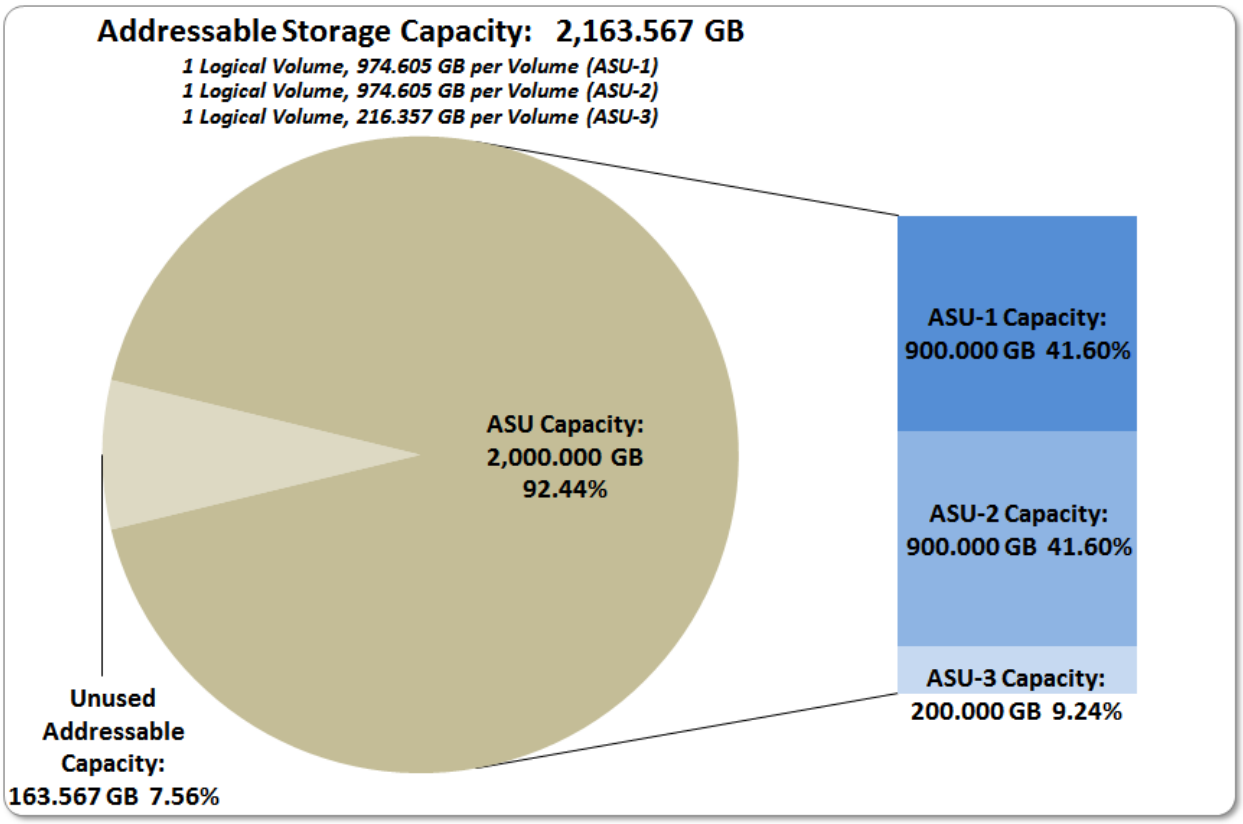
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

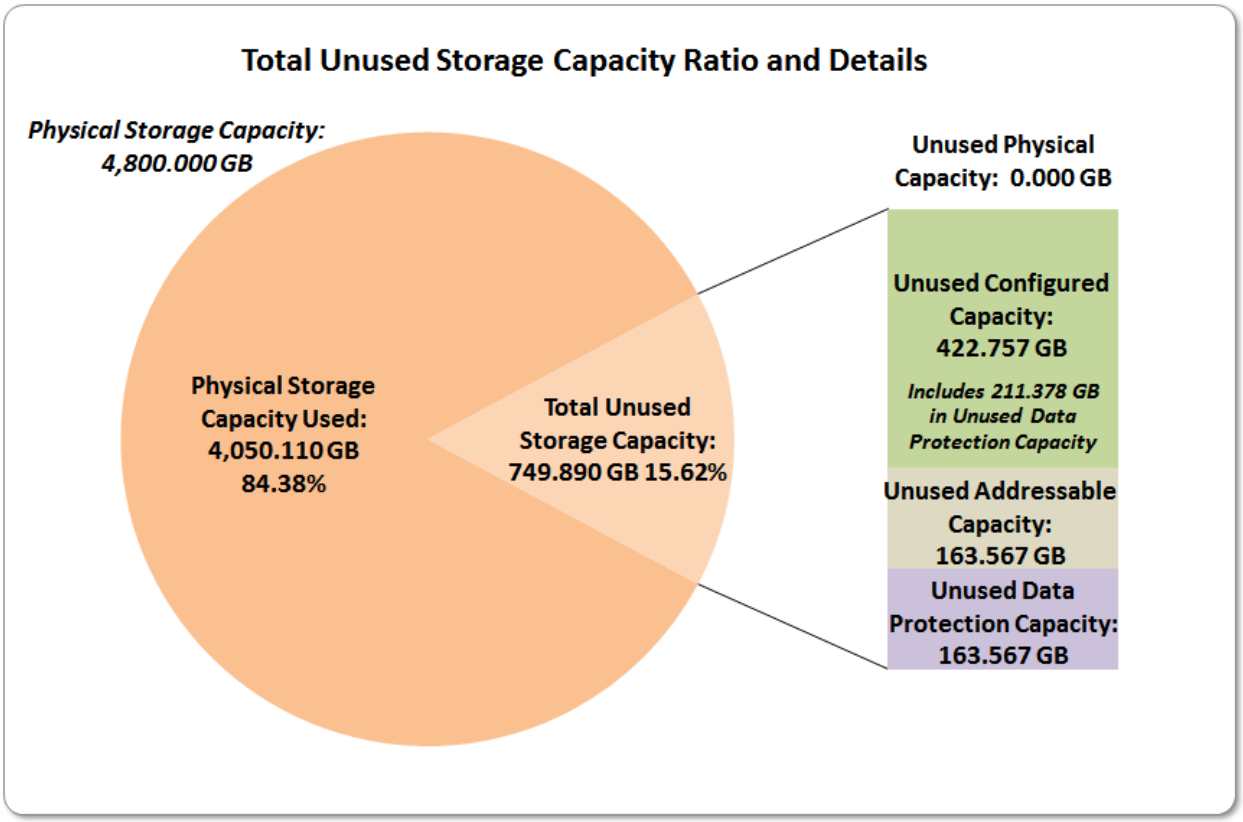
Storage Capacities, Relationships, and Utilization

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: 4,800.000 GB
Configured Storage Capacity Available for Application Use: 4,749.890 GB 99.06%
Overhead: 44.854 GB 0.94%
Addressable Storage Capacity: 2,163.567 GB 45.12%
Data Protection Capacity (used): 2,000.000 GB 41.71%
Includes 211378 GB in Unused Data Protection Capacity
Unused Configured Capacity: 422.757 GB 8.82%
Unused Data Protection Capacity: 163.567 GB 3.41%


Addressable Storage Capacity: 2,163.567 GB
1 Logical Volume, 974.605 GB per Volume (ASU-1)
1 Logical Volume, 974.605 GB per Volume (ASU-2)
1 Logical Volume, 216.357 GB per Volume (ASU-3)
ASU Capacity: 2,000.000 GB 92.44%
Unused Addressable Capacity: 163.567 GB 7.56%
ASU-1 Capacity: 900.000 GB 41.60%
ASU-2 Capacity: 900.000 GB 41.60%
ASU-3 Capacity: 200.000 GB 9.24%



SPC-1 Storage Capacity Utilization	
Application Utilization	41.67%
Protected Application Utilization	83.33%
Unused Storage Ratio	15.62%

Application Utilization: Total ASU Capacity *(2,000.000 GB)* divided by Physical Storage Capacity *(4,800.000 GB)*.

Protected Application Utilization: (Total ASU Capacity *(2,000.000 GB)* plus total Data Protection Capacity *(2,374.945 GB)* minus unused Data Protection Capacity *(374.945 GB)*) divided by Physical Storage Capacity *(4,800.000 GB)*.

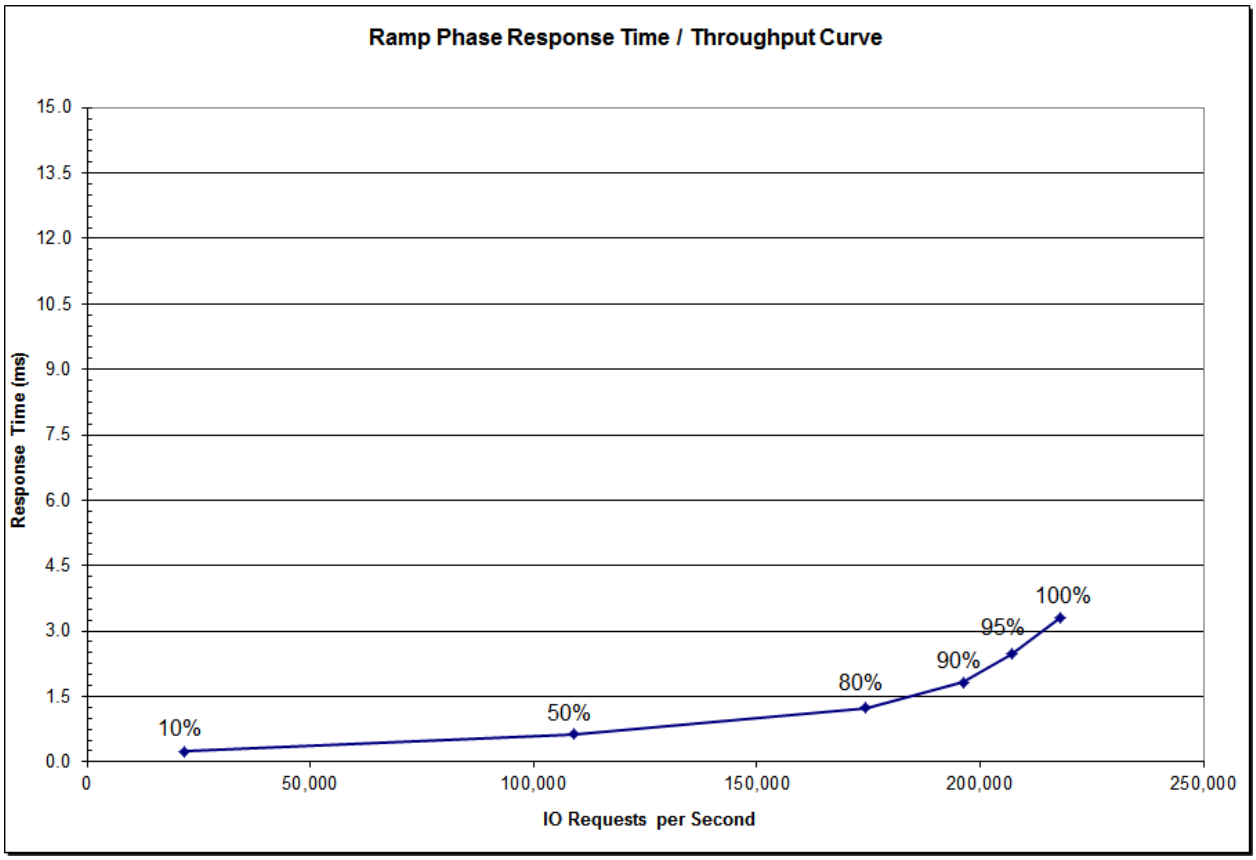
Unused Storage Ratio: Total Unused Capacity *(749.890 GB)* divided by Physical Storage Capacity *(4,800.000 GB)* and may not exceed 45%.

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	21,794.16	109,000.67	174,400.36	196,201.86	207,101.51	218,007.79
Average Response Time (ms):						
All ASUs	0.24	0.63	1.24	1.82	2.47	3.31
ASU-1	0.24	0.62	1.30	2.03	2.88	4.09
ASU-2	0.22	0.56	1.04	1.39	1.69	1.93
ASU-3	0.26	0.68	1.19	1.57	1.94	2.27
Reads	0.23	0.55	1.12	1.67	2.34	3.29
Writes	0.25	0.68	1.32	1.92	2.55	3.32

Priced Storage Configuration Pricing

P/N	Description	Q'ty	MSRP	Extended Price
DS3024RT2B00F	EonStor DS 3000 Gen2 2U/24bay, High IOPS solutions, Dual Redundant controller subsystem including 2x6Gb SAS EXP. Ports, 8x1G iSCSI ports +2x host board slot(s), 4x8GB, 2x(PSU+FAN Module), 2x(BBU+Flash module), 24xHDD trays and 1xRackmount kit	1	11,082.00	11,082.00
RFC16G0HIO2-0010	EonStor / EonStor DS host board with 2 x 16Gb/s FC ports	2	1,260.00	2,520.00
HESTSSS3020-00301	Toshiba Enterprise 2.5" SAS 12Gb/s MLC SSD, 200GB, 1 in 1 Packing	24	895.00	21,480.00
US-PSPHD-3Y304	3 Years PSP 4 - 24/7 Help Desk & Engineer Onsite Services within 4 hours. Parts are prepared by customer (HDDs included)	1	4,472.00	4,472.00
DS3024BTSK-0010	EonStor DS 3024B spare kit including 1 x RAID Controller w/2x8GB DDR-III, 1 x Host Board w/ 2 x 16Gb FC ports, 1 x Toshiba 2.5" SAS 12Gb/s MLC 200GB SSD, 1 x PSU, 1 x FC SFPs and 1 x FC cables	1	7,429.00	7,429.00
9270CFCCAB06-0010	Optical FC cable, LC-LC, MM-50/125, Duplex, LSZH, O.D.=1.8mm*2, 10 Meters	4	54.00	216.00
9370CSFP16G-0010	16Gb/s Fibre Channel SFP optical transceiver, LC, wave-length 850nm, multi-mode	4	286.00	1,144.00
BH1EMF311-0010	HBA card, LPe16002B, FC-16G, Dual ports, 1 in 1 package	2	1,921.00	3,842.00
	Total			**52,185.00**

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:

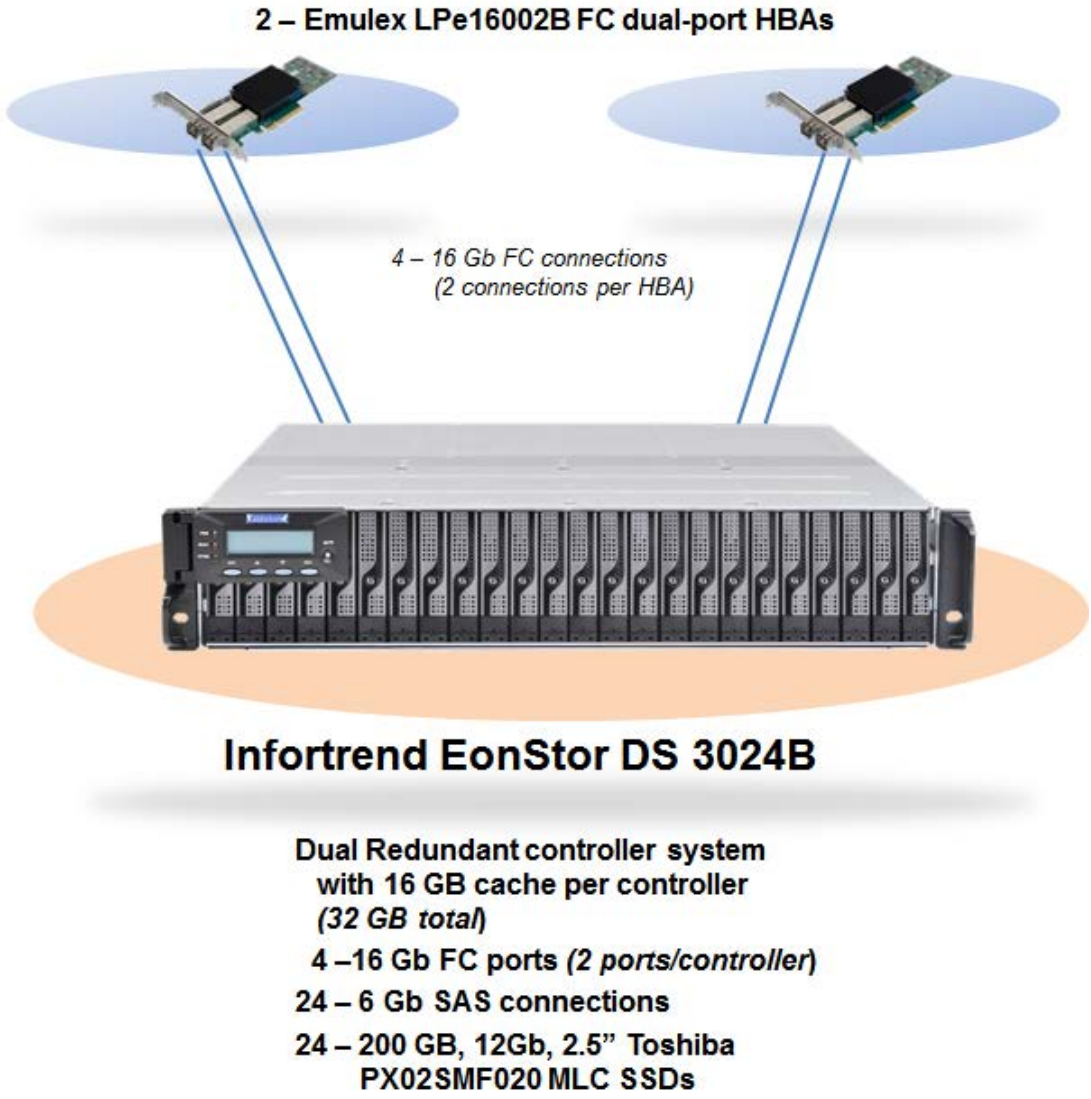
- Acknowledgement of new and existing problems within four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration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

The above pricing also includes a spare kit with the components that the customer are required to have available in the case of any hardware failure *("Parts are prepared by customer").*

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

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

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Priced Storage Configuration
2 – Emulex LPe16002B-FC dual port 16Gb FC HBAs
Infortrend EonStor DS3024B Dual Redundant controller subsystem 16 GB cache per controller *(32 GB total)* 4 – 16Gb FC ports *(2ports per controller, 4 ports used)* 24 – backend 6Gb SAS connections *(24 connections used)* 24 – 200 GB 12Gb 2.5" Toshiba PX02SMF020 MLC SSDs