SPC BENCHMARK 1™
EXECUTIVE SUMMARY

NEC CORPORATION
NEC STORAGE M710

SPC-1 V1.14

Submitted for Review: August 26, 2015
Submission Identifier: A00161

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
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Test Sponsor Alternate Contact	NEC Corporation of America – http://www.necam.com/ Chauncey Schwartz – chauncey.schwartz@necam.com 2880 Scott Blvd. Santa Clara, CA 95050 Phone: (952) 388-8466
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

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	August 26, 2015
Date the FDR was submitted to the SPC	August 26, 2015
Date the Priced Storage Configuration is available for shipment to customers	July 13, 2015
Date the TSC completed audit certification	August 25, 2015

Tested Storage Product (TSP) Description

The NEC M710 SAN disk array has the high performance, capacity and availability demanded by data-intensive, mission critical environments.

Easy to operate, the M710 is well-suited for virtualized settings due to its scalability, 16Gbps or 8Gbps of fibre channel, and VMware APIs support.

Large-scale storage integration is achieved by utilizing advanced virtualization technologies, such as VMware certified and thin provisioning.

Superior security functions, such as self-encrypting HDDs, are supported on the M710 SAN disk array.

As an additional security measure, internal storage data can also be completely erased using NEC's Secure Erase Technology, which is based on approved methods defined by the U.S. Department of Defense.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: NEC Storage M710	
Metric	**Reported Result**
SPC-1 IOPS™	255,011.06
SPC-1 Price-Performance™	$3.11/SPC-1 IOPS™
Total ASU Capacity	134,739.741 GB
Data Protection Level	Protected 2 *(mirroring)*
Total Price	$793,975.85
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.*

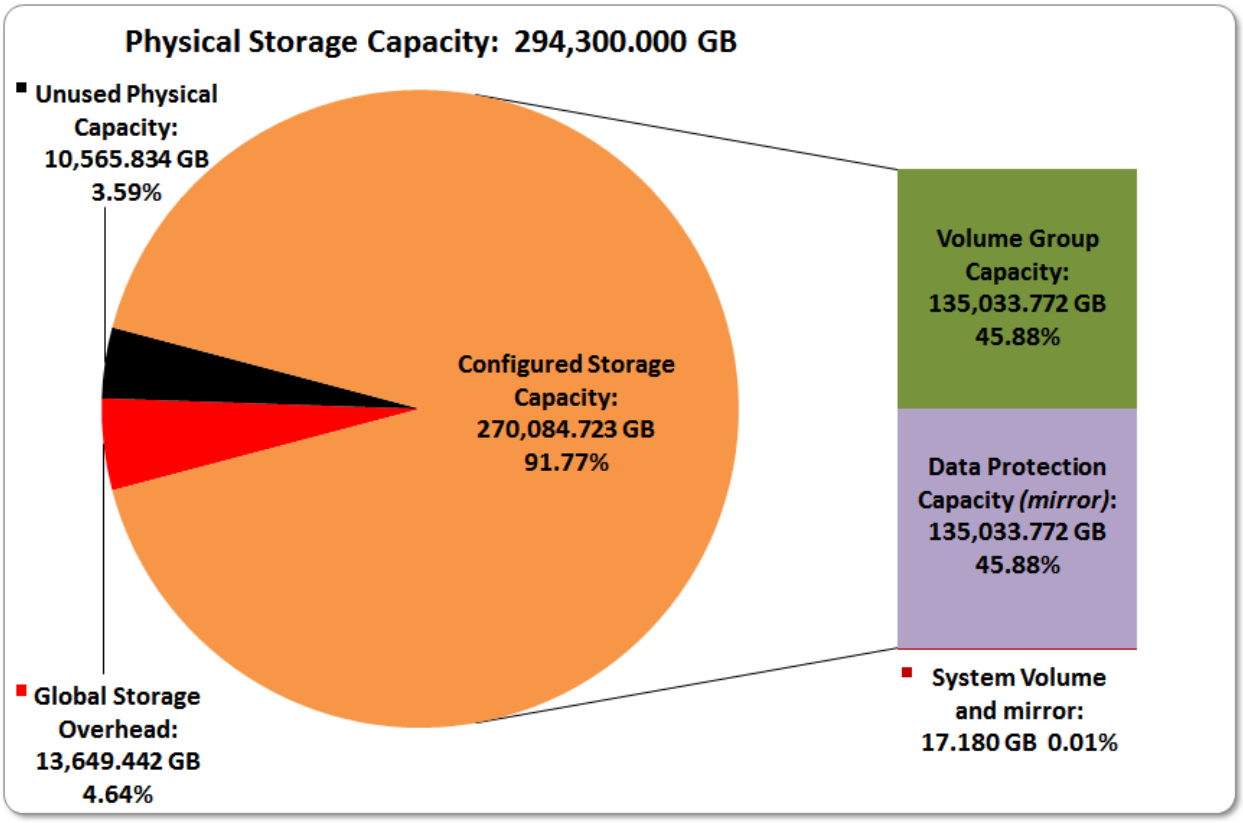
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

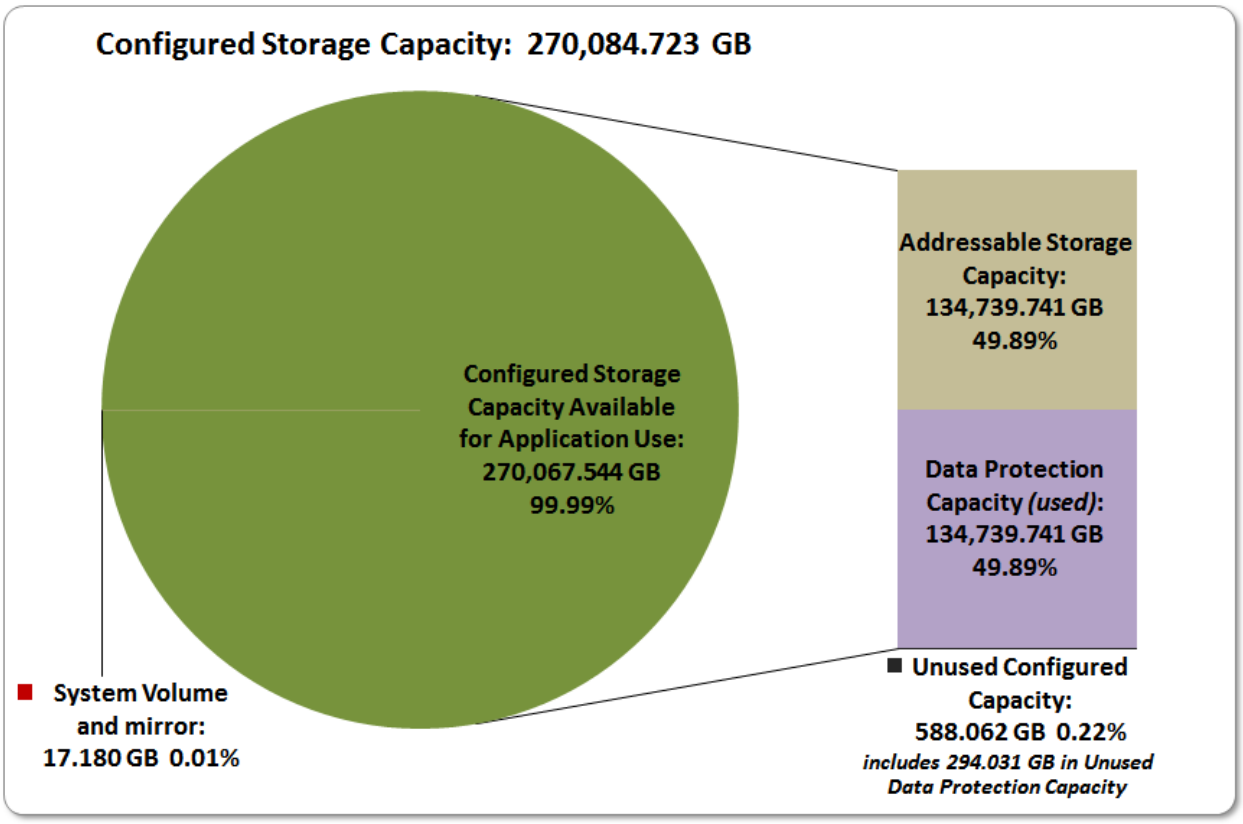
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

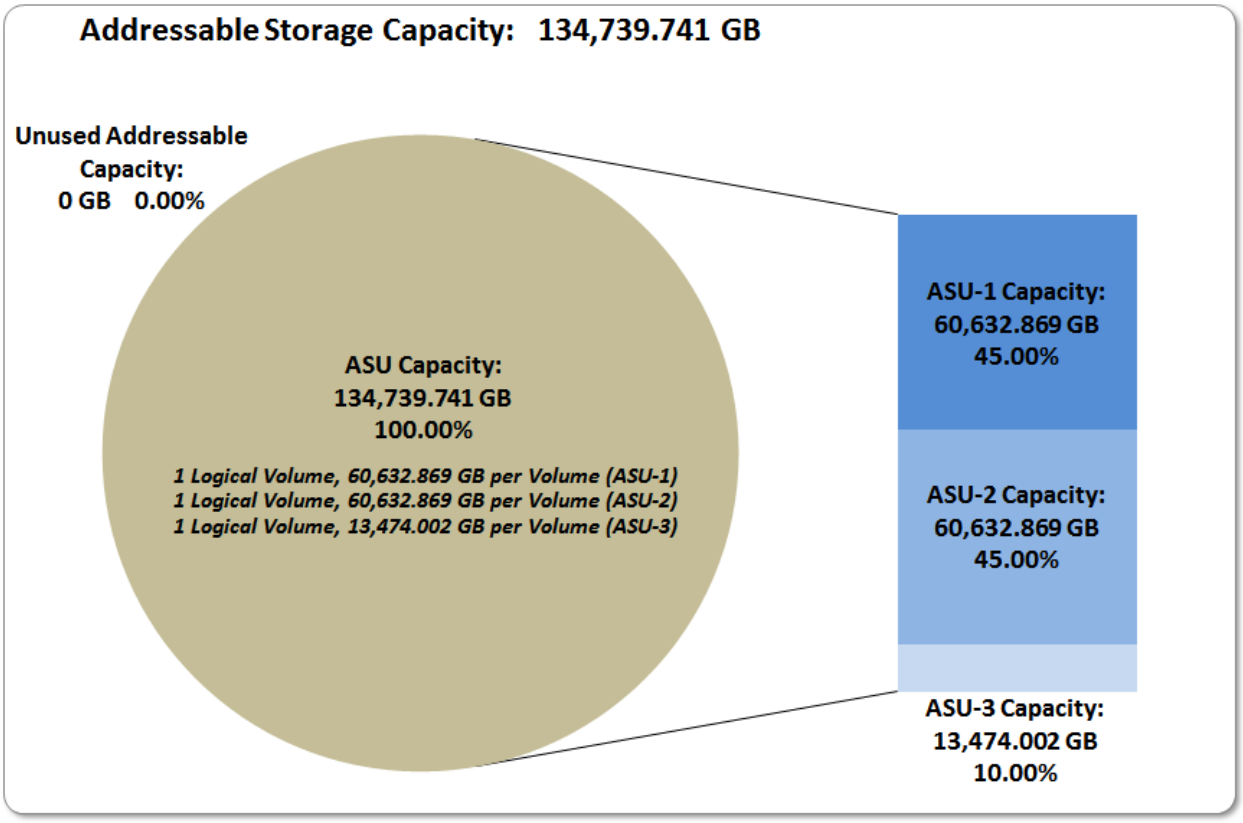
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

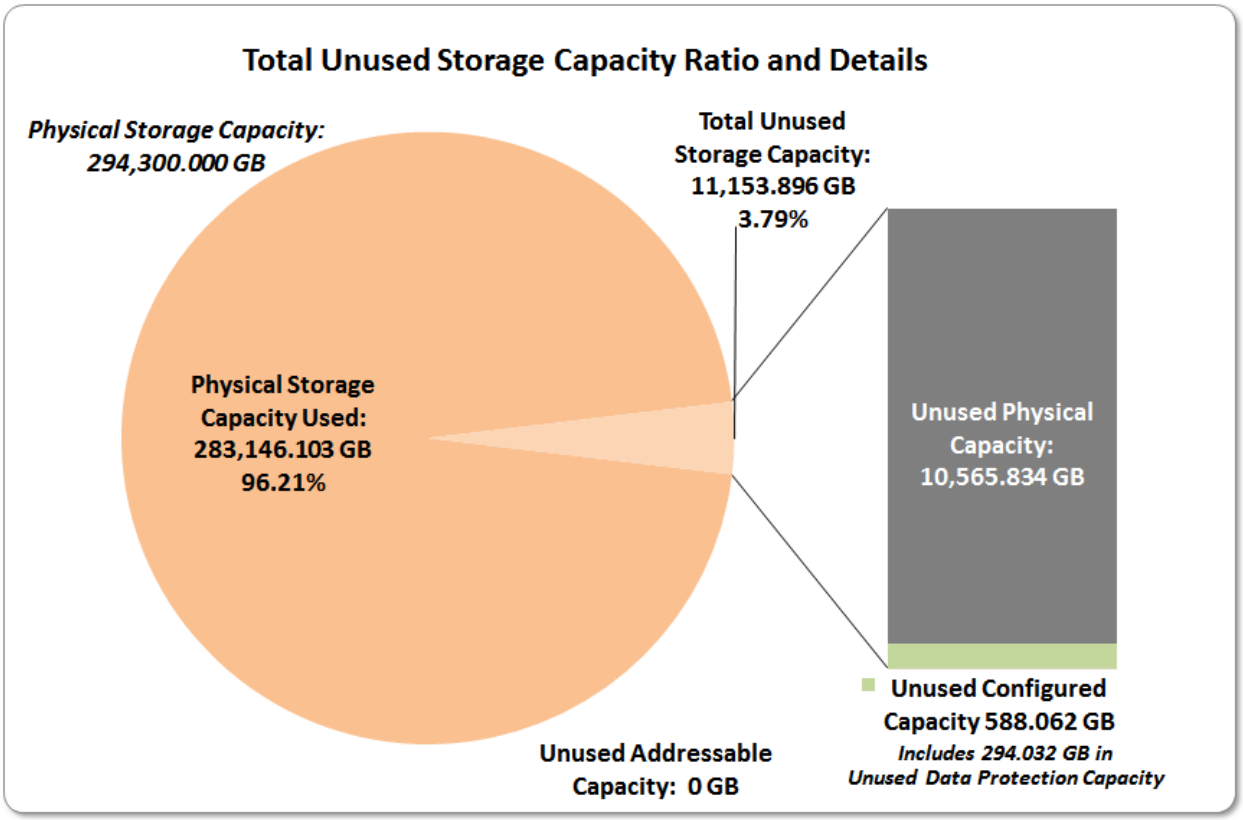
Storage Capacities, Relationships, and Utilization

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: 270,084.723 GB
Configured Storage Capacity Available for Application Use: 270,067.544 GB 99.99%
System Volume and mirror: 17.180 GB 0.01%
Addressable Storage Capacity: 134,739.741 GB 49.89%
Data Protection Capacity (used): 134,739.741 GB 49.89%
Unused Configured Capacity: 588.062 GB 0.22%
includes 294.031 GB in Unused Data Protection Capacity


Addressable Storage Capacity: 134,739.741 GB
Unused Addressable Capacity: 0 GB 0.00%
ASU Capacity: 134,739.741 GB 100.00%
1 Logical Volume, 60,632.869 GB per Volume (ASU-1)
1 Logical Volume, 60,632.869 GB per Volume (ASU-2)
1 Logical Volume, 13,474.002 GB per Volume (ASU-3)
ASU-1 Capacity: 60,632.869 GB 45.00%
ASU-2 Capacity: 60,632.869 GB 45.00%
ASU-3 Capacity: 13,474.002 GB 10.00%



SPC-1 Storage Capacity Utilization	
Application Utilization	45.78%
Protected Application Utilization	91.57%
Unused Storage Ratio	3.79%

Application Utilization: Total ASU Capacity *(134,739.741 GB)* divided by Physical Storage Capacity *(294,300.000 GB)*.

Protected Application Utilization: (Total ASU Capacity *(134,739.741 GB)* plus total Data Protection Capacity *(135,033.772 GB)* minus unused Data Protection Capacity *(294.031GB)*) divided by Physical Storage Capacity *(294,300.000 GB)*.

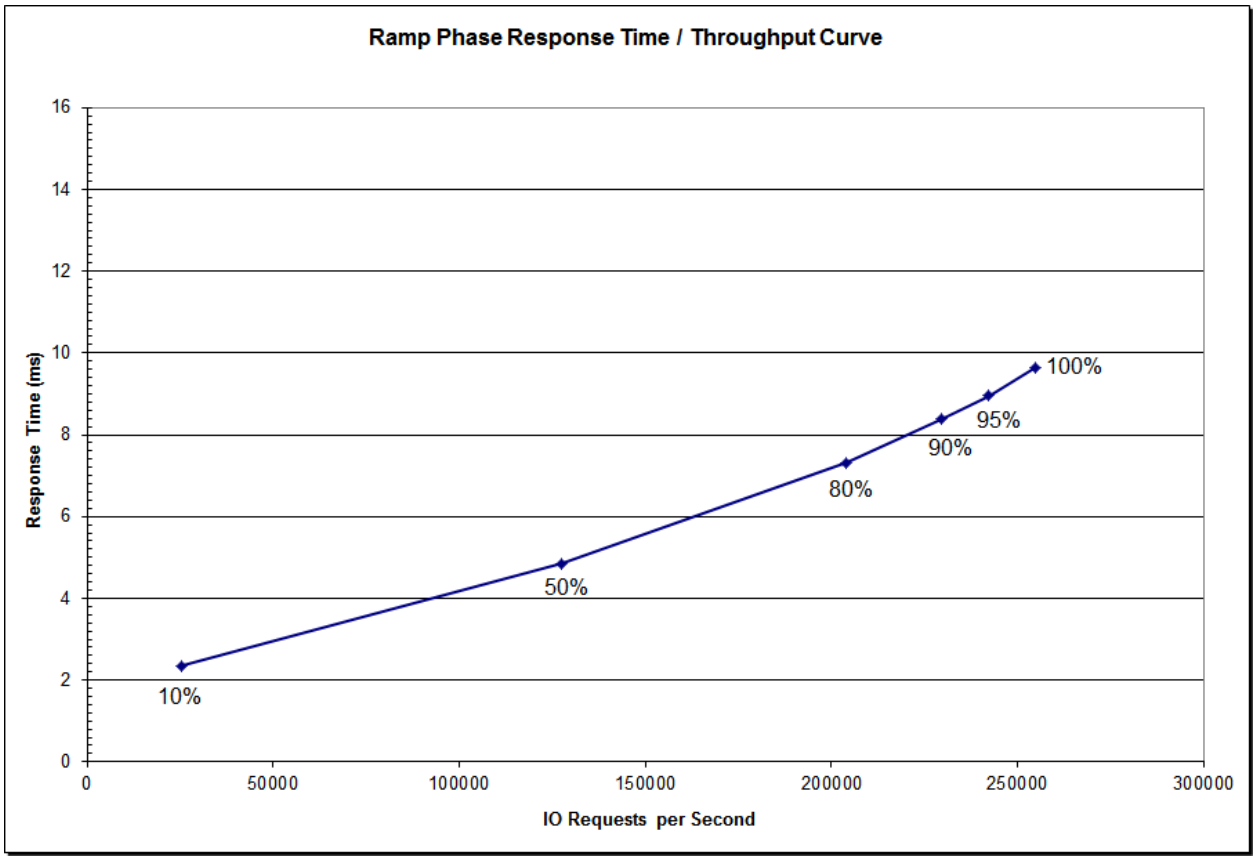
Unused Storage Ratio: Total Unused Capacity *(11,153.897 GB)* divided by Physical Storage Capacity *(294,300.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 27-28 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	25,505.67	127,491.21	203,981.77	229,479.20	242,274.38	255,011.06
Average Response Time (ms):						
All ASUs	2.34	4.85	7.32	8.37	8.96	9.65
ASU-1	2.99	6.06	9.25	10.75	11.57	12.52
ASU-2	2.55	5.86	9.51	11.35	12.29	13.43
ASU-3	0.87	1.85	2.26	2.03	1.98	1.92
Reads	4.85	10.39	16.08	18.80	20.21	21.88
Writes	0.71	1.25	1.61	1.59	1.63	1.68

Priced Storage Configuration Pricing

SKU	Description	Quantity	Unit List Price	Extended List	Discount	Discounted Price
Hardware						
Q24-FR000000072050	Ordering Part number for SAN Storage M710 Disk Array	1	0.00	0.00	20%	0.00
NF5322-SFP16E	2 - 16Gb FC SFPs	16	367.00	5,872.00	20%	4,697.60
NF5372-SR00E	M710 Dual Controller Disk Array Unit w Base SW (w 2 - 4 port Disk Port Cards, w/o Host Port Card, SFP or Cache Memory)	1	94,177.00	94,177.00	20%	75,341.60
Q24-HL000000072891	Localization Kit for M510/M710 Disk Array Unit	1	0.00	0.00	20%	0.00
NF5372-SF06WE	M710 2 - 4 port FC Host Port Cards (4 ports per Controller) w/o SFP	4	3,491.00	13,964.00	20%	11,171.20
NF5372-SD01WE	M710 2 - 4 port Disk Port Cards (4 ports per Controller)	3	2,961.00	8,883.00	20%	7,106.40
NF5372-SC04E	M710 Cache Memory 96GB per Controller (192GB total cache)	1	8,881.00	8,881.00	20%	7,104.80
NF5322-SMA75E	SAS Disk Drive(2.5" 15krpm/300GB)	939	489.00	459,171.00	20%	367,336.80
NF5322-SMA78E	SAS Disk Drive(2.5" 15krpm/600GB)	21	643.00	13,503.00	20%	10,802.40
NF5322-SE81E	Disk Enclosure 2.5 inch for Mx10	40	5,427.00	217,080.00	20%	173,664.00
Q24-HL000000072706	Localization Kit for Mx10 Disk Enclosure	40	0.00	0.00	20%	0.00
NF9100-SF26E	Front Bezel (4U Black, w/ NEC Logo) for Mx10	1	123.00	123.00	20%	98.40
NF9100-SF22E	Front Bezel (2U Black, w/ NEC Logo) for Mx10	40	90.00	3,600.00	20%	2,880.00
N8190-158	NEC N8190-158 dual-port 16G FC HBAs (w/ SFP)	16	1,570.00	25,120.00	20%	20,096.00
Software						
Q24-HL000000074244	M710 60 Day Trial License Bundle	1	0.00	0.00	20%	0.00
Q24-HL000000072867	M710 Base Software	1	0.00	0.00	20%	0.00
Maintenance						
Q24-DN000000072502	3 Years Upgrade to Platinum M710 Dual Controller w/Base SW	1	16,571.00	16,571.00	15%	14,085.35
Q24-DN000000072693	3 Years Upgrade to Platinum M710 2 - 4 port FC Host Port Cards (4 ports per Controller)	4	1,222.00	4,888.00	15%	4,154.80
Q24-DN000000072700	3 Years Upgrade to Platinum M710 2 - 4 port Disk Port Cards (4 ports per Controller)	3	1,037.00	3,111.00	15%	2,644.35
Q24-DN000000072588	3 Years Upgrade to Platinum M710 Cache Memory 96GB per Controller (192GB Total)	1	3,109.00	3,109.00	15%	2,642.65
Q24-DN000000072609	3 Years Upgrade to Platinum Disk Enclosure 2.5 inch for Mx10	40	1,900.00	76,000.00	15%	64,600.00
Q24-DN000000072939	1 Year Platinum SW Maintenance M710 Base Software	3	5,620.00	16,860.00	15%	14,331.00
Cables and Racks						
Power Strips	Power Strips (8 outlets)	12	78.00	936.00	10%	842.40
RACK	Rack 42U	3	1,799.00	5,397.00	10%	4,857.30
NF9120-SJ93	2 - 3M Mini SAS HD Cables	12	439.00	5,268.00	10%	4,741.20
FC CABLE	CRU FC CABLE 5M x2 (M#LCLC-5MQ) 5M	16	54.00	864.00	10%	777.60
	Configuration Total			**$983,378.00**		**$793,975.85**

- *Power codes for M710 and Disk Enclosures are included in Localization Kits (Q24-HL000000072891 and Q24-HL000000072706)*
- *Thef M710 Disk Array Unit price includes M710 Base Software (Q24-HL000000072867)*
- *PathManager for Windows/Linux/VMware is included in M710 Base Software (Q24-HL000000072867)*

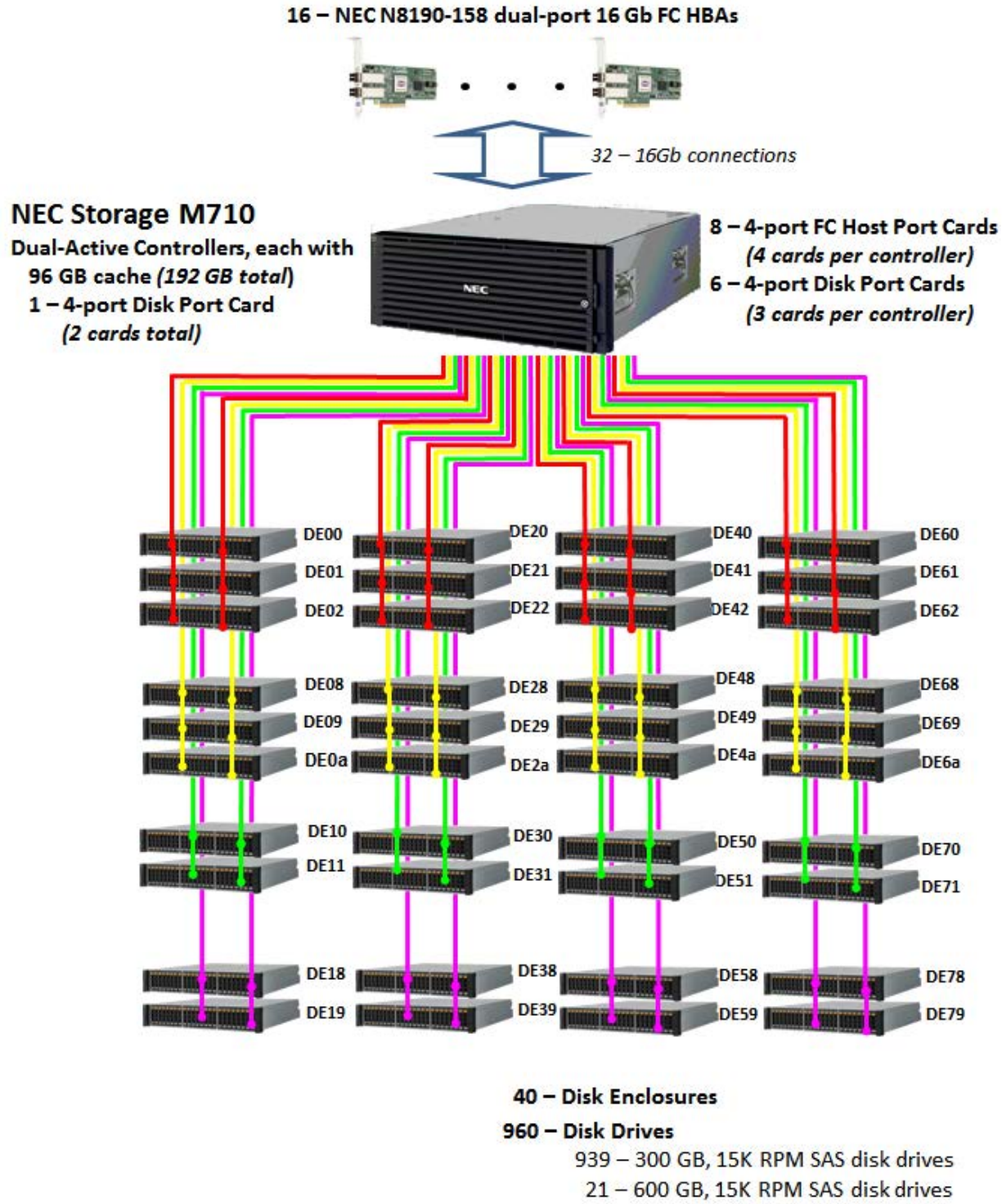
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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 Tested Storage Configuration and the Priced Storage Configuration.

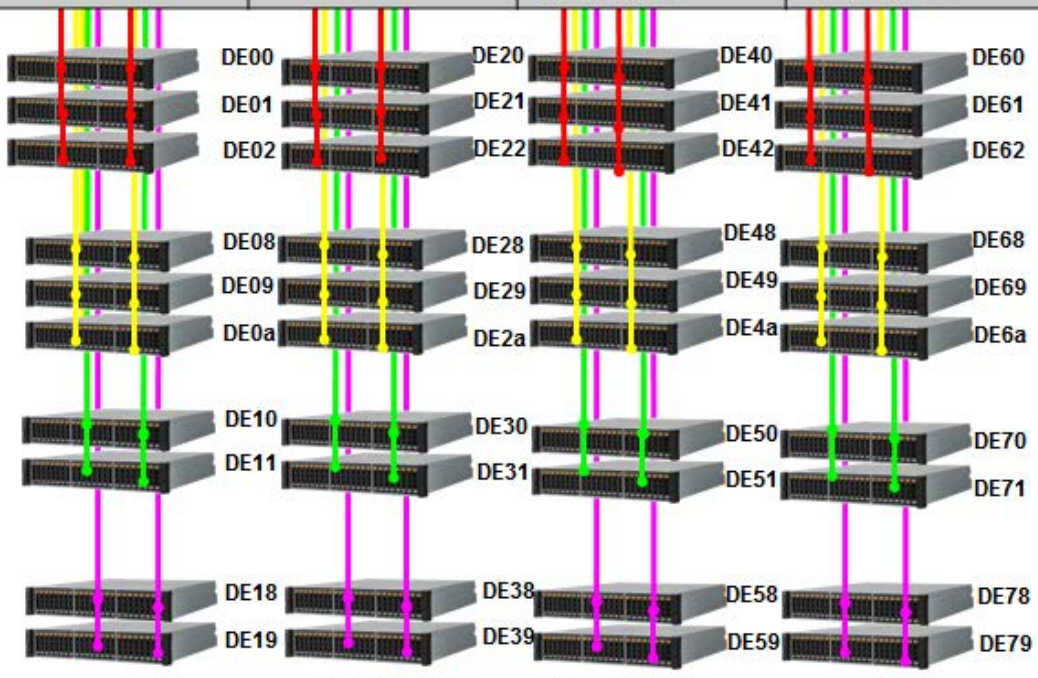
Priced Storage Configuration Diagram



The distribution of disk drives to disk enclosures is documented on page 12.

Distribution of Disk Drives to Disk Enclosures

DE00 (2.5"): 24 - 300 GB HDD	DE20 (2.5"): 24 - 300 GB HDD	DE40 (2.5"): 24 - 300 GB HDD	DE60 (2.5"): 24 - 300 GB HDD
DE01 (2.5"): 24 - 300 GB HDD	DE21 (2.5"): 24 - 300 GB HDD	DE41 (2.5"): 24 - 300 GB HDD	DE61 (2.5"): 24 - 300 GB HDD
DE02 (2.5"): 24 - 300 GB HDD	DE22 (2.5"): 24 - 300 GB HDD	DE42 (2.5"): 24 - 300 GB HDD	DE62 (2.5"): 22 - 300 GB HDD 2 - 600 GB HDD
DE08 (2.5"): 24 - 300 GB HDD	DE28 (2.5"): 12 - 300 GB HDD 12 - 600 GB HDD	DE48 (2.5"): 24 - 300 GB HDD	DE68 (2.5"): 23 - 300 GB HDD 1 - 600 GB HDD
DE09 (2.5"): 24 - 300 GB HDD	DE29 (2.5"): 24 - 300 GB HDD	DE49 (2.5"): 24 - 300 GB HDD	DE69 (2.5"): 24 - 300 GB HDD
DE0a (2.5"): 24 - 300 GB HDD	DE2a (2.5"): 23 - 300 GB HDD 1 - 600 GB HDD	DE4a (2.5"): 24 - 300 GB HDD	DE6a (2.5"): 24 - 300 GB HDD
DE10 (2.5"): 24 - 300 GB HDD	DE30 (2.5"): 24 - 300 GB HDD	DE50 (2.5"): 24 - 300 GB HDD	DE70 (2.5"): 24 - 300 GB HDD
DE11 (2.5"): 24 - 300 GB HDD	DE31 (2.5"): 24 - 300 GB HDD	DE51 (2.5"): 24 - 300 GB HDD	DE71 (2.5"): 22 - 300 GB HDD 2 - 600 GB HDD
DE18 (2.5"): 23 - 300 GB HDD 1 - 600 GB HDD	DE38 (2.5"): 24 - 300 GB HDD	DE58 (2.5"): 24 - 300 GB HDD	DE78 (2.5"): 24 - 300 GB HDD
DE19 (2.5"): 24 - 300 GB HDD	DE39 (2.5"): 24 - 300 GB HDD	DE59 (2.5"): 23 - 300 GB HDD 1 - 600 GB HDD	DE79 (2.5"): 23 - 300 GB HDD 1 - 600 GB HDD



40 – Disk Enclosures, 960 – Disk Drives

939 – 300 GB, 15K RPM SAS HDDs, 21 – 600 GB, 15K RPM SAS HDDs

Priced Storage Configuration Components

Priced Storage Configuration
16 – NEC N8190-158 dual-port 16Gb FC HBAs
NEC Storage M710 Dual-Active Controllers, each with 96 GB memory *(192 GB total)* 1 – 4-port Disk Port Card *(2 cards total, 8 ports total and used)*
8 – 4-port FC Host Port Cards *(4 cards,16 ports per controller, 32 ports total and used)*
6 – 4-port Disk Port Cards *(3 cards, 12 ports per controller; 24 ports total and used)*
40 – Disk Enclosures, 2.5”
960 – 15K RPM SAS disk drives (HDDs) 939 – 300 GB HDDs 21 – 600 GB HDDs
3 – 42U Racks with 12 power strips *(8 outlets per strip)*