SPC BENCHMARK 1™
EXECUTIVE SUMMARY

NEC CORPORATION
NEC STORAGE M710F

SPC-1 V1.14

Submitted for Review: March 11, 2016
Submission Identifier: A00170

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	March 11, 2016
Date the FDR was submitted to the SPC	March 11, 2016
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	March 10, 2016

Tested Storage Product (TSP) Description

The NEC M710F SAN disk array has the high performance, capacity and availability demanded by data-intensive, mission critical environments. Easy to operate, the M710F is well-suited for virtualized settings due to its scalability, 192GB of cache, 16Gbps or 8Gbps of fibre channel, and VMware APIs support.

Best tuning to maximize the performance of SSD realizes fast and stable response. And large amount of cache memory assures high I/O performance to access the data frequently used.

Large-scale storage integration is achieved by utilizing advanced virtualization technologies, such as VMware certified, data allocation optimization with a high-speed SSD and thin provisioning.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: NEC Storage M710F	
Metric	**Reported Result**
SPC-1 IOPS™	605,016.49
SPC-1 Price-Performance™	$0.81/SPC-1 IOPS™
Total ASU Capacity	17,175.474 GB
Data Protection Level	Protected 2 *(Mirroring)*
Total Price	$492,726.70
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.*

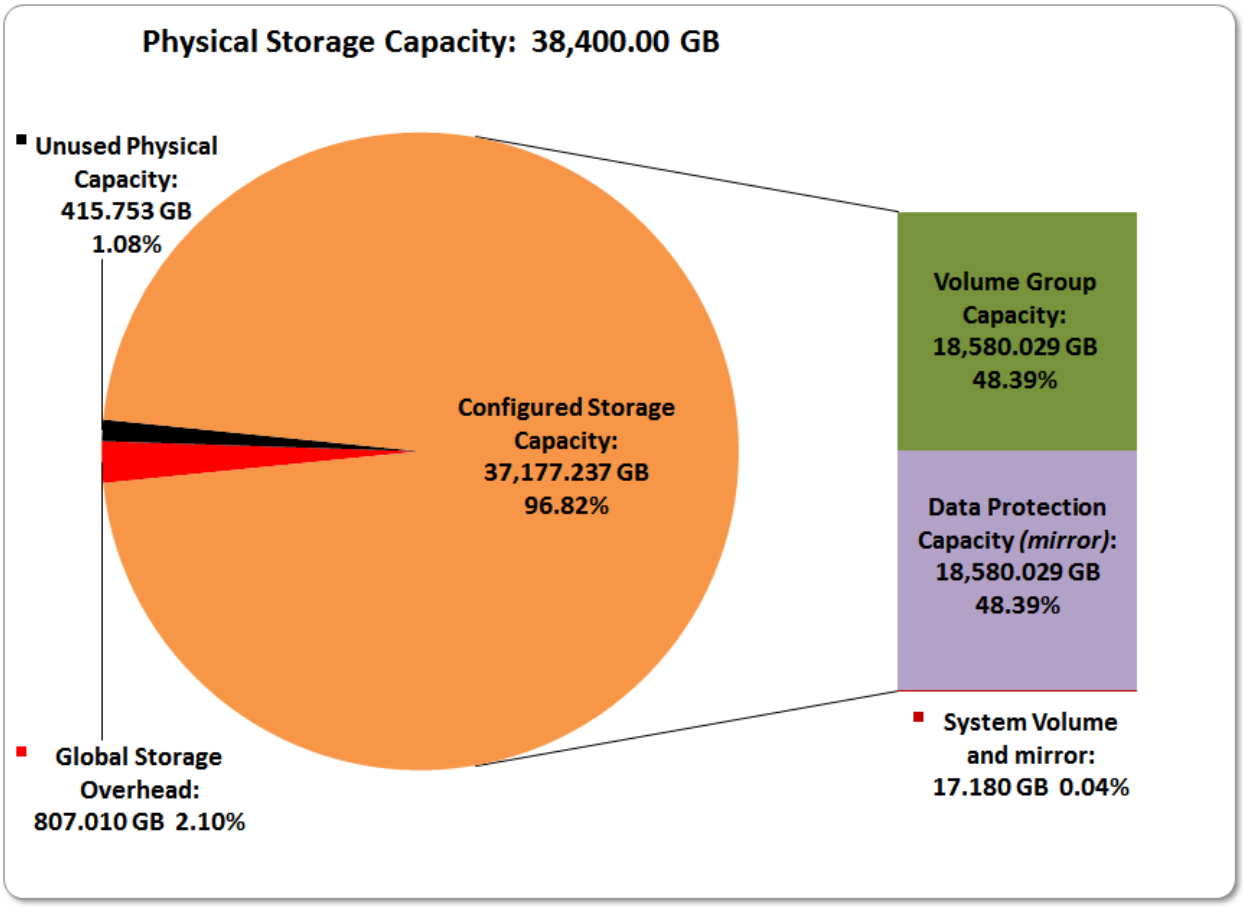
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

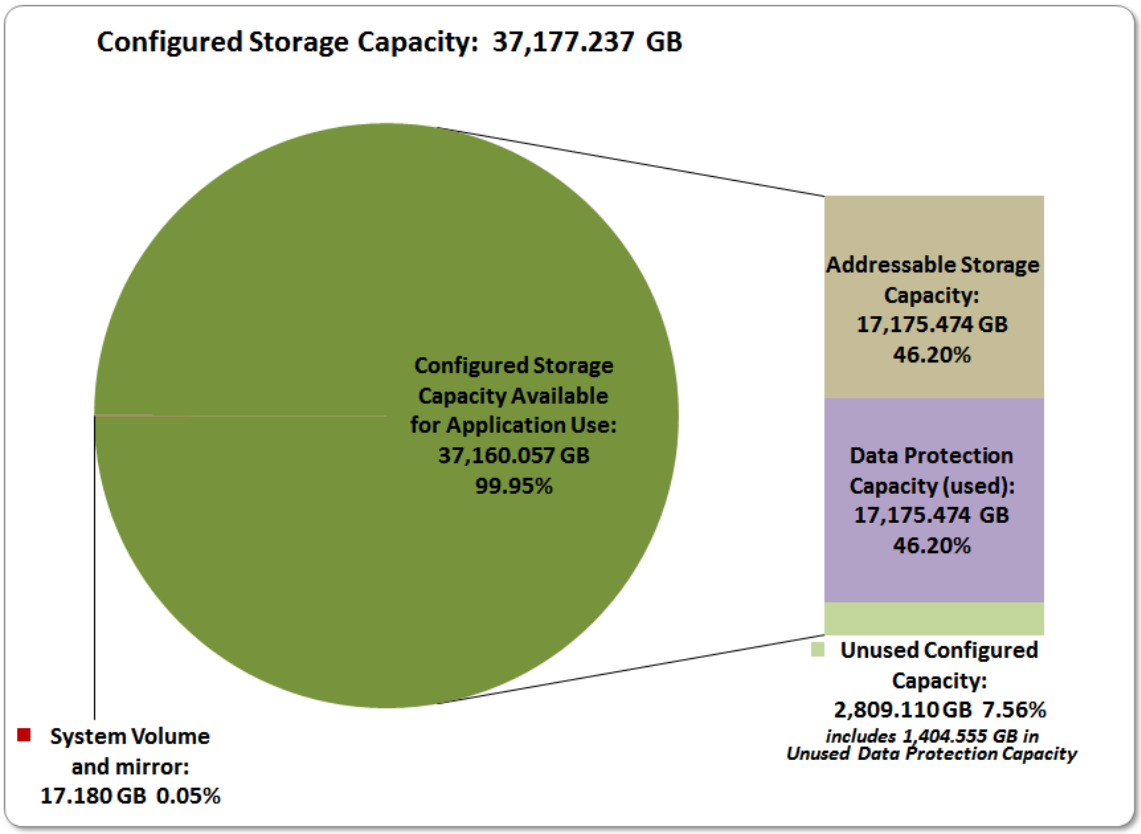
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

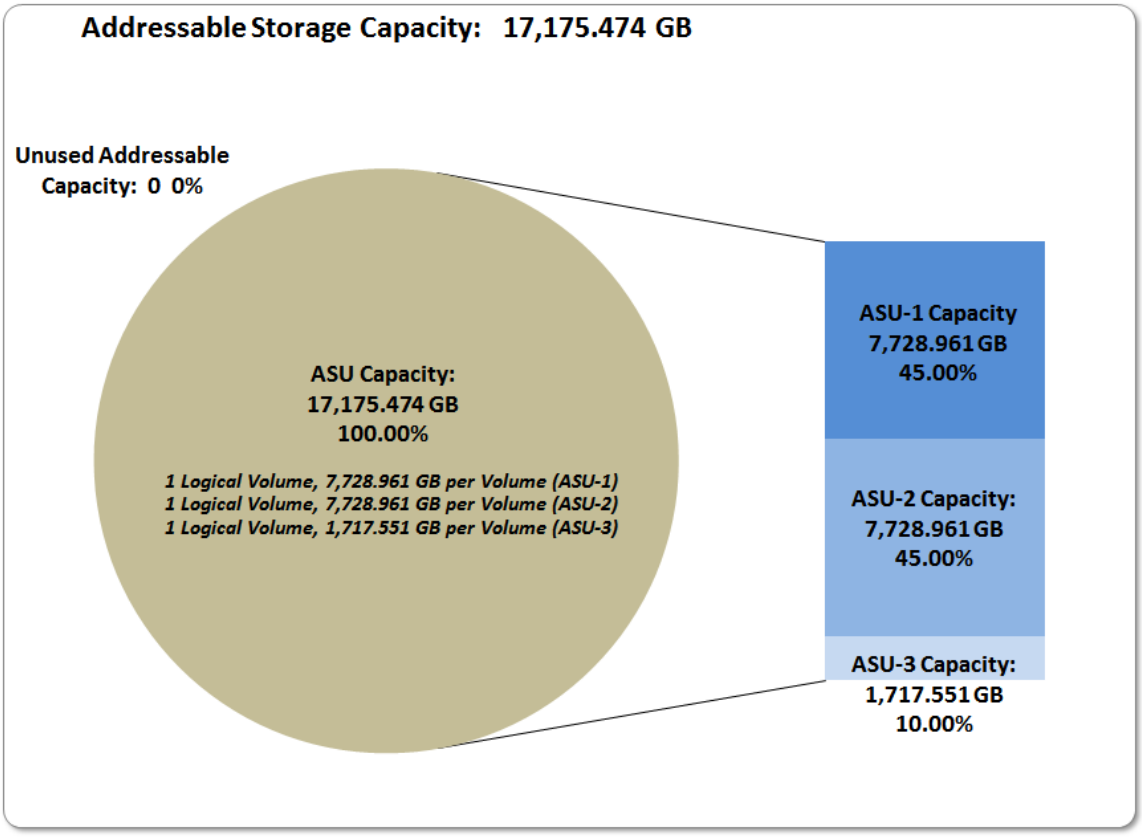
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

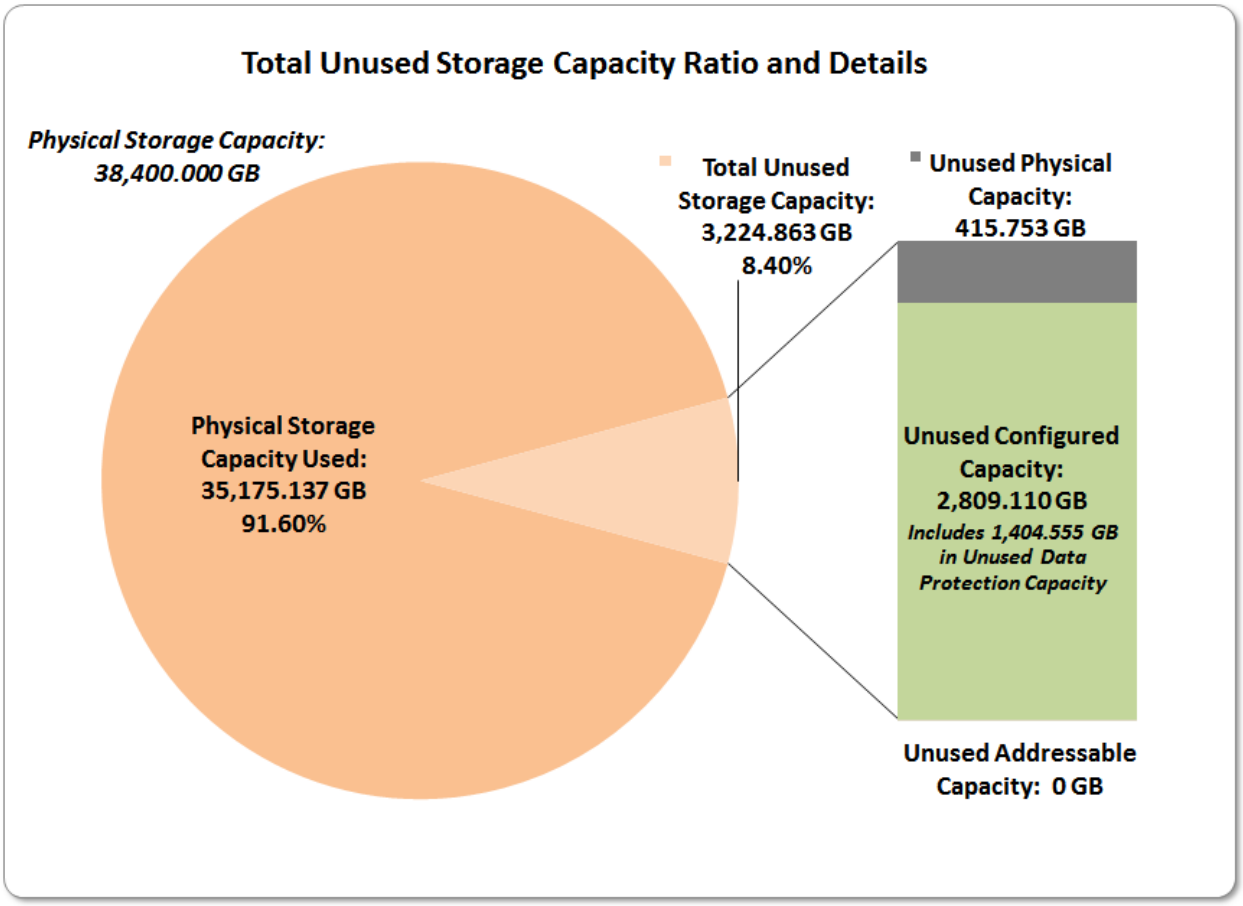
Storage Capacities, Relationships, and Utilization

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: 37,177.237 GB
Configured Storage Capacity Available for Application Use: 37,160.057 GB 99.95%
System Volume and mirror: 17.180 GB 0.05%
Addressable Storage Capacity: 17,175.474 GB 46.20%
Data Protection Capacity (used): 17,175.474 GB 46.20%
Unused Configured Capacity: 2,809.110 GB 7.56%
includes 1,404.555 GB in Unused Data Protection Capacity


Addressable Storage Capacity: 17,175.474 GB
Unused Addressable Capacity: 0 0%
ASU Capacity: 17,175.474 GB 100.00%
1 Logical Volume, 7,728.961 GB per Volume (ASU-1)
1 Logical Volume, 7,728.961 GB per Volume (ASU-2)
1 Logical Volume, 1,717.551 GB per Volume (ASU-3)
ASU-1 Capacity 7,728.961 GB 45.00%
ASU-2 Capacity: 7,728.961 GB 45.00%
ASU-3 Capacity: 1,717.551 GB 10.00%



SPC-1 Storage Capacity Utilization	
Application Utilization	44.73%
Protected Application Utilization	89.46%
Unused Storage Ratio	8.40%

Application Utilization: Total ASU Capacity *(17,175.474 GB)* divided by Physical Storage Capacity *(38,400.000 GB)*.

Protected Application Utilization: (Total ASU Capacity *(17,175.474 GB)* plus total Data Protection Capacity *(18,580.029 GB)* minus unused Data Protection Capacity *(1,404.555 GB)*) divided by Physical Storage Capacity *(38,400.000 GB)*.

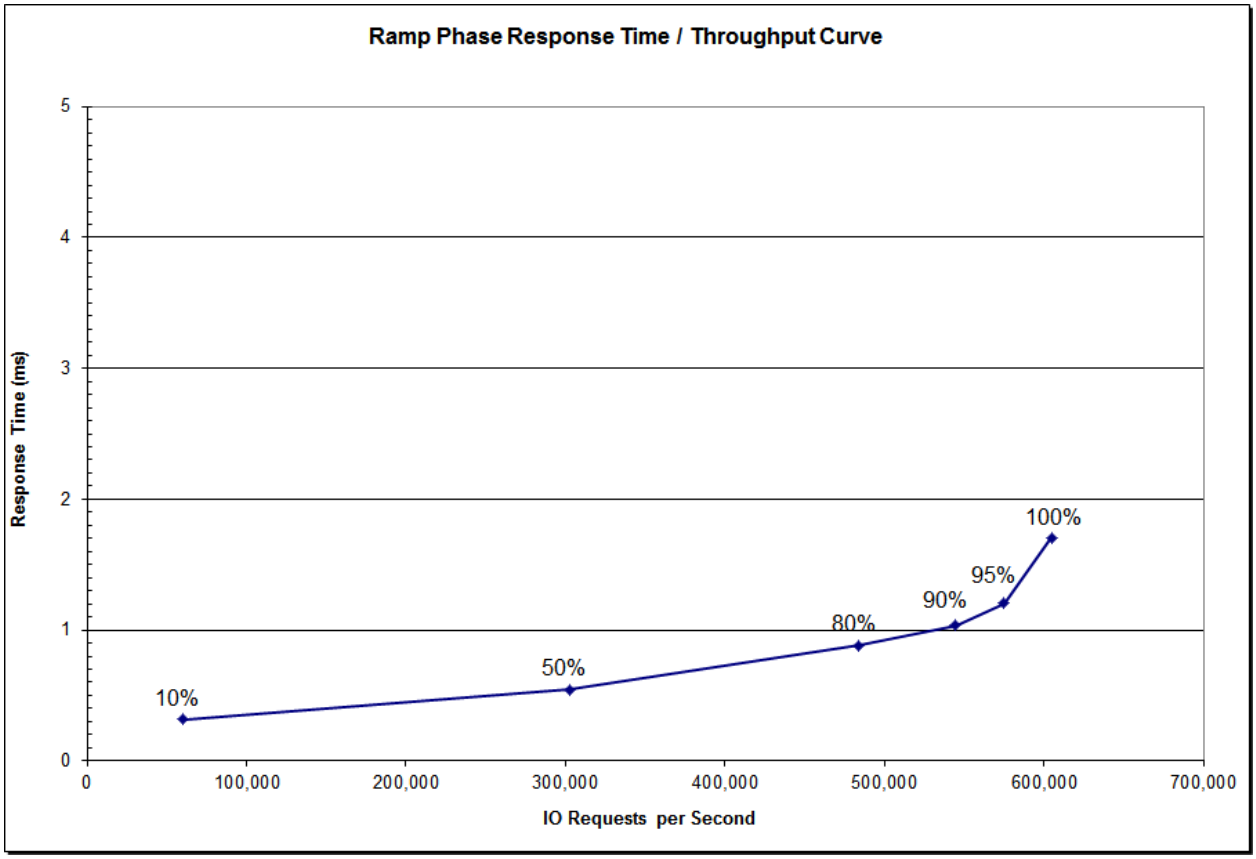
Unused Storage Ratio: Total Unused Capacity *(3,224,863 GB)* divided by Physical Storage Capacity *(38,400.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 26-27 of the associated 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	60,496.10	302,501.55	483,971.18	544,458.66	574,758.81	605,016.49
Average Response Time (ms):						
All ASUs	0.32	0.54	0.88	1.04	1.21	1.71
ASU-1	0.31	0.53	0.84	0.98	1.14	1.60
ASU-2	0.34	0.56	0.89	1.04	1.21	1.70
ASU-3	0.32	0.57	0.96	1.15	1.35	1.93
Reads	0.35	0.55	0.82	0.93	1.06	1.47
Writes	0.30	0.54	0.92	1.10	1.30	1.86

Priced Storage Configuration Pricing

SKU	Description	Quantity	Unit List Price	Extended List	Discount	Extended Discount
Hardware						
NF5322-SFP16E	2 - 16Gb FC SFPs	12	$ 367.00	$ 4,404.00	20%	$ 3,523.20
Q24-HL000000118980	M710F Dual Controller Disk Array Unit w Base SW (w - 192GB Cache Memory,2 - 4 port Disk Port Cards w/o Host Port Card, SFP)	1	$ 100,913.00	$ 100,913.00	20%	$ 80,730.40
Q24-HL000000072891	Localization Kit for M510/M710 Disk Array Unit	1	$ -	$ -	20%	$ -
NF5372-SF06WE	M710 2 - 4 port FC Host Port Cards (4 ports per Controller) w/o SFP	6	$ 3,491.00	$ 20,946.00	20%	$ 16,756.80
NF5372-SD01WE	M710 2 - 4 port Disk Port Cards (4 ports per Controller)	1	$ 2,961.00	$ 2,961.00	20%	$ 2,368.80
NF5322-SSA96E	SAS SSD (2.5" 400GB)	96	$ 2,739.00	$ 262,944.00	20%	$ 210,355.20
			$ -	$ -	20%	$ -
NF5322-SE81E	Disk Enclosure 2.5 inch for Mx10	8	$ 5,427.00	$ 43,416.00	20%	$ 34,732.80
Q24-HL000000072706	Localization Kit for Mx10 Disk Enclosure	8	$ -	$ -	20%	$ -
N8190-158	NEC N8190-158 dual-port 16G FC HBAs (w/ SFP)	12	$ 1,570.00	$ 18,840.00	20%	$ 15,072.00
Software						
Q24-HL000000074244	M710 60 Day Trial License Bundle	1	$ -	$ -	20%	$ -
Q24-HL000000072867	M710 Base Software	1	$ -	$ -	20%	$ -
Maintenance						
Q24-DN000000072502	3 Years Upgrade to Platinum M710F 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)	6	$ 1,222.00	$ 7,332.00	15%	$ 6,232.20
Q24-DN000000072700	3 Years Upgrade to Platinum M710 2 - 4 port Disk Port Cards (4 ports per Controller)	1	$ 1,037.00	$ 1,037.00	15%	$ 881.45
Q24-DN000000072609	3 Years Upgrade to Platinum Disk Enclosure 2.5 inch for Mx10	8	$ 1,900.00	$ 15,200.00	15%	$ 12,920.00
Q24-DN000000072939	1 Year Platinum SW Maintenance M710 Base Software	3	$ 5,620.00	$ 16,860.00	15%	$ 14,331.00
Q24-DN000000073181	3 Years Upgrade to Platinum SAS SSD (2.5" 400GB)	96	$ 959.00	$ 92,064.00	15%	$ 78,254.40
Cables and Racks						
Power Strips	Power Strips (8 outlets)	4	$ 78.00	$ 312.00	10%	$ 280.80
RACK	Rack 42U	1	$ 1,799.00	$ 1,799.00	10%	$ 1,619.10
FC CABLE	CRU FC CABLE 5M x2 (M#LCLC-5MQ) 5M	12	$ 54.00	$ 648.00	10%	$ 583.20
	Configuration Total			**$ 606,247.00**		**$ 492,726.70**

- *Power codes for M710F and Disk Enclosures are included in Localization Kits (Q24-HL000000072891 and Q24-HL000000072706).*
- *Price of M710F Disk Array Unit includes price of M710F Base Software (Q24-HL000000072867).*
- *PathManager for Windows/Linux/VMware is included in M710F Base Software (Q24-HL000000072867).*

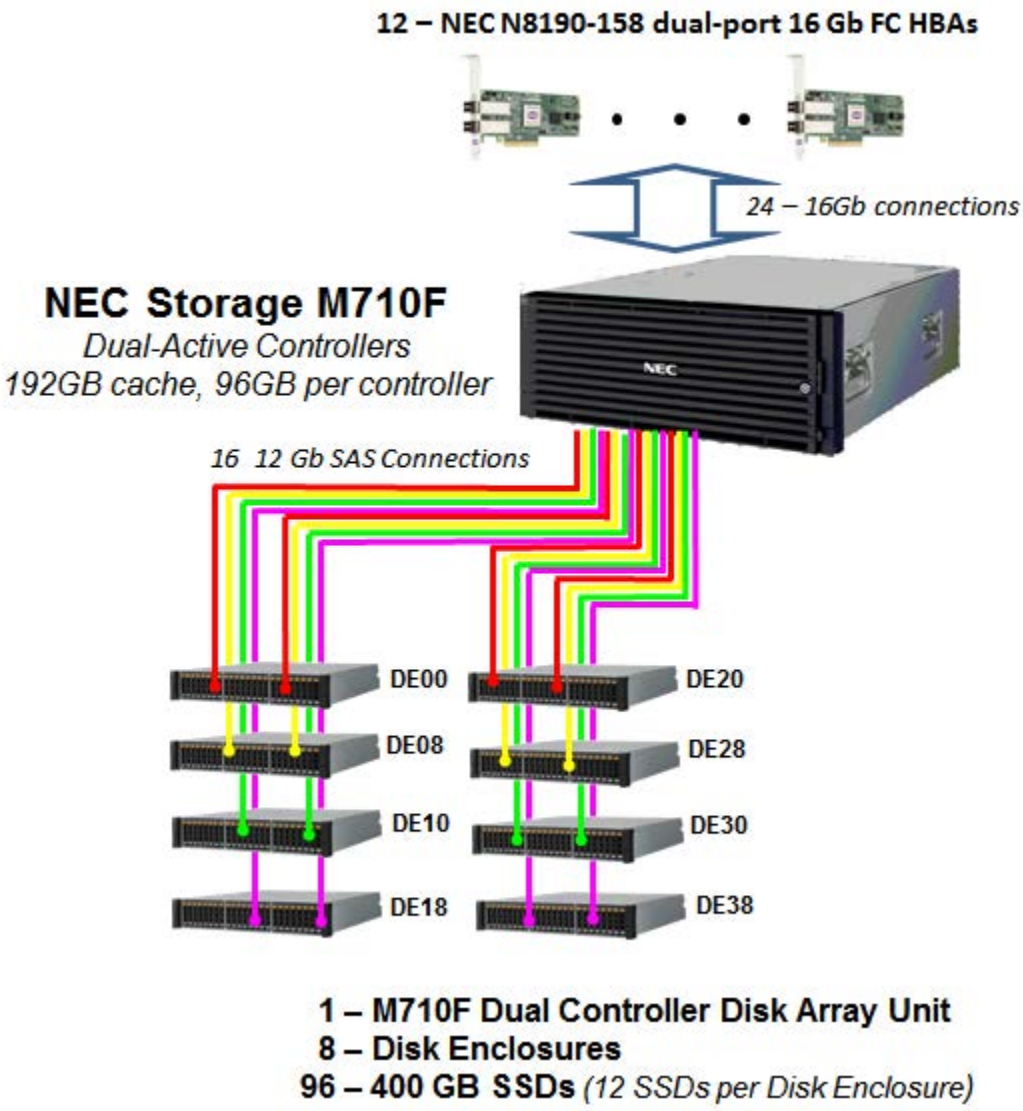
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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



Priced Storage Configuration Components

Priced Storage Configuration
12 – NEC N8190-158 dual-port 16Gb FC HBAs
NEC Storage M710F 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)*
12 – 4-port FC Host Port Cards *(6 cards and 24 ports per controller, 48 ports total, 24 ports used)*
2 – 4-port Disk Port Cards *(1 card and 4 ports per controller; 8 ports total and used)*
8 – Disk Enclosures, 2.5”
96 – 400 GB SAS SSDs *(12 SSDs per Disk Enclosure)*
1 – 42U Rack with 4 power strips *(8 outlets per strip)*