SPC BENCHMARK 1™
EXECUTIVE SUMMARY

NEC CORPORATION
NEC STORAGE M310

SPC-1 V1.14

Submitted for Review: March 7, 2016
Submission Identifier: A00169

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 7, 2016
Date the FDR was submitted to the SPC	March 7, 2016
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	March 6, 2016

Tested Storage Product (TSP) Description

The NEC M310 SAN disk array has the high performance, capacity and availability demanded by data-intensive, mission critical environments.

With a straightforward navigational GUI, systems administrators can easily modify settings and capacity, and monitor disk performance. Equipped with 48GB of cache, the M310 storage solution simultaneously supports DDRs, SSDs, Nearline SAS and traditional SAS HDDs in the same enclosure, enabling flexible tiered storage architecture.

Ideal for use in any virtualized datacenter with its flexibility for scaling and support with VMware APIs.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: NEC Storage M310	
Metric	**Reported Result**
SPC-1 IOPS™	131,986.51
SPC-1 Price-Performance™	$2.54/SPC-1 IOPS™
Total ASU Capacity	65,970.603 GB
Data Protection Level	Protected 2 *(Mirroring)*
Total Price	$335,139.15
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.*

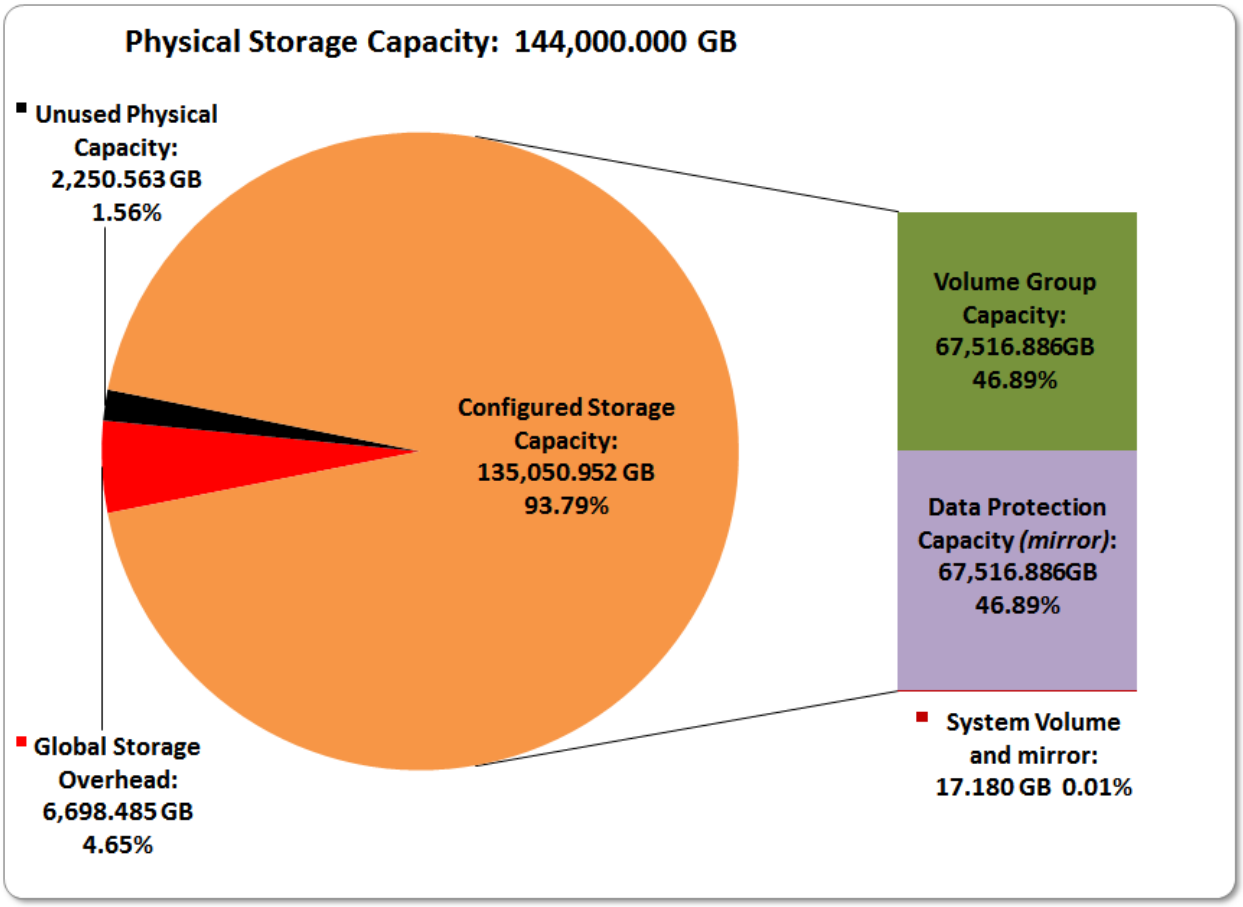
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

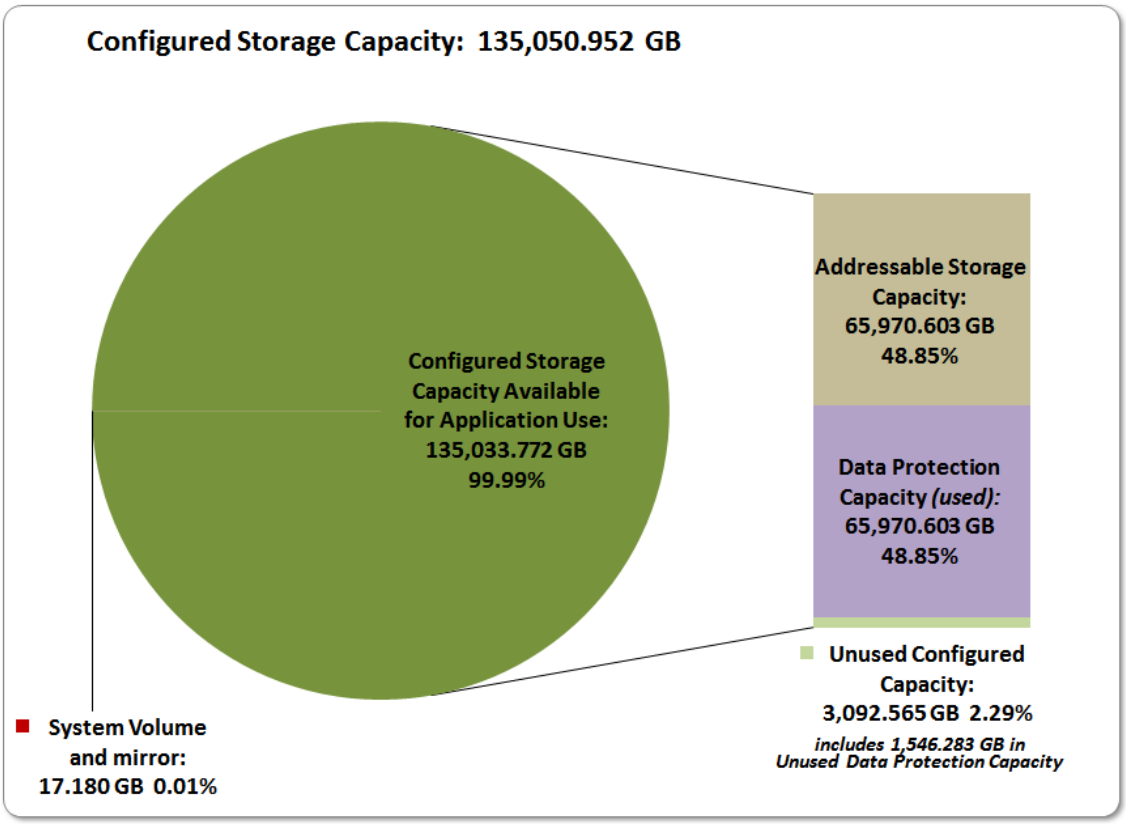
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

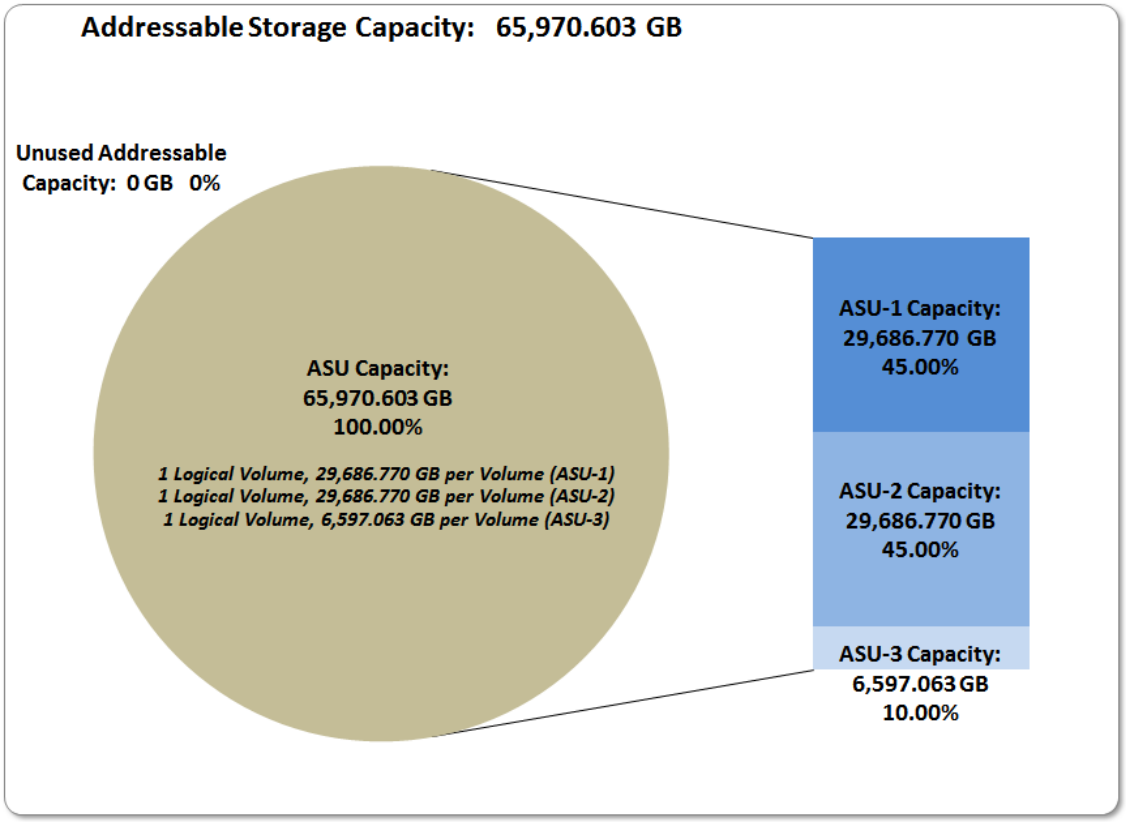
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

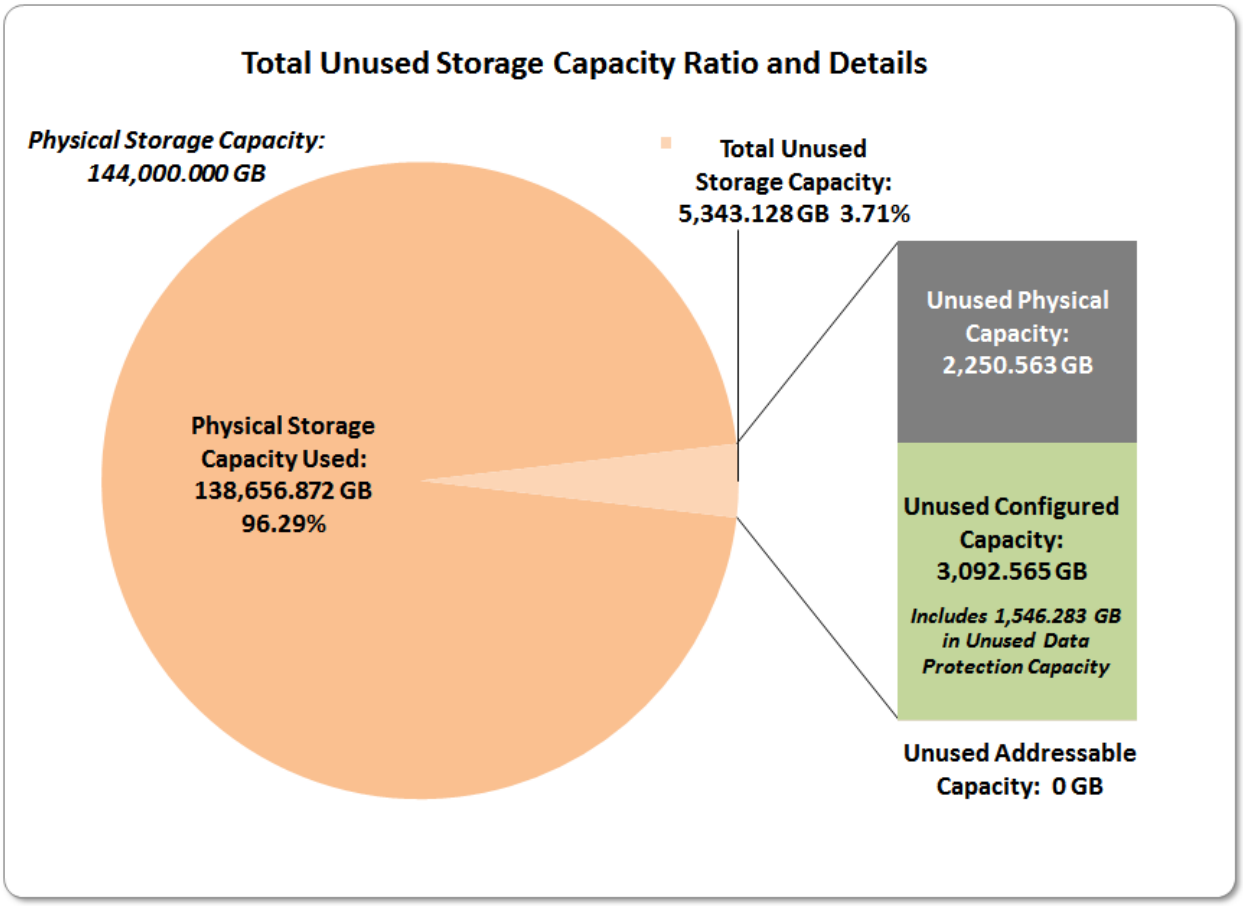
Storage Capacities, Relationships, and Utilization

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: 135,050.952 GB
Configured Storage Capacity Available for Application Use: 135,033.772 GB 99.99%
System Volume and mirror: 17.180 GB 0.01%
Addressable Storage Capacity: 65,970.603 GB 48.85%
Data Protection Capacity (used): 65,970.603 GB 48.85%
Unused Configured Capacity: 3,092.565 GB 2.29%
includes 1,546.283 GB in Unused Data Protection Capacity


Addressable Storage Capacity: 65,970.603 GB
Unused Addressable Capacity: 0 GB 0%
ASU Capacity: 65,970.603 GB 100.00%
1 Logical Volume, 29,686.770 GB per Volume (ASU-1)
1 Logical Volume, 29,686.770 GB per Volume (ASU-2)
1 Logical Volume, 6,597.063 GB per Volume (ASU-3)
ASU-1 Capacity: 29,686.770 GB 45.00%
ASU-2 Capacity: 29,686.770 GB 45.00%
ASU-3 Capacity: 6,597.063 GB 10.00%



SPC-1 Storage Capacity Utilization	
Application Utilization	45.81%
Protected Application Utilization	91.63%
Unused Storage Ratio	3.71%

Application Utilization: Total ASU Capacity *(65,970.603 GB)* divided by Physical Storage Capacity *(144,000.000 GB)*.

Protected Application Utilization: (Total ASU Capacity *(65,970.603 GB)* plus total Data Protection Capacity *(67,516.886 GB)* minus unused Data Protection Capacity *(1,546.283 GB)*) divided by Physical Storage Capacity *(144,000.000 GB)*.

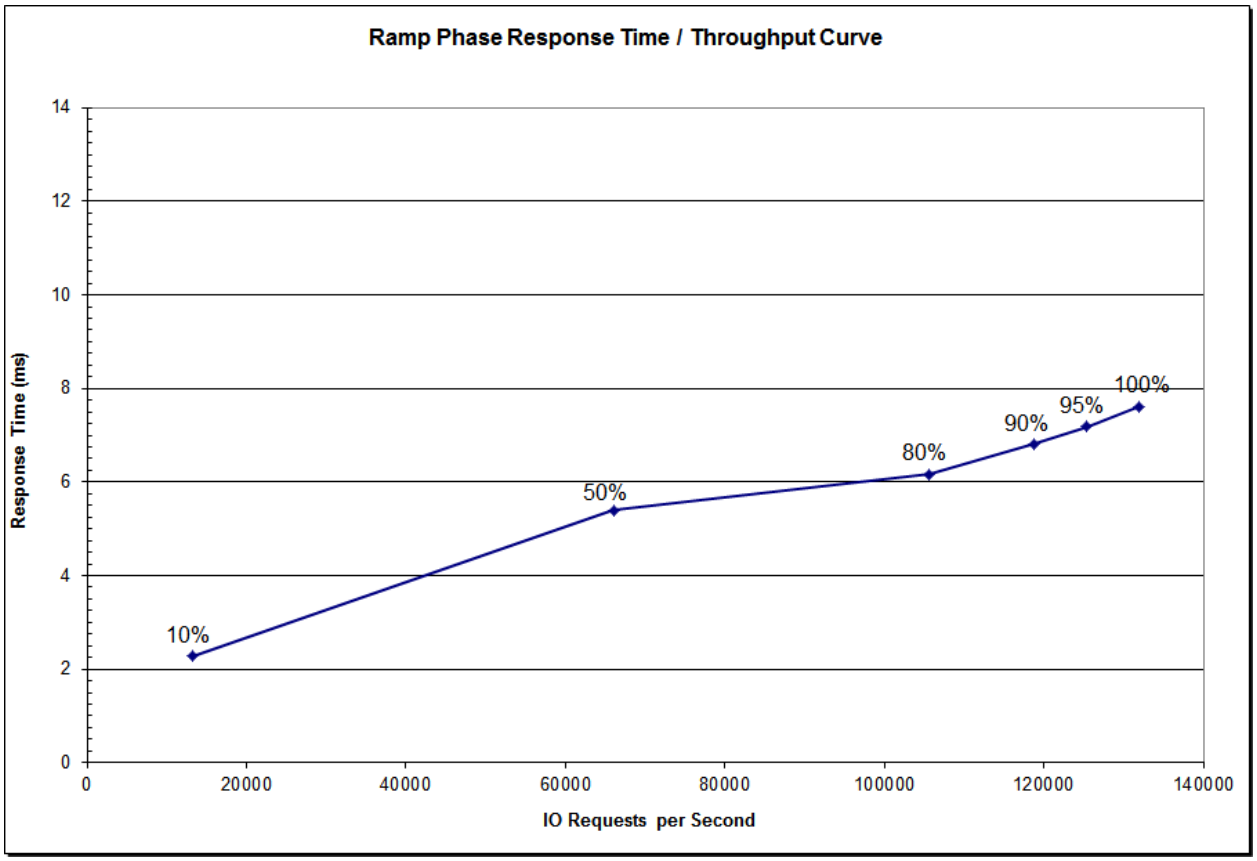
Unused Storage Ratio: Total Unused Capacity *(5,343.128 GB)* divided by Physical Storage Capacity *(144,000.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 26-27 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	13,199.74	66,007.92	105,619.86	118,804.45	125,395.53	131,986.51
Average Response Time (ms):						
All ASUs	2.28	5.40	6.17	6.82	7.19	7.62
ASU-1	2.72	6.53	8.29	9.15	9.61	10.16
ASU-2	2.20	6.16	8.03	9.11	9.70	10.37
ASU-3	1.37	2.67	0.85	0.86	0.94	1.03
Reads	4.41	11.13	14.20	15.69	16.41	17.28
Writes	0.89	1.67	0.94	1.04	1.18	1.33

Priced Storage Configuration Pricing

SKU	Description	Quantity	Unit List Price	Extended List	Discount	Extended Discount
Hardware						
NF5322-SFP16E	2 - 16Gb FC SFPs	4	$367.00	$1,468.00	20%	$1,174.40
NF5332-SR01E	M310 2.5 inch Dual Controller Disk Array Unit w Base SW, 4 Port SAS Disk ports (w/o Host Port Card, SFP or Cache Memory)	1	$16,788.00	$16,788.00	20%	$13,430.40
NF5322-SF06E	M110/M310 4 port FC Host Port Card w/o SFP	2	$1,665.00	$3,330.00	20%	$2,664.00
Q24-HL000000072705	Localization Kit for M110/M310 Disk Array Unit	1	$0.00	$0.00	20%	$0.00
NF5332-SC02SE	M310 Cache Memory 24GB for one Controller	2	$987.00	$1,974.00	20%	$1,579.20
NF5322-SMA75E	SAS Disk Drive (2.5" 15krpm/300GB)	480	$489.00	$234,720.00	20%	$187,776.00
NF5322-SE81E	Disk Enclosure 2.5 inch for Mx10	19	$5,427.00	$103,113.00	20%	$82,490.40
Q24-HL000000072706	Localization Kit for Mx10 Disk Enclosure	19	$0.00	$0.00	20%	$0.00
NF9100-SF22E	Front Bezel (2U Black, w/ NEC Logo) for Mx10	20	$90.00	$1,800.00	20%	$1,440.00
N8190-158	NEC N8190-158 dual-port 16G FC HBAs (w/ SFP)	4	$1,570.00	$6,280.00	20%	$5,024.00
Software						
Q24-HL000000074242	M310 60 Day Trial License Bundle	1	$0.00	$0.00	20%	$0.00
Q24-HL000000072865	M310 Base Software	1	$0.00	$0.00	20%	$0.00
Maintenance						
Q24-DN000000072488	3 Years Upgrade to Platinum M310 2.5 inch Dual Controller w/Base SW	1	$3,132.00	$3,132.00	15%	$2,662.20
Q24-DN000000072623	3 Years Upgrade to Platinum M110/310 4 port FC Host Port Card w/ SFP	2	$583.00	$1,166.00	15%	$991.10
Q24-DN000000072523	3 Years Upgrade to Platinum M310 Cache Memory 24GB for one Controller	2	$346.00	$692.00	15%	$588.20
Q24-DN000000072609	3 Years Upgrade to Platinum Disk Enclosure 2.5 inch for Mx10	19	$1,900.00	$36,100.00	15%	$30,685.00
Q24-DN000000072915	1 Year Upgrade to Platinum SW Maintenance M310 Base Software	3	$941.00	$2,823.00	15%	$2,399.55
Cables and Racks						
Power Strips	Power Strips (8 outlets)	6	$78.00	$468.00	10%	$421.20
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	4	$54.00	$216.00	10%	$194.40
	Configuration Total			**$415,869.00**		**$335,139.15**

- *Power codes for M310 and Disk Enclosures are included in Localization Kits (Q24-HL000000072705 and Q24-HL000000072706).*
- *Price of M310 Disk Array Unit includes price of M310 Base Software (Q24-HL000000072865).*
- *PathManager for Windows/Linux/VMware is included in M310 Base Software (Q24-HL000000072865).*

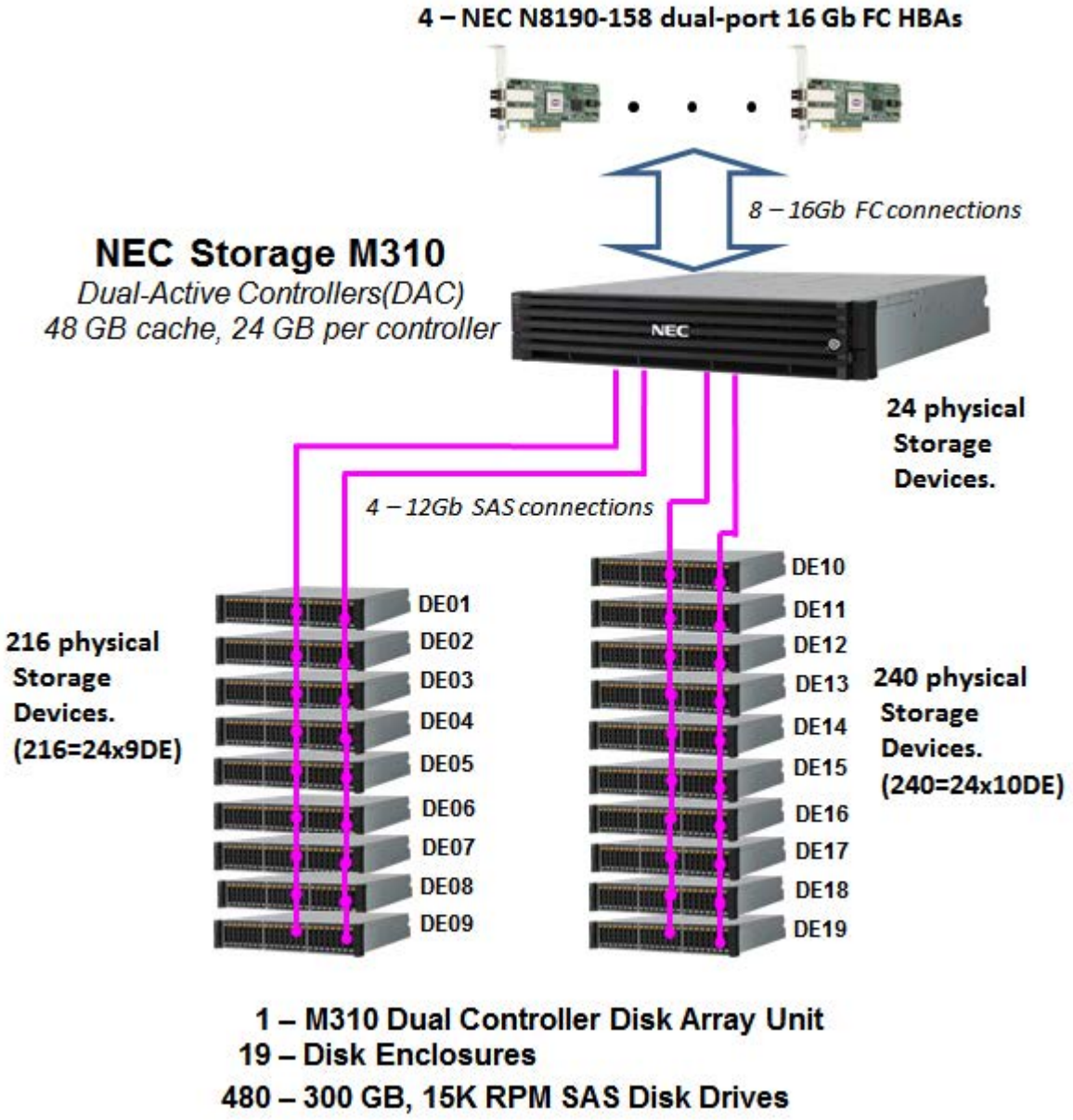
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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
4 – NEC N8190-158 dual-port 16Gb FC HBAs
NEC Storage M310 Dual-Active Controllers, each with 24 GB memory *(48 GB total)* 2 – 12 Gb SAS ports *(4 ports total)*
2 – 4-port FC Host Port Cards *(2 cards and 4 ports per controller, 8 ports total and used)*
19 – Disk Enclosures, 2.5”
480 – 300 GB, 15K RPM SAS disk drives (HDDs) (24 HDDs in each of the 19 disk enclosures 24 HDDs in the M310 Dual Controller Disk Array Unit)
1 – 42U Rack with 6 power strips *(8 outlets per strip)*