SPC Benchmark 2™
Executive Summary

NEC Corporation
NEC Storage M700

SPC-2™ V1.5

Submitted for Review: August 19, 2013
Submission Identifier: B00066

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-2 Specification revision number	V1.5
SPC-2 Workload Generator revision number	V1.2
Date Results were first used publicly	August 19, 2013
Date FDR was submitted to the SPC	August 19, 2013
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	August 12, 2013

Tested Storage Product (TSP) Description

NEC's M700 SAN storage arrays are a great choice for very scalable, mission-critical, high performance, primary or tiered storage. These SAN storage arrays are easy to operate, dependable and efficient. They are also well-suited for use in virtualized environments by virtue of their great scalability, LUN lock stability, support for VMware APIs and flexibility.

NEC M700 SAN arrays feature host interfaces: 8 Gbps Fibre Channel, 10Gbps/1Gbps iSCSI. Both interfaces can be deployed concurrently. M700 offers 3.5" and 2.5" drives. 2.5" drives are attractive due to their lower power and space consumption. 3.5" drives by contract offer the best storage density per spindle. M700 simultaneous supports SAS HDD, NearLine SAS HDD, and SSD in the same enclosures, enabling flexible tiered storage architecture.

SPC-2 Reported Data

SPC-2 Reported Data consists of three groups of information:

- The following SPC-2 Primary Metrics, which characterize the overall benchmark result:
  - SPC-2 MBPS™
  - SPC-2 Price Performance
  - Application Storage Unit (ASU) Capacity

- Supplemental data to the SPC-2 Primary Metrics.
  - Total Price
  - Data Protection Level

- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

SPC-2 Price-Performance™ is the ratio of **Total Price** to **SPC-2 MBPS™**.

ASU *(Application Storage Unit)* **Capacity** represents the total storage capacity available to be read and written in the course of executing the SPC-2 benchmark.

Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page on page 17 of the corresponding Full Disclosure Report.

Data Protection Level of **Protected 1** using ***Mirroring*** configures two or more identical copies of user data.

> ***Protected 1:*** *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-2 Data Repository.*

Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-2 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.
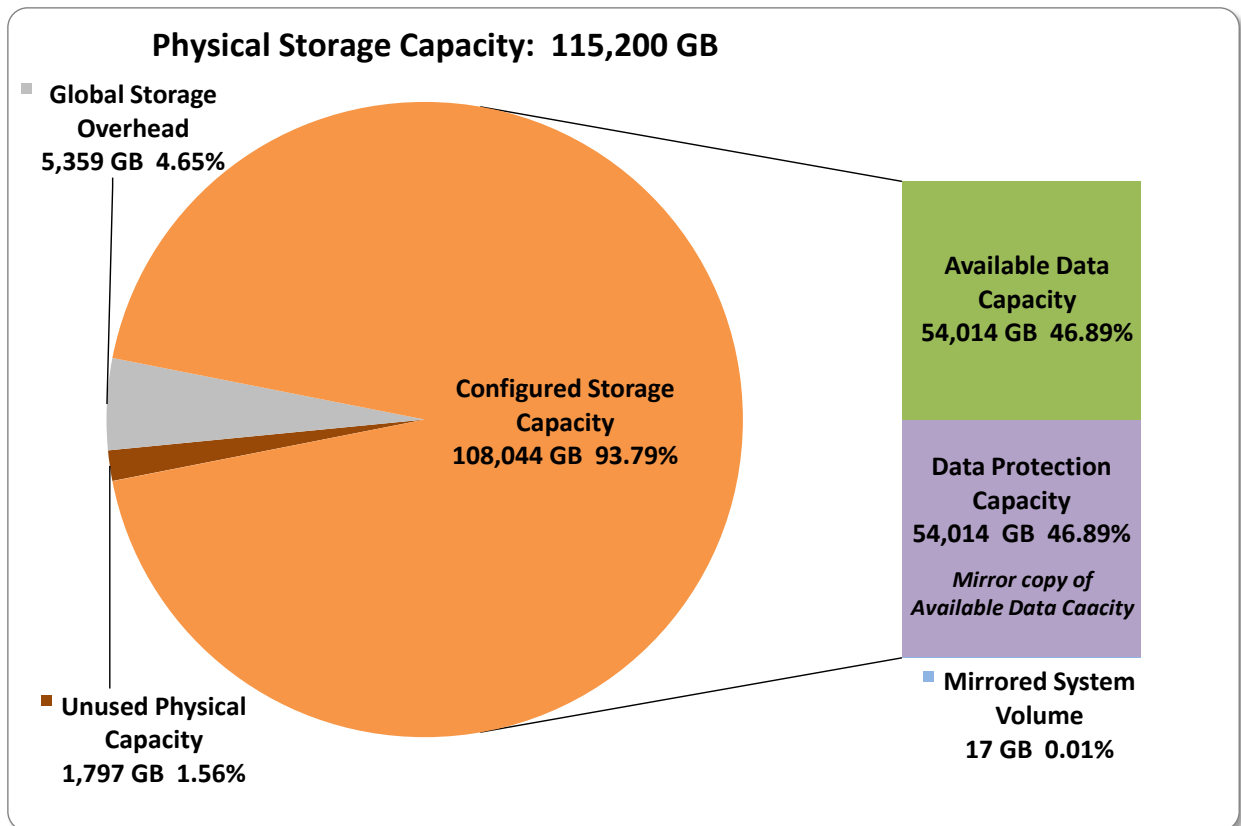
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.
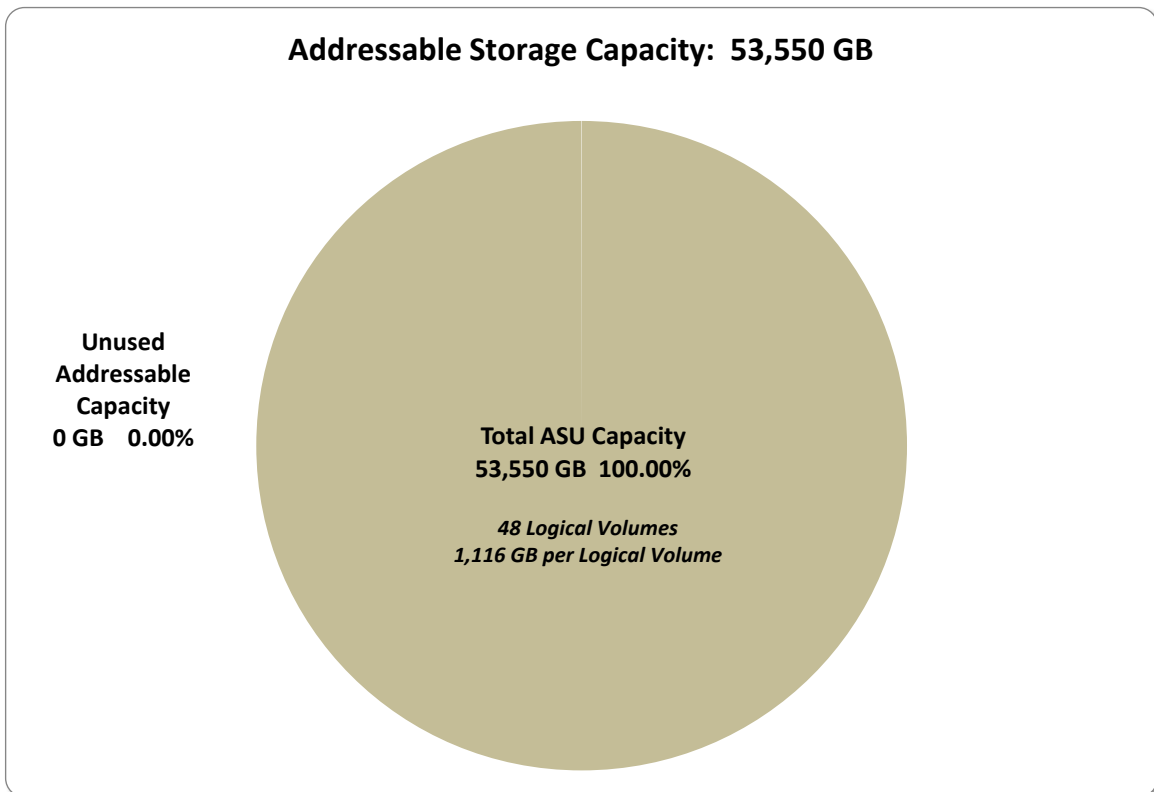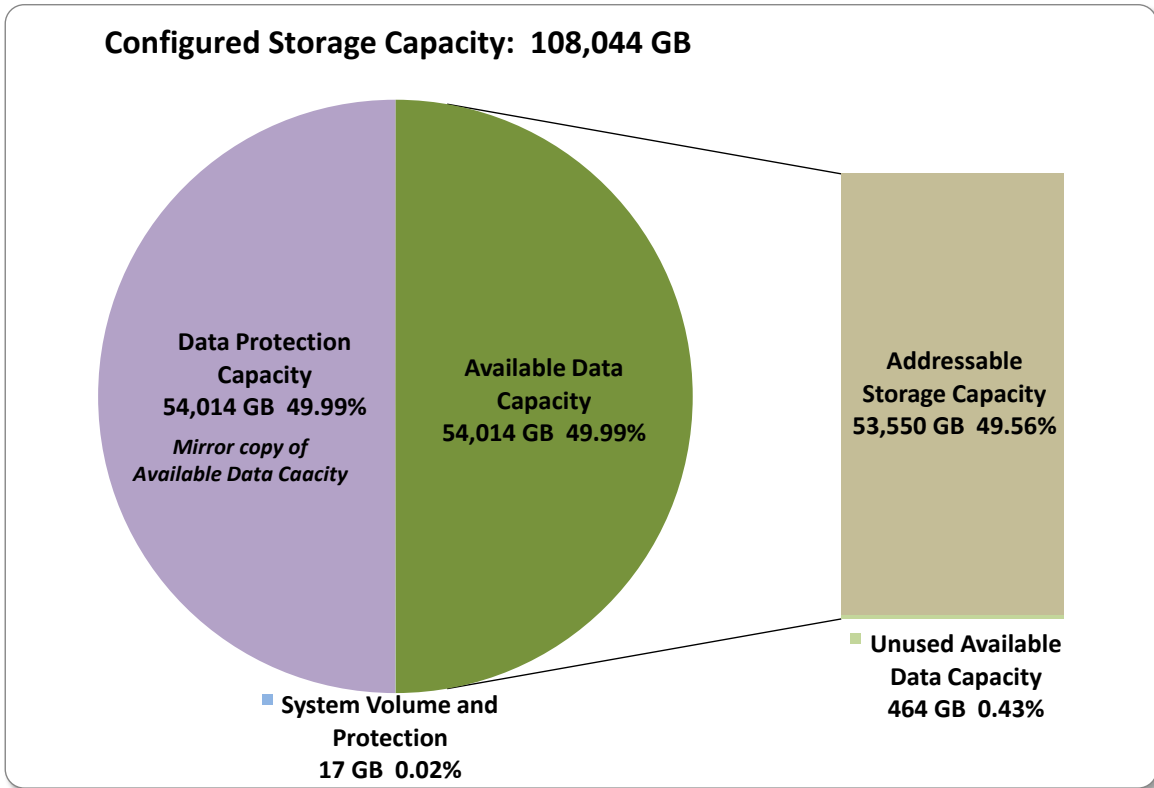
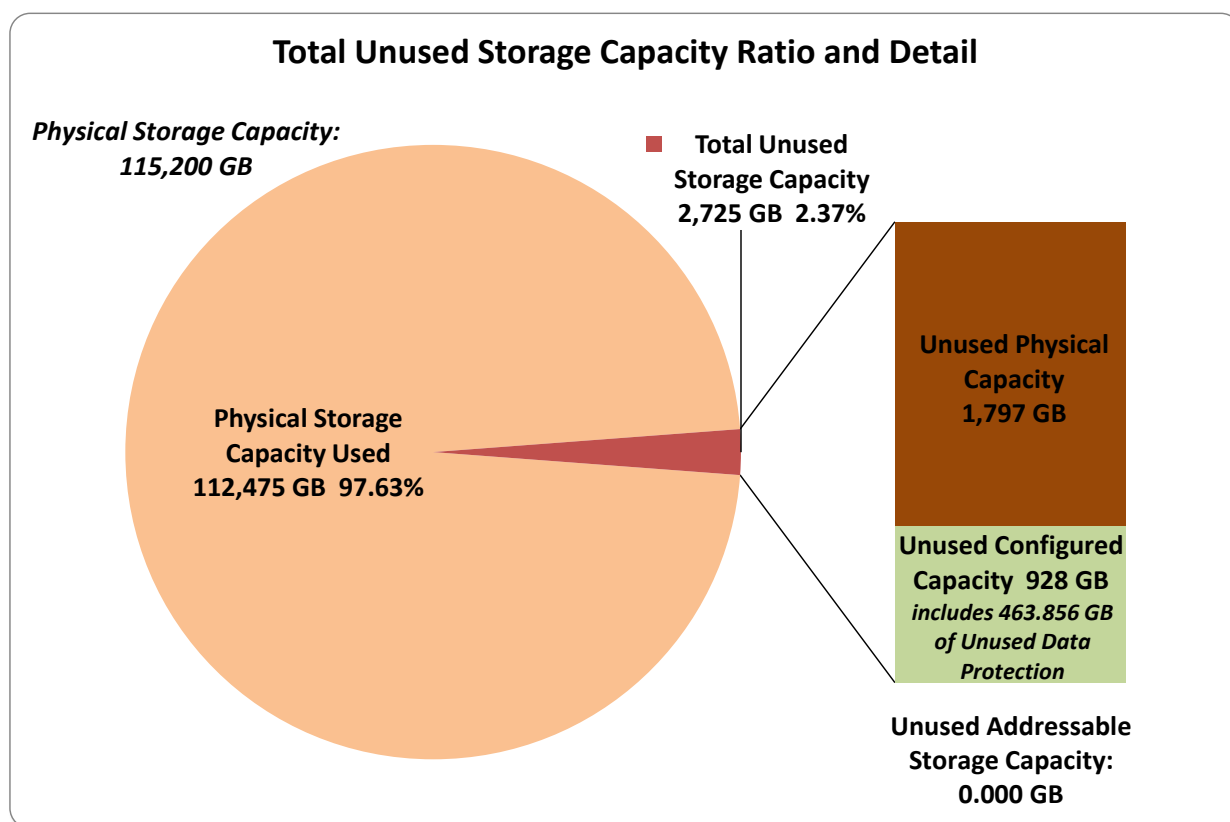| SPC-2 Reported Data				
NEC Storage M700				
SPC-2 MBPS™	**SPC-2 Price-Performance**	**ASU Capacity (GB)**	**Total Price**	**Data Protection Level**
14,408.89	$25.10	53,549.652	$361,612.93	Protected 1 *(Mirroring)*
The above SPC-2 MBPS™ value represents the aggregate data rate of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video On Demand (VOD)				
SPC-2 Large File Processing (LFP) Reported Data				
	Data Rate *(MB/second)*	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
LFP Composite	11,393.94			$31.74
Write Only:				
1024 KiB Transfer	6,553.10	100	65.53	
256 KiB Transfer	6,641.97	100	66.42	
Read-Write:				
1024 KiB Transfer	10,462.85	180	58.13	
256 KiB Transfer	10,550.67	180	58.61	
Read Only:				
1024 KiB Transfer	16,246.35	700	23.21	
256 KiB Transfer	17,908.71	700	25.58	
The above SPC-2 Data Rate value for LFP Composite represents the aggregate performance of all three LFP Test Phases: (Write Only, Read-Write, and Read Only).				
SPC-2 Large Database Query (LDQ) Reported Data				
	Data Rate *(MB/second)*	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
LDQ Composite	16,890.48			$21.41
1024 KiB Transfer Size				
4 I/Os Outstanding	16,856.23	700	24.08	
1 I/O Outstanding	16,571.29	700	23.67	
64 KiB Transfer Size				
4 I/Os Outstanding	17,288.51	700	24.70	
1 I/O Outstanding	16,845.90	700	24.07	
The above SPC-2 Data Rate value for LDQ Composite represents the aggregate performance of the two LDQ Test Phases: (1024 KiB and 64 KiB Transfer Sizes).				
SPC-2 Video On Demand (VOD) Reported Data				
	Data Rate *(MB/second)*	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
	14,942.25	19,000	0.79	$24.20

Storage Capacities and Relationships

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.

Physical Storage Capacity: 115,200 GB

- Global Storage Overhead
  5,359 GB 4.65%
- Configured Storage Capacity
  108,044 GB 93.79%
- Unused Physical Capacity
  1,797 GB 1.56%
- Available Data Capacity
  54,014 GB 46.89%
- Data Protection Capacity
  54,014 GB 46.89%
  Mirror copy of Available Data Caacity
- Mirrored System Volume
  17 GB 0.01%

Configured Storage Capacity: 108,044 GB

Data Protection Capacity
54,014 GB 49.99%

Mirror copy of Available Data Caacity

Available Data Capacity
54,014 GB 49.99%

Addressable Storage Capacity
53,550 GB 49.56%

Unused Available Data Capacity
464 GB 0.43%

System Volume and Protection
17 GB 0.02%

Addressable Storage Capacity: 53,550 GB

Unused Addressable Capacity
0 GB   0.00%

Total ASU Capacity
53,550 GB 100.00%

48 Logical Volumes
1,116 GB per Logical Volume

Total Unused Storage Capacity Ratio and Detail

Physical Storage Capacity:
115,200 GB

■ **Total Unused Storage Capacity 2,725 GB 2.37%**

Physical Storage Capacity Used 112,475 GB 97.63%

Unused Physical Capacity 1,797 GB

Unused Configured Capacity 928 GB
includes 463.856 GB of Unused Data Protection

Unused Addressable Storage Capacity: 0.000 GB

SPC-1 Storage Capacity Utilization	
Application Utilization	79.86%
Protected Application Utilization	99.82%
Unused Storage Ratio	0.00%

Application Utilization: Total ASU Capacity *(28,748.431 GB)* divided by Physical Storage Capacity *(36,000.000 GB)*.

Protected Application Utilization: Total ASU Capacity *(28,748.431 GB)* plus total Data Protection Capacity *(7,187.108 GB)* minus unused Data Protection Capacity *(0.000 GB)* divided by Physical Storage Capacity *(36,000.000 GB)*.

Unused Storage Ratio: Total Unused Capacity *(0.000 GB)* divided by Physical Storage Capacity *(36,000.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 25-26 in the Full Disclosure Report.

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

There were no differences between the TSC and the Priced Storage Configuration.
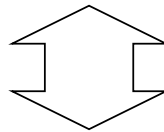
Priced Storage Configuration Pricing

PART#	Product Name	Qty	Unit List Price	Extended LP	Discount	Discounted Price
NF5371-SB00E	M700 Disk Array Unit (includes 1 x NF5371-SD01WE (Disk Port Expansion), 8 x NF9120-SJ73 (Mini SAS Conversion cable(1m))	1	$108,096.00	$108,096.00	20.0%	$86,476.80
NF5371-SF02WE	M700 Host Port Expansion(2X8Gb FC 4-Port)	6	$4,686.00	$28,116.00	20.0%	$22,492.80
NF5371-SD01WE	M700 Disk Port Expansion (SAS 8Port)	1	$3,564.00	$3,564.00	20.0%	$2,851.20
NF5371-SC03E	M700 Standard Cache Memory(96GB)	1	$5,321.00	$5,321.00	20.0%	$4,256.80
NF5321-SM775E	SAS Disk Drive(2.5", 15krpm/300GB, 6Gbps)	384	$395.00	$151,680.00	20.0%	$121,344.00
NF5321-SE71E	Disk Enclosure(2.5", 6Gbps)	16	$3,383.00	$54,128.00	20.0%	$43,302.40
NF9120-SJ73	Mini SAS conversion cable(3m x 2)	4	$636.00	$2,544.00	20.0%	$2,035.20
N8190-154	8Gbps Dual Port Fibre Channel HBA	12	$1,355.00	$16,260.00	10.0%	$14,634.00
FC cable	FC cable	24	$100.00	$2,400.00	10.0%	$2,160.00
Power Cord	Power Cord (10 ft.)	36	$18.20	$655.20	10.0%	$589.68
Power Strips	Power Strips (8 outlets)	5	$78.00	$390.00	10.0%	$351.00
RACK	Rack 42U	1	$1,799.00	$1,799.00	10.0%	$1,619.10
UFSM01-700600AM	SW,STORAGE BASEPRODUCT M700	1	$0.00	$0.00	20.0%	$0.00
UFS206-0060W0AM	SW, PATH MANAGER FOR WINDOWS, M700	1	$1,123.00	$1,123.00	20.0%	$898.40
Q24-DN000000013775	3Years Upgraded Platinum Warranty for M700 Disk Array Unit	1	$14,417.00	$14,417.00	15.0%	$12,254.45
Q24-DN000000013782	3Years Upgraded Platinum Warranty for M700 Host Port(8Gb FC 8Port)	6	$1,640.00	$9,840.00	15.0%	$8,364.00
Q24-DN000000013803	3Years Upgraded Platinum Warranty for M700 Disk Port (SAS 8Port)	2	$1,247.00	$2,494.00	15.0%	$2,119.90
Q24-DN000000013856	3Years Upgraded Platinum Warranty for M700 Standard Cache Memory(96GB)	1	$1,862.00	$1,862.00	15.0%	$1,582.70
Q24-DN000000008386	3YR Upgraded to Platinum Warranty M100 HDD 2.5" 15K 300GB 6Gbps	16	$300.00	$4,800.00	15.0%	$4,080.00
Q24-DN000000006695	3YR Upgraded to Platinum Warranty M100 DiskExp2.5"6Gbps	16	$846.00	$13,536.00	15.0%	$11,505.60
Q24-DN000000061141	3 Years Upgraded Platinum Warranty for Mini SAS conversion cable (1m x 2)	4	$171.00	$684.00	15.0%	$581.40
Q24-DN000000061148	3 Years Upgraded Platinum Warranty for Mini SAS conversion cable (3m x 2)	4	$222.00	$888.00	15.0%	$754.80
Q24-DN000000013974	3 Years Upgraded Platinum SW Maintenance for M700 Storage Base SW	1	$20,071.00	$20,071.00	15.0%	$17,060.35
Q24-DN000000061692	3 Years Upgraded Platinum SW Maintenance for M-series PathManager_Windows	1	$351.00	$351.00	15.0%	$298.35
	Total			*$445,019.20*		**$361,612.93**

The following pricing includes the following:

- Acknowledgement of new and existing hardware and/or software problems within four hours.

- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration component.
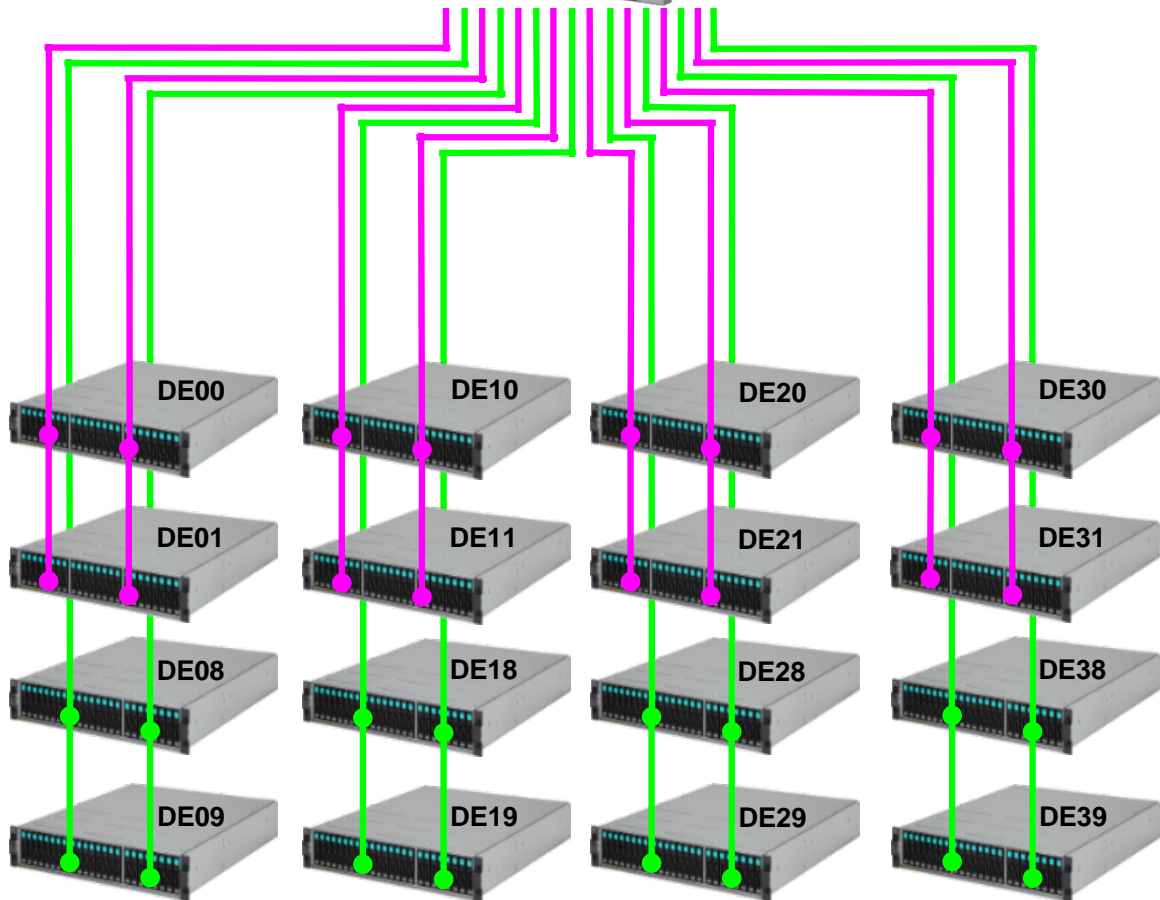
Priced Storage Configuration Diagram

12 – NEC N8190-154 Dual 8 Gb/s FC HBAs
(2 ports per HBA, 1 HBA per server)

24 – 8 Gbps Fibre Channel connections
(12 HBAs)

NEC Storage M700
Dual-Active Controllers
96 GB cache, 48 GB/controller

DE00   DE10   DE20   DE30

DE01   DE11   DE21   DE31

DE08   DE18   DE28   DE38

DE09   DE19   DE29   DE39

16 – Disk Enclosures
384 – 300 GB, 15K RPM SAS disk drives
(24 disk drives per disk enclosure)

Priced Storage Configuration Components

Priced Storage Configuration:
Path Manager for Windows
12 – N8190-154 dual 8 Gb/s FC HBAs

NEC Storage M700
Dual Active Controllers
   48 GB cache per controller *(96 GB total)*
   3 – FC 2x4-port Host Port Expansion per controller
      (8 Gbps, 6 Host Port Expansions total)
   24 – 8 Gbps front-end connections per controller
      (48 total, 24 used)
   1 – SAS 8 port Disk Port Expansion per controller
      (6 Gbps, 2 Disk Port Expansions total)
   8 –6 Gbps SAS backend connections per controller
      (16 total, 16 used)

16 – Disk Enclosures, 6 Gbps *(2.5" disk drives)*
384 – 15K RPM 2.5" 300 GB SAS disk drives   *(24 disk drives per disk enclosure)*
1 – 42U Rack with 5 Power Strips *(8 outlets per strip)*