



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**MACROSAN TECHNOLOGIES Co., LTD.
MACROSAN MS5520**

SPC-1 V1.14

**Submitted for Review: December 20, 2015
Submission Identifier: A00165**

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	December 20, 2015
Date the FDR was submitted to the SPC	December 20, 2015
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	December 19, 2015

Tested Storage Product (TSP) Description

The MS5580 is a new-generation mid-range storage product launched by MacroSAN. It incorporates various advanced design ideas and architecture technologies and provides a secure and reliable storage platform that supports flexible resource deployment for small and medium-sized data centers. MacroSAN MS5520 provides a secure and reliable storage platform with high performance and flexible resource deployment for small and medium-sized data centers.

Regarding resource management, the MS5520 combines the cell-based virtualization technology to support flexible resource deployment through an innovative intelligent cell management technology (ICMT).

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: MacroSAN MS5520	
Metric	Reported Result
SPC-1 IOPS™	295,004.28
SPC-1 Price-Performance™	5.21CNY/SPC-1 IOPS™
Total ASU Capacity	5,000.000 GB
Data Protection Level	Protected 2 (<i>Mirroring</i>)
Total Price	1,535,800.00CNY
Currency Used	Renminbi (CNY)
Target Country for availability, sales and support	China

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 **component** in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

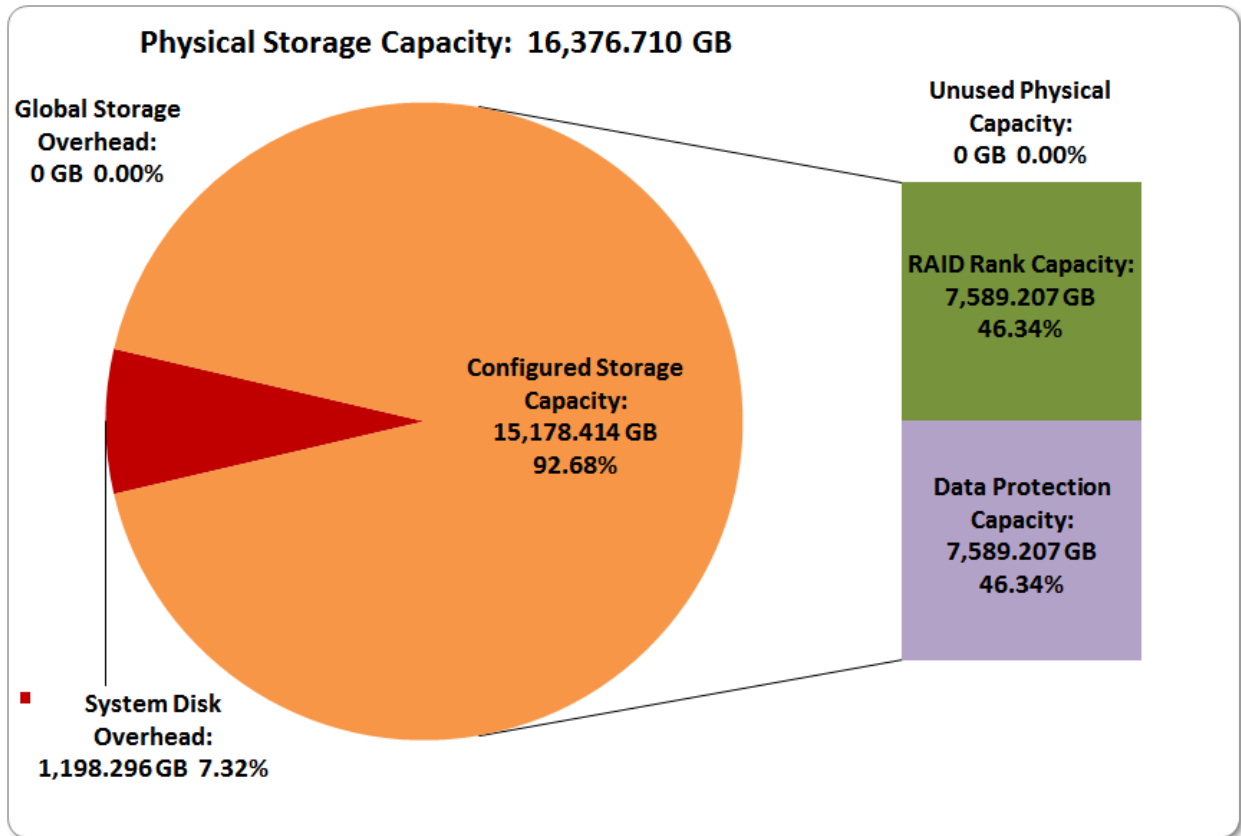
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page [8](#).

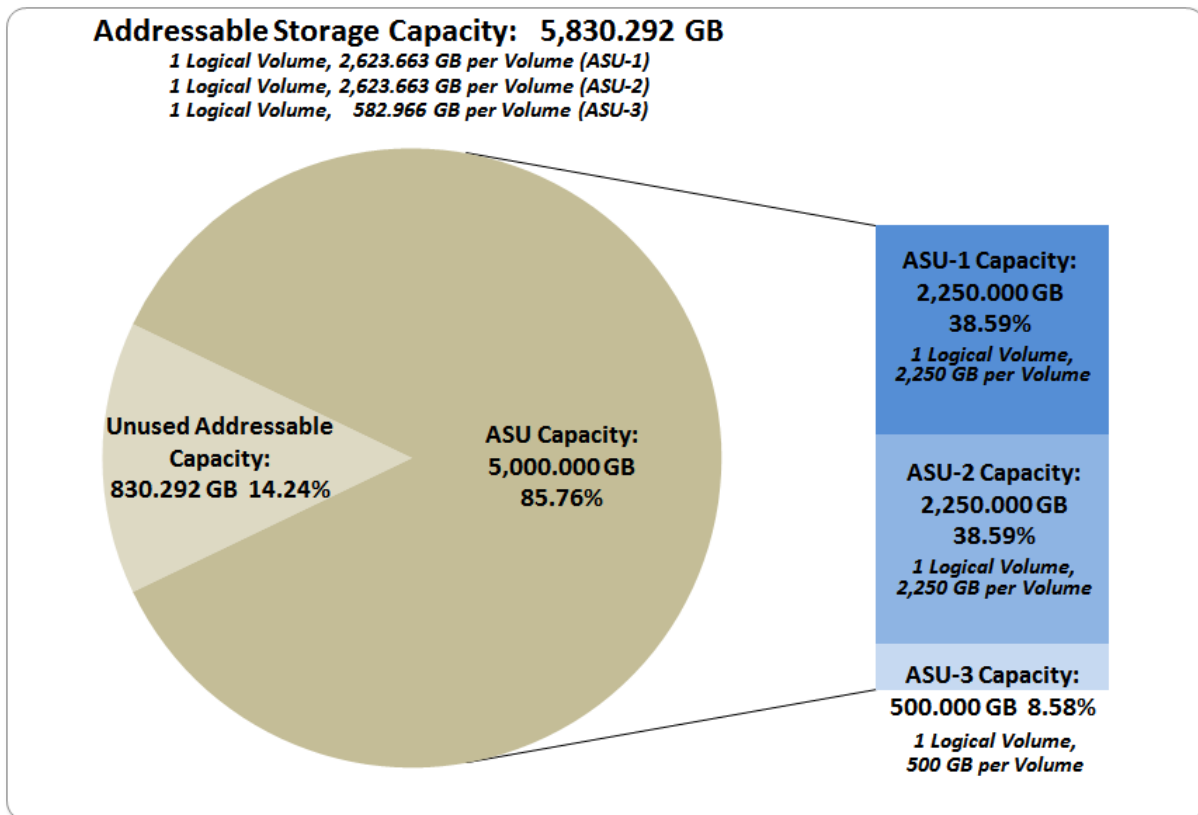
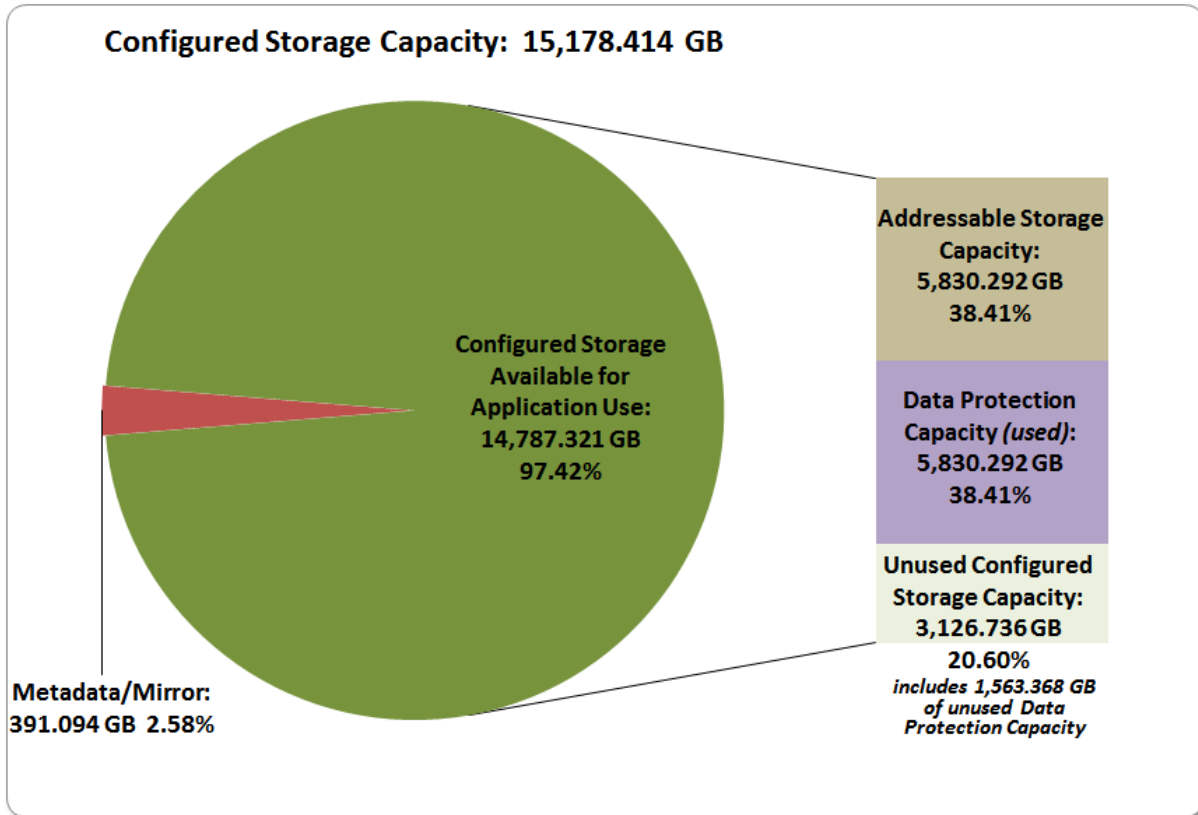
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

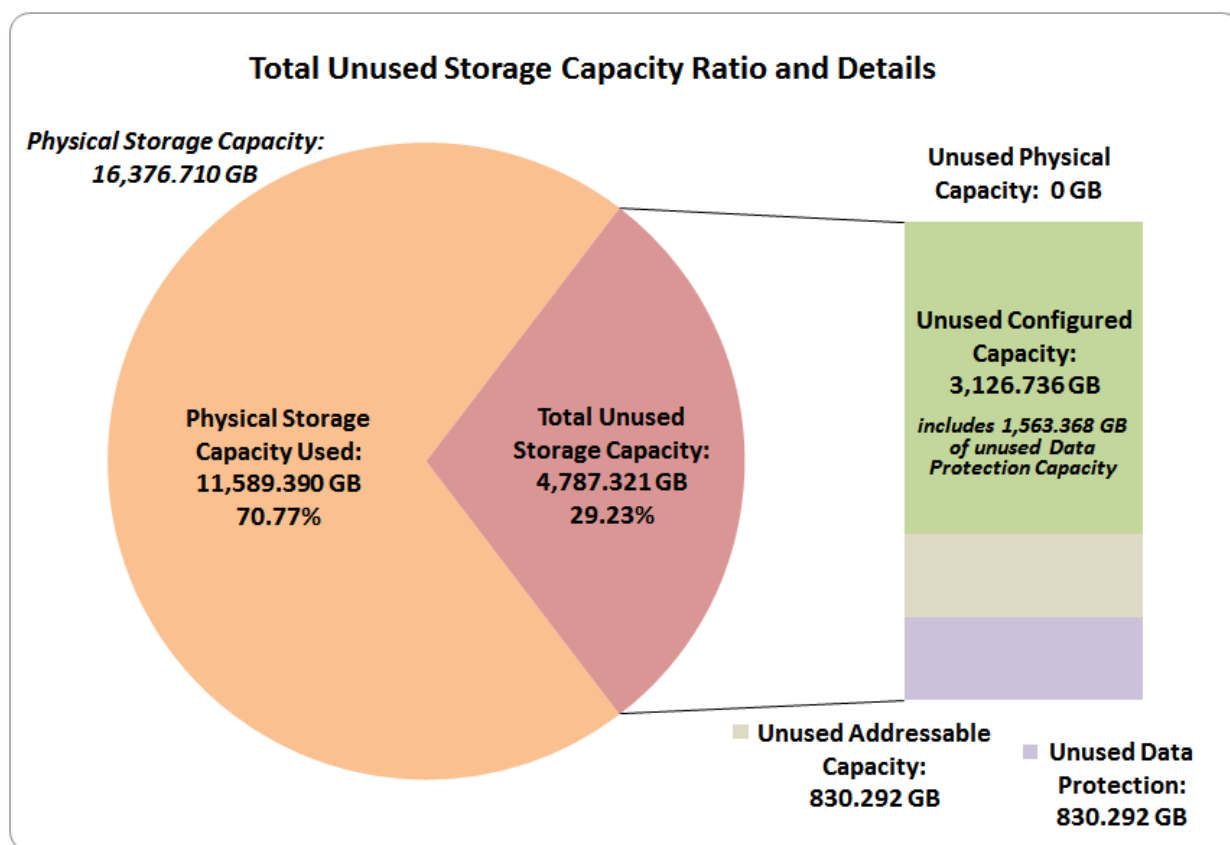
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

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.







SPC-1 Storage Capacity Utilization	
Application Utilization	30.53%
Protected Application Utilization	62.26%
Unused Storage Ratio	29.23%

Application Utilization: Total ASU Capacity (5,000.000 GB) divided by Physical Storage Capacity (16,376.710 GB).

Protected Application Utilization: (Total ASU Capacity (5,000.000 GB) plus total Data Protection Capacity (7,589.207 GB) minus unused Data Protection Capacity (2,393.660 GB)) divided by Physical Storage Capacity (16,376.710 GB).

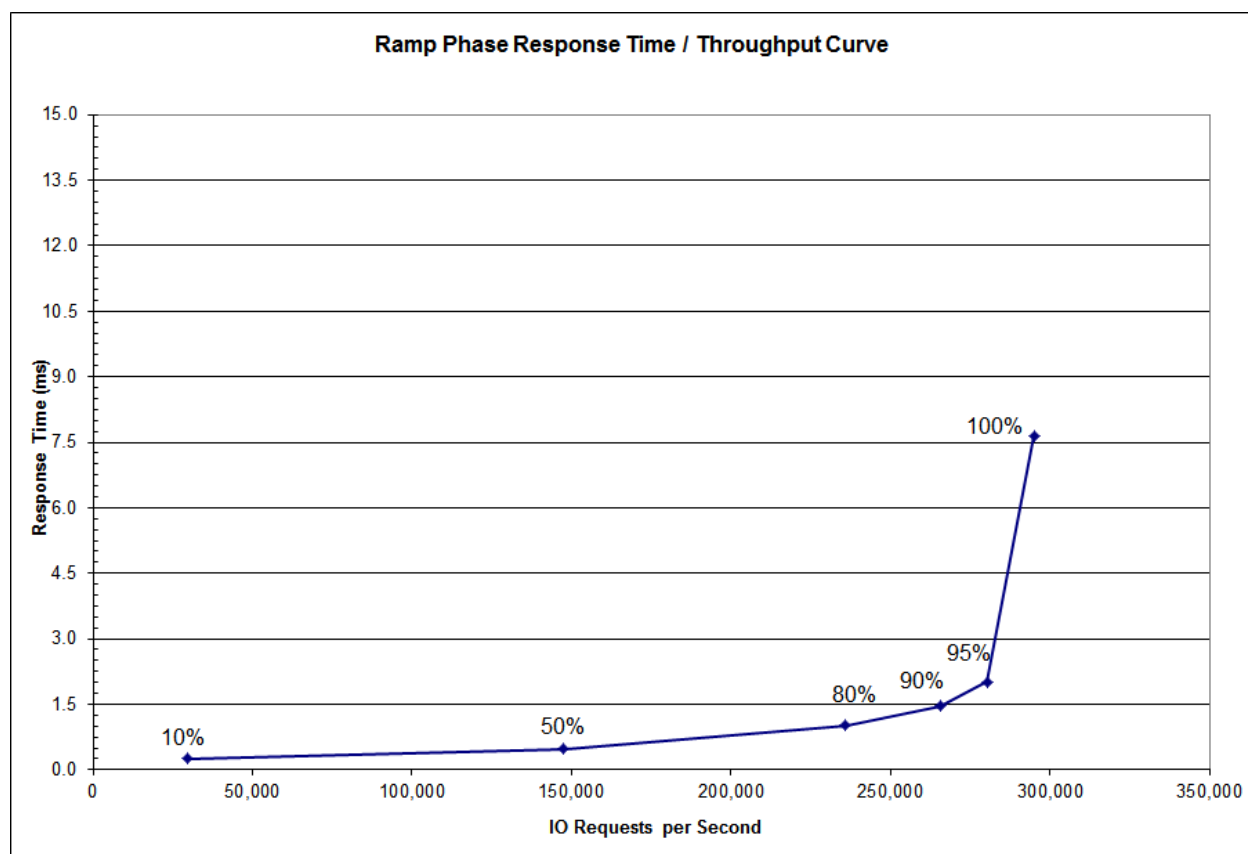
Unused Storage Ratio: Total Unused Capacity (4,787.321 GB) divided by Physical Storage Capacity (16,376.710 GB) and may not exceed 45%.

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

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	29,503.36	147,499.40	235,999.92	265,538.02	280,284.50	295,004.28
Average Response Time (ms):						
All ASUs	0.25	0.48	1.01	1.47	2.02	7.65
ASU-1	0.26	0.49	1.02	1.46	2.00	7.62
ASU-2	0.26	0.48	1.00	1.45	1.99	7.64
ASU-3	0.25	0.47	1.01	1.49	2.07	7.72
Reads	0.28	0.48	0.99	1.42	1.94	7.51
Writes	0.24	0.49	1.03	1.50	2.07	7.75

Priced Storage Configuration Pricing

Part number	Description	Qty	Unit Price (CNY)	Extended Price (CNY)	Discount	Discounted Price (CNY)
MacroSAN MS5520 Enterprise System						
Control Module						
1020037	MS5520 Storage Processor Unit (Dual Controllers,AC,192GB Cache ,with Battery Cache Protected Module)	1	1,445,000.00	1,445,000.00	85.00%	216,750.00
Disk Enclosure						
1020036	DSU1616(3U,2.5"/3.5",AC)	3	115,000.00	345,000.00	85.00%	51,750.00
Storage Devices						
2080133	300GB 15K RPM 3.5" SAS Drive	4	21,500.00	86,000.00	85.00%	12,900.00
2080054	200GB MLC SSD Drive(2.5")	44	80,000.00	3,520,000.00	85.00%	528,000.00
2080085	400GB MLC SSD Drive(2.5")	16	150,000.00	2,400,000.00	85.00%	360,000.00
IO Interface						
2080087	4*8Gbps Fibre Channel I/O modules (Total 4 ports)	4	60,000.00	240,000.00	85.00%	36,000.00
Storage Software						
7050315	MacroSAN Open Data Storage Platform MS5000 Storage System Management Software	1	100,000.00	100,000.00	85.00%	15,000.00
Accessory						
5040001	Patch Cord,DLC/PC-DLC/PC, Multimode,2mm-Parallel,5m	32	50.00	1,600.00	0.00%	1,600.00
FC Switch						
	Brocade300 8Gbps FC Switch with 24 available ports and 16 enabled ports, including 16*8Gbps SFPs, Single-Power Supply,AC	3	33,200.00	99,600.00	0.00%	99,600.00
Third Party						
	Qlogic QLE2562 HBA Card,PCIE, 8Gbps DualPort,Fiber Channel Multimode LC Optic Interface	8	3,300.00	26,400.00	0.00%	26,400.00
Total of Product						1,348,000.00
Maintenance Support Service						
53010043	MS5520 Installation Base Service per Set	1	40,000.00	40,000.00	70.00%	12,000.00
53010044	Disk Enclosure Installation Base Service per Set	3	10,000.00	30,000.00	70.00%	9,000.00
53010018	MS5520 SPU Gold-Level 24x7x4H Service (Per Set*3Year)	1	282,000.00	282,000.00	70.00%	84,600.00
53010064	Disk Enclosure Gold-Level 24x7x4H Service (Per Set*3Year)	3	78,000.00	234,000.00	70.00%	70,200.00
	Brocade300 FC Switch 24x7x4H Service (Per Set*3Year), including Installation Base Service(Per Set)	2	6,000.00	12,000.00	0.00%	12,000.00
Total of Service(3 years)						187,800.00
Total Price						1,535,800.00

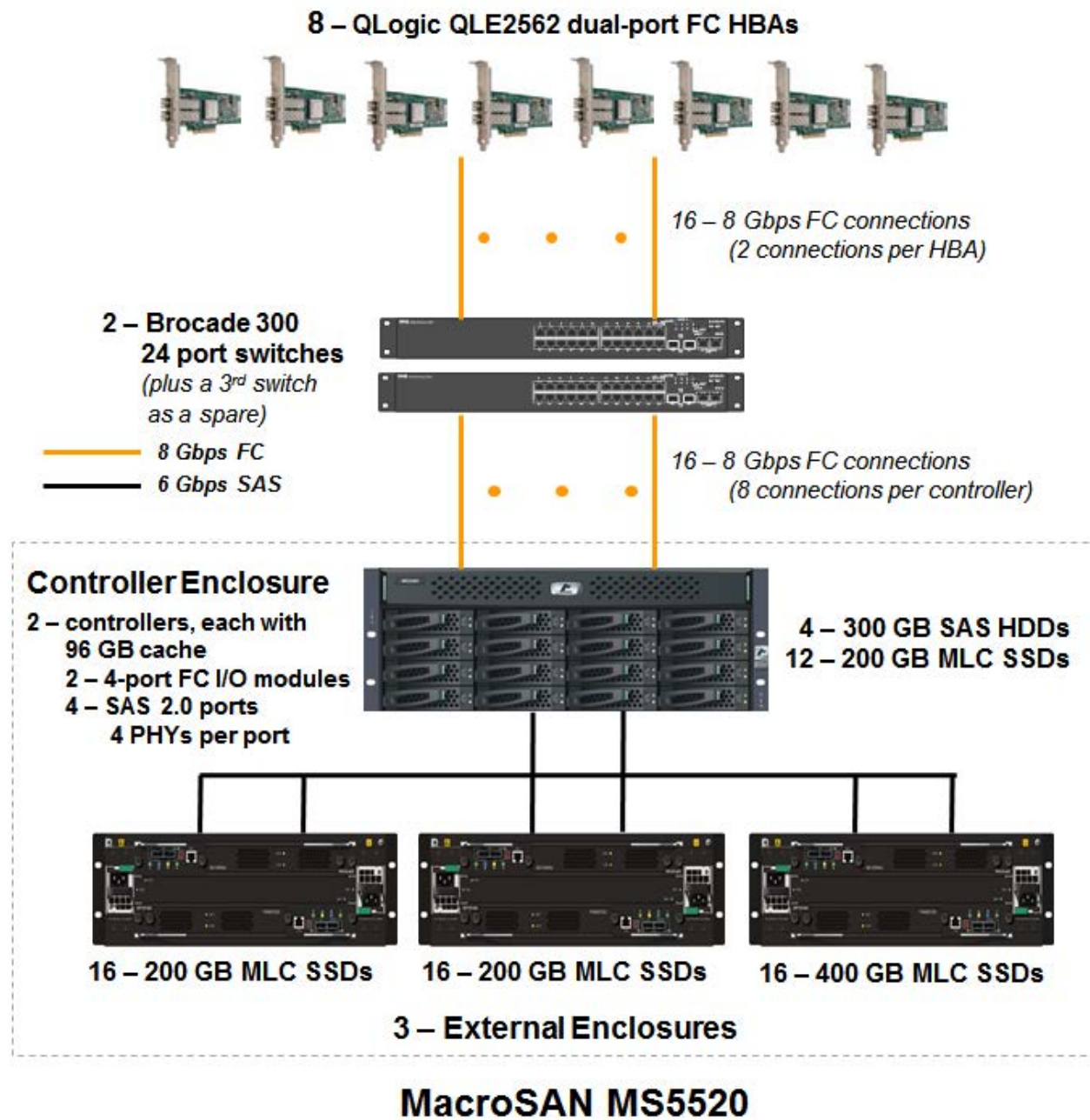
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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.

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
8 – QLogic QLE2562 dual-port, 8 Gbps, FC HBAs
3 – Brocade 300 Fibre Channel 24-port switches with 16 ports enabled and SFPs included <i>(3rd switch included as a spare for Protected 2 requirement)</i>
MacroSAN MS5520
1 – Controller Enclosure with 2 – controllers, each controller includes: 96 GB cache <i>(192 GB total)</i> 2 – 4-port Fibre Channel I/O modules <i>(4 modules total, 16 ports total, 16 ports used)</i> 4 – SAS 2.0 ports, 4 6Gbps PHYs per port <i>(16 PHYs total)</i> <i>(8 ports total, 32 PHYs total, 4 ports/16 PHYs used)</i> 4 – 300GB SAS disk drives (HDDs) <i>(system disks)</i> 12 – 200GB MLC SSD drives
3 – External Enclosures <i>(2 enclosures, each with 16 200GB MLC SSDs)</i> <i>(1 enclosure, with 16 400GB MLC SSDs)</i>
4 – 300 GB SAS disk drives (HDDs) 44 – 200 GB MLC SSDs 16 – 400GB MLC SSDs <i>(HDDs and SSDs distributed as documented above)</i>