



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**HUAWEI TECHNOLOGIES CO., LTD.
HUAWEI OCEANSTOR™ 5500 V3**

SPC-1 V1.14

**Submitted for Review: April 21, 2015
Submission Identifier: A00127**

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	April 21, 2015
Date the FDR was submitted to the SPC	April 21, 2015
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	April 20,2015

Tested Storage Product (TSP) Description

The Huawei OceanStor 5500 V3 mid-range storage system is part of a family of next-generation unified storage products (*Huawei OceanStor™ 5300, 5500, 5600 and 5800 V3*) specifically designed for enterprise-class applications. Leveraging a storage operating system built on a cloud-oriented architecture, a powerful new hardware platform, and a suite of intelligent management software, the Huawei OceanStor™ 5500 V3 delivers industry-leading functionality, efficiency, reliability, and ease-of-use. It provides data storage for applications such as large-database Online Transaction Processing (OLTP)/Online Analytical Processing (OLAP), file sharing, and cloud computing, and can be widely applied to industries ranging from government, finance, telecommunications, and energy, to media and entertainment (M&E). Meanwhile, the Huawei OceanStor™ 5500 V3 can provide a wide range of efficient and flexible backup and disaster recovery solutions to ensure business continuity and data security, delivering excellent storage services.

OceanStor OS, the Huawei OceanStor storage operating system, enables Huawei storage products evolve to the future cloud architecture and deliver the core business platform. It supports all OceanStor Storage arrays, specifically, for managing the underlying infrastructure, the physical space and logical space. OceanStor OS delivers intelligent and convergent services and multiple SLAs to the application scenarios, including SAN and NAS convergence, all-level storage convergence, performance and capacity convergence, primary and backup storage convergence, and heterogeneous storage convergence. OceanStor OS helps customers evolve their traditional storage to cloud services in the future.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: Huawei OceanStor™ 5500 V3	
Metric	Reported Result
SPC-1 IOPS™	100,499.14
SPC-1 Price-Performance™	\$2.20/SPC-1 IOPS™
Total ASU Capacity	76,815.488 GB
Data Protection Level	Protected 1 (<i>mirroring</i>)
Total Price	\$221,032.75
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 1** 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.*

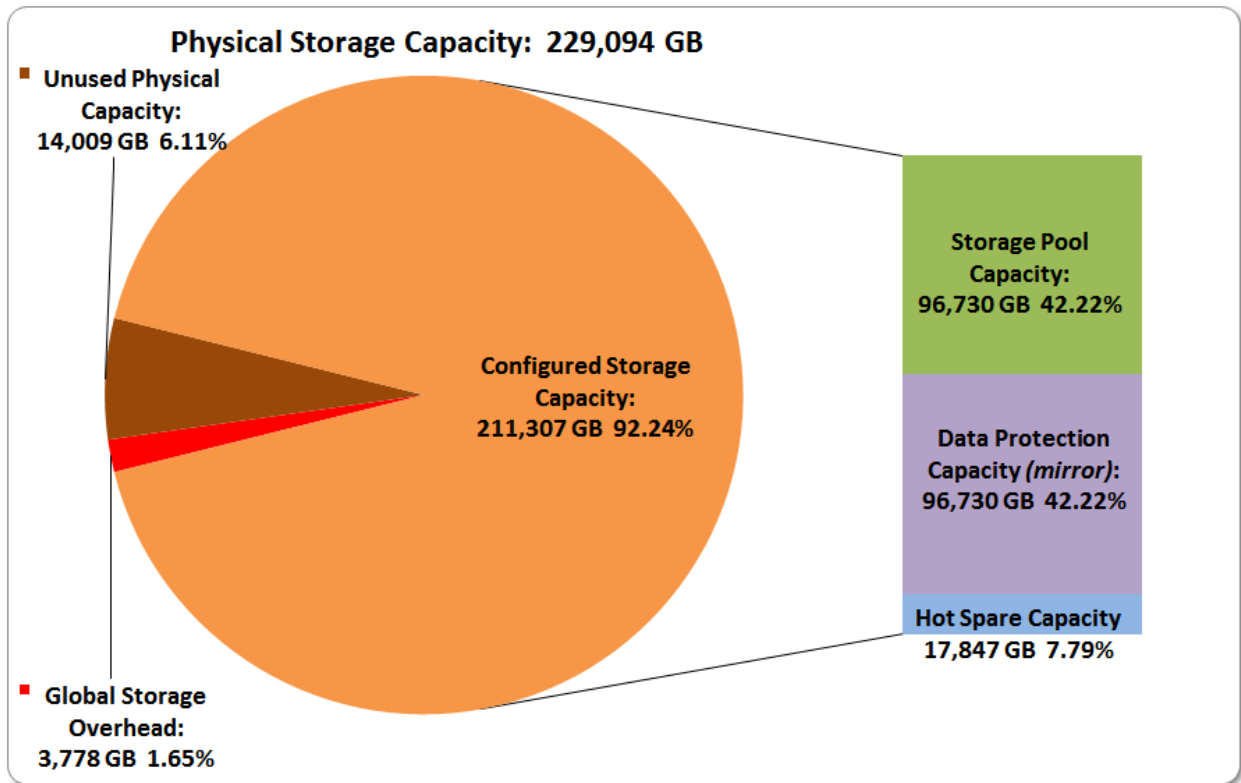
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

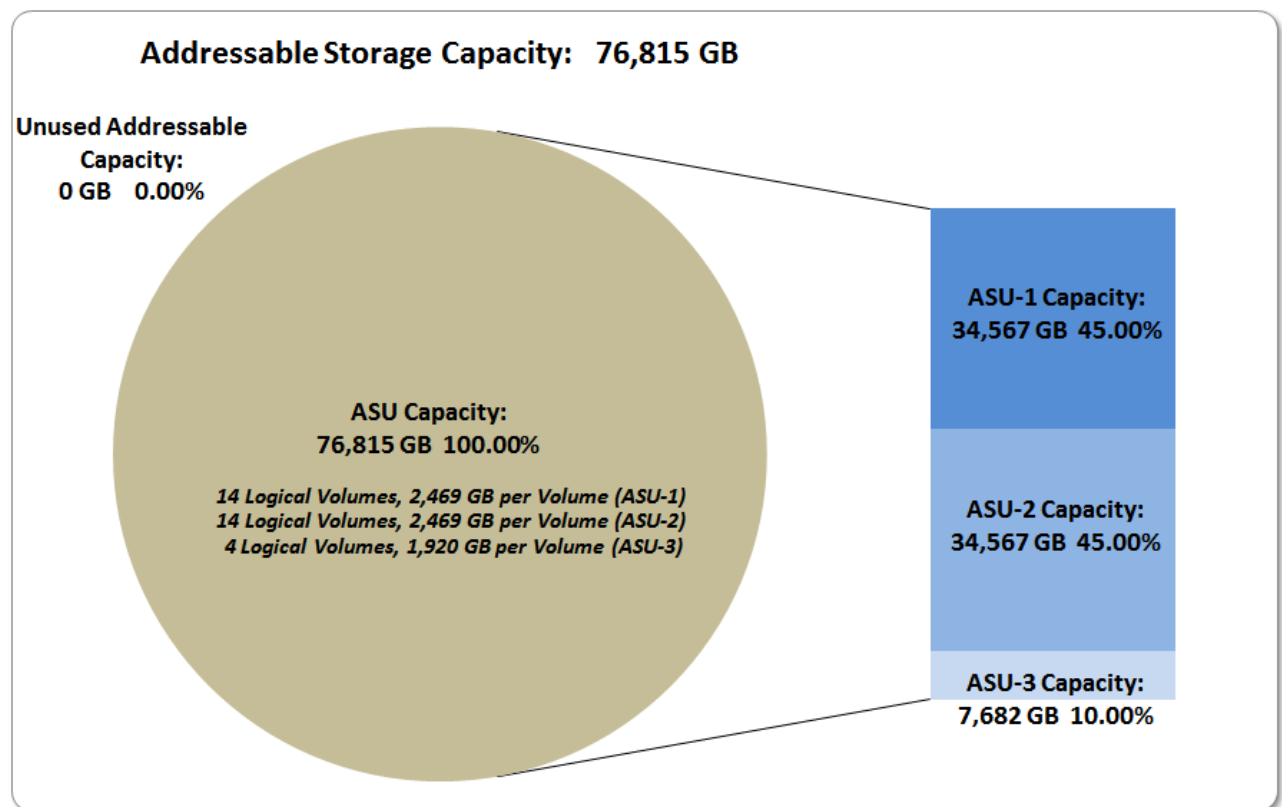
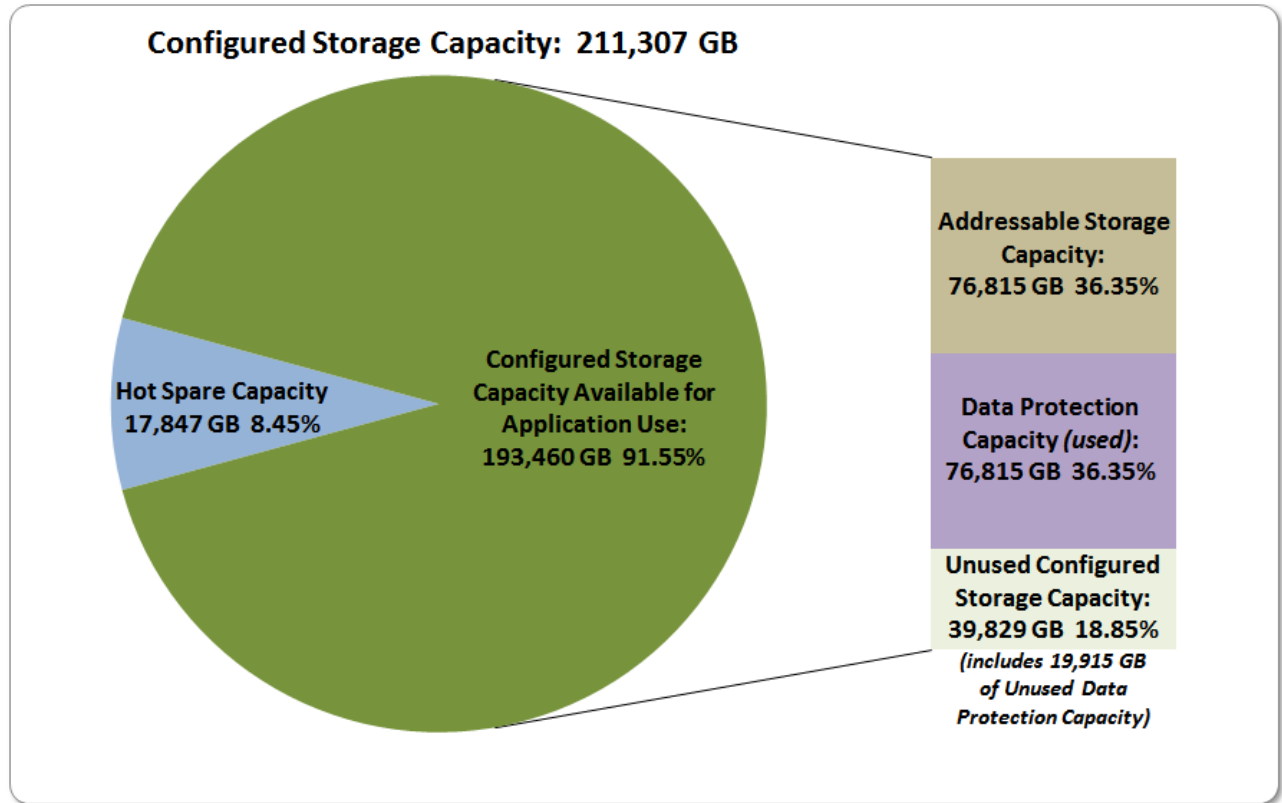
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

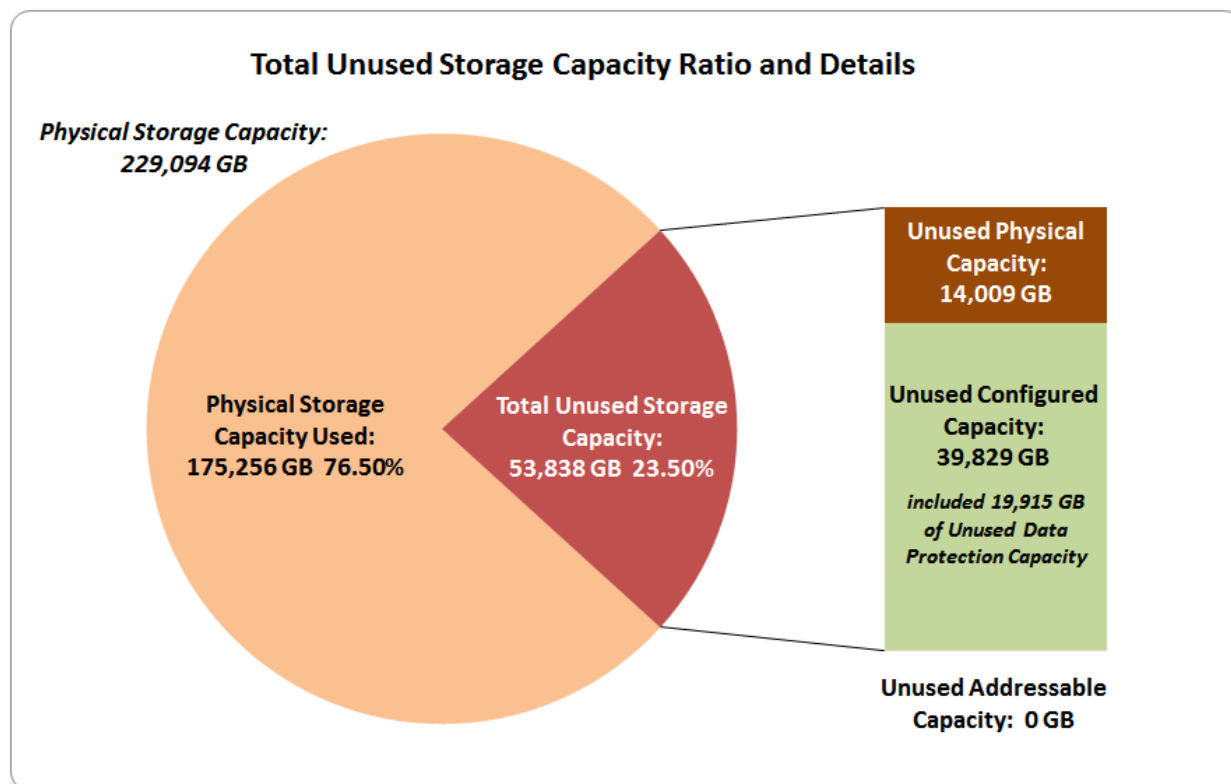
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

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.







SPC-1 Storage Capacity Utilization	
Application Utilization	33.53%
Protected Application Utilization	67.06%
Unused Storage Ratio	23.50%

Application Utilization: Total ASU Capacity (76,815.490 GB) divided by Physical Storage Capacity (229,094.401 GB).

Protected Application Utilization: Total ASU Capacity (76,815.490 GB) plus total Data Protection Capacity (96,730.180 GB) minus unused Data Protection Capacity (19,914.690 GB) divided by Physical Storage Capacity (229,094.401 GB).

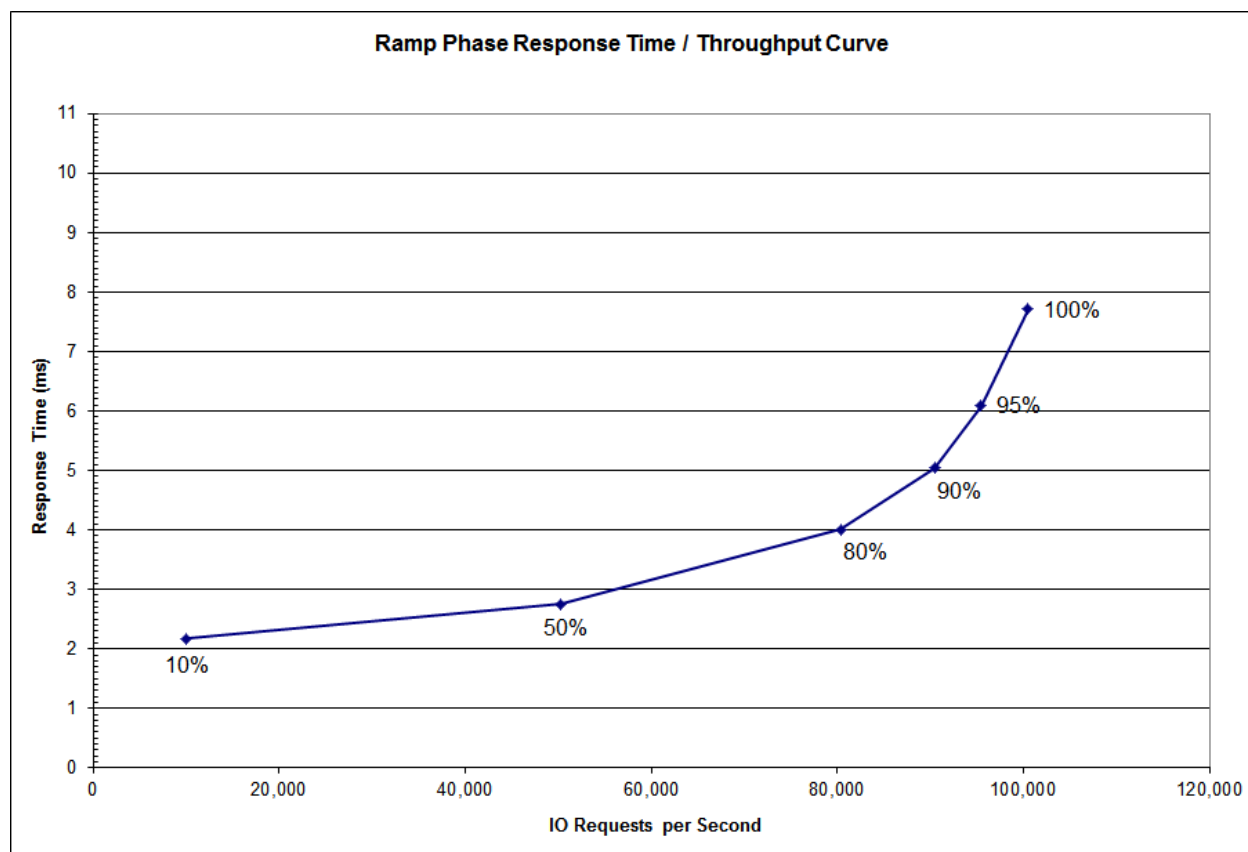
Unused Storage Ratio: Total Unused Capacity (53,838.240 GB) divided by Physical Storage Capacity (229,094.401 GB) and may not exceed 45%.

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	10,046.79	50,266.36	80,395.61	90,445.76	95,459.02	100,499.14
Average Response Time (ms):						
All ASUs	2.17	2.75	4.01	5.04	6.09	7.71
ASU-1	2.94	3.72	5.30	6.48	7.61	9.27
ASU-2	2.09	2.73	4.13	5.26	6.35	8.00
ASU-3	0.58	0.71	1.21	1.89	2.74	4.27
Reads	4.63	5.89	8.30	9.85	11.16	12.95
Writes	0.58	0.71	1.21	1.91	2.79	4.30

Priced Storage Configuration Pricing

No.	Model	Description	Qty	Unit Price(\$)	Total Price(\$)
1	Phase				
1.1	Location				
1.1.1	5500 V3 Storage System				
1.1.1.1	Control Module				
	5500V3-96G-AC-2S	5500 V3(2U,Dual Ctrl,AC,96GB,8*SmartIO,without Optical Transceiver,25*2.5",HW Storage System Software,SPE33C0225)	1	11138.75	11,138.75
		Optical transceiver,SFP+-850nm-8.5Gbps--8.2dBm--1.3dBm--11.2dBm-LC-MM-0.15km	8	58.00	464.00
1.1.1.2	Disk Enclosure				
	DAE22525U2-1AC	Disk Enclosure(2U,AC,2.5",Expanding Module,25 Disk Slots,DAE22525U2)	15	2205.00	33,075.00
1.1.1.3	Hard Disk Drives				
	SAS600-10K-2-V3	600GB 10K RPM SAS Disk Unit(2.5")	384	339.75	130,464.00
1.1.1.4	IO Interface				
	LPU4S12V3	4*12Gbps SAS I/O module(Total 4 ports,MiniSAS HD)	4	1034.00	4,136.00
1.1.1.5	Accessory				
	SS-OP-D-LC-M-3	Patchcord,DLC/PC-DLC/PC,Multimode,2mm Parallel,3m	4	11.00	44.00
	HS-SAS-5-01	High Speed Cable,Mini SAS HD Cable,5m,(SFF 8644 Plug),(26AWG*4P*2B(S)),(SFF 8644 Plug),Indoor use	10	91.00	910.00
	RACK-46U-AC	N610E-22 46U Common AC Storage Rack(include 2 AC power distribution panels)	2	1712.00	3,424.00
1.1.1.6	HBA				
	N8GHBA000	QLOGIC QLE2562 HBA Card,PCIe,8Gbps DualPort ,Fiber Channel Multimode LC Optic Interface,English Manual, No Drive CD	2	1000.00	2,000.00
1.1.1.7	Storage Software				
	LIC-5500V3-BS	Basic Software License,Include Device Management	1	821.00	821.00
	LIC-55-SMARTPAK	Storage efficiency Software suit License(SmartTier,SmartCache)	1	3761.00	3,761.00
	LIC-5500V3-PATH	OceanStor HW UltraPath Software License	1	985.00	985.00
Total of Product					191,222.75

Priced Storage Configuration Pricing (continued)

1.1.1.8 Maintenance Support Service					
		5500V3 Control Enclosure Implementation Service-Installation Service(Include disks and SAS I/O modules)	1	884.75	884.75
		DAE(5500V3) Implementation Service-Installation Service(Include disks)	15	448.15	6,722.25
		5500V3-Control Enclosure(Include disks and SAS I/O modules)-Warranty Upgrade To Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service	1	1713.00	1,713.00
		DAE (5500V3,Include disks) -Warranty Upgrade To Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service	15	1366.00	20,490.00
Total of Service (3 years)					29,810.00
Total Price					221,032.75
<p>Notes:Hi-Care Premier On-Site Service include: 7*24 Technical Assistance Center Access. Access to all new software updates and Online Support. 24*7*4 Hours Onsite Hardware Replacement.</p>					

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.

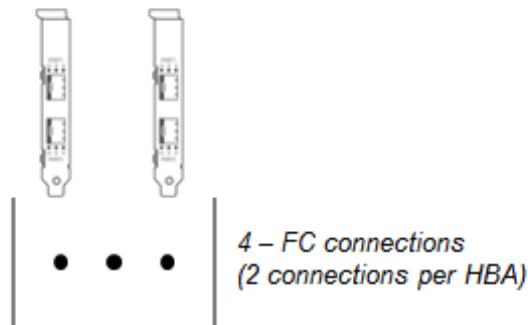
Huawei Technologies Co., Ltd. only sells its products to third-party resellers, who in turn, sell those products to U.S. customers. The above pricing, which also includes the required three-year maintenance and support, was obtained from one of those third-party resellers. See page 88 (*Appendix F: Third-Party Quotation*) in the corresponding SPC-1 Full Disclosure Report for a copy of the third-party reseller quotation.

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

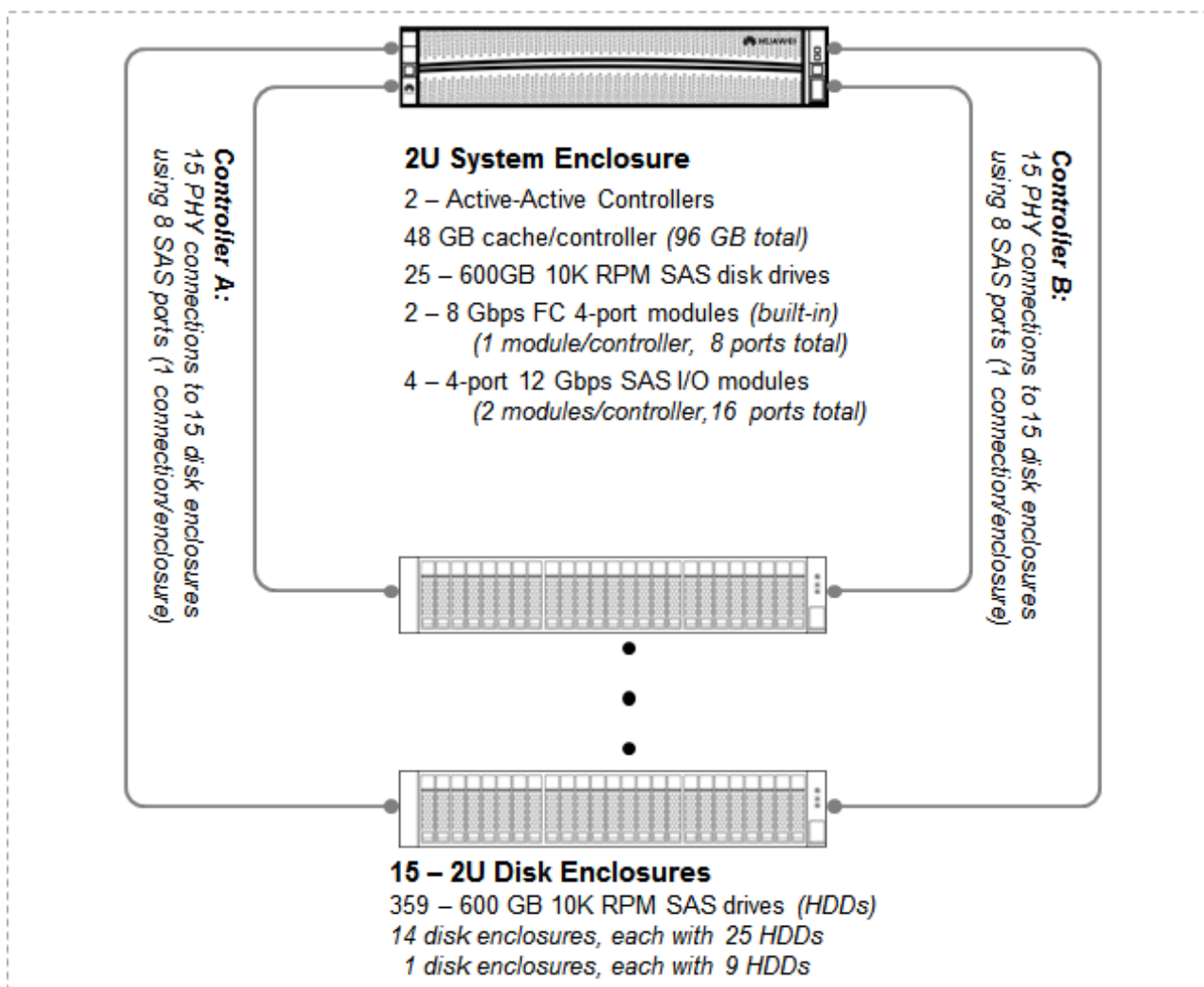
There were no differences between the TSC and Priced Storage Configuration.

Priced Storage Configuration Diagram

2 – QLogic dual-ported QLE2562 FC HBAs



Huawei OceanStor™ 5500 V3



Priced Storage Configuration Components

Priced Storage Configuration
OceanStor UltraPath
2 – QLogic QLE2562 dual-port, 8 Gbps, FC HBAs
Huawei OceanStor™ 5500 V3 2 – Active-Active Controllers each controller includes: 48 GB cache (<i>96 GB total</i>) 1 – 8 Gbps Fibre Channel 4-port frontend modules (<i>built-in</i>) (<i>2 modules total, 8 ports total, 4 ports used</i>) 2 – 4-port 12 Gbps SAS-wide I/O modules (<i>4 modules total, 16 ports total, 16 ports used</i>) (<i>4 PHYs per port, 64 PHYs total, 30 PHYs used</i>)
384 – 600 GB, 10K RPM SAS drives (<i>HDDs</i>) 25 <i>HDDs in the controller enclosure</i> 25 <i>HDDs in 14 disk enclosure</i> 9 <i>HDDs in 1 disk enclosure</i>
15 – Disk Enclosures (<i>2U, 2.5"</i>)
2 – 46U Common AC Storage racks with 2 AC power distribution panels per rack