



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**HUAWEI TECHNOLOGIES CO., LTD.
HUAWEI OCEANSTOR™ 6800 V3**

SPC-1 V1.14

**Submitted for Review: November 21, 2014
Submission Identifier: A00149**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Huawei Technologies Co., Ltd. – http://www.huawei.com/en/ Xu Zhong – xuzhong@huawei.com Huawei Chengdu Base No. 1899, Xiyuan Avenue Chengdu, 611731 P.R. China Phone: 86 28 65281927 FAX: 86 28 62282516
Test Sponsor Alternate Contact	Huawei Technologies Co., Ltd. – http://www.huawei.com/en/ Li Huan – tomas.l@huawei.com Huawei Chengdu Base No. 1899, Xiyuan Avenue Chengdu, 611731 P.R. China Phone: 86 28 65281927 FAX: 86 28 62282516
Test Sponsor Alternate Contact	Huawei Technologies Co., Ltd. – http://www.huawei.com/en/ Li Xingxin – lixingxin@huawei.com Huawei Chengdu Base No. 1899, Xiyuan Avenue Chengdu, 611731 P.R. China Phone: 86 28 65281926 FAX: 86 28 62282516
Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

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	November 21, 2014
Date the FDR was submitted to the SPC	November 21, 2014
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	November 19, 2014

Tested Storage Product (TSP) Description

Huawei OceanStor™ 6800 V3 high-end storage system is the next-generation unified storage product specifically designed for enterprise-class applications. Leveraging a storage operating system, OceanStor OS, built on a cloud-oriented architecture, a powerful new hardware platform, and a suite of intelligent management software, the V3 high-end storage system delivers industry-leading functionality, performance, 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, which can be widely applied to industries ranging from government, finance, telecommunications, energy, media and entertainment (M&E). Meanwhile, the V3 high-end storage system 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™ 6800 V3	
Metric	Reported Result
SPC-1 IOPS™	650,987.88
SPC-1 Price-Performance™	\$2.29/SPC-1 IOPS™
Total ASU Capacity	240,518.169 GB
Data Protection Level	Protected 2 (<i>mirroring</i>)
Total Price	\$1,488,036.50
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 **component** in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

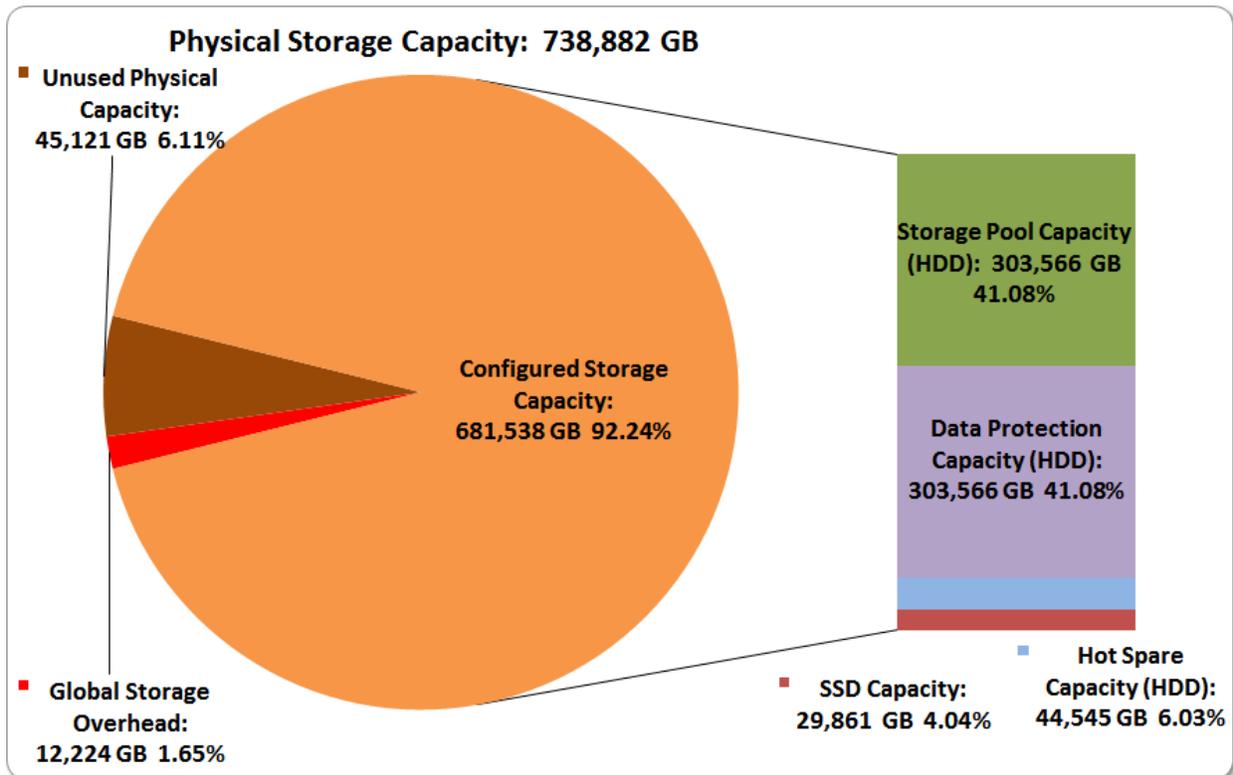
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

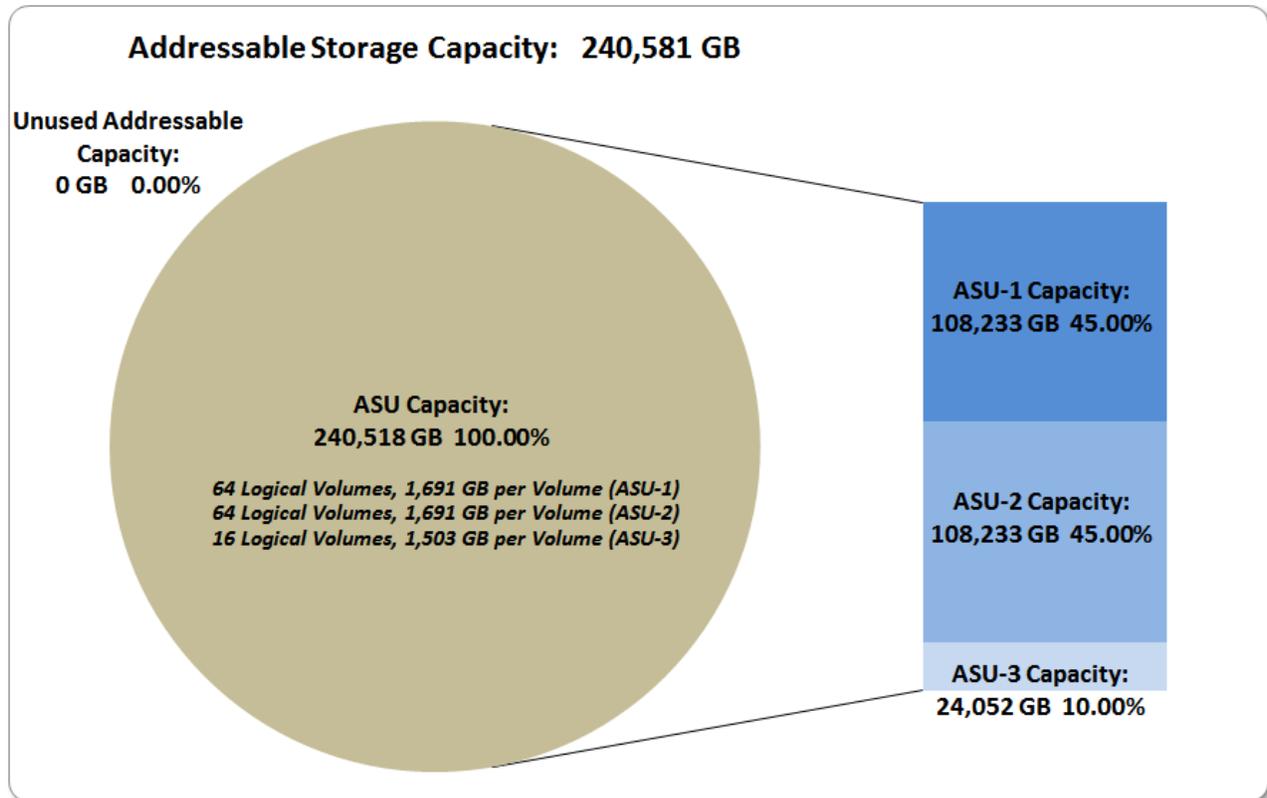
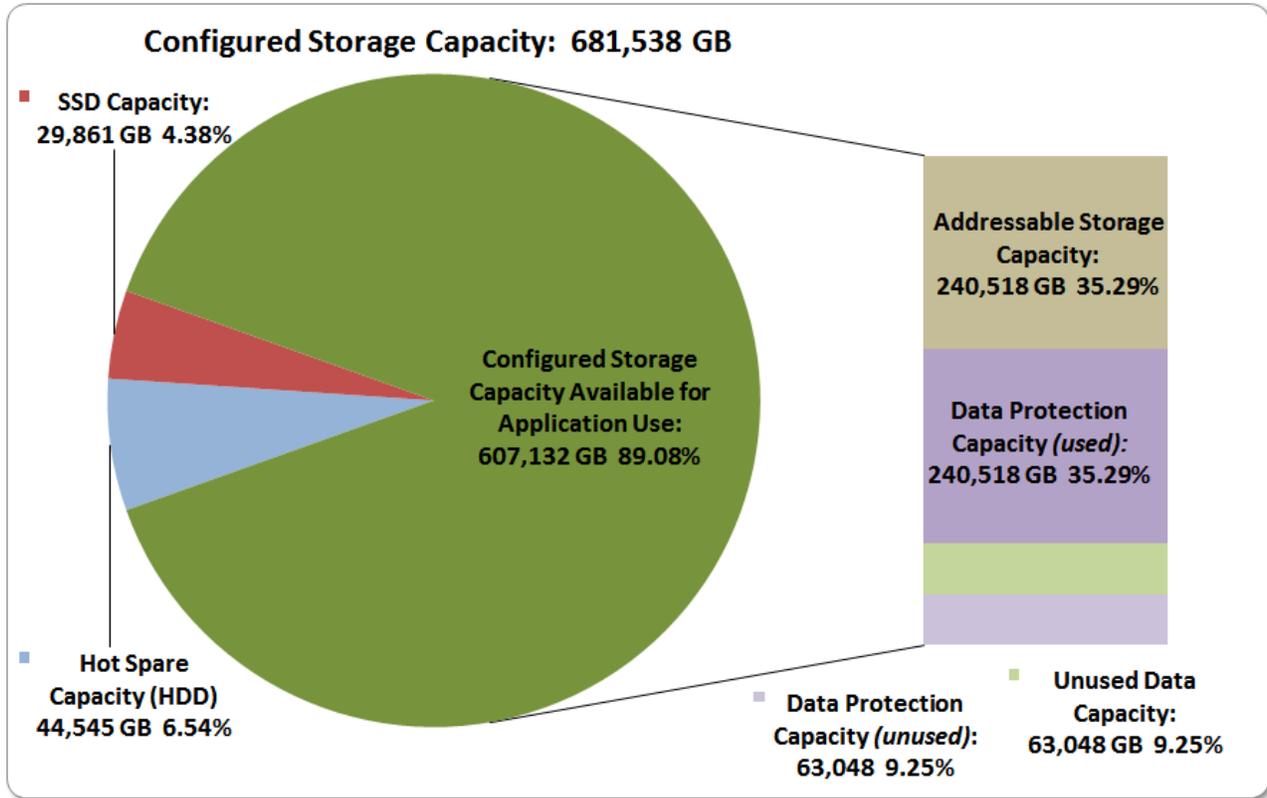
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

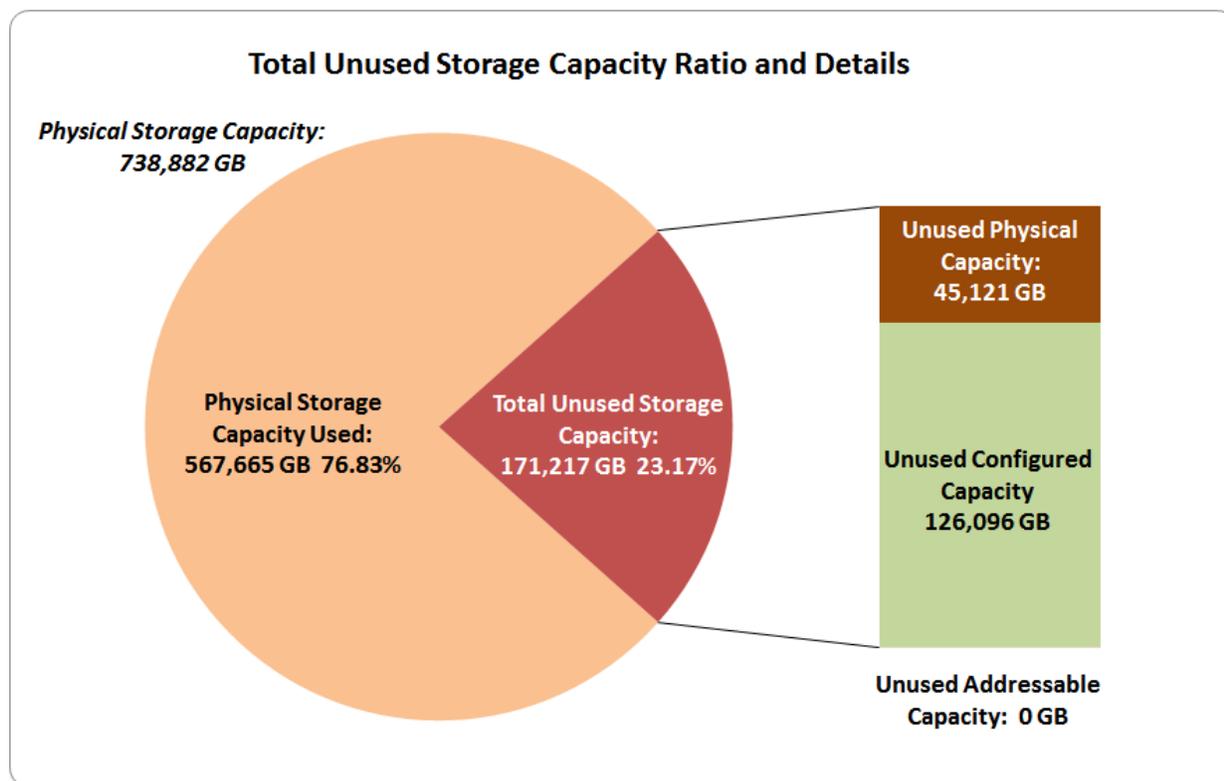
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

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	32.55%
Protected Application Utilization	66.92%
Unused Storage Ratio	23.17%

Application Utilization: Total ASU Capacity (240,518.169 GB) divided by Physical Storage Capacity (738,882.470 GB).

Protected Application Utilization: (Total ASU Capacity (240,518.169 GB) plus total Data Protection Capacity (316,983.619 GB) minus unused Data Protection Capacity (63,047.972 GB) divided by Physical Storage Capacity (738,882.470 GB).

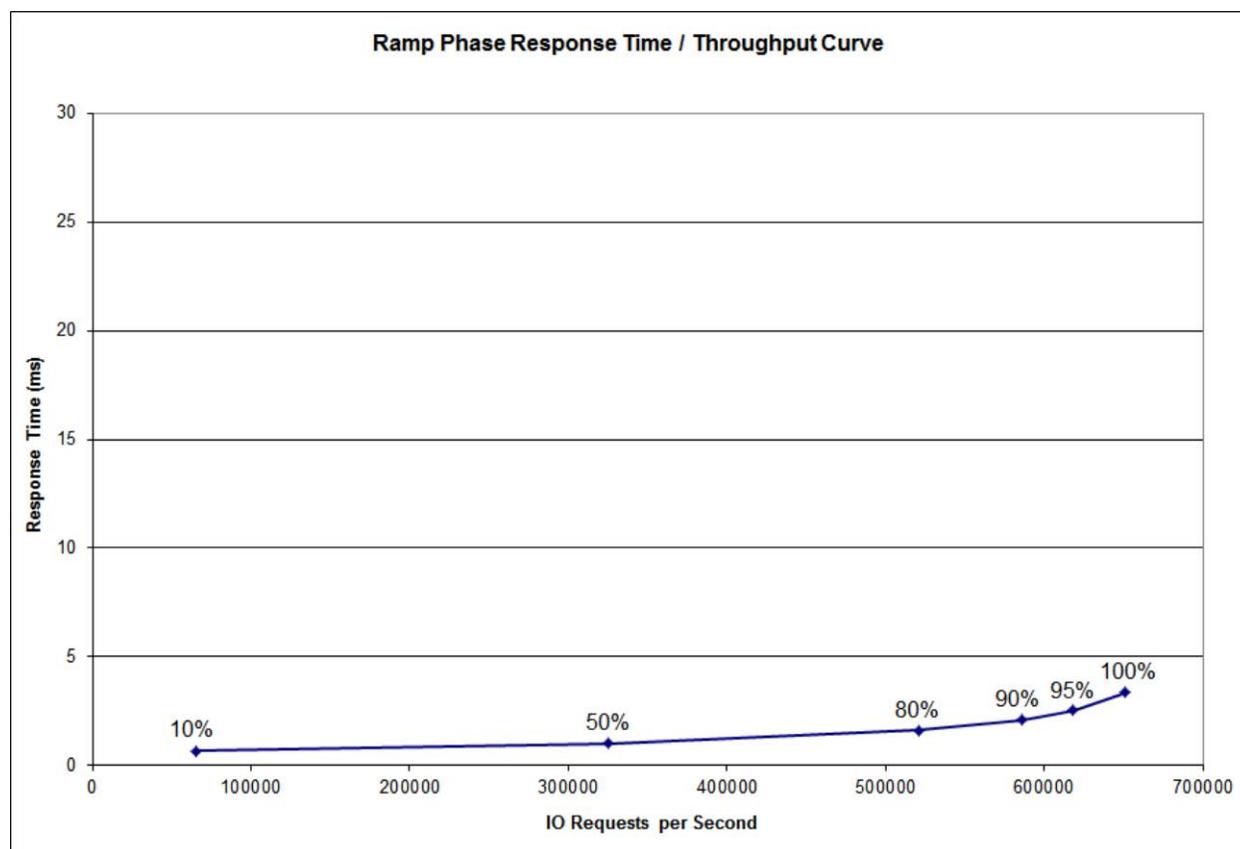
Unused Storage Ratio: Total Unused Capacity (171,217.146 GB) divided by Physical Storage Capacity (738,882.470 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 24-25 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	65,098.38	325,492.99	520,705.64	585,883.12	618,437.41	650,987.88
Average Response Time (ms):						
All ASUs	0.68	1.01	1.63	2.08	2.54	3.36
ASU-1	0.61	0.86	1.35	1.70	2.10	2.78
ASU-2	1.55	2.49	3.82	4.43	4.87	5.65
ASU-3	0.45	0.67	1.26	1.85	2.46	3.61
Reads	1.04	1.53	2.21	2.46	2.71	3.04
Writes	0.45	0.67	1.25	1.83	2.43	3.57

Priced Storage Configuration Pricing

No.	Model	Description	Qty	Unit Price(\$)	Total Price(\$)
1	Phase				
1.1	Location				
1.1.1	6800 V3 Storage System				
1.1.1.1	Control Module				
	6800V3-512G-AC	6800 V3(6U,Dual Ctrl,AC,512GB,HW Storage System Software,SPE72C0600)	1	41091.00	41,091.00
	6800V3-256G-CTL	Controller Module(2*Intel 6 Cores,256GB Cache)	2	8903.00	17,806.00
1.1.1.2	Disk Enclosure				
	DAE22525U2-1AC	Disk Enclosure(2U,2.5",AC,SAS Expanding Module)	56	2054.50	115,052.00
1.1.1.3	Hard Disk Drives				
	SAS600-10K-2-V3	600GB 10K RPM SAS Disk Unit(2.5")	1184	457.75	541,976.00
	SLC200-2-02	200GB HSSD SLC SAS Disk Unit(2.5")	160	2888.00	462,080.00
1.1.1.4	IO Interface				
	LPU4FC8V3	4*8Gbps Fibre Channel I/O modules(Total 4 ports)	12	1983.75	23,805.00
	LPU4S12V3	4*12Gbps SAS I/O module(Total 4 ports,MiniSAS HD)	12	741.25	8,895.00
1.1.1.5	Accessory				
	SS-OP-D-LC-M-3	Patchcord,DLC/PC-DLC/PC,Multimode,2mm Parallel,3m	24	11.00	264.00
	HS-SAS-3-01	High Speed Cable,Mini SAS HD Cable,3m,(SFF 8644	1	67.00	67.00
	HS-SAS-5-01	High Speed Cable,Mini SAS HD Cable,5m,(SFF 8644 Plug),(26AWG*4P*2B(S)),(SFF 8644 Plug),Indoor use	18	91.00	1,638.00
	RACK-46U-AC	N610E-22 46U Common AC Storage Rack(include 2 AC power distribution panels)	3	1712.00	5,136.00
1.1.1.6	HBA				
	N8GHBA000	QLOGIC QLE2562 HBA Card,PCIE,8Gbps DualPort ,Fiber Channel Multimode LC Optic Interface,English Manual, No Drive CD	12	1000.00	12,000.00
1.1.1.7	Storage Software				
	LIC-6800V3-BS	Basic Software License,Include Device Management	1	3281.50	3,281.50
	LIC-6800V3-TIER	SmartTier License	1	11944.50	11,944.50
	LIC-6800V3-PATH	OceanStor HW UltraPath Software License	1	716.25	716.25
Total of Product					1,245,752.25

Priced Storage Configuration Pricing (continued)

No.	Model	Description	Qty	Unit Price(\$)	Total Price(\$)
1.1.1.8	Maintenance Support Service				
		6800V3 Control Enclosure Implementation Service-Installation Service	1	2484.95	2,484.95
		DAE(6800V3) Implementation Service-Installation Service	56	321.75	18,018.00
		6800V3-Control Enclosure-Warranty Upgrade To Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service	1	9824.10	9,824.10
		DAE (6800V3) -Warranty Upgrade To Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service	56	3784.95	211,957.20
Total of Service (3 years)					242,284.25
Total Price					1,488,036.50
<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.

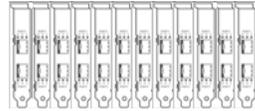
Huawei Technologies Co., Ltd. only sells its products to third-party resellers, who in turn, sell those products to U.S. customers. The above pricing, which also includes the required three-year maintenance and support, was obtained from one of those third-party resellers. See page 109 (*Appendix F: 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.

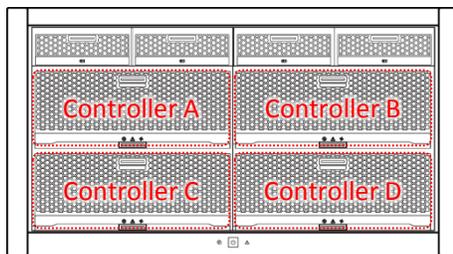
Priced Storage Configuration Diagram

12 – QLogic dual-ported QLE2562 FC HBAs



24 – FC connections
(2 connections per HBA)

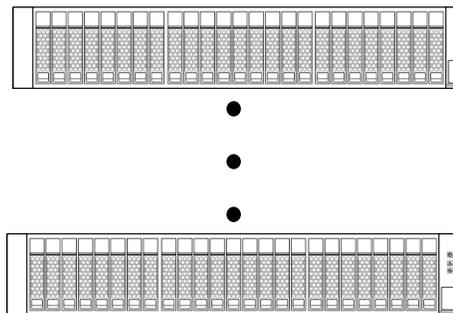
Huawei OceanStor™ 6800 V3



6U System Enclosure

- 4 – Active-Active Controllers
- 256 GB cache/controller (1,024 GB total)
- 12 – 4-port FC Interface Modules
(3 modules/controller, 48 ports total)
- 12 – 4-port 12 Gbps SAS I/O modules
(3 modules/controller, 48 ports total)
(4 PHYs/port, 192 PHYs total)

2 PHY connections to each disk enclosure
(112 PHY connections total)



56 – 2U Disk Enclosures

- 160 – 200 GB SLC SSD drives
- 1,184 – 600 GB 10K RPM SAS drives (HDDs)
- 8 disk enclosures, each with 20 SSDs
- 46 disk enclosures, each with 25 HDDs
- 2 disk enclosures, each with 17 HDDs

Priced Storage Configuration Components

Priced Storage Configuration
SmartTier
OceanStor UltraPath
12 – QLogic QLE2562 dual-port, 8 Gbps, FC HBAs
Huawei OceanStor™ 6800 V3
4 – Active-Active Controllers each controller includes: 256 GB cache (<i>1,024 GB total</i>) 3 – 4-port Fibre Channel I/O modules (<i>12 modules total, 48 ports total, 24 ports used</i>) 3 – 4-port 12 Gbps SAS-wide I/O modules (<i>12 modules total, 48 ports total, 40 ports used</i>) (<i>4 PHYs per port, 192 PHYs total, 112 PHYs used</i>)
1,184 – 600 GB, 10K RPM SAS drives (<i>HDDs</i>)
160 – 200 GB SLC SSD drives
56 – Disk Enclosures (<i>2U, 2.5"</i>) (<i>46 disk enclosures, each with 25 HDDs</i>) (<i>2 disk enclosures, each with 17 HDDs</i>) (<i>8 disk enclosures, each with 20 SSDs</i>)
3 – 46U Common AC Storage racks with 2 AC power distribution panels per rack