



# SPC BENCHMARK 1™
# EXECUTIVE SUMMARY

## HUAWEI TECHNOLOGIES CO., LTD.
## HUAWEI OCEANSTOR™ 5300 V3

**SPC-1 V1.14**

**Submitted for Review: March 20, 2016**
**Submission Identifier: A00171**

# 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/<br>Xu Zhong – xuzhong@huawei.com<br>Huawei Chengdu Base<br>No. 1899, Xiyuan Avenue<br>Chengdu, 611731 P.R. China<br>Phone: 86 28 65281927<br>FAX: 86 28 62282516 |
| **Test Sponsor Alternate Contact** | Huawei Technologies Co., Ltd. – http://www.huawei.com/en/<br>Li Huan – tomas.l@huawei.com<br>Huawei Chengdu Base<br>No. 1899, Xiyuan Avenue<br>Chengdu, 611731 P.R. China<br>Phone: 86 28 65281927<br>FAX: 86 28 62282516 |
| **Auditor** | Storage Performance Council – http://www.storageperformance.org<br>Walter E. Baker – AuditService@StoragePerformance.org<br>643 Bair Island Road, Suite 103<br>Redwood City, CA 94063<br>Phone: (650) 556-9384<br>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** | March 20, 2016 |
| **Date the FDR was submitted to the SPC** | March 20, 2016 |
| **Date the Priced Storage Configuration is available for shipment to customers** | currently available |
| **Date the TSC completed audit certification** | March 18, 2016 |

## Tested Storage Product (TSP) Description

The Huawei OceanStor™ 5300 V3 offers a cloud architecture-oriented operating system, high-performance hardware platform, and a complete suite of smart management software.

The product is scalable to eight controllers, 256 GB cache, a maximum of 500 storage devices, with a variety of interfaces, including 16 Gbit/s FC, 56 Gbit/s InfiniBand, PCIe 3.0, 12 Gbit/s SAS, and smart I/O cards.

The Huawei OceanStor™ 5300 V3 is a perfect storage system for large OLTP/OLAP databases, file sharing, and cloud computing in the government, finance, telecom, energy, and media industries.

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™ 5300 V3 | |
| **Metric** | **Reported Result** |
| **SPC-1 IOPS™** | 201,000.32 |
| **SPC-1 Price-Performance™** | $0.33/SPC-1 IOPS™ |
| **Total ASU Capacity** | 4,252.018 GB |
| **Data Protection Level** | Protected 2 *(Mirroring)* |
| **Total Price** | $66,215.92 |
| **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.*

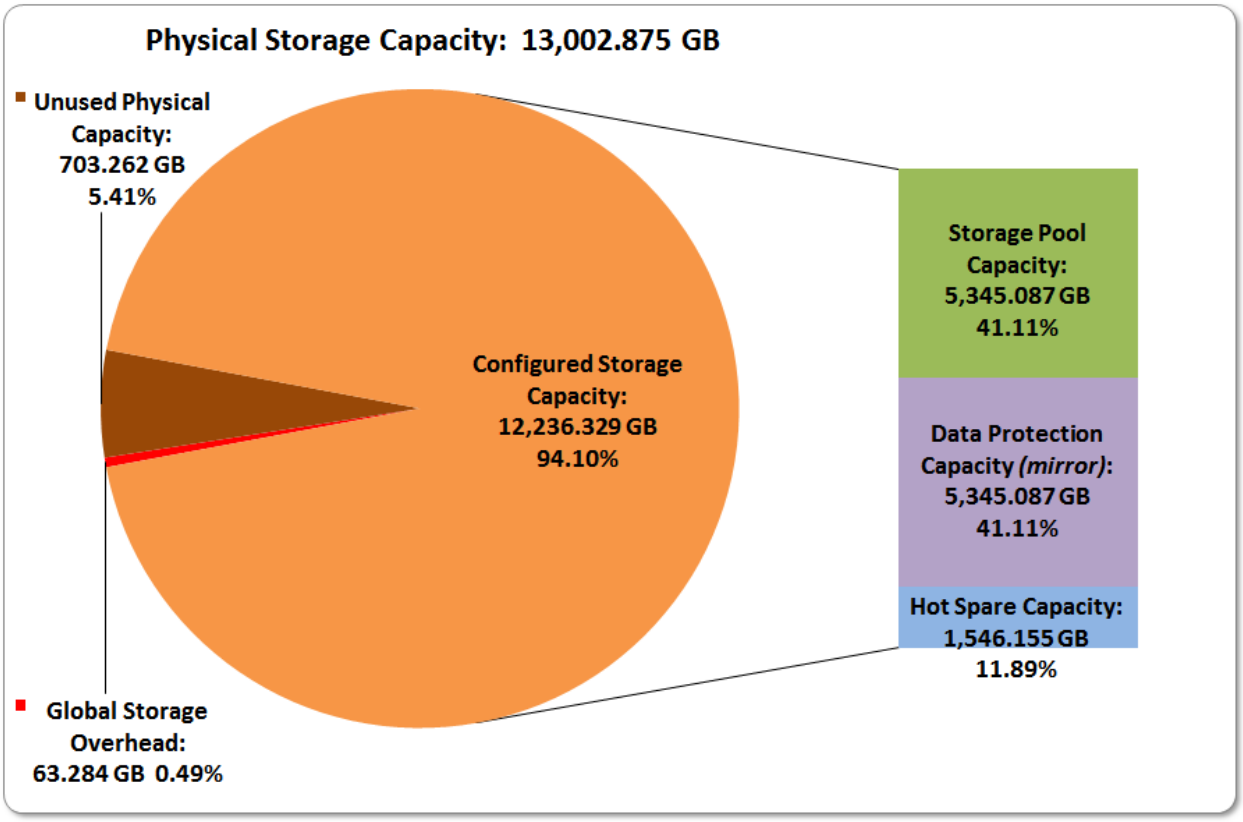
**Total Price** includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

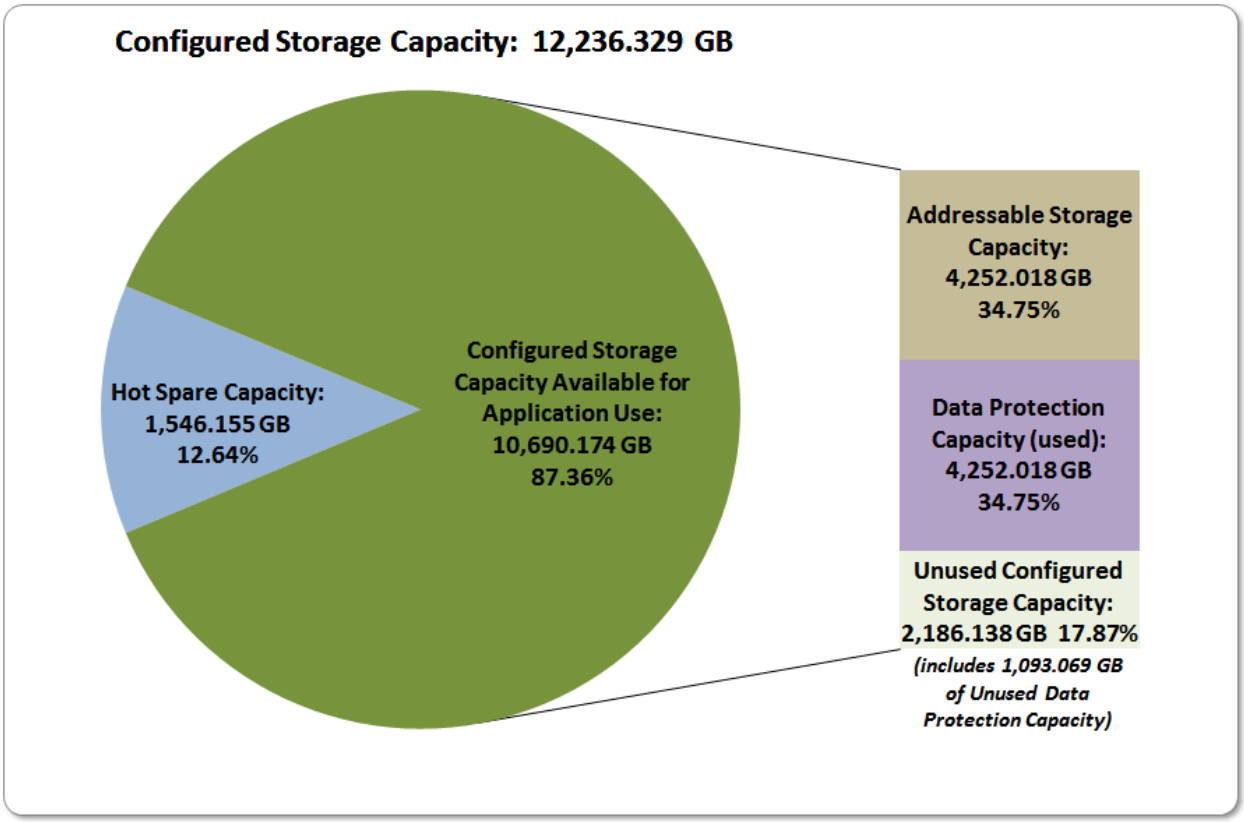
**Currency Used** is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

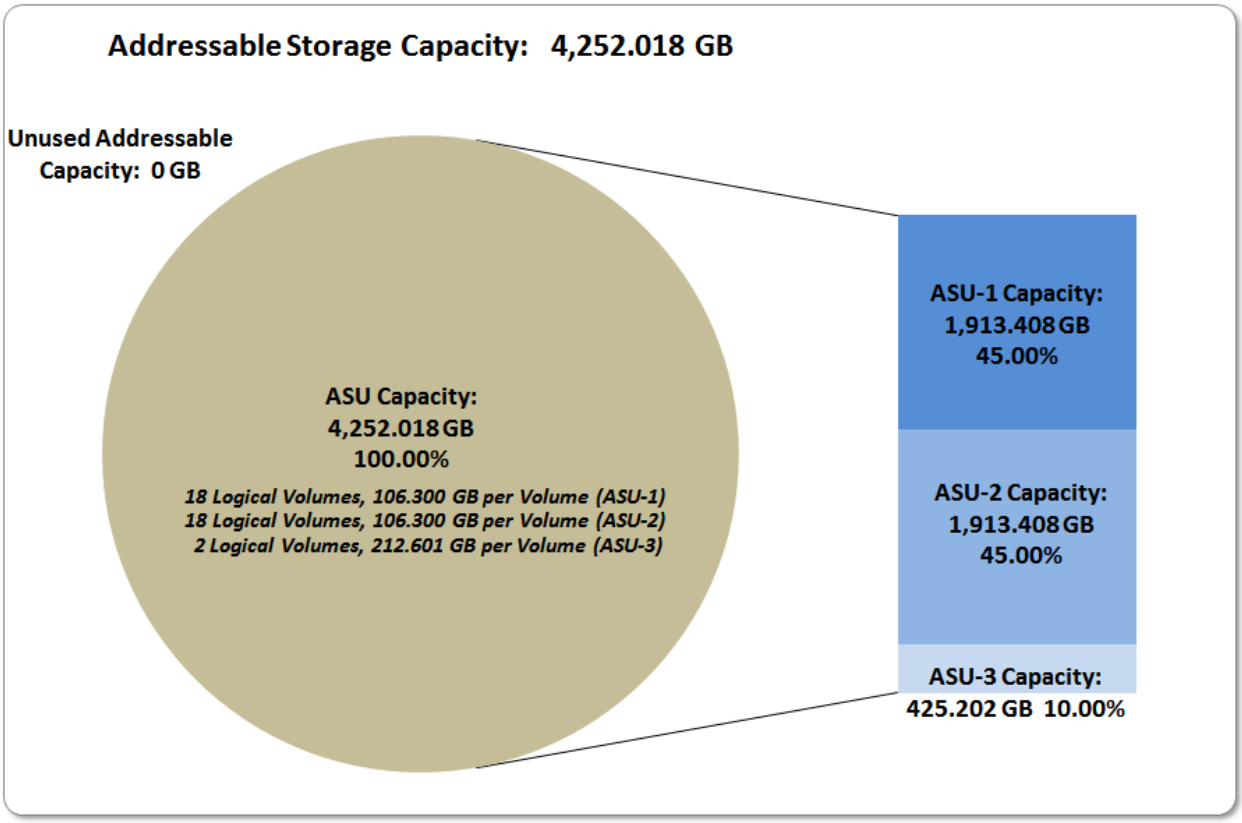
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

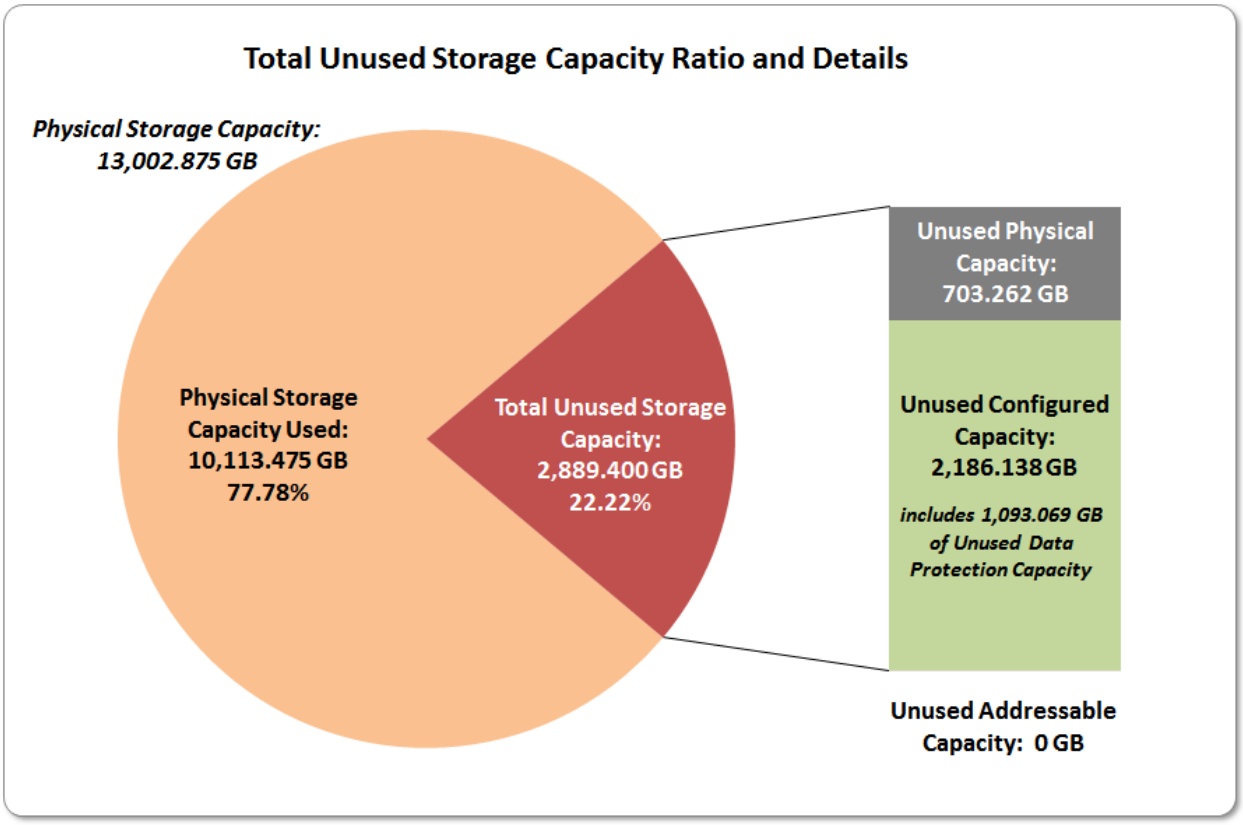
## Storage Capacities, Relationships, and Utilization

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: 12,236.329 GB
Hot Spare Capacity:
1,546.155 GB
12.64%
Configured Storage Capacity Available for Application Use:
10,690.174 GB
87.36%
Addressable Storage Capacity:
4,252.018 GB
34.75%
Data Protection Capacity (used):
4,252.018 GB
34.75%
Unused Configured Storage Capacity:
2,186.138 GB 17.87%
(includes 1,093.069 GB of Unused Data Protection Capacity)


Addressable Storage Capacity: 4,252.018 GB
Unused Addressable Capacity: 0 GB
ASU Capacity:
4,252.018 GB
100.00%
18 Logical Volumes, 106.300 GB per Volume (ASU-1)
18 Logical Volumes, 106.300 GB per Volume (ASU-2)
2 Logical Volumes, 212.601 GB per Volume (ASU-3)
ASU-1 Capacity:
1,913.408 GB
45.00%
ASU-2 Capacity:
1,913.408 GB
45.00%
ASU-3 Capacity:
425.202 GB 10.00%




| SPC-1 Storage Capacity Utilization | |
|---|---|
| Application Utilization | 32.70% |
| Protected Application Utilization | 65.40% |
| Unused Storage Ratio | 22.22% |

**Application Utilization:** Total ASU Capacity *(4,252.018 GB)* divided by Physical Storage Capacity *(13,002.875 GB)*.

**Protected Application Utilization:** (Total ASU Capacity *(4,252.018 GB)* plus total Data Protection Capacity *(5,345.087GB)* minus unused Data Protection Capacity *(1,093.069GB)*) divided by Physical Storage Capacity *(13,002.875 GB)*.

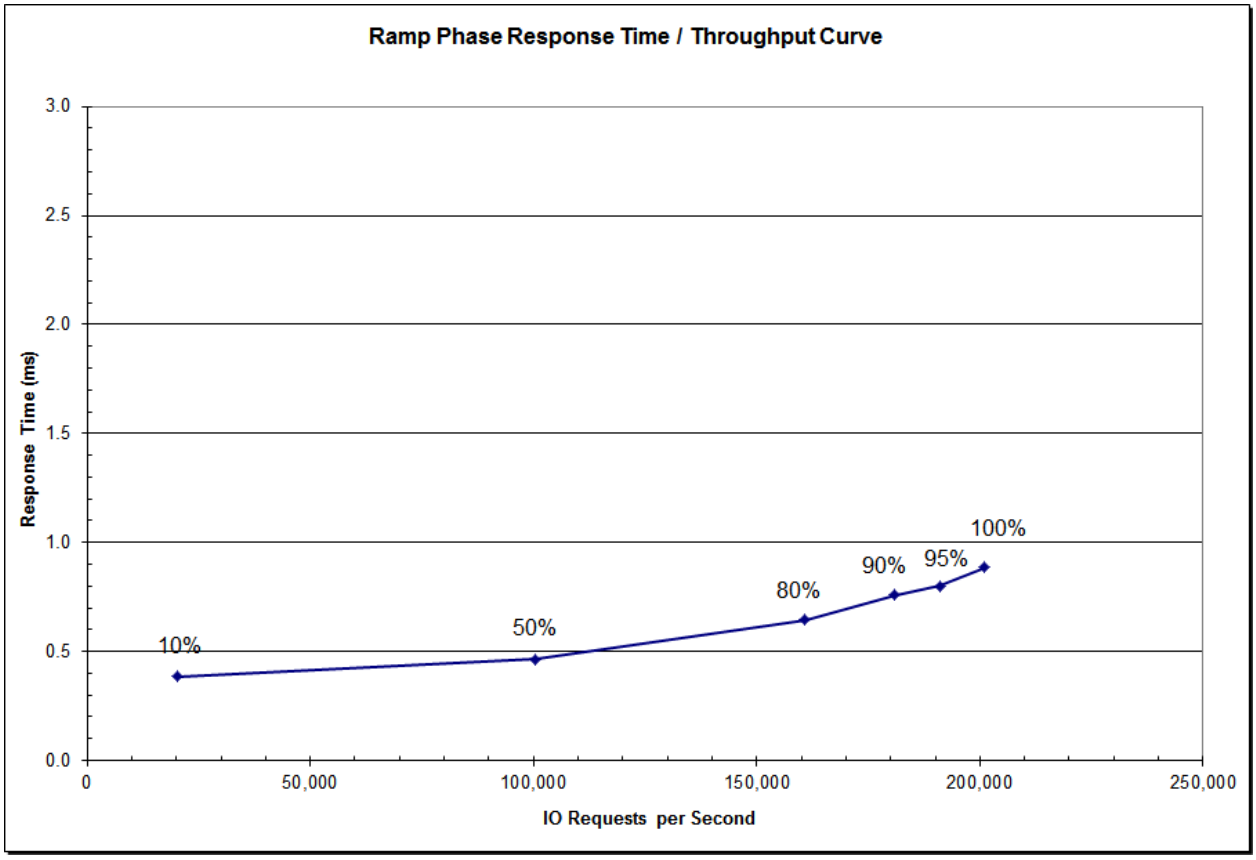
**Unused Storage Ratio:** Total Unused Capacity *(2,889.400 GB)* divided by Physical Storage Capacity *(13,002.875 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 25-26 of the associated 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** | 20,107.45 | 100,482.63 | 160,802.01 | 180,887.50 | 190,964.23 | 201,000.32 |
| ***Average Response Time (ms):*** | | | | | | |
| **All ASUs** | 0.39 | 0.46 | 0.65 | 0.76 | 0.80 | 0.89 |
| **ASU-1** | 0.38 | 0.47 | 0.65 | 0.76 | 0.80 | 0.88 |
| **ASU-2** | 0.40 | 0.49 | 0.68 | 0.79 | 0.83 | 0.91 |
| **ASU-3** | 0.39 | 0.44 | 0.63 | 0.75 | 0.79 | 0.90 |
| **Reads** | 0.41 | 0.52 | 0.70 | 0.80 | 0.84 | 0.91 |
| **Writes** | 0.37 | 0.43 | 0.61 | 0.73 | 0.77 | 0.87 |

## Priced Storage Configuration Pricing

| No. | Model | Description | Qty. | Unit Price (USD) | Total Price (USD) |
|---|---|---|---|---|---|
| 1 | Phase | | | | |
| 1.1 | Location | | | | |
| 1.1.1 | OceanStor 5300 V3 Storage System | | | | |
| 1.1.1 | Engine | | | | |
| | 5300V3-64G-AC-2 | 5300 V3(2U, Dual Ctrl, AC,64GB, 8*GE,25*2.5", SPE33C0225) | 2 | 8,649.12 | 17,298.24 |
| 1.1.2 | Expand Interface Module | | | | |
| | SMARTIO8FC | 4 port SmartIO I/O module (SFP+, 8Gb FC) | 4 | 665.04 | 2,660.16 |
| | SMARTIO10ETH | 4 port SmartIO I/O module (SFP+, 10Gb Eth/FCoE (VN2VF)/Scale-out) | 4 | 1,310.16 | 5,240.64 |
| 1.1.3 | Disk Components | | | | |
| | SSDM-400G2S-A1 | SSD Midrange 400GB 2.5" SAS 6G Disk Unit | 32 | 710.40 | 22,732.80 |
| 1.1.4 | Installation Material | | | | |
| | SN2F01FCPC | Patch Cord, DLC/PC, DLC/PC, Multi-mode, 3m, A1a.2,2mm, OM3 bending insensitive | 32 | 11.00 | 352.00 |
| 1.1.5 | HBA | | | | |
| | N8GHBA000 | QLOGIC QLE2562 HBA Card, PCIE, 8Gbps DualPort, Fiber Channel Multimode LC Optic Interface, English Manual, No Drive CD | 8 | 1,000.00 | 8,000.00 |
| 1.1.6 | Storage Software | | | | |
| | LIC-5300V3-BS | Basic Software License for Block (Includes Device Management, SmartThin, SmartMulti-tenant, SmartMigration, SmartErase, SmartMotion,Ultrapath, Cloud Service) | 1 | 656.88 | 656.88 |
| | LIC-53-SMARTPAK | Storage efficieny Software suit License (SmartTier, SmartCache) | 1 | 2,407.20 | 2,407.20 |
| Total of Product | | | | | 59,347.92 |
| | | | | | |
| 1.1.7 | Maintenance Support Service | | | | |
| | 02350BRY-88134ULJ-3 | 5300 V3 (2U,Dual Ctrl, AC ,64GB, 8*GE, 25*2.5", SPE33C0225) Warranty Upgrade To Hi-Care Onsite Standard 9x5xNBD Engineer Onsite Service-3Year(s) | 2 | 2,950.00 | 5,900.00 |
| | 88032KMV-88134UHK-3 | Storage efficieny Software suit License (SmartTier, SmartCache) Hi-Care Application Software Upgrade Support Service-3Year(s) | 1 | 722.00 | 722.00 |
| | 88032NMR-88134UHK-3 | Basic Software License for Block (Includes Device Management, SmartThin, SmartMulti-tenant, SmartMigration, SmartErase, SmartMotion, Ultrapath, Cloud Service) Hi-Care Application Software Upgrade Support Service-3Year(s) | 1 | 246.00 | 246.00 |
| Total of Service (3 years) | | | | | 6,868.00 |
| | | | | | |
| Total Price | | | | | 66,215.92 |
| 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. | | | | | |

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 76 *(Appendix F: Third-Party Quotation)* of the Full Disclosure Report for a copy of the third-party reseller quotation.

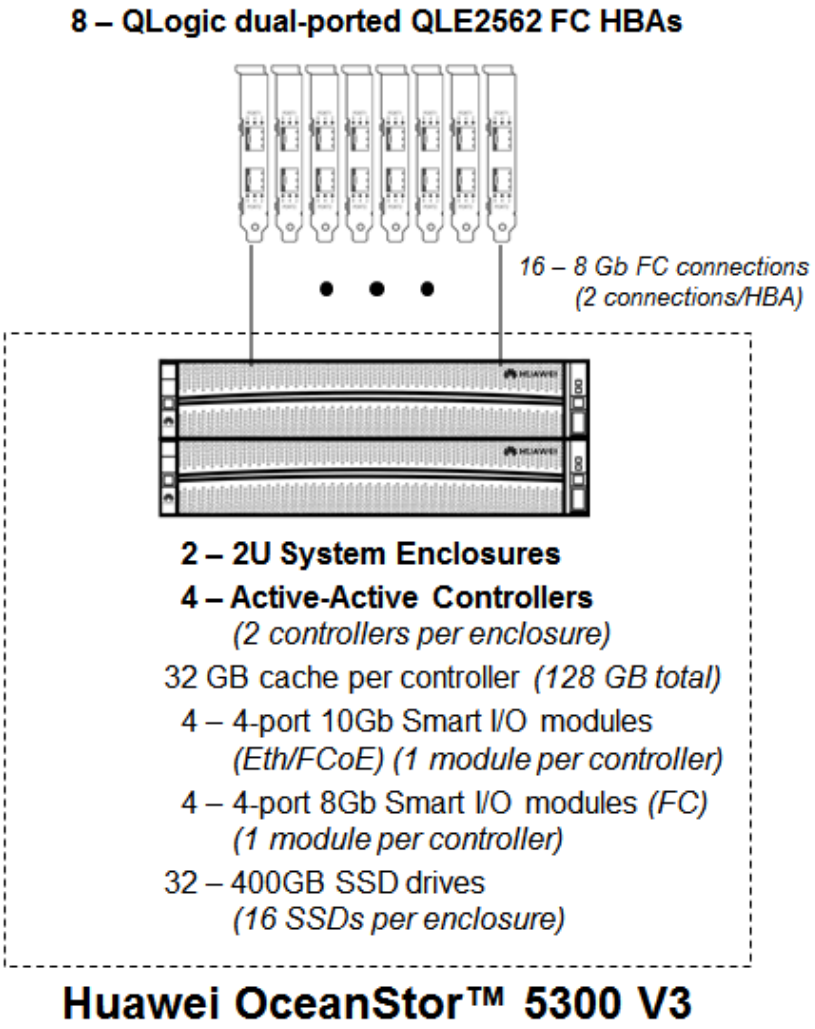
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- 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 |
|---|
| OceanStor UltraPath |
| 8 – QLogic QLE2562 dual-port, 8 Gbps, FC HBAs |
| **Huawei OceanStor™ 5300 V3**<br>2 – 2U System Enclosures<br>4 – Active-Active Controllers *(2 controllers per enclosure)*<br>each controller includes:<br>32 GB cache *(128 GB total)*<br>1 – 4-port 10Gb Smart I/O modules *(Eth/FCoE)*<br>*(used for inter-controller connectivity)*<br>*(4 modules total, 4 ports per controller)*<br>*(16 ports total and used)*<br>1 – 4-port 8Gb Smart I/O module *(FC)*<br>*(4 modules total, 4 ports per controller*<br>*(16 ports total and used)*<br>32 – 400 GB SSDs |