SPC BENCHMARK 1™
EXECUTIVE SUMMARY

HUAWEI TECHNOLOGIES CO., LTD.
HUAWEI OCEANSTOR™ DORADO2100

SPC-1 V1.12

Submitted for Review: December 29, 2011
Submission Identifier: A00112
Revised: December 13, 2012
EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

| Revision Information and Key Dates       | Details
|------------------------------------------|----------------------------------
| SPC-1 Specification revision number     | V1.12                            
| SPC-1 Workload Generator revision number| V2.2.0                           
| Date Results were first used publicly   | December 29, 2011                 
| Date the FDR was submitted to the SPC   | December 29, 2011                 
| Date revised FDR was submitted to the SPC| December 13, 2012
| Revision History:                       | Updated company name, logo and product name to reflect the complete acquisition of Huawei Symantec by Huawei Technologies Co., Ltd.
| Date the Priced Storage Configuration is available for shipment to customers | currently available
| Date the TSC completed audit certification | December 28, 2011

Tested Storage Product (TSP) Description

The Huawei OceanStor™ Dorado2100 (Dorado2100) is an FC-SAN solid state storage product designed for the enterprise-level high-performance storage market. Dorado2100 is designed with an SSD storage system architecture, advanced cache management and I/O scheduling algorithm to present stunning performance. It fits into scenarios such as large database query/retrieval, high-performance computing, and video editing.
Summary of Results

### SPC-1 Reported Data

<table>
<thead>
<tr>
<th>Tested Storage Product (TSP) Name: Huawei OceanStor™ Dorado2100</th>
<th>Metric</th>
<th>Reported Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPC-1 IOPS™</strong></td>
<td>100,051.99</td>
<td></td>
</tr>
<tr>
<td><strong>SPC-1 Price-Performance</strong></td>
<td>$0.90/SPC-1 IOPS™</td>
<td></td>
</tr>
<tr>
<td><strong>Total ASU Capacity</strong></td>
<td>1,104.947 GB</td>
<td></td>
</tr>
<tr>
<td><strong>Data Protection Level</strong></td>
<td>Protected (Mirroring)</td>
<td></td>
</tr>
<tr>
<td><strong>Total TSC Price (including three-year maintenance)</strong></td>
<td>$90,320.79</td>
<td></td>
</tr>
</tbody>
</table>

**SPC-1 IOPS™** represents the maximum I/O Request Throughput at the 100% load point.

**Total ASU (Application Storage Unit) Capacity** represents the total storage capacity read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of **Protected (Mirroring)** configures two or more identical copies of user data.

### Storage Capacities, Relationships, and Utilization

The following diagram 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.

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**Application Storage Unit (ASU) Capacity**

- **ASU 1**: 497.226 GB
- **ASU 2**: 497.226 GB
- **ASU 3**: 110.495 GB

**Configured Storage Capacity**: 2,331.093 GB

**Physical Storage Capacity**: 2,400.694 GB

**Addressable Storage Capacity**: 1,104.947 GB

**Data Protection (Mirroring)**

- **1,165.547 GB**
  - (includes 60.599 GB of Unused)

**Global Storage Overhead**

- **68.719 GB**
- **Unused**
  - 60.599 GB
### SPC-1 Storage Capacity Utilization

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Utilization</td>
<td>46.03%</td>
</tr>
<tr>
<td>Protected Application Utilization</td>
<td>92.05%</td>
</tr>
<tr>
<td>Unused Storage Ratio</td>
<td>5.09%</td>
</tr>
</tbody>
</table>

**Application Utilization**: Total ASU Capacity ($1,104.947 \text{ GB}$) divided by Physical Storage Capacity ($2,400.694 \text{ GB}$)

**Protected Application Utilization**: Total ASU Capacity ($1,104.947 \text{ GB}$) plus total Data Protection Capacity ($1,165.547 \text{ GB}$) minus unused Data Protection Capacity ($60.599 \text{ GB}$) divided by Physical Storage Capacity ($2,400.694 \text{ GB}$)

**Unused Storage Ratio**: Total Unused Capacity ($122.079 \text{ GB}$) divided by Physical Storage Capacity ($2,400.694 \text{ GB}$) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 19-20 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 IOPSTM metric.

The Average Response Time measured at any of the above load points cannot exceed 30 milliseconds or the benchmark measurement is invalid.

Response Time – Throughput Data

<table>
<thead>
<tr>
<th>I/O Request Throughput</th>
<th>10% Load</th>
<th>50% Load</th>
<th>80% Load</th>
<th>90% Load</th>
<th>95% Load</th>
<th>100% Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Response Time (ms):</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All ASUs</td>
<td>0.61</td>
<td>0.74</td>
<td>0.81</td>
<td>0.85</td>
<td>0.90</td>
<td>0.95</td>
</tr>
<tr>
<td>ASU-1</td>
<td>0.56</td>
<td>0.62</td>
<td>0.70</td>
<td>0.74</td>
<td>0.77</td>
<td>0.79</td>
</tr>
<tr>
<td>ASU-2</td>
<td>0.75</td>
<td>0.76</td>
<td>0.86</td>
<td>0.89</td>
<td>0.93</td>
<td>0.95</td>
</tr>
<tr>
<td>ASU-3</td>
<td>0.64</td>
<td>1.00</td>
<td>1.02</td>
<td>1.05</td>
<td>1.16</td>
<td>1.30</td>
</tr>
<tr>
<td>Reads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All ASUs</td>
<td>0.58</td>
<td>0.90</td>
<td>0.82</td>
<td>0.85</td>
<td>0.91</td>
<td>0.97</td>
</tr>
</tbody>
</table>

SPC BENCHMARK 1™ V1.12
Huawei Technologies Co., Ltd.
Huawei OceanStor™ Dorado2100
Priced Storage Configuration Pricing

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit Price (USD)</th>
<th>Total Price(USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDO21SLC24T</td>
<td>Dorado2100 High Performance Solid State Storage System-2.4TB(SPE31C0224,AC,24<em>100GB SLC SSD,8</em>8G FC Port,Maximum Supporting 16*8G FC Port,with HS HSSD Controller System Software)</td>
<td>1</td>
<td>52028.66</td>
<td>52028.66</td>
</tr>
<tr>
<td>14130321</td>
<td>Patch Cord,DLC/PC-DLC/PC,Multimode,2mm Parallel,3m</td>
<td>8</td>
<td>11.00</td>
<td>88.00</td>
</tr>
<tr>
<td>SDO21MP</td>
<td>Dorado2100 Multi-path Software</td>
<td>1</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>SDO21ISM</td>
<td>HS Integrated Storage Manager-Device Management License for Dorado2100(V100R003) (ESSENTIAL)</td>
<td>1</td>
<td>7432.56</td>
<td>7432.56</td>
</tr>
<tr>
<td>SDO21SSLCPAE</td>
<td>OceanStor HS Storage Array Control System Software-Include PAE License Certificate (ESSENTIAL)</td>
<td>1</td>
<td>14865.12</td>
<td>14865.12</td>
</tr>
<tr>
<td>QLE2562-CK</td>
<td>QLogic Dual Port 8Gb Fibre Channel to PCI Express Host Bus</td>
<td>4</td>
<td>1050.00</td>
<td>4200.00</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>78614.34</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warranty Uplift</th>
<th>Maintenance Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSGSDO21SLC24T</td>
<td>Upgrade from Standard to Gold service package in warranty period (3 years). Gold service package include:7*24 Remote Support. Access to all new software updates. 4 Business Hours Parts Delivery. 4 Business Hours Engineer Onsite.</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

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 with 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 66 ("Appendix F: Third-Party Quotation") of the associated 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

4 - Qlogic dual-ported QLE 2562 FC HBAs
  8 Fibre Channel Connections

Huawei OceanStor™ Dorado2100
  2 - Active-Active controllers
  16 GB per controller (32 GB total)
  4 - FC 4-port Adapters (8 Gbps)
    8 – 8 Gbps SFPs
  24 – 100 GB Solid State Devices (SSDs)

Priced Storage Configuration Components

<table>
<thead>
<tr>
<th>Priced Storage Configuration:</th>
</tr>
</thead>
<tbody>
<tr>
<td>UltraPath for Windows, version 5.2.3790.3959</td>
</tr>
<tr>
<td>4 – Qlogic dual-ported QLE2562 FC HBAs</td>
</tr>
</tbody>
</table>

Huawei OceanStor™ Dorado2100
  2 – Active-Active controllers
    16 GB cache per controller (32 total)
    4 – FC 4-port 8 Gbps adapters
    8 – 8 Gbps SFPs
    8 – front-end connections (total and used)

24 – 100 GB Solid State Devices (SSDs)