SPC BENCHMARK 1™
EXECUTIVE SUMMARY

HUAWEI TECHNOLOGIES CO., LTD.
HUAWEI OCEANSTOR™ S8100 *(4-NODE)*

SPC-1 V1.12

Submitted for Review: October 29, 2010
Submission Identifier: A00098
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	
SPC-1 Specification revision number	V1.12
SPC-1 Workload Generator revision number	V2.1.0
Date Results were first used publicly	October 29, 2010
Date the FDR was submitted to the SPC	October 29, 2010
Date revised FDR was submitted to the SPC Updated company name, logo and product name to reflect the complete acquisition of Huawei Symantec by Huawei Technologies Co., Ltd.	December 13, 2012
Date the priced storage configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	October 28, 2010

Tested Storage Product (TSP) Description

Huawei OceanStor™ S8100 storage system (hereinafter referred to as the S8100) is a new generation, high-end, storage product that is used by enterprises for mission-critical applications. Boasting high reliability, high performance, high scalability, large capacity, comprehensive data protection, and diversified value-added features, the S8100 is applicable to the scenarios of large-scaled core database, high availability computing, high performance computing, and integrated storage, backup, and retrieving of mass data, and is the best choice for investment saving.

Summary of Results

SPC-1 Results	
Tested Storage Product (TSP) Name: Huawei OceanStor™ S8100 *(4-node)*	
Metric	**Reported Result**
SPC-1 IOPS™	160,057.09
SPC-1 Price-Performance	CNY 49.03/SPC-1 IOPS™
Total ASU Capacity	92,160.000 GB
Data Protection Level	Protected *(Mirroring)*
Total TSP Price (including three-year maintenance)	CNY 7,847,296

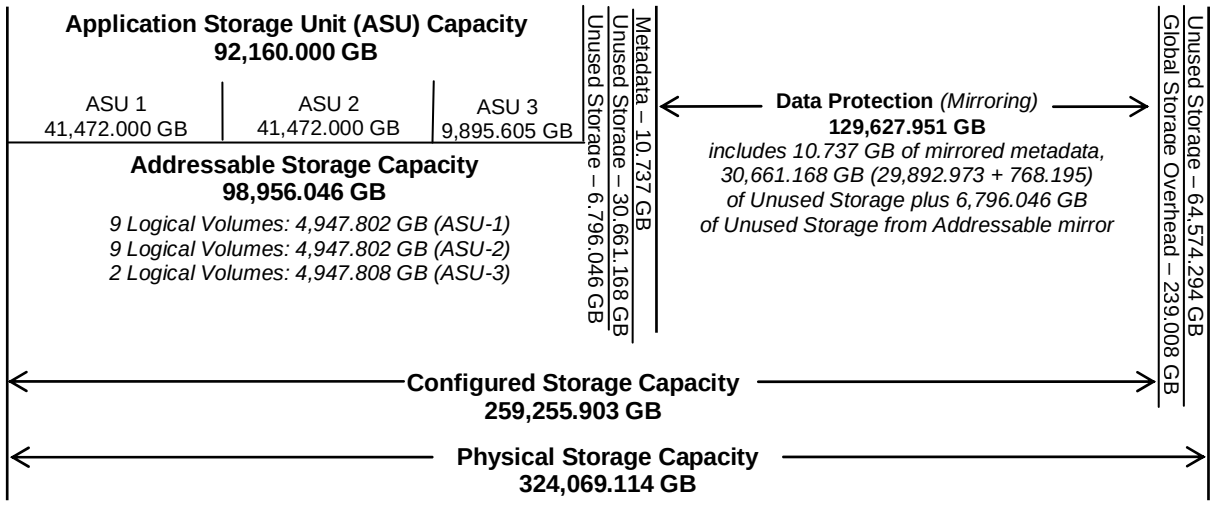
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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** using ***Mirroring*** configures two or more identical copies of user data.

Storage Capacities and Relationships

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.



SPC-1 Storage Capacity Utilization	
Application Utilization	28.44%
Protected Application Utilization	56.88%
Unused Storage Ratio	43.04%

Application Utilization: Total ASU Capacity *(92,160.000 GB)* divided by Physical Storage Capacity *(324,069.114 GB)*

Protected Application Utilization: (Total ASU Capacity *(92,160.000 GB)* plus total Data Protection Capacity *(129,627.951 GB)* minus unused Data Protection Capacity *(37,457.214 GB)* divided by Physical Storage Capacity *(324,069.114 GB)*

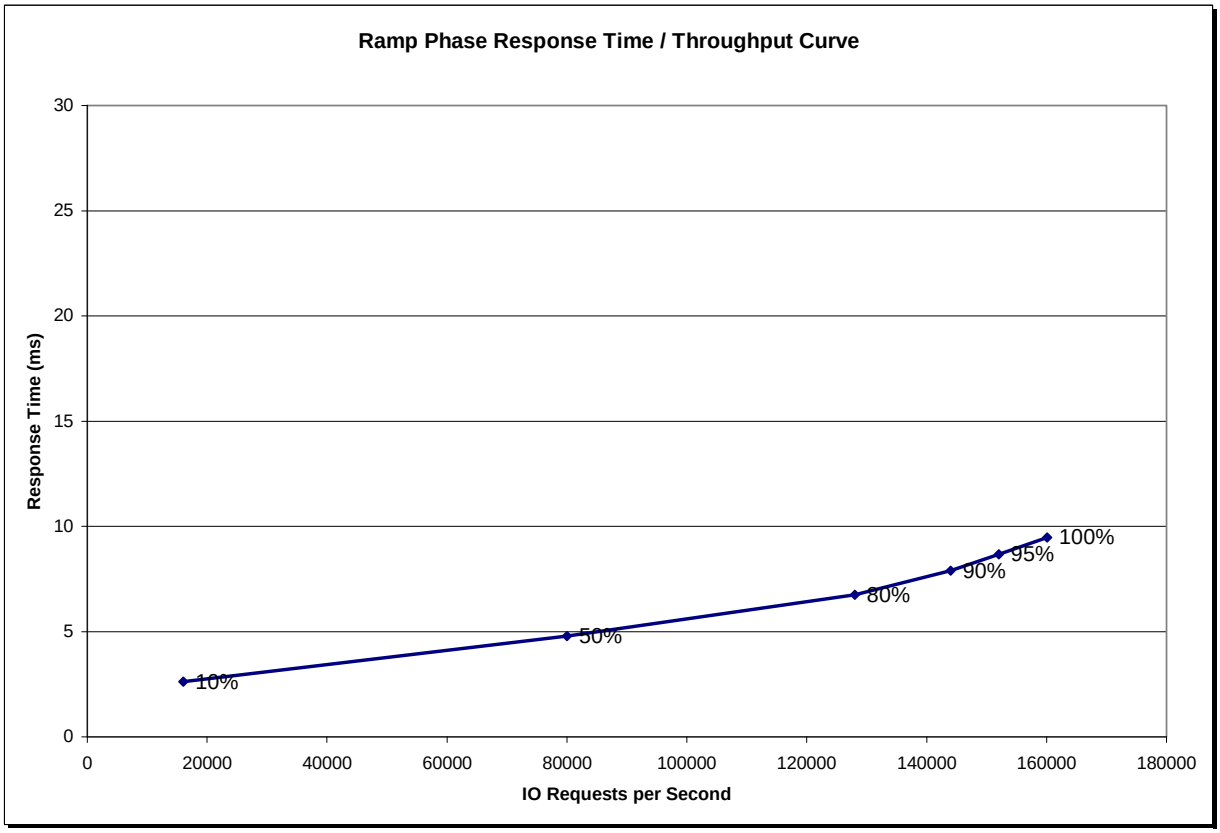
Unused Storage Ratio: Total Unused Capacity *(139,488.632 GB)* divided by Physical Storage Capacity *(324,069.114 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 21-22 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	16,006.65	80,015.25	128,000.15	144,016.01	152,005.22	160,057.09
Average Response Time (ms):						
All ASUs	2.62	4.79	6.74	7.90	8.68	9.47
ASU-1	3.34	6.00	8.49	9.98	10.98	12.03
ASU-2	3.11	5.98	9.11	11.07	12.44	13.85
ASU-3	0.86	1.68	2.00	2.10	2.14	2.12
Reads	5.42	9.66	14.19	16.99	18.89	20.93
Writes	0.80	1.61	1.89	1.98	2.02	2.01

Priced Storage Configuration Pricing

Product Name	Quantity	Unit Price(CNY)	Total Price(CNY)
S8100 System Rack	1	58,005	58,005
S8100 Service Controller Group *16 GB of memory, 8 GB per controller *8 - 4 Gbps SFPs	2	121,911	243,822
S8100 Management Switch Module	2	8,550	17,100
Fibre Channel 4-Port Adapter(4Gbps)	8	20,700	165,600
Ethernet 4-Port Adapter(1Gbps)	4	4,500	18,000
S8100 Expansion Rack	4	48,840	195,360
S8100 Data Controller Group（32GB） *32 GB of memory, 8 GB per controller *20 - 4 Gbps SFPs	4	90,504	362,018
S8100 Disk Expansion *4 - 4 Gbps SFPs	28	21,129	591,625
450GB/15Krpm (4Gbps) FC disk drive	144	7,950	1,144,800
600GB/15Krpm (4Gbps) FC disk drive	432	10,350	4,471,200
Storage Management Base License	1	33,000	33,000
Storage Management 1TB (>251TB)	324	600	194,400
UltraPath Base License	1	7,500	7,500
UltraPath For Windows/Linux License	2	750	1,500
S8000 First Installation Service , per Set per Time	1	249,691	249,691
UltraPath First Installation Service , per Set per Time	2	1,200	2,400
5-Meter Fiber Optic Cable	80	90	7,200
Blank panel	192	70	13,440
Dual-port Qlogic QLE2562 Fiber Channel HBA	4	17,659	70,636
Total (3-Year Maintenance Included)			**7,847,296**

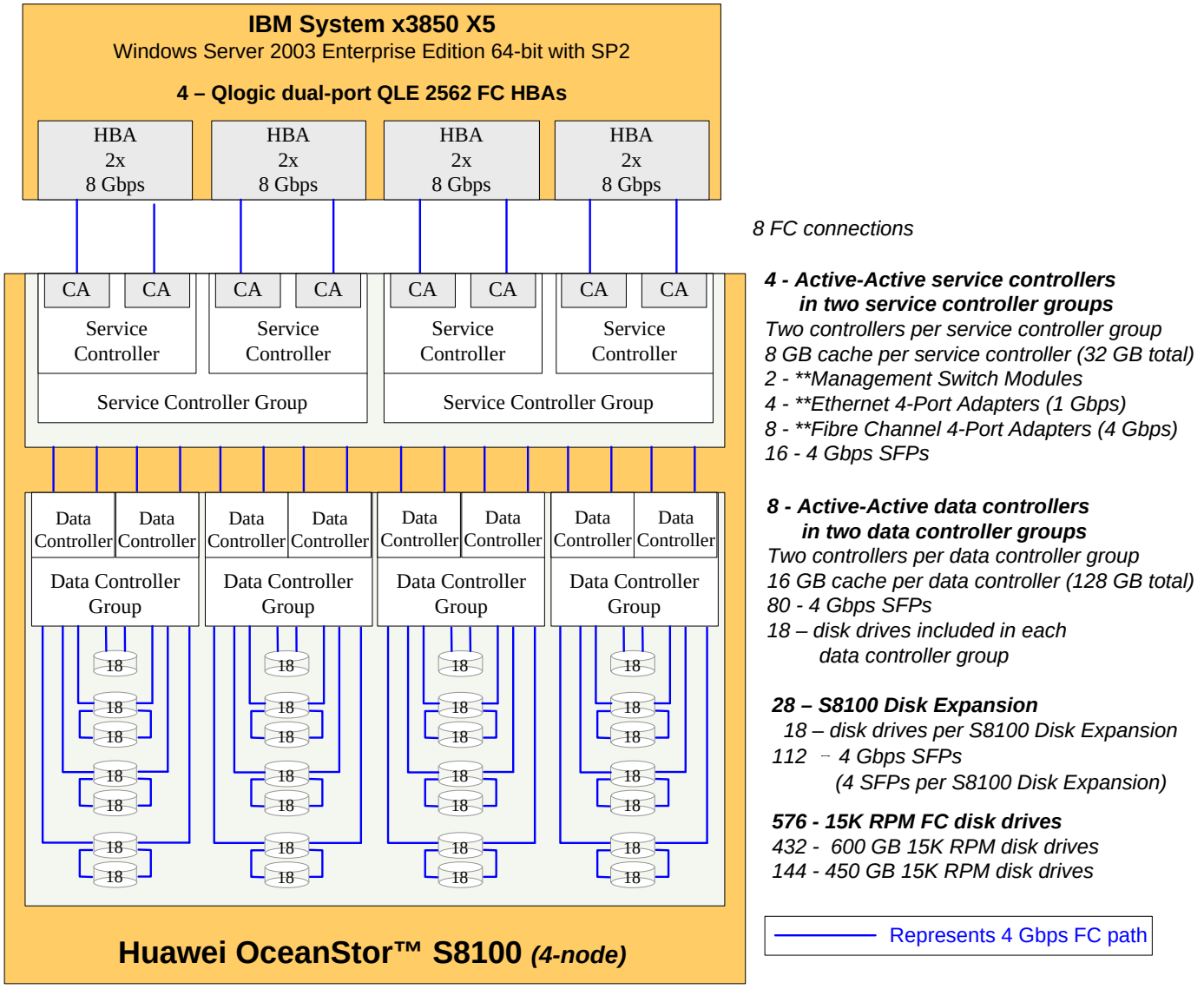
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems with four (4) hours.
- Onsite present 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 Price 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 TSC and Priced Storage Configuration.

Priced Storage Configuration Diagram



**The 2 Management Switch Modules and 4 Ethernet 4-Port Adapters are used by the service controller controllers *(nodes)* to communicate and synchronize with each other. The 8 Fibre Channel 4-Port Adapters, labeled as "CA" in the above diagram, are used by the service controllers for connectivity with the data controllers and Host Systems.

Priced Storage Configuration Components

Priced Storage Configuration:
Huawei UltraPath For Windows/Linux
4 – Qlogic dual-port QLE2562 FC HBAs
Huawei OceanStor™ S8100 *(4 node)*   **4 - Active-Active service controllers in 2 service controller groups:**   2 service controllers per service controller group   8 GB cache per service controller *(32 GB total)*   8 – Fibre Channel 4-port adapters (4 Gbps)   4 – 4 Gbps front-end connections per service controller (*16 total, 8 used)*   16 – 4 Gbps SFPs   **8 - Active-Active data controllers in 4 data controller groups:**   2 data controllers per data controller group   16 GB cache per data controller *(128 GB total)*   4 – 4 Gbps backend connections per data controller *(32 total, 32 used)*   80 – 4 Gbps SFPs   18 – 15K RPM FC disk drives included in each data controller group *(72 disk drives total)*
2 – Management Switch Modules
4 – Ethernet 4-Port Adapters *(1 Gbps)*
28– S8100 Disk Expansion each with four 4 Gbps SFPs *(112 SFPs total)* and 18 15K RPM FC disk drives *(504 disk drives total)*
576 –15K RPM FC disk drives   432 – 600 GB 15K RPM disk drives   144 – 450 GB 15K RPM disk drives