



**SPC BENCHMARK 1C™
EXECUTIVE SUMMARY**

**SEAGATE TECHNOLOGY LLC
SEAGATE PULSAR®.2/ST400FM0002**

SPC-1C™ V1.3

**Submitted for Review: November 8, 2011
Submission Identifier: C00014**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

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SPC-1C Specification revision number	V1.3
SPC-1C Workload Generator revision number	V1.0
Date Results were first used publicly	November 8, 2011
Date the FDR was submitted to the SPC	November 8, 2011
Date the TSC is available for shipment to customers	currently available
Date the TSC completed audit certification	November 7, 2011

Tested Storage Product (TSP) Description

Pulsar.2 is an enterprise class, MLC-enabled, up to 800GB SSD from Seagate that delivers the price/performance, data integrity, and endurance benefits needed by complex, IOPS hungry enterprise environments. Unlike client MLC SSDs designed for simple, read-intensive workloads and low usage (e.g. 8-10 hours a day, 5 days a week, single user), Pulsar.2 was designed from the ground up for enterprises with complex, write-intensive workloads and high usage (e.g. 24 hours a day, 7 days a week, multiple users) and delivers 10 full drive writes per day - every day for the 5 year warranty life of the product.

Pulsar.2 uses the same, proven enterprise development platform and feature set used by all Seagate mission critical enterprise hard drives, just optimized for solid state technology. This reduces qualification costs for OEMs and systems integrators while simplifying storage management for datacenters.

Summary of Results

SPC-1C Results	
Tested Storage Product: Seagate Pulsar®.2/ST400FM0002	
Metric	Reported Result
SPC-1C IOPS™	14,008.36
Total ASU Capacity	399.931 GB
Data Protection Level	Unprotected
Total Price – Priced Storage Configuration	\$2,945.91

SPC-1C 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-1C benchmark.

A Data Protection Level of *Unprotected* provides no data protection in the event of a single point of failure.

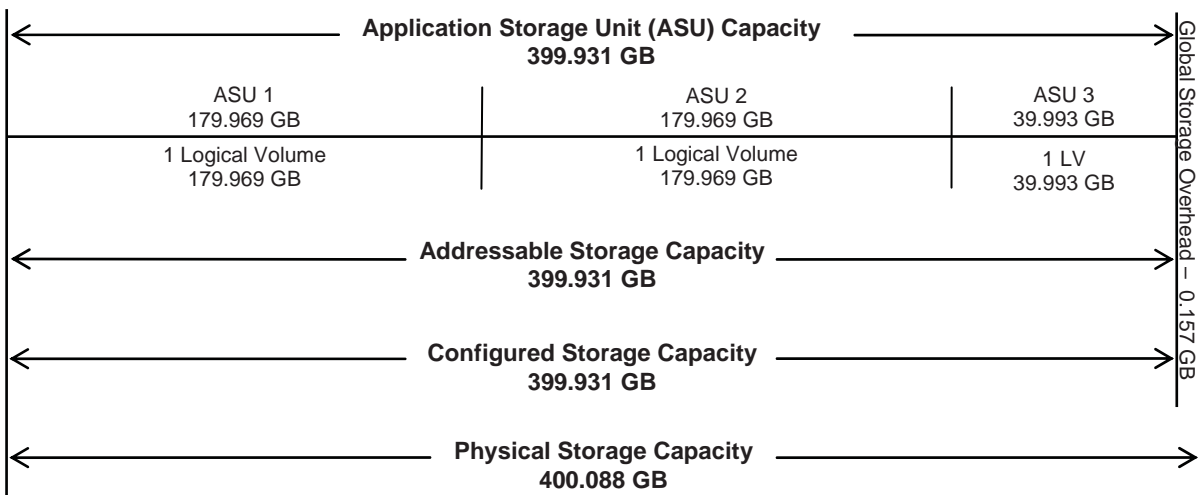
Storage Capacities and Relationships

The Tested Storage Configuration (TSC) must be configured so that there is either no Unused Storage or that the sum of Total ASU Capacity and storage required for data protection equals 50% (+-1 GiB) of the Physical Storage Capacity.

The TSC meets the “no Unused Storage” requirement as documented below:

$$400.088 \text{ GB (Physical Storage Capacity)} \\ 399.931 \text{ GB (Total ASU Capacity)} + 0.157 \text{ (Global Storage Overhead)} = 400.088 \text{ GB}$$

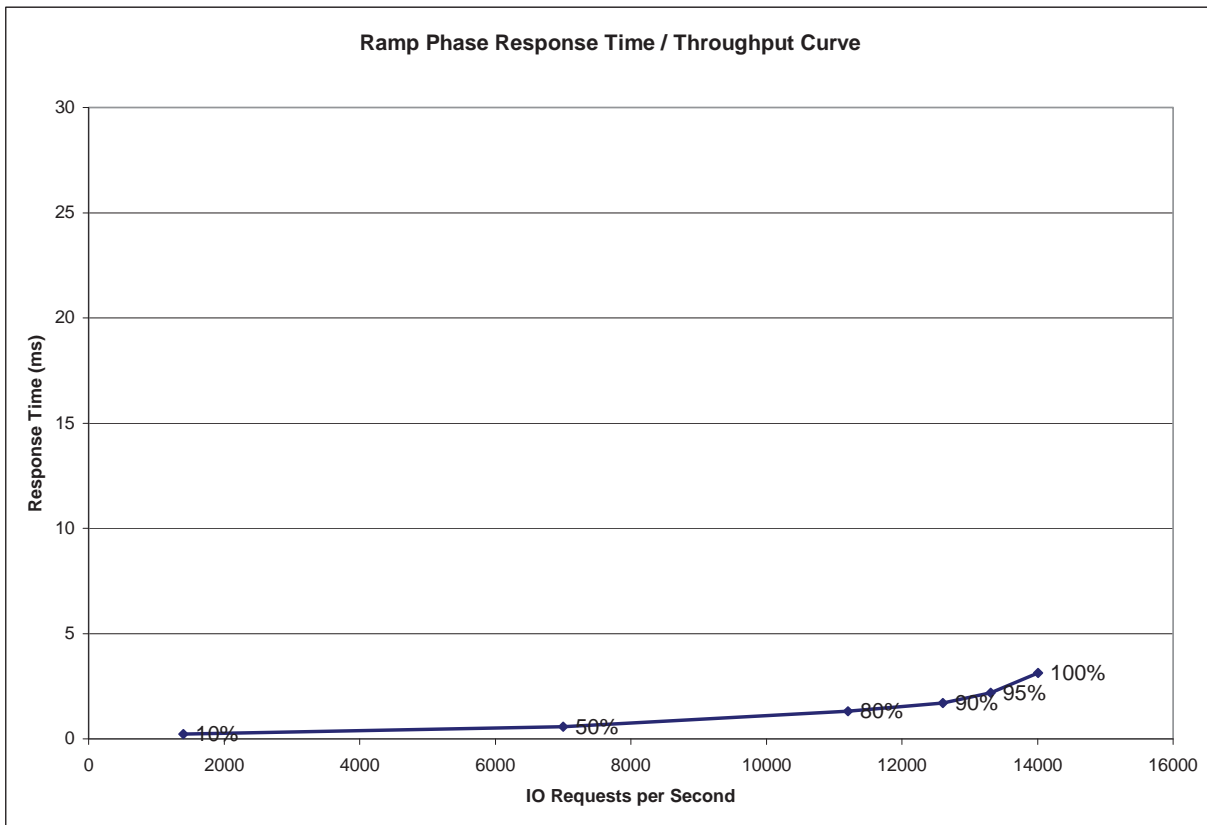
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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	1,400.29	7,004.73	11,202.17	12,605.11	13,307.20	14,008.36
Average Response Time (ms):						
All ASUs	0.22	0.57	1.31	1.69	2.19	3.13
ASU-1	0.24	0.66	1.46	1.88	2.41	3.38
ASU-2	0.25	0.67	1.47	1.88	2.41	3.38
ASU-3	0.17	0.35	0.92	1.20	1.63	2.50
Reads	0.33	0.95	1.95	2.47	3.08	4.15
Writes	0.15	0.32	0.89	1.18	1.61	2.47

Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Description	Part Numbers	Qty	Price	Extended Price
400GB SAS 2.5" SSD MLC	ST400FM0002	1	\$2,540.00	\$2,540.00
6Gb SAS Controller (<i>third party</i>)	LSI00188	1	\$338.99	\$338.99
SAS 2.0 1M Cable (<i>third party</i>)	MiniSAS	1	\$59.99	\$59.99
SAS Adaptor (<i>third party</i>)	SKU 27652	1	\$6.93	\$6.93
included 5 year warranty			Total	\$2,945.91

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.

Benchmark Configuration/Tested Storage Configuration Diagram

**Seagate Pulsar®.2
/ ST400FM0002
(400 GB)**



“Generic” Windows 2008 Server
 ASUS P6T6 WS Revolution motherboard
 1 – Intel® Xeon® Processor X5570
 Windows Server 2008 R2

Benchmark Configuration/Tested Storage Configuration Components

Host System:	Tested Storage Configuration (TSC):
“Generic” Windows 2008 Server ASUS P6T6 WS Revolution motherboard 1 – Intel® Xeon® Processor X5570 4 Cores, 2.93 GHz, 8 MB Intel® Smart Cache	1 – LSI SAS 9200-8e 6Gb SAS Controller
	1 – Seagate Pulsar®.2 / ST400FM0002 400 GB SSD
	1 – PCIe 2.0 x8 front-end connection
6 GB main memory	2 – 6Gb SAS backend connections (1 used)
Windows Server 2008 R2	1 – X4 SAS 2.0 cable
PCIe 2.0	