



**SPC BENCHMARK 1C™  
EXECUTIVE SUMMARY**

**SEAGATE TECHNOLOGY LLC  
SEAGATE BARRACUDA ES.2 ST31000640SS**

**SPC-1C™ V1.1**

**Submitted for Review: October 15, 2008  
Submission Identifier: C00001**

## **EXECUTIVE SUMMARY**

### **Test Sponsor and Contact Information**

<b>Test Sponsor and Contact Information</b>	
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### **Revision Information and Key Dates**

<b>Revision Information and Key Dates</b>	
<b>SPC-1C Specification revision number</b>	V1.1
<b>SPC-1C Workload Generator revision number</b>	V1.0
<b>Date Results were first used publicly</b>	October 15, 2008
<b>Date the FDR was submitted to the SPC</b>	October 15, 2008
<b>Date the TSC is available for shipment to customers</b>	currently available
<b>Date the TSC completed audit certification</b>	October 1, 2008

### **Tested Storage Product (TSP) Description**

The Seagate® Barracuda® ES.2 drive uses second-generation Seagate perpendicular recording technology to provide up to one terabyte of storage in a single, 4-platter hard drive. This 7200-RPM drive with best-in-class reliability and rotational vibration tolerance was developed for 24x7 availability in high-density, Tier 2 storage applications. The drive's integrated workload management feature aids in drive cooling during periods of prolonged activity. The integrated PowerTrim™ technology optimizes power consumption during operation and idle without any host interaction or performance loss. The Barracuda ES.2 drive comes with in-drive data integrity protection guaranteed through Seagate IOEDC/IOECC\* technology and is available with a choice of system initiators. SAS offers improved performance over SATA due in part to the dual processors, hardware sequential streaming, the 2.4 GHz SAS ASIC data rate and the SAS clock rate of 75 MHz. The SAS interface allows Barracuda ES.2 drives to be freely attached to any SAS host in single or dual-ported configurations and provides full-duplex support, with two active data channels, to as many as 16 concurrent initiators.

### Summary of Results

SPC-1C Results	
Tested Storage Product: Seagate Barracuda ES.2 ST31000640SS	
Metric	Reported Result
SPC-1C IOPS™	184.37
Total ASU Capacity	500.103 GB
Data Protection Level	Unprotected
Total Price – Price Storage Configuration	\$508.26

**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” makes no claim of data protection in the event of a single point of failure.

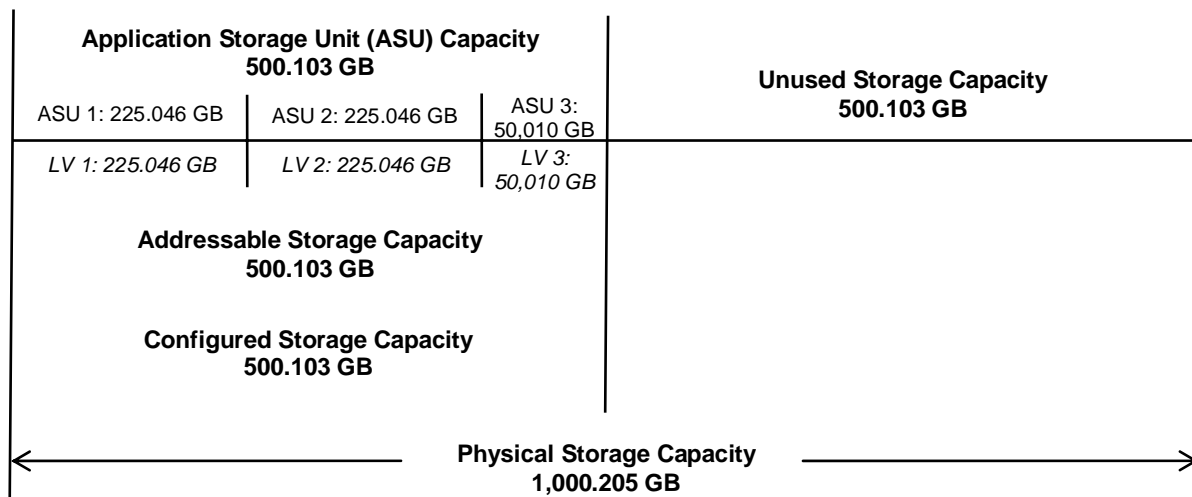
### Storage Capacities and Relationships

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. This configuration meets the 50% requirement as documented below:

$$1,000.205 \text{ GB (Physical Storage Capacity)} * 0.5 = 500.102 \text{ GB}$$

$$500.103 \text{ GB (Total ASU Capacity)} + 0.000 \text{ GB (data protection)} = 500.103 \text{ GB}$$

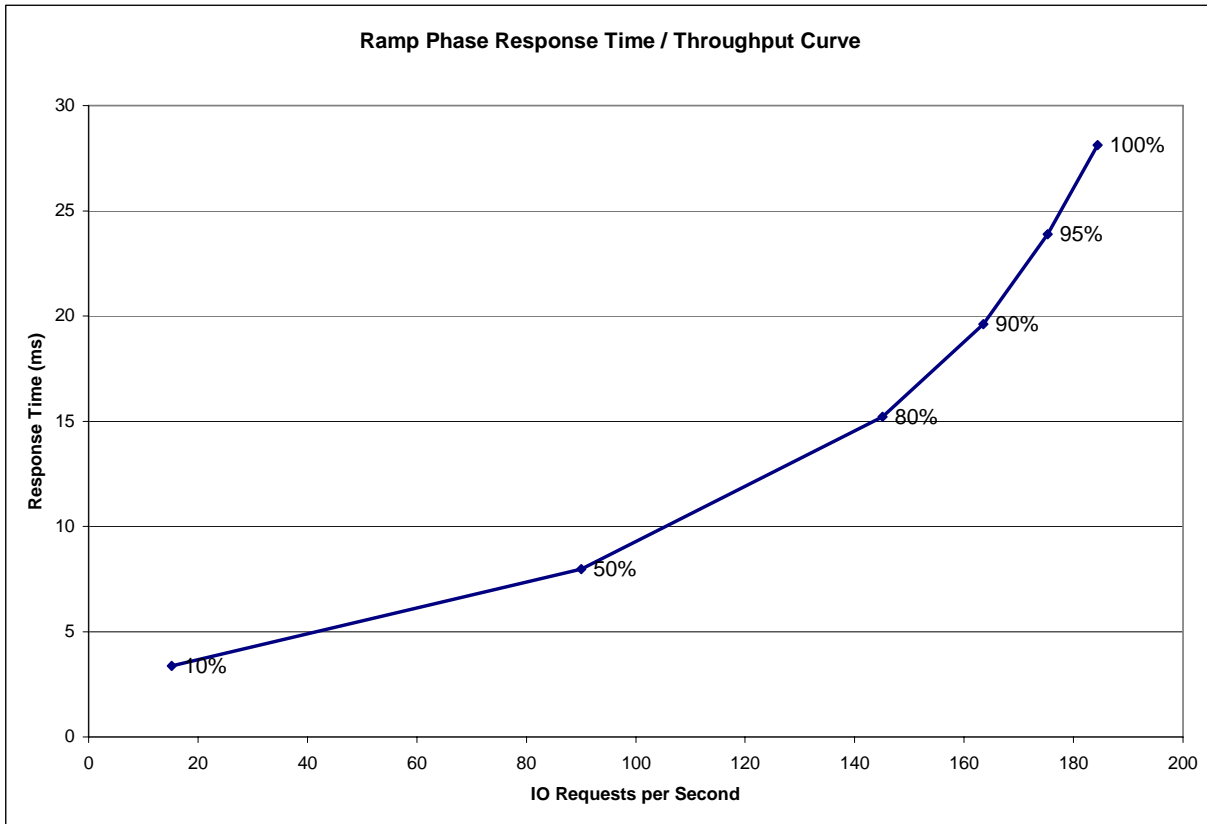
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



### 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
<b>I/O Request Throughput</b>	15.19	90.05	145.12	163.51	175.23	184.37
<b>Average Response Time (ms):</b>						
All ASUs	3.37	7.98	15.22	19.61	23.89	28.12
ASU-1	4.77	10.28	19.01	24.33	29.51	34.38
ASU-2	2.74	10.26	21.26	27.97	33.66	39.86
ASU-3	0.63	2.02	4.42	5.89	7.33	9.80
Reads	7.71	18.02	35.02	45.02	54.78	64.11
Writes	0.48	1.40	2.32	2.98	3.63	4.87

**Tested Storage Configuration Pricing (*Priced Storage Configuration*)**

Description	Part Numbers	Qty	Price	Extended Price
1TB GB SAS 3.5" HDD	ST31000640SS	1	295.18	295.18
SAS HBA (incl 4 SAS/SATA -1M Cables)	LSI00033-F	1	213.08	213.08
			<b>Total</b>	<b>\$508.26</b>

**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**



**Benchmark Configuration/Tested Storage Configuration Components**

Host System:	Tested Storage Configuration (TSC):
<b>HS-1</b>	1 – LSI SAS3041X-R HBA
"White Box" server: Supermicro X6DH*-XG2 motherboard 2 – 2.8 GHz Intel® Xeon™ CPUs 16 KB L1 cache per CPU 1024 KB L2 cache per CPU 2 GB main memory	1 – Seagate Barracuda ES.2 ST31000640SS SAS disk drive
	Point-to-point cable connection
Windows 2003 Enterprise Edition	
PCIe	