



**SPC BENCHMARK 2C™
EXECUTIVE SUMMARY**

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

SPC-2C™ V1.1

**Submitted for Review: October 15, 2008
Submission Identifier: D00001**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Test Sponsor Primary Contact	Seagate Technology LLC – http://www.seagate.com Craig Parris – Craig.Parris@seagate.com 1280 Disc Drive Shakopee, MN 55372 Phone: (952) 402-2418 FAX: (952) 402-2695
Test Sponsor Alternate Contact	Seagate Technology LLC – http://www.seagate.com Jeff Crist – Jeff.Crist@seagate.com 1280 Disc Drive Shakopee, MN 55372 Phone: (952) 402-2840 FAX: (952) 402-2840
Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

Revision Information and Key Dates

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SPC-2C Specification revision number	V1.1
SPC-2C Workload Generator revision number	V1.0
Date Results were first used publicly	October 15, 2008
Date FDR was submitted to the SPC	October 15, 2008
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	October 6, 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.

SPC-2 Reported Data

SPC-2 Reported Data consists of three groups of information:

- The following SPC-2 Primary Metrics, which characterize the overall benchmark result:
 - SPC-2 MBPS™
 - SPC-2 Price Performance
 - Application Storage Unit (ASU) Capacity
- Supplemental data to the SPC-2 Primary Metrics.
 - Total Price
 - Data Protection Level
- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

SPC-2C Reported Data			
Seagate Barracuda ES.2 ST31000640SS			
SPC-2C MBPS™	ASU Capacity (GB)	Total Price	Data Protection Level
65.53	500.103	\$508.26	Unprotected
<i>The above SPC-2C MBPS™ value represents the aggregate data rate of all three SPC-2C workloads: Large File Processing, Large Database Query, and Video On Demand</i>			
SPC-2 Large File Processing (LFP) Reported Data			
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream
LFP Composite	79.47		
Write Only:			
1024 KiB Transfer	109.80	5	21.96
256 KiB Transfer	105.63	5	21.13
Read-Write:			
1024 KiB Transfer	59.45	5	11.89
256 KiB Transfer	38.24	5	7.65
Read Only:			
1024 KiB Transfer	53.02	5	10.60
256 KiB Transfer	110.67	5	22.13
<i>The above SPC-2C Data Rate value for LFP Composite represents the aggregate performance of all three LFP Test Phases: (Write Only, Read-Write, and Read Only).</i>			
SPC-2 Large Database Query (LDQ) Reported Data			
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream
LDQ Composite	82.52		
1024 KiB Transfer Size			
4 I/Os Outstanding	107.32	5	21.46
1 I/O Outstanding	53.78	5	10.76
64 KiB Transfer Size			
4 I/Os Outstanding	94.64	5	18.93
1 I/O Outstanding	74.35	5	14.87
<i>The above SPC-2C Data Rate value for LDQ Composite represents the aggregate performance of the two LDQ Test Phases: (1024 KiB and 64 KiB Transfer Sizes).</i>			
SPC-2 Video On Demand (VOD) Reported Data			
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream
	34.60	44	0.79

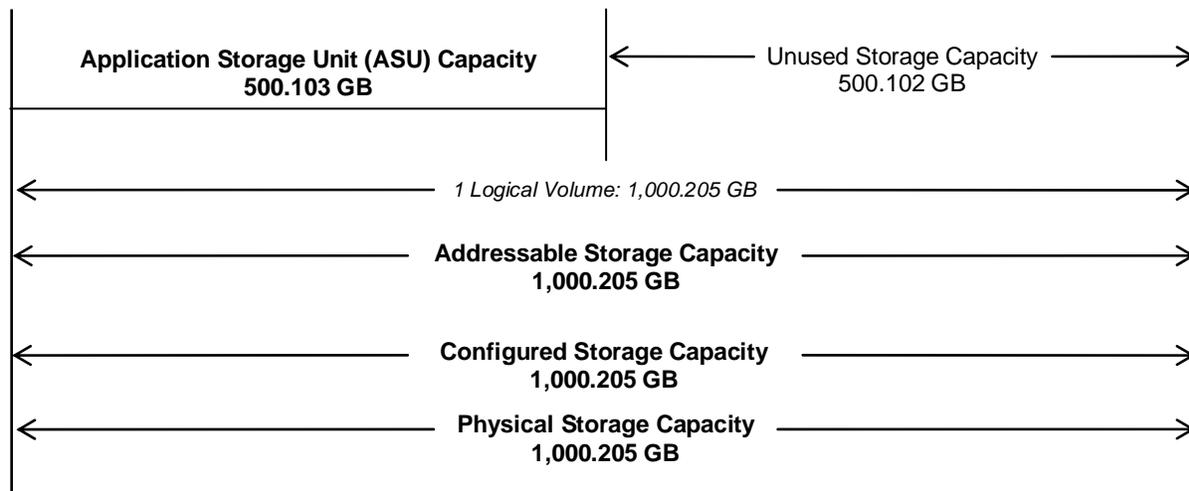
SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

ASU (Application Storage Unit) Capacity represents the total storage capacity read and written in the course of executing the SPC-2 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 following diagram (*not to scale*) documents the various storage capacities, used in this benchmark, and their relationships.



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
			Total	\$508.26

Differences between the Tested Storage Configuration (TSC) and Priced Storage Configuration

There were no differences between the TSC and the Priced Storage Configuration.

Benchmark Configuration/Tested Storage Configuration Diagram



Host System(s) and Tested Storage Configuration Components

Host System:	Tested Storage Configuration (TSC):
HS-1	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	