



SPC BENCHMARK 2C™
EXECUTIVE SUMMARY

SEAGATE TECHNOLOGY LLC (*TEST SPONSOR*)
HITACHI ULTRASTAR A7K1000

SPC-2C™ V1.1

Submitted for Review: October 15, 2008
Submission Identifier: D00003

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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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 Ultrastar™ A7K1000 delivers up to one terabyte of storage capacity in a standard 3.5-inch form factor, filling a vital need for high-density storage in the enterprise. As the third generation design, based on the popular Deskstar™ E7K500, the Ultrastar A7K1000 continues to set the standard in enterprise-class reliability and performance for enterprise and nearline applications requiring high-capacity storage. With a unique 5-platter design, Hitachi has relaxed the bit densities to achieve higher reliability. The Ultrastar A7K1000 is built using the industry's most reliable perpendicular magnetic recording (PMR) recording heads and media.

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			
Hitachi Ultrastar A7K1000			
SPC-2C MBPS™	ASU Capacity (GB)	Total Price	Data Protection Level
33.92	500.103	\$527.89	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	42.24		
Write Only:			
1024 KiB Transfer	55.03	5	11.01
256 KiB Transfer	52.53	5	10.51
Read-Write:			
1024 KiB Transfer	43.71	5	8.74
256 KiB Transfer	30.96	5	6.19
Read Only:			
1024 KiB Transfer	48.50	5	9.70
256 KiB Transfer	22.72	5	4.54
<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	35.94		
1024 KiB Transfer Size			
4 I/Os Outstanding	48.49	5	9.70
1 I/O Outstanding	48.43	5	9.69
64 KiB Transfer Size			
4 I/Os Outstanding	25.18	5	5.04
1 I/O Outstanding	21.65	5	4.33
<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
	23.59	30	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.

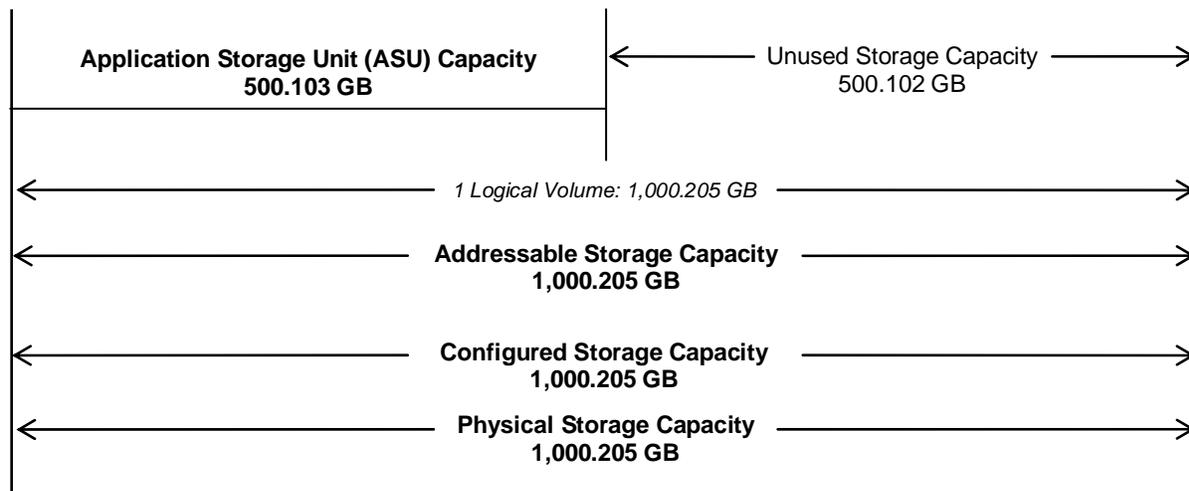
Storage Capacities and Relationships

The Tested Storage Configuration (TSC) must be configured so that there is either no Unused Storage or that the sum of 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:

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

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

The following diagram (*not to scale*) documents the various storage capacities, used in this benchmark, and their relationships.



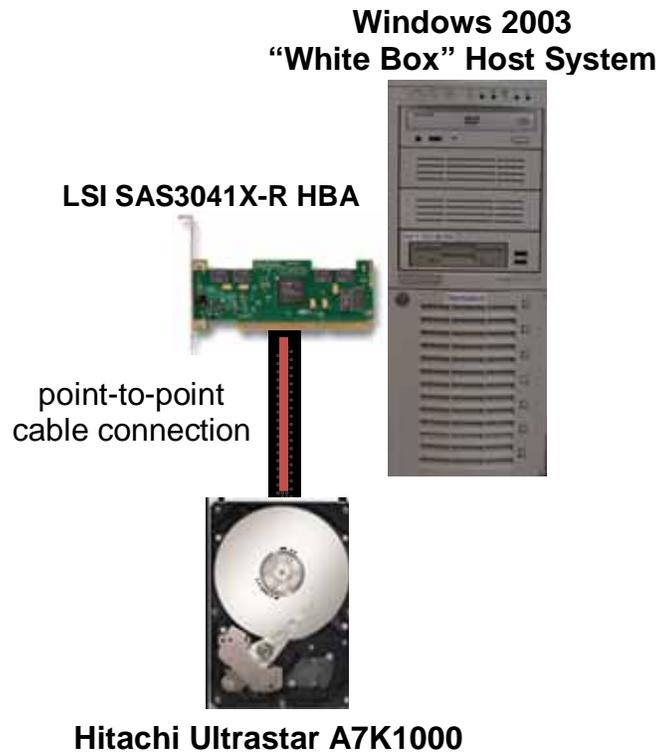
Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Description	Part Numbers	Qty	Price	Extended Price
1TB GB SATA 3.5" HDD	HUA72101	1	314.81	314.81
SAS HBA (incl 4 SAS/SATA -1M Cables)	LSI00033-F	1	213.08	213.08
			Total	\$527.89

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" Host System: 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 – Hitachi Ultrastar A7K1000 disk drive
	1 – Point-to-point cable connection
Windows 2003 Enterprise Edition	
PCIe	