



**SPC BENCHMARK 1C™
EXECUTIVE SUMMARY**

**SEAGATE TECHNOLOGY LLC
IBM 600GB 10K 6GBPS SAS 2.5" SFF SLIM-HS HDD**

SPC-1C™ V1.5

Submitted for Review: June 14, 2013

Submission Identifier: C00015

EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
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Revision Information and Key Dates

Revision Information and Key Dates	
SPC-1C Specification revision number	V1.5
SPC-1C Workload Generator revision number	V1.2.0
Date Results were first used publicly	June 14, 2013
Date the FDR was submitted to the SPC	June 14, 2013
Date the TSC is available for shipment to customers	currently available
Date the TSC completed audit certification	June 14, 2013

Tested Storage Product (TSP) Description

The IBM 600GB 10K 6Gbps SAS 2.5" SFF HDD is a mission critical enterprise hard drive with storage capacities of 300, 450, 600 and 900GB. Ideal for random and sequential mission critical applications, it delivers best-in-class 10K-rpm random performance and highest capacities that data centers need to meet demanding service level agreements and to keep up with data growth and reduce IT operating costs. With up to 2× the capacity and a smaller footprint, data centers can store and access data faster than ever, enabling them to keep pace with data growth while optimizing scarce IT real estate.

The latest IBM 600GB 10K 6Gbps SAS 2.5" SFF HDD drives stores up to 100% more data in half the rack space than even the highest capacity 3.5-inch 15K HDDs. It uses the same, proven enterprise development platform and feature set used by all IBM mission critical enterprise hard drives and is backed by a 1 year limited warranty.

Summary of Results

SPC-1C Reported Data	
Tested Storage Product (TSP) Name: IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	
Metric	Reported Result
SPC-1C Submission Identifier	C00015
SPC-1C IOPS™	448.46
Total ASU Capacity	1,500.318 GB
Data Protection Level	Protected 1 (RAID-5)
Total Price	\$9,213.00
Pricing Currency	U.S. Dollars
Target Country for availability, sales and support	USA

SPC-1C Submission Identifier is the unique identifier assigned to this specific SPC-1C Result.

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 available to be read and written in the course of executing the SPC-1C benchmark.

A **Data Protection Level** of **Protected 1** using **RAID-5** by distributing check data corresponding to user data across multiple disk in the form of bit-by-bite parity.

***Protected 1:** The single point of failure of any **storage device** in the configuration will not result in permanent loss of access to or integrity of the SPC-1C Data Repository.*

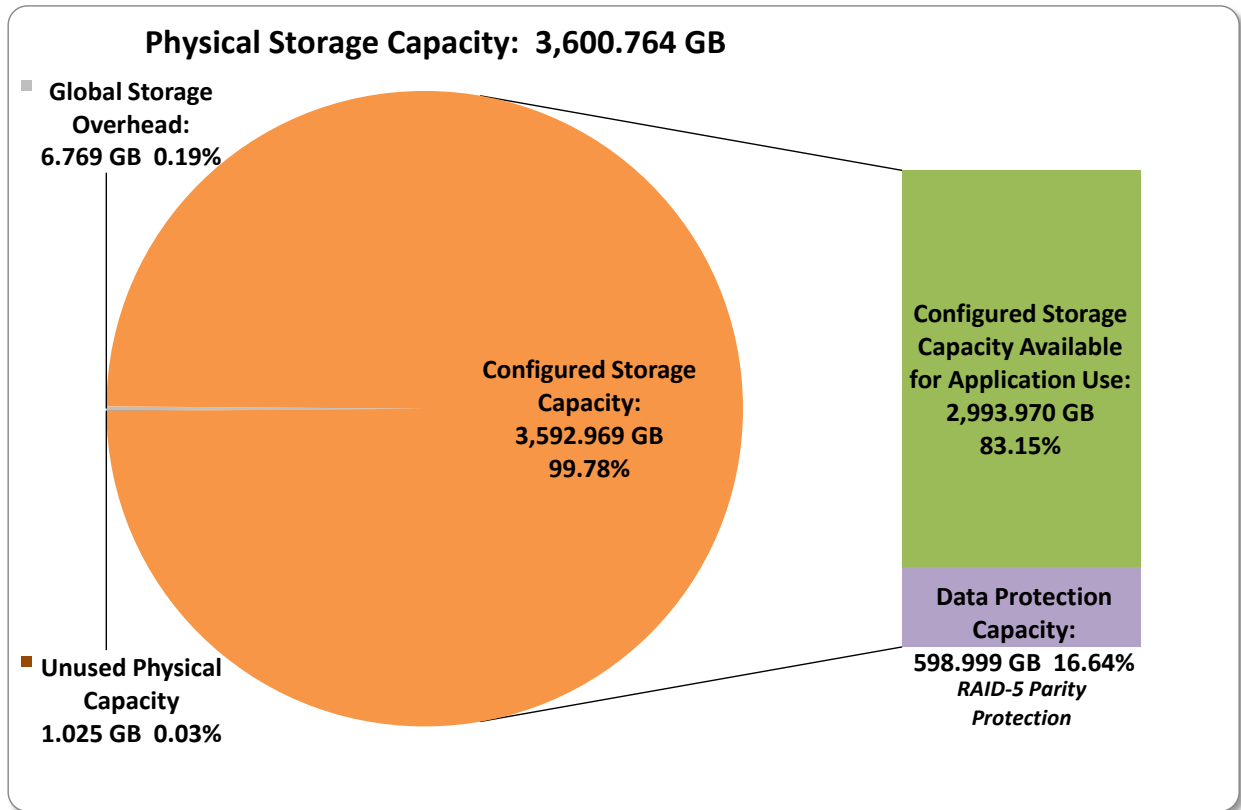
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page [8](#).

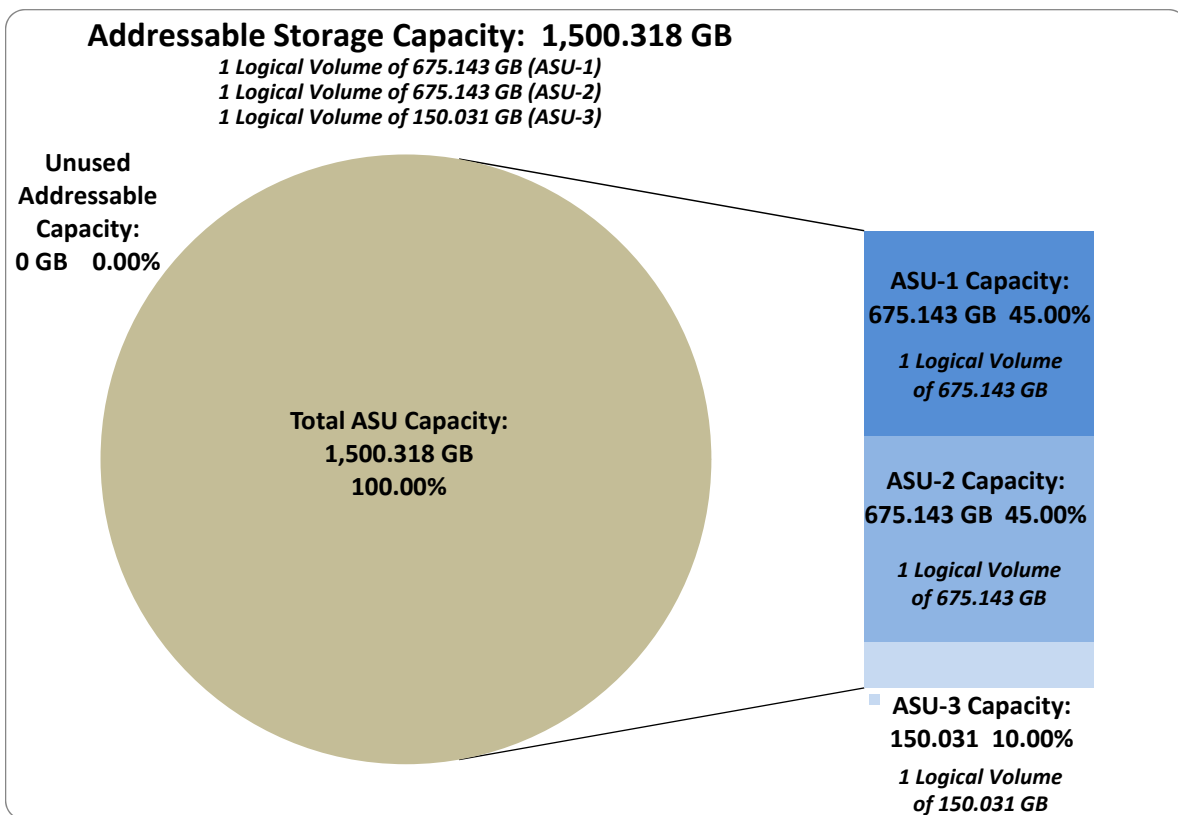
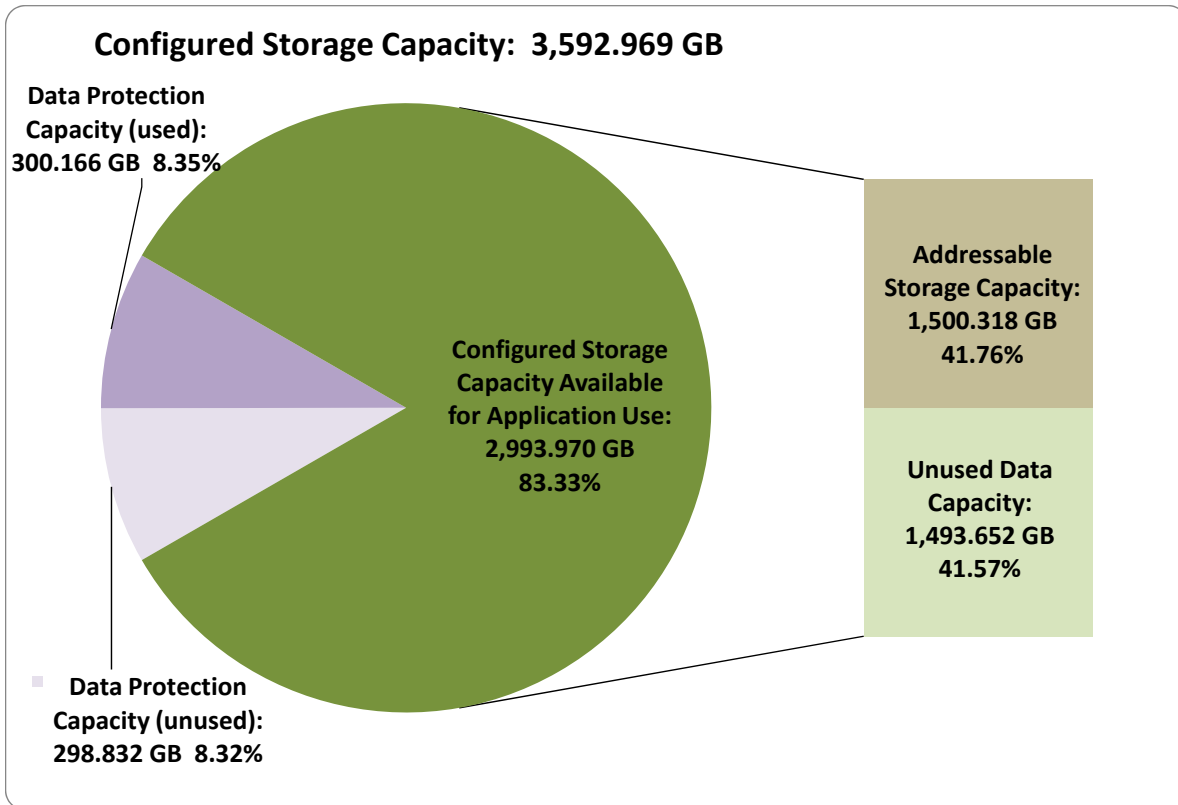
Pricing Currency is formal name for the currency used in calculating the **Total Price**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

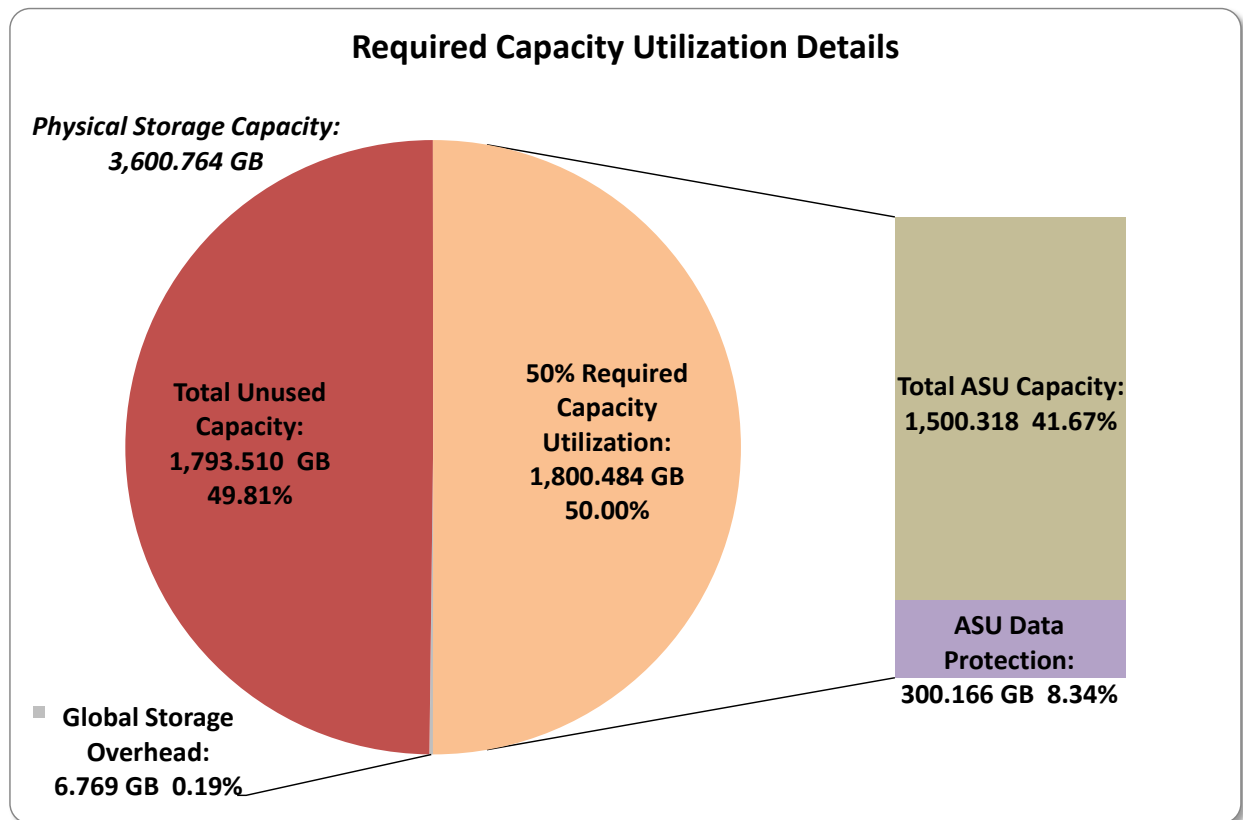
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

Storage Capacities, Relationships, and Utilization

The following four charts 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.







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 “50%” requirement as documented below:

3,600.764 GB (*Physical Storage Capacity*)

1,800.382 GB (*50% capacity requirement*)

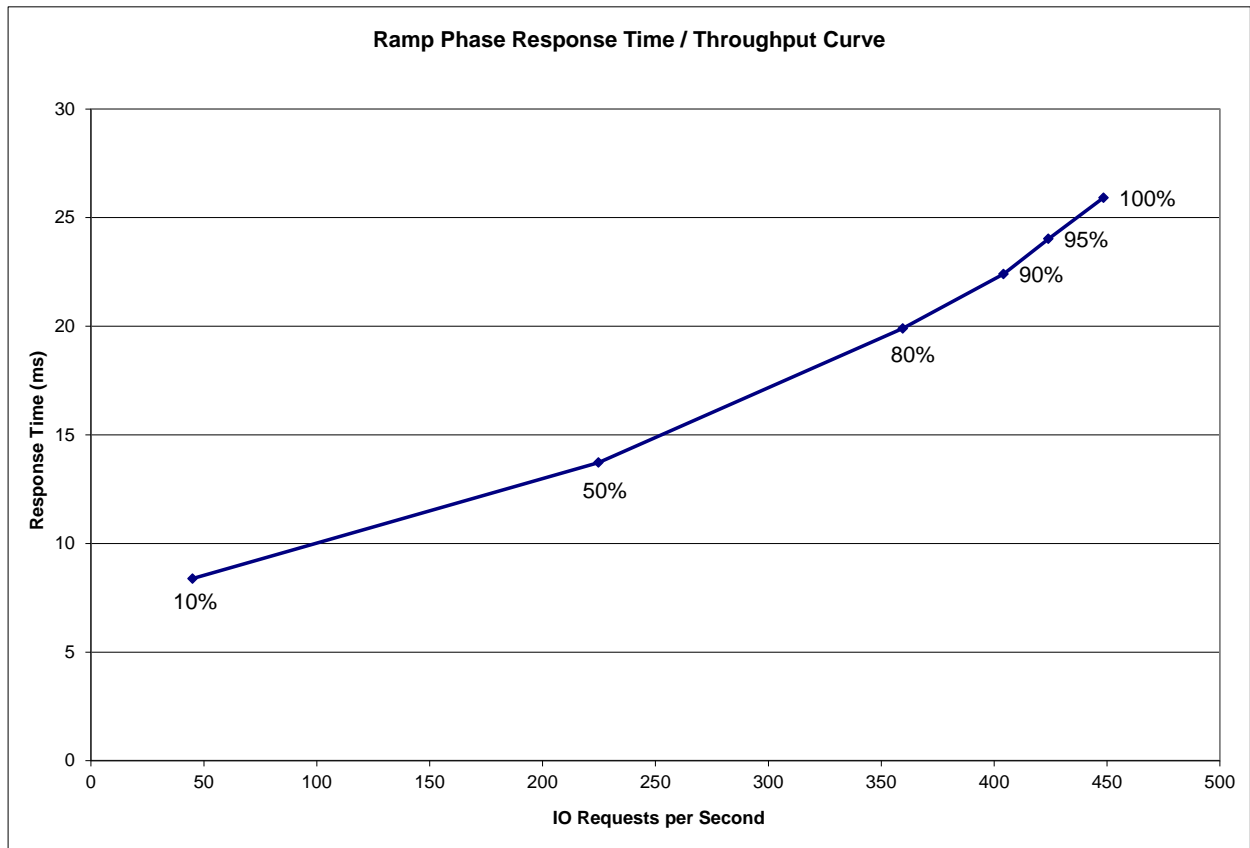
1,500.318 GB (*Total ASU Capacity*) + **300.166 GB** (*Data Protection*) = **1,800.484 GB**

Detailed information for the various storage capacities and utilizations is available on pages 21-22 of the corresponding SPC-1C Full Disclosure Report (FDR).

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	44.96	224.74	359.54	404.17	424.04	448.46
Average Response Time (ms):						
All ASUs	8.38	13.72	19.90	22.40	24.02	25.91
ASU-1	7.89	12.72	17.84	20.00	21.30	22.79
ASU-2	8.83	14.73	21.16	23.81	25.60	27.67
ASU-3	9.22	15.41	23.72	26.88	29.12	31.81
Reads	4.05	7.25	9.97	11.01	11.65	12.43
Writes	11.20	17.90	26.40	29.82	32.07	34.71

Priced Storage Configuration Pricing

Description		Part Numbers	Qty	Price	Extended Price
IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD	Warranty period 1 year CRU & On-site 9x5 Next Business Day	49Y2003	6	\$ 579.00	\$3,474.00
IBM system x3650 M4	Base System w/1 Xeon Processor	7915B2U	1	\$ 2,565.00	\$2,565.00
	Primary drive	90Y8872	1	\$ 579.00	\$ 579.00
	Xeon Processor	69Y5325	1	\$ 485.00	\$ 485.00
	Power Supply	94Y6668	1	\$ 299.00	\$ 299.00
	4GB DDR3	49Y1559	1	\$ 115.00	\$ 115.00
	8GB DDR3	90Y3109	2	\$ 189.00	\$ 378.00
	RAID M5120 Controller	81Y4478	1	\$ 299.00	\$ 299.00
	RAID M5100 512MB RAID Cache	81Y4484	1	\$ 199.00	\$ 199.00
	Power cables	39Y7931	2	\$ 15.00	\$ 30.00
	3yr onsite repair 24x7 4hr response	00A4405	1	\$ 790.00	\$ 790.00
Total					\$9,213.00

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

IBM System x3650 M4



6 – IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD
(6 Seagate 600GB Hard Disk Drives)

Host System and Tested Storage Configuration Components

Tested Storage Configuration (TSC):

IBM System x3650 M4 rack server

2 – Intel® Xeon® E5-2609 quad core processors
 2.4 GHz, 10 MB L3 cache

20 GB – main memory

1 – system disk drive

IBM ServRAID M5110e SAS/SATA built-in controller

512 MB RAID cache

Single embedded PCIe front-end (*PCIe x8*) connection

Single SAS 6 Gb (*4 lanes*) backend connection

6 – IBM 600GB 10K 6Gbps SAS 2.5" SFF Slim-HS HDD
(Seagate 600GB Hard Disk Drives)