



SPC BENCHMARK 2™
FULL DISCLOSURE REPORT
HEWLETT PACKARD ENTERPRISE
HPE 3PAR STORESERV 20840

SPC-2™ V1.5

Submitted for Review: February 29, 2016
Submission Identifier: B00077

First Edition – March 2016

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AUDIT CERTIFICATION



Bill McCormack
Hewlett Packard Enterprise
4209 Technology Drive
Fremont, CA 94538

February 26, 2015

The SPC Benchmark 2™ Reported Data listed below for the **HPE 3PAR StoreServ 20840** were produced in compliance with the SPC Benchmark 2™ V1.5 Onsite Audit requirements.

SPC Benchmark 2™ 1.5 Reported Data	
Tested Storage Product (TSP) Name:	
HPE 3PAR StoreServ 20840	
Metric	Reported Result
SPC-2 MBPS™	62,844.45
SPC-2 Price-Performance	\$19.93/SPC-2 MBPS™
ASU Capacity	28,862.180 GB
Data Protection Level	Protected 2 (Mirroring)
Total Price (including three-year maintenance)	\$1,252,723.54
Currency Used	U.S. Dollars
Target Country for availability, sales and support	USA

The following SPC Benchmark 2™ Onsite Audit requirements were reviewed and found compliant with V1.5 of the SPC Benchmark 2™ Specification:

- A Letter of Good Faith, signed by a senior executive.
- The following Data Repository storage items were verified by physical inspection and documentation supplied by Hewlett Packard Enterprise:
 - ✓ Physical Storage Capacity and requirements.
 - ✓ Configured Storage Capacity and requirements.
 - ✓ Addressable Storage Capacity and requirements.
 - ✓ Capacity of each Logical Volume and requirements.
 - ✓ Capacity of the Application Storage Unit (ASU) and requirements.
- The total Application Storage Unit (ASU) Capacity was filled with random data prior to the execution of the SPC-2 Tests.
- An appropriate diagram of the Benchmark Configuration/Tested Storage Configuration.

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AuditService@storageperformance.org
650.556.9384

AUDIT CERTIFICATION (CONT.)

HPE 3PAR StoreServ 20840
SPC-1 Audit Certification

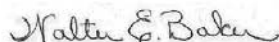
Page 2

- Physical verification of the components to match the above diagram
- Listings and commands to configure the Benchmark Configuration/Tested Storage Configuration.
- Documentation of all customer tunable parameters and options that were changed from default values.
- The following Host System items were verified by physical inspection and documentation supplied by Hewlett Packard Enterprise:
 - ✓ Required Host System configuration information.
 - ✓ The TSC boundary within the Host System.
- The following SPC-2 Workload Generator information was verified by physical inspection and documentation supplied by Hewlett Packard Enterprise:
 - ✓ The presence and version number of the Workload Generator on each Host System.
 - ✓ Commands and parameters used to configure the SPC-2 Workload Generator.
- The execution of each Test, Test Phase, and Test Run was observed and found compliant with all of the requirements and constraints of Clauses 6, 7 and 12 of the SPC-2 Benchmark Specification.
- The Test Results Files and resultant Summary Results Files received from Hewlett Packard Enterprise for each of the following were authentic, accurate, and compliant with all of the requirements and constraints of Clauses 6, 7 and 12 of the SPC Benchmark 2™ Specification:
 - ✓ Data Persistence Test
 - ✓ Large File Processing Test
 - ✓ Large Database Query Test
 - ✓ Video on Demand Delivery Test
- The differences between the Priced Storage Configuration and the Tested Storage Configuration if applied to the Tested Storage Configuration would have no impact on the benchmark measurements.
- The submitted pricing information met all of the requirements and constraints of Clause 9 of the SPC Benchmark 2™ Specification.
- The Full Disclosure Report (FDR) met all of the requirements in Clause 10 of the SPC Benchmark 2™ Specification.
- This successfully audited SPC measurement is not subject to an SPC Confidential Review.

Audit Notes:

There were no audit notes or exceptions.

Respectfully,



Walter E. Baker
SPC Auditor

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LETTER OF GOOD FAITH



LETTER OF GOOD FAITH

Date: February 8, 2016

From: Philip Tamer
 Vice President of 3PAR Engineering
 Hewlett Packard Enterprise
 4209 Technology Drive
 Fremont, CA 94538

To: Walter E. Baker
 SPC Administrator and Auditor
 Gradient Systems, Inc.
 643 Bair Island Road, Suite 103
 Redwood City, CA 94063

Subject: SPC-2 Letter of Good Faith for the HPE 3PAR StoreServ 20840

Hewlett Packard Enterprise is the SPC-2 Test Sponsor for the above listed product. To the best of our knowledge and belief, the required SPC-2 benchmark results and materials we have submitted for that product are complete, accurate, and in full compliance with V1.5 of the SPC-2 benchmark specification.

In addition, we have reported any items in the Benchmark Configuration and execution of the benchmark that affected the reported results even if the items are not explicitly required to be disclosed by the SPC-2 benchmark specification.

Signed: 

 Philip Tamer
 Vice President of 3PAR Engineering

Date: *2/8/2016*

 Date of Signature

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Hewlett Packard Enterprise – http://www.hpe.com Bill McCormack – Bill.McCormack@hpe.com 4209 Technology Drive Fremont, CA 94538 Phone: (510) 344-4206
Test Sponsor Alternate Contact	Hewlett Packard Enterprise – http://www.hpe.com Chuck Paridon – Chuck.Paridon@hpe.com 8000 Foothills Blvd. M/S 5785 Roseville, CA 95747 Phone: (916) 472-8239
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

Revision Information and Key Dates	
SPC-2 Specification revision number	V1.5
SPC-2 Workload Generator revision number	V1.2
Date Results were first used publicly	February 29, 2016
Date FDR was submitted to the SPC	February 29, 2016
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	February 26, 2016

Tested Storage Product (TSP) Description

HPE 3PAR StoreServ 20840 Converged Flash Storage is a new class of enterprise array delivering high performance, tier 1 data services and affordability for massive consolidation of today's most demanding workloads. Built on core architectural tenets including a mesh-active cluster, ASIC-based workload management, and multi-layer storage virtualization, HPE 3PAR StoreServ 20840 Converged Flash Storage provides enterprise storage options for on-demand and hybrid IT. The flash-optimized 3PAR architecture allows the HPE 3PAR StoreServ 20840 to deliver multi-petabyte scalability and industry leading data throughput. The HPE 3PAR StoreServ 20840 features the Gen5 Thin Express ASIC for silicon-based hardware acceleration of thin technologies, including inline deduplication, to reduce acquisition and operational costs. Enhanced Tier-1 storage capabilities for always-on data access and fine-grained Quality of Service (QoS) controls ensure predictable service levels for all workload types, while bi-directional data mobility enables virtually limitless elastic pools of storage to support the most rigorous on-demand infrastructure. The HPE 3PAR StoreServ 20840 also delivers true multi-protocol convergence with support of FC/iSCSI/FCoE/NFS/SMB and Object Access. Features like 3PAR Adaptive Sparing ensure SSD media endurance and the support for spinning disks also enables a low \$/GB, making flash-enabled configurations more affordable for any application.

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
 - Currency Used
 - Target Country
- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

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).

SPC-2 Price-Performance™ is the ratio of **Total Price** to **SPC-2 MBPS™**.

ASU (Application Storage Unit) Capacity represents the total storage capacity available to be read and written in the course of executing the SPC-2 benchmark.

Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 18.

Data Protection Level of Protected 2 using **Mirroring**, which configures two or more identical copies of user data.

***Protected 2:** The single point of failure of any **component** in the configuration will not result in permanent loss of access to or integrity of the SPC-2 Data Repository.*

Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-2 Price-Performance™**. 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.

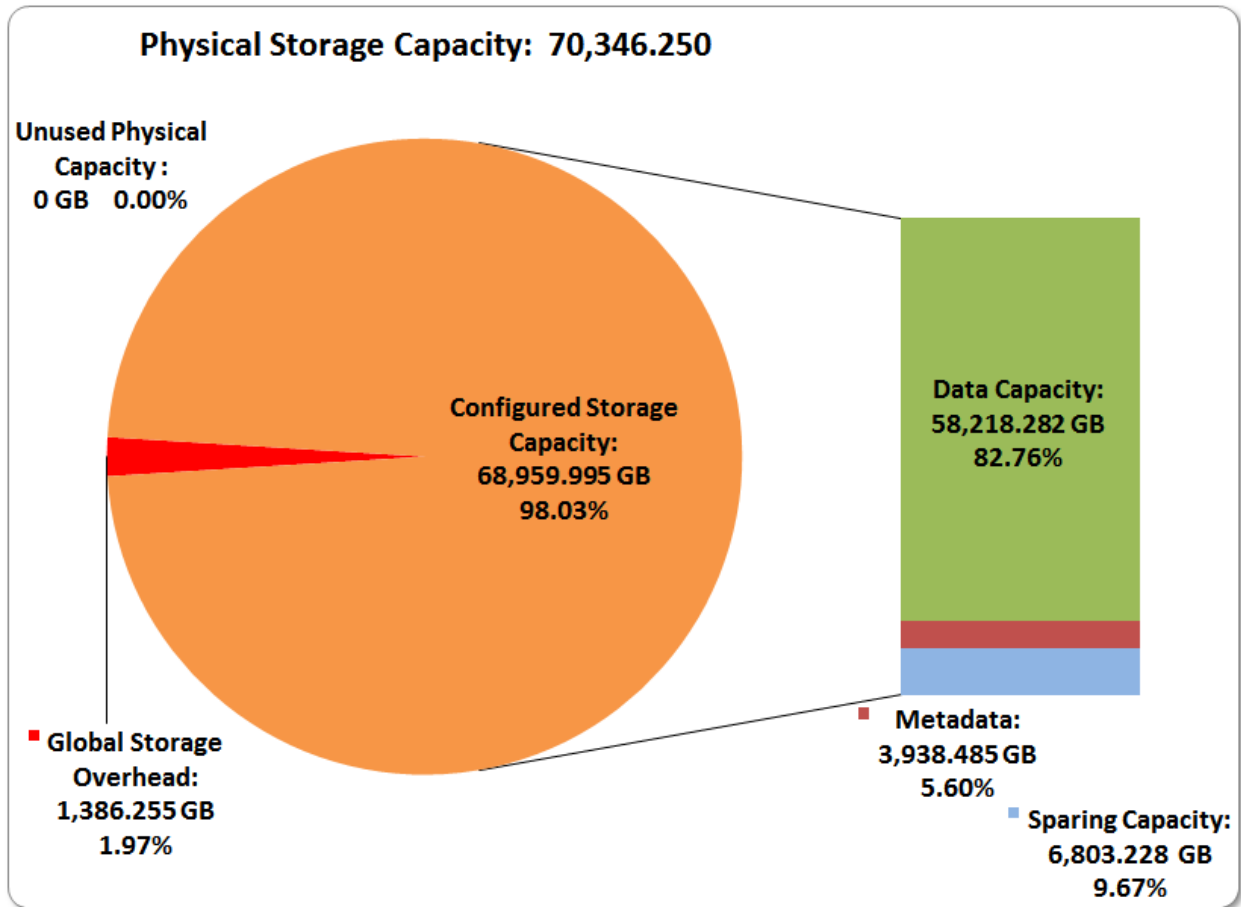
SPC-2 Reported Data (continued)

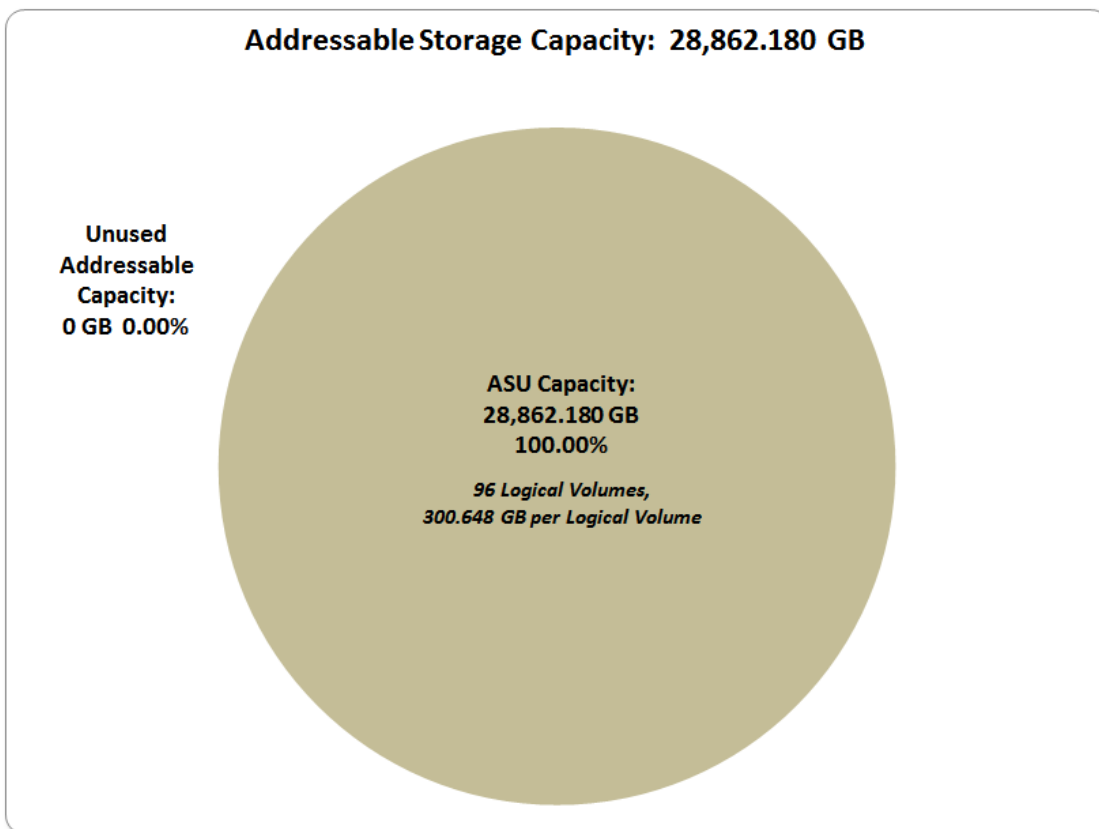
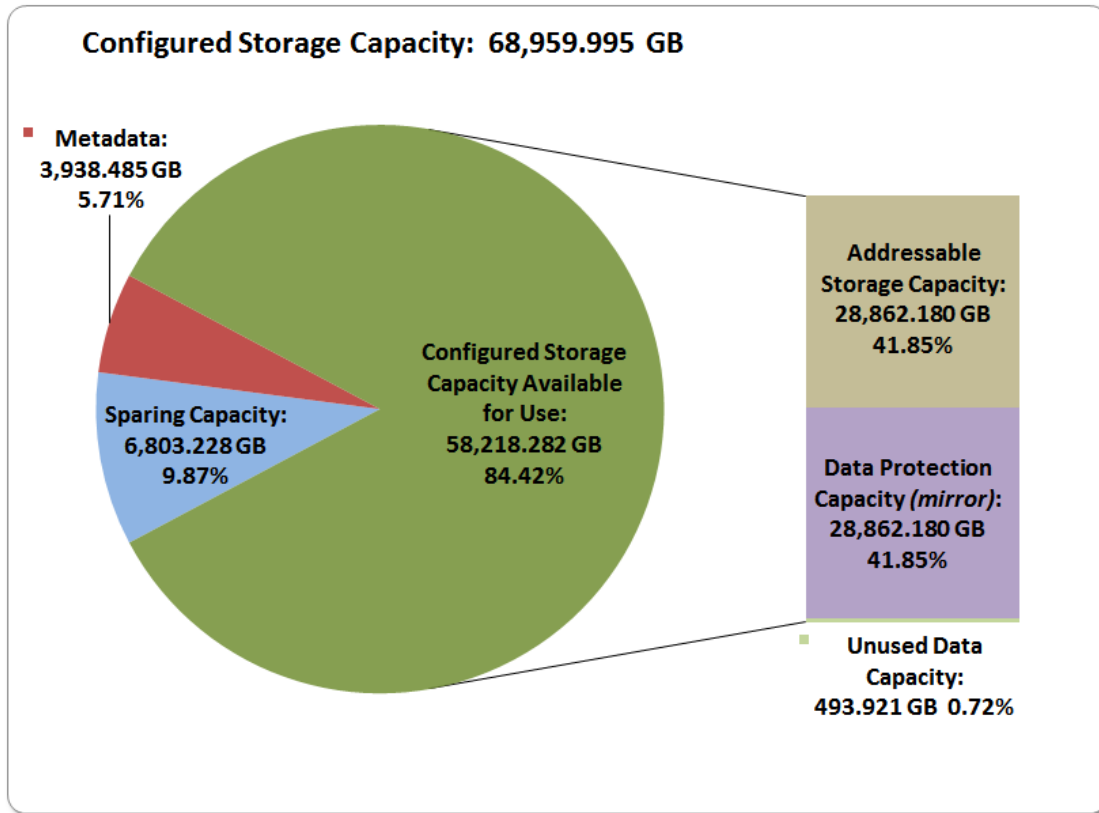
SPC-2 Reported Data				
HPE 3PAR StoreServ 20840				
SPC-2 MBPS™	SPC-2 Price-Performance	ASU Capacity (GB)	Total Price	Data Protection Level
62,844.45	\$19.93	28,862.180	\$1,252,723.54	Protected 2 (Mirroring)
<i>The above SPC-2 MBPS™ value represents the aggregate data rate of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video On Demand (VOD)</i>				
Currency Used:		"Target Country":		
U.S. dollars		USA		
SPC-2 Large File Processing (LFP) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
LFP Composite	38,490.17			\$32.55
Write Only:				
1024 KiB Transfer	11,706.48	124	94.41	
256 KiB Transfer	12,011.74	124	96.87	
Read-Write:				
1024 KiB Transfer	19,953.88	248	80.46	
256 KiB Transfer	20,182.66	248	81.38	
Read Only:				
1024 KiB Transfer	83,550.65	2,300	36.33	
256 KiB Transfer	83,535.59	2,300	36.32	
<i>The above SPC-2 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	Price-Performance
LDQ Composite	75,332.47			\$16.63
1024 KiB Transfer Size				
4 I/Os Outstanding	74,779.73	1,953	38.29	
1 I/O Outstanding	74,918.92	1,953	38.36	
64 KiB Transfer Size				
4 I/Os Outstanding	76,658.87	2,697	28.42	
1 I/O Outstanding	74,972.38	2,697	27.80	
<i>The above SPC-2 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	Price-Performance
	74,710.71	95,000	0.79	\$16.77

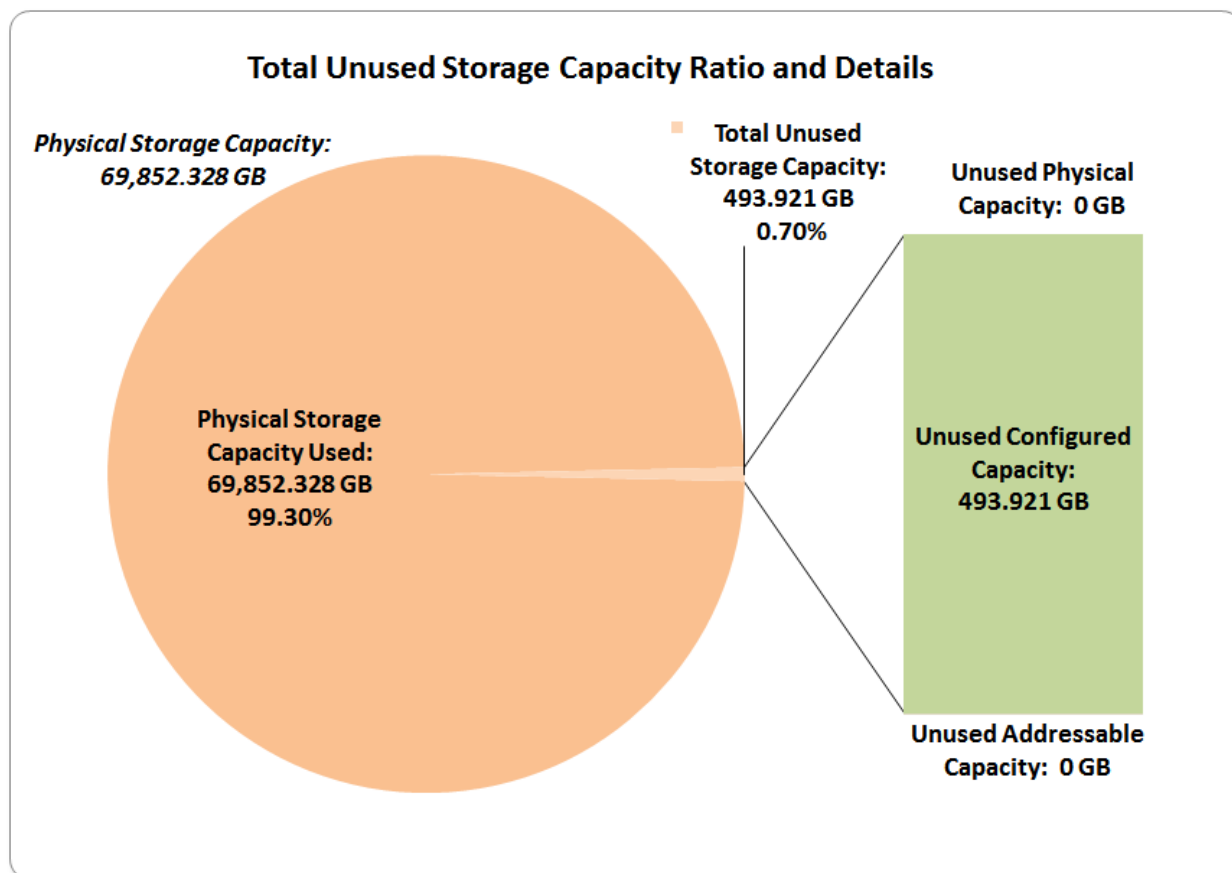
Storage Capacities, Relationships and Utilization

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 capacity values in each of the following four charts are listed as integer values, for readability, rather than the decimal values listed elsewhere in this document.







SPC-2 Storage Capacity Utilization	
Application Utilization	41.03%
Protected Application Utilization	82.06%
Unused Storage Ratio	0.70%

Application Utilization: Total ASU Capacity (28,862.180 GB) divided by Physical Storage Capacity (70,346.250 GB).

Protected Application Utilization: Total ASU Capacity (28,862.180 GB) plus total Data Protection Capacity (28,862.180 GB) minus unused Data Protection Capacity 0.000 GB) divided by Physical Storage Capacity (70,346.250 GB).

Unused Storage Ratio: Total Unused Capacity (GB) divided by Physical Storage Capacity (70,346.250 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 27-28 in the Full Disclosure Report.

Priced Storage Configuration Pricing

Quantity	Model #	Description	List Price	Extended List Price
1	C8S83A	HP 3PAR StoreServ 20000 8N Config Base	84,000.00	84,000.00
2	TK808A	HP Rack Front Door Cover Kit	2.00	4.00
2	MOT19A	HP 3PAR Rack Accessories Kit	285.00	570.00
8	N9Y49A	HP 3PAR 20840 192GB CC/256GB DC Node	65,000.00	520,000.00
32	C8S92A	HP 3PAR 20000 4p 16Gbps FC HBA	8,700.00	278,400.00
24	C8S93A	HP 3PAR 20000 4p 12Gbps SAS HBA	3,600.00	86,400.00
24	E7Y20A	HP 3PAR 20000 24d 2U SFF Drive Enclosure	3,200.00	76,800.00
144	K2Q50A	HP 3PAR 20000 480GB SFF SSD	8,930.00	1,285,920.00
1	K2R29A	HP 3PAR StoreServ RPS Service Processor	6,620.00	6,620.00
12	716197-B21	HP Ext 2.0m MiniSAS HD to MiniSAS HD Cbl	129.00	1,548.00
36	E7V95A	HP 10m Mini SAS HD Active Optical Cable	2,800.00	100,800.00
Hardware Subtotal				2,441,062.00
1	L7E06A	HP 3PAR 20840 OS Suite Base LTU	32,427.00	32,427.00
144	L7E07A	HP 3PAR 20840 OS Suite Drive LTU	1,353.00	194,832.00
1	BD362AAE	HP 3PAR StoreServ Mgmt/Core SW E-Media	20.00	20.00
1	BD363AAE	HP 3PAR OS Suite E-Media	20.00	20.00
1	BD373AAE	HP 3PAR Reporting Suite E-Media	20.00	20.00
Software Subtotal				227,319.00
2	BW904A 001	HP Factory Express Base Racking Service	300.00	600.00
2	HA113A1 5BY	Rack and Rack Options Installation	550.00	1,100.00
24	H1K92A3 YNE	HP 3PAR 20000 24d 2U SFF Enclosure Supp	77.00	1,848.00
1	H1K92A3 YNH	HP 3PAR StoreServ 20000 8N Base Supp	1,839.00	1,839.00
8	H1K92A3 XEF	HP 3PAR 20840 192GBCC/256GB DC Node Supp	562.00	4,496.00
32	H1K92A3 YNN	HP 3PAR 20000 4p 16Gbps FC HBA Supp	81.00	2,592.00
24	H1K92A3 YNQ	HP 3PAR 20000 4p 12Gbps SAS HBA Supp	81.00	1,944.00
1	H1K92A3 YNW	HP 3PAR StoreServ RPS Service Proc Supp	132.00	132.00
144	H1K92A3 YPB	HP 3PAR 20000 480GB SSD Supp	99.00	14,256.00
1	H1K92A3 XEH	HP 3PAR 20840 OS Suite Base Supp	111,873.00	111,873.00
144	H1K92A3 XEJ	HP 3PAR 20840 OS Suite Drive Supp	560.00	80,640.00
1	HA124A1	HP Technical Installation Startup SVC	0.00	0.00
1	HA124A1 5WZ	HP Startup 3PAR 20K 8N Base Fact Int SVC	7,438.00	7,438.00
1	HA124A1 5X1	HP Startup 3PAR 20K Exp Rck Fact Int SVC	1,094.00	1,094.00
Services/Support Subtotal				229,852.00
2	BW904A	HP 642 1075mm Shock Intelligent Rack	1,899.00	3,798.00
2	BW932A	HP 600mm Rack Stabilizer Kit	229.00	458.00
2	BW906A	HP 42U 1075mm Side Panel Kit	399.00	798.00
4	252663-D74	HP 24A HV Core Only Corded PDU	259.00	1,036.00
4	H5M58A	HP 4.9kVA 208V 20out NA/JP bPDU	279.00	1,116.00
Additional Storage Hardware Subtotal				7,206.00

Priced Storage Configuration Pricing (continued)

64	710608-B21	HP QMH2672 16Gb FC HBA	1,099.00	70,336.00
8	C8S47A	Brocade 16Gb/28c PP+ Embedded SAN Switch	17,599.00	140,792.00
8	H1K92AE#9LS	B-Series 8/24c Switch Power Pack c-Class	3,753.00	30,024.00
96	QK724A	HP B-series 16Gb SFP+SW XCVR	405.00	38,880.00
96	QK735A	HP Premier Flex LC/LC OM4 2f 15m Cbl	162.00	15,552.00
SAN Hardware/Support Subtotal				295,584.00

Product Category	List Price	Discount	Discounted Price
Hardware Subtotal	\$2,441,062.00	62.0%	\$927,603.56
Software Subtotal	\$227,319.00	62.0%	\$86,381.22
Services/Support Subtotal	\$229,852.00	62.0%	\$87,343.76
Additional Storage Hardware Subtotal	\$7,206.00	50.0%	\$3,603.00
SAN Hardware/Support Subtotal	\$295,584.00	50.0%	\$147,792.00
Grand Total	\$3,201,023.00		\$1,252,723.54

The above pricing includes the following:

- Acknowledgement of new and existing hardware and/or software problems within four hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration component.

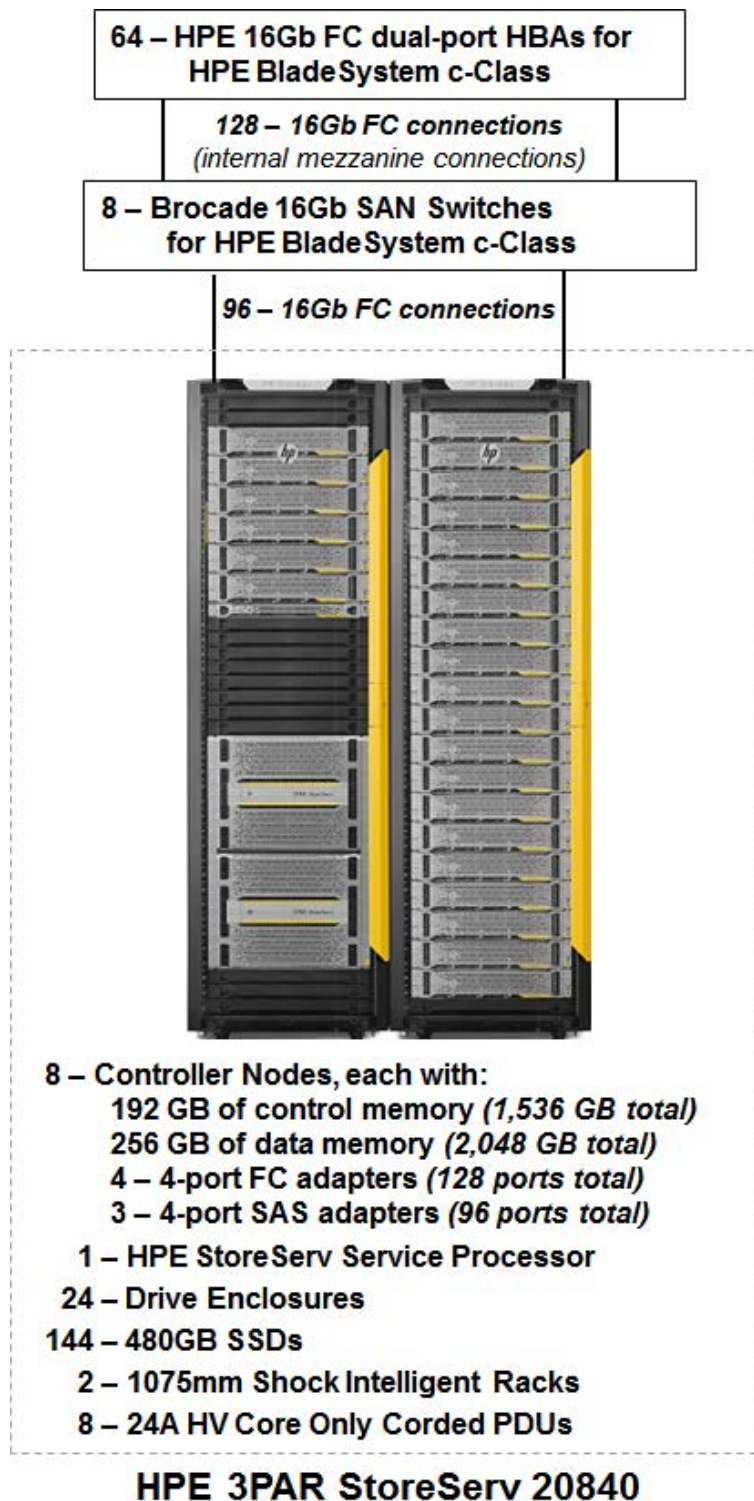
Differences between the Tested Storage Configuration (TSC) and Priced Storage Configuration

The HPE 3PAR StoreServ 20840 uses the same controllers as the HPE 3PAR StoreServ 20850.

The HPE 3PAR StoreServ 20840 Priced Storage Configuration differs from the HPE 3PAR StoreServ 20850 Tested Storage Configuration as follows:

- The factory programmed BIOS model identifier is set to the value representing the HPE 3PAR StoreServ 20840 model.
- The HPE 3PAR StoreServ 20840 optionally supports HDD storage devices and the HPE 3PAR StoreServ 20850 does not.

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Priced Storage Configuration
64 – HPE 16Gb FC dual-port HBAs for HPE Blade System c-Class
8 – Brocade 16Gb SAN Switches for HPE Blade System c-Class
HPE 3PAR StoreServ 20840
8 – Controller Nodes, each with 192 GB of control memory (<i>1,536 GB total</i>) 256 GB of data memory (<i>2,048 GB total</i>) 4 – 4-port FC adapters (<i>16 ports per node, 128 ports total and 96 ports used</i>) 3 – 4-port SAS adapters (<i>12 ports per node, 96 ports total and 48 ports used</i>)
1 – HPE StoreServ Service Processor
96 – 16GB SFPs
24 – Drive Enclosures
144 – 480GB SSDs (<i>6 SSDs per enclosure</i>)
2 – 1075mm Shock Intelligent Racks
8 – 24A HV Core Only Corded PDUs

CONFIGURATION INFORMATION

This portion of the Full Disclosure Report documents and illustrates the detailed information necessary to recreate the Benchmark Configuration (BC), including the Tested Storage Configuration (TSC), so that the SPC-2 benchmark result produced by the BC may be independently reproduced.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

Benchmark Configuration (BC)/Tested Storage Configuration (TSC) Diagram

Clause 10.6.6

The FDR will contain a one page BC/TSC diagram that illustrates all major components of the BC/TSC.

The Benchmark Configuration (BC)/Tested Storage Configuration (TSC) is illustrated on page [23 \(Benchmark Configuration \(BC\)/Tested Storage Configuration \(TSC\) Diagram\)](#).

Storage Network Configuration

Clause 10.6.6.1

If a storage network was configured as a part of the Tested Storage Configuration and the Benchmark Configuration described in Clause 10.6.6 contains a high-level illustration of the network configuration, the Executive Summary will contain a one page topology diagram of the storage network as illustrated in Figure 10.11.

The storage network would be configured as part of the customer installation process, which is performed by an HPE Field Engineer ([Appendix C: Tested Storage Configuration \(TSC\) Creation](#)).

The details of the storage network configuration are available in [Storage Network Details](#) section of ([Appendix C: Tested Storage Configuration \(TSC\) Creation](#)).

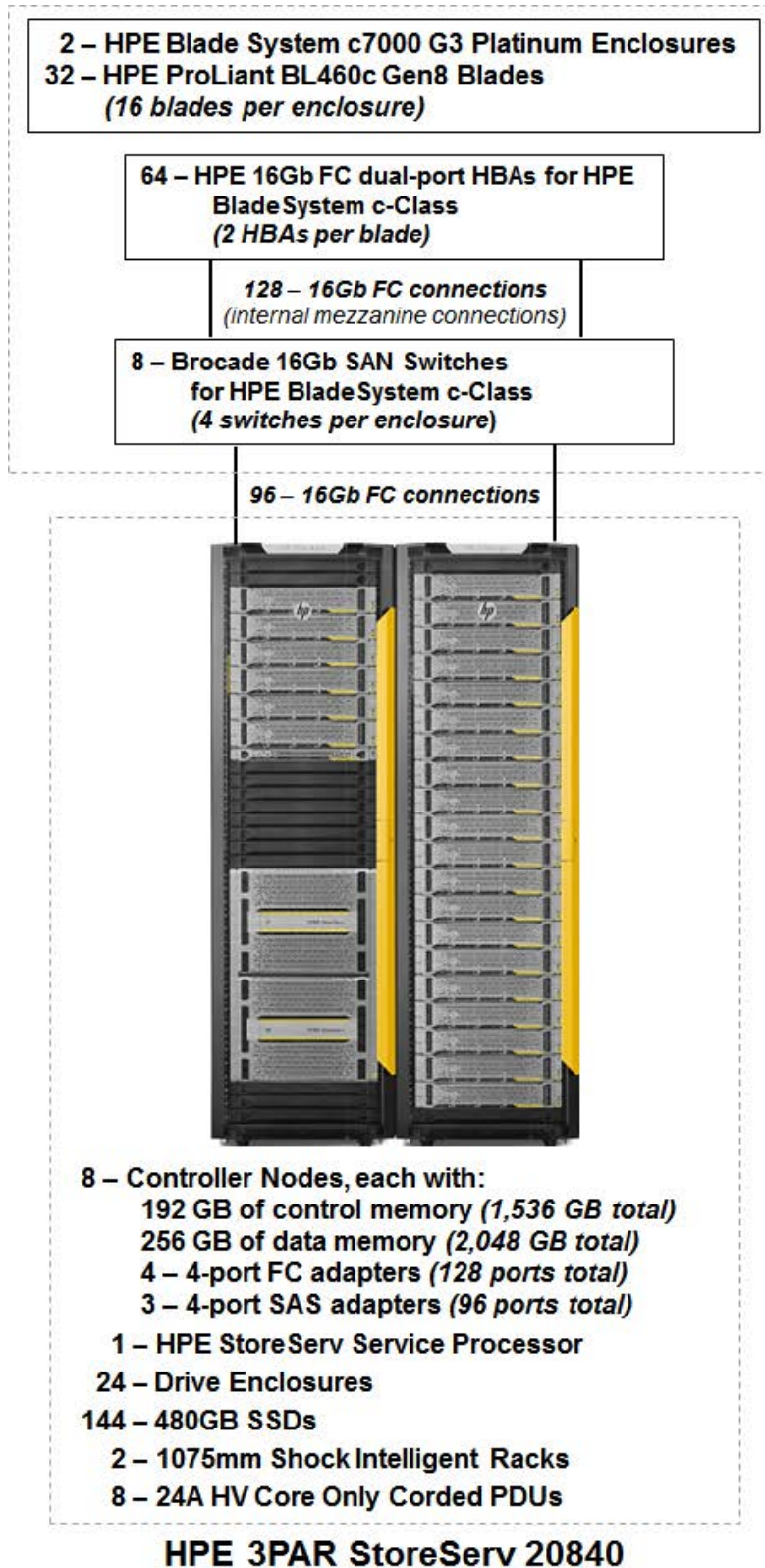
Host System and Tested Storage Configuration Table

Clause 10.6.6.2

The FDR will contain a table that lists the major components of each Host System and the Tested Storage Configuration.

The components that comprise each Host System and the Tested Storage Configuration are listed in the table that appears on page [24 \(Host System and Tested Storage Configuration Components\)](#).

Benchmark Configuration/Tested Storage Configuration Diagram



Host System and Tested Storage Configuration Components

Host Systems
<p>2 – HPE Blade System c7000 G3 Enclosures, each with</p> <p>16 – HPE ProLiant BL460c Gen8 Blades (<i>32 blades total</i>) each blade includes:</p> <p>2 – Intel® Xeon® E5-2690 0 processors 2.4 GHz each with 4 cores, 10 MB Smart Cache</p> <p>64 GB main memory</p> <p>Windows Server 2008 R2 (<i>Service Pack 1 and multiple patches</i>)</p> <p>Internal mezzanine HBA connections</p>
Priced Storage Configuration
64 – HPE 16Gb FC dual-port HBAs for HPE Blade System c-Class (<i>2 HBA per server/blade</i>)
8 – Brocade 16Gb SAN Switches for HPE Blade System c-Class (<i>4 switches per enclosure</i>)
<p>HPE 3PAR StoreServ 20840</p> <p>8 – Controller Nodes, each with</p> <p>192 GB of control memory (<i>1,536 GB total</i>)</p> <p>256 GB of data memory (<i>2,048 GB total</i>)</p> <p>4 – 4-port FC adapters (<i>16 ports per node, 128 ports total and 96 ports used</i>)</p> <p>3 – 4-port SAS adapters (<i>12 ports per node, 96 ports total and 48 ports used</i>)</p>
1 – HPE StoreServ Service Processor
96 – 16GB SFPs
24 – Drive Enclosures
144 – 480GB SSDs (<i>6 SSDs per enclosure</i>)
2 – 1075mm Shock Intelligent Racks
8 – 24A HV Core Only Corded PDUs

Customer Tunable Parameters and Options

Clause 10.6.7.1

All Benchmark Configuration (BC) components with customer tunable parameter and options that have been altered from their default values must be listed in the FDR. The FDR entry for each of those components must include both the name of the component and the altered value of the parameter or option. If the parameter name is not self-explanatory to a knowledgeable practitioner, a brief description of the parameter's use must also be included in the FDR entry.

[Appendix B: Customer Tunable Parameters and Options](#) on page 69 contains the customer tunable parameters and options that have been altered from their default values for this benchmark.

Tested Storage Configuration (TSC) Creation and Configuration

Clause 10.6.7.2

The Full Disclosure Report must include sufficient information to recreate the logical representation of the Tested Storage Configuration (TSC). In addition to customer tunable parameters and options (Clause 10.6.6.1), that information must include, at a minimum:

- A diagram and/or description of the following:
 - All physical components that comprise the TSC. Those components are also illustrated in the BC Configuration Diagram in Clause 10.6.5.7 and the Storage Network Configuration Diagram in Clause 10.6.5.8.
 - The logical representation of the TSC, configured from the above components that will be presented to the SPC-2 Workload Generator.
- Listings of scripts used to create the logical representation of the TSC.
- If scripts were not used, a description of the process used with sufficient detail to recreate the logical representation of the TSC.

[Appendix C: Tested Storage Configuration \(TSC\) Creation](#) on page 71 contains the detailed information that describes how to create and configure the logical TSC.

SPC-2 Workload Generator Storage Configuration

Clause 10.6.7.3

The Full Disclosure Report will include all SPC-2 Workload Generator storage configuration commands and parameters used in the SPC-2 benchmark measurement.

The SPC-2 Workload Generator storage configuration commands and parameters for this measurement appear in [Appendix D: SPC-2 Workload Generator Storage Commands and Parameter Files](#) on page 76.

ASU Pre-Fill

Clause 6.3.3

The SPC-2 ASU is required to be completely filled with specified content prior to the execution of audited SPC-2 Tests. The content is required to consist of random data pattern such as that produced by an SPC recommended tool.

...

Clause 6.3.3.3

The required ASU pre-fill must be executed as the first step in the uninterrupted benchmark execution sequence described in Clause 6.4.2. That uninterrupted sequence will consist of: ASU Pre-Fill, Large File Processing, Large Database Query, Video on Demand Delivery and Persistence Test Run 1. The only exception to this requirement is described in Clause 6.3.3.4.

Clause 6.3.3.4

If approved by the Auditor, the Test Sponsor may complete the required ASU pre-fill prior to the execution of the audited SPC-2 Tests and not as part of the SPC-2 Test execution sequence.

The Auditor will verify the required random data pattern content in the ASU prior to the execution of the audited SPC-2 Tests. If that verification fails, the Test Sponsor is required to reload the specified content to the ASU.

The configuration file used to complete the required ASU pre-fill appears in [Appendix D: SPC-2 Workload Generator Storage Commands and Parameter Files](#) on page [76](#).

SPC-2 DATA REPOSITORY

This portion of the Full Disclosure Report presents the detailed information that fully documents the various SPC-2 storage capacities and mappings used in the Tested Storage Configuration. [SPC-2 Data Repository Definitions](#) on page [64](#) contains definitions of terms specific to the SPC-2 Data Repository.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

SPC-2 Storage Capacities and Relationships

Clause 10.6.8.1

Two tables and four charts documenting the storage capacities and relationships of the SPC-2 Storage Hierarchy (Clause 2.1) shall be included in the FDR. ... The capacity value in each chart may be listed as an integer value, for readability, rather than the decimal value listed in the table below.

SPC-2 Storage Capacities

The Physical Storage Capacity consisted of 70,346.250 GB distributed over 144 solid state devices (SSDs) each with a formatted capacity of 488.516 GB. There was 0.000 GB (0.00%) of Unused Storage within the Physical Storage Capacity. Global Storage Overhead consisted of 1,386.255 GB (1.97%) of the Physical Storage Capacity. There was 493.921 GB (0.72%) of Unused Storage within the Configured Storage Capacity. The Total ASU Capacity utilized 100.00% of the Addressable Storage Capacity resulting in 0.000 GB (0.00%) of Unused Storage within the Addressable Storage Capacity. The Data Protection capacity (*Mirroring*) was 28,862.180 GB of which 28,862.180 GB was utilized. The total Unused Storage was 493.921 GB.

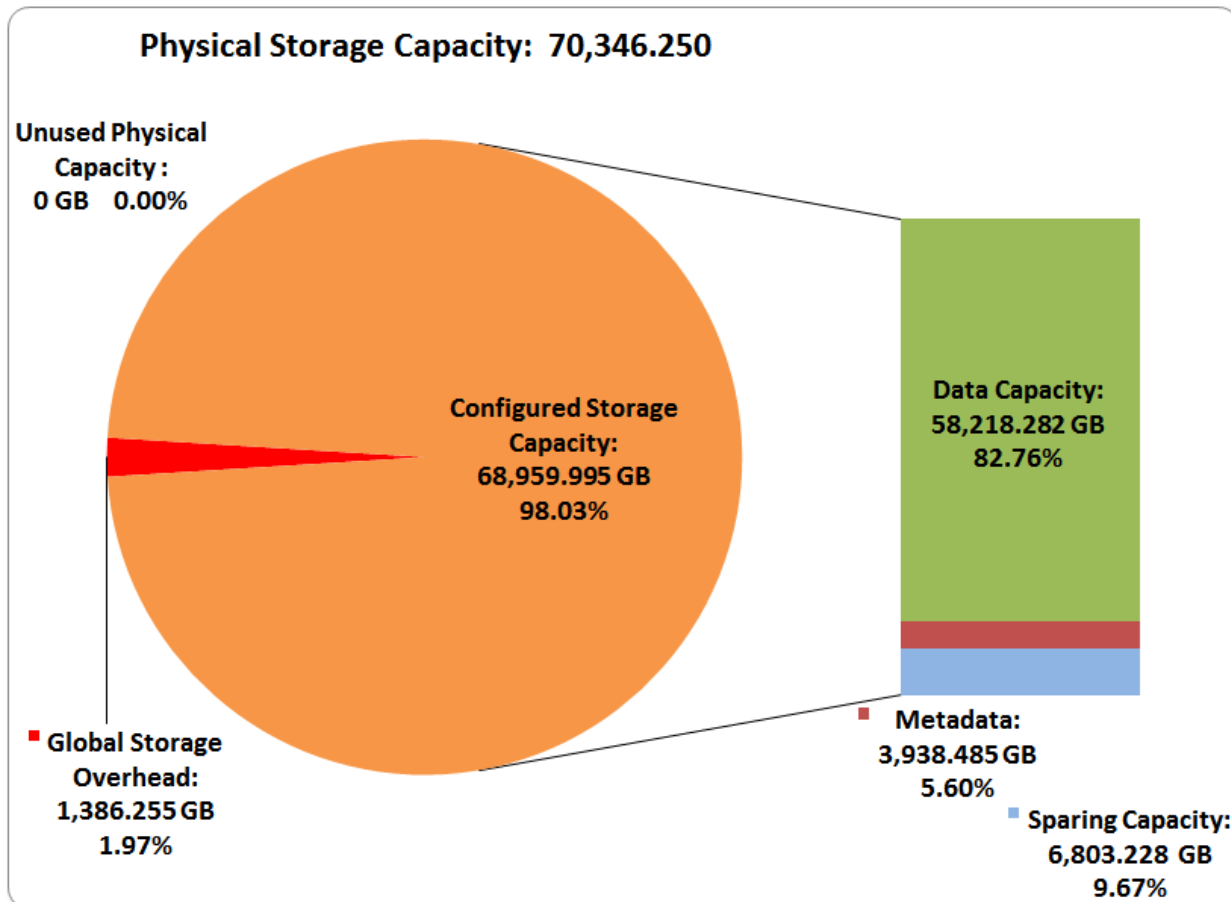
Note: The configured Storage Devices may include additional storage capacity reserved for system overhead, which is not accessible for application use. That storage capacity may not be included in the value presented for Physical Storage Capacity.

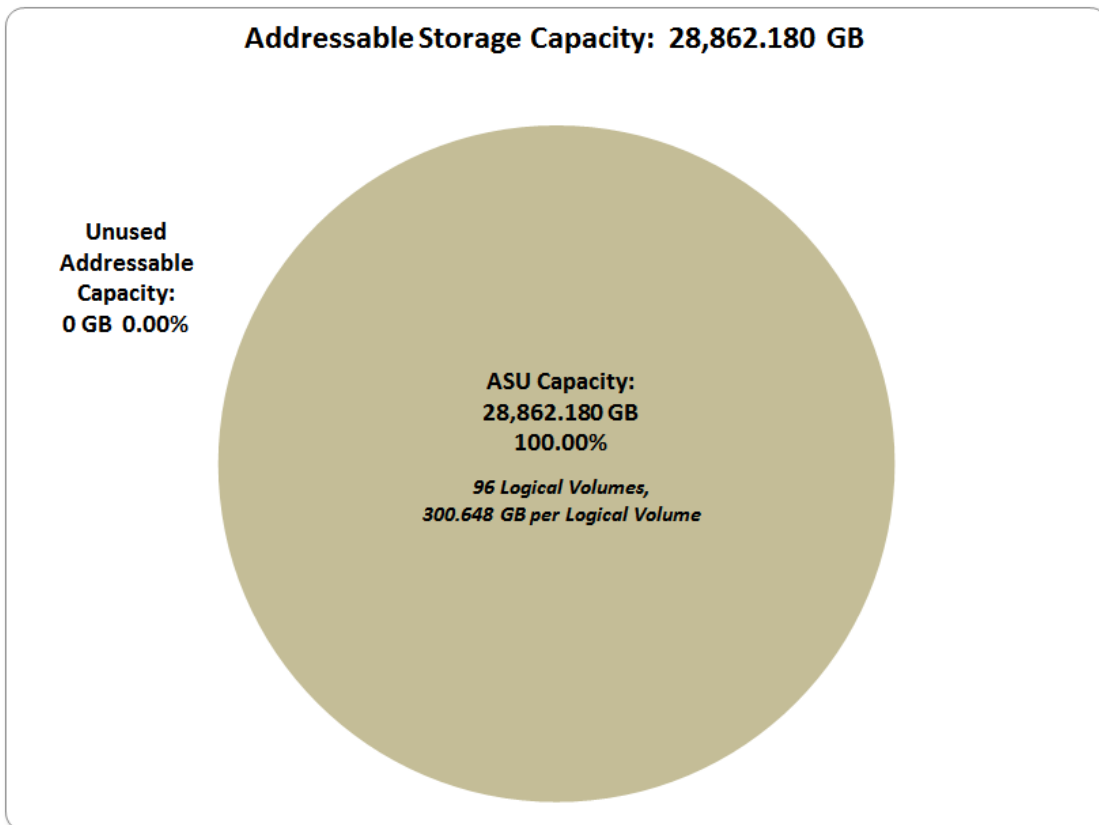
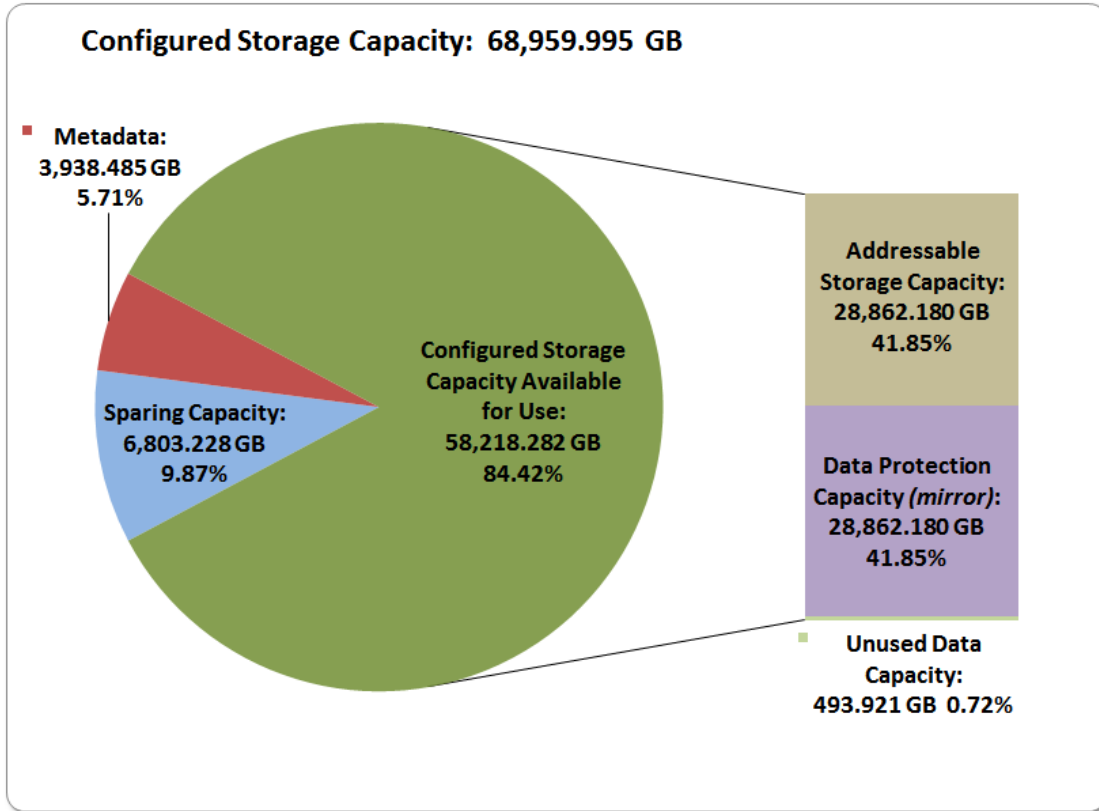
SPC-2 Storage Capacities		
Storage Hierarchy Component	Units	Capacity
Total ASU Capacity	Gigabytes (GB)	28,862.180
Addressable Storage Capacity	Gigabytes (GB)	28,862.180
Configured Storage Capacity	Gigabytes (GB)	68,959.995
Physical Storage Capacity	Gigabytes (GB)	70,346.250
Data Protection (<i>Mirroring</i>)	Gigabytes (GB)	28,862.180
Required Storage (<i>sparing, metadata</i>)	Gigabytes (GB)	10,741.713
Global Storage Overhead	Gigabytes (GB)	1,386.255
Total Unused Storage	Gigabytes (GB)	493.921

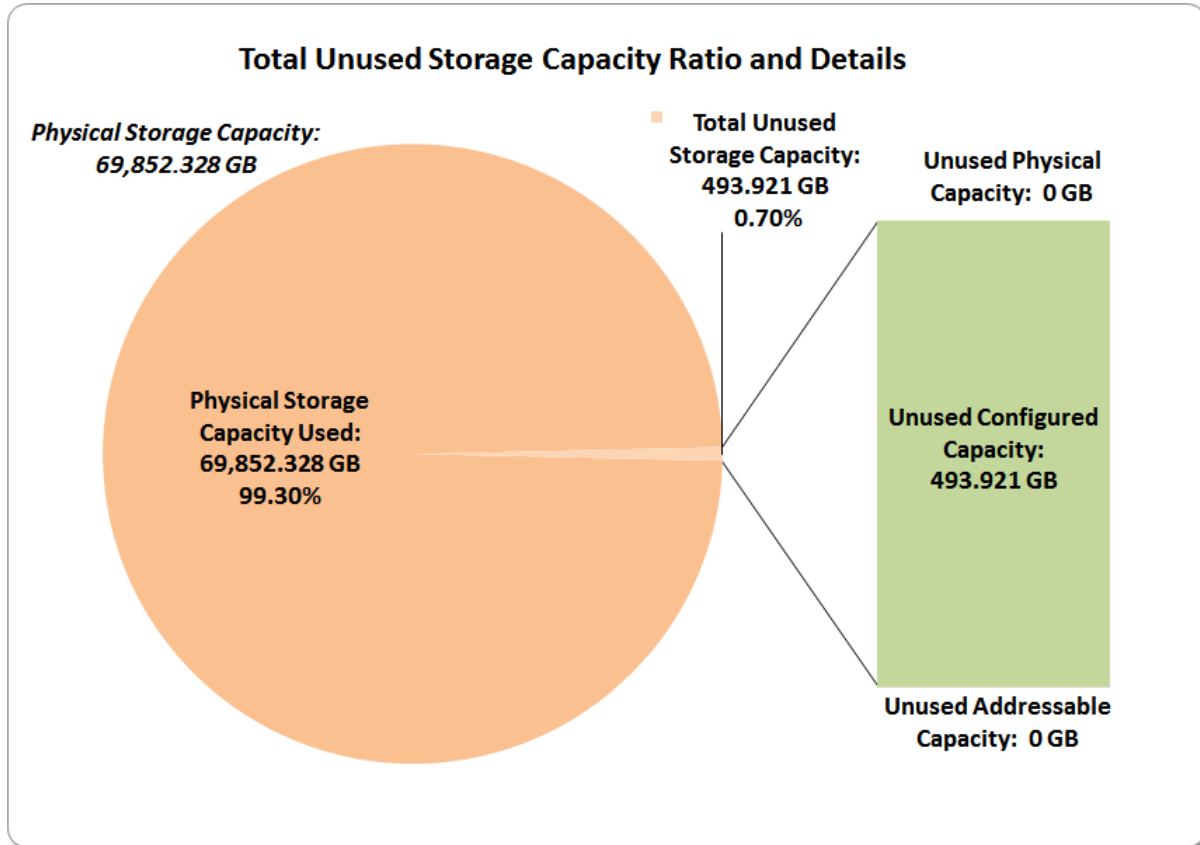
SPC-2 Storage Hierarchy Ratios

	Addressable Storage Capacity	Configured Storage Capacity	Physical Storage Capacity
Total ASU Capacity	100.00%	41.85%	41.03%
Data Protection (RAID-6)		41.85%	41.03%
Addressable Storage Capacity		41.85%	41.03%
Required Storage		15.58%	15.27%
Configured Storage Capacity			98.03%
Global Storage Overhead			1.97%
Unused Storage:			
Addressable	0.00%		
Configured		0.72%	
Physical			0.00%

SPC-2 Storage Capacity Charts







Storage Capacity Utilization

Clause 10.6.8.2

The FDR will include a table illustrating the storage capacity utilization values defined for Application Utilization (Clause 2.8.1), Protected Application Utilization (Clause 2.8.2), and Unused Storage Ratio (Clause 2.8.3).

Clause 2.8.1

Application Utilization is defined as Total ASU Capacity divided by Physical Storage Capacity.

Clause 2.8.2

Protected Application Utilization is defined as (Total ASU Capacity plus total Data Protection Capacity minus unused Data Protection Capacity) divided by Physical Storage Capacity.

Clause 2.8.3

Unused Storage Ratio is defined as Total Unused Capacity divided by Physical Storage Capacity and may not exceed 45%.

SPC-2 Storage Capacity Utilization	
Application Utilization	41.03%
Protected Application Utilization	82.06%
Unused Storage Ratio	0.70%

Logical Volume Capacity and ASU Mapping

Clause 10.6.8.3

A table illustrating the capacity of the Application Storage Unit (ASU) and the mapping of Logical Volumes to ASU will be provided in the FDR. Capacity must be stated in gigabytes (GB) as a value with a minimum of two digits to the right of the decimal point. Each Logical Volume will be sequenced in the table from top to bottom per its position in the contiguous address space of the ASU. Each Logical Volume entry will list its total capacity, the portion of that capacity used for the ASU, and any unused capacity.

Logical Volume (LV) Capacity and Mapping			
ASU (28,862.180 GB)			
	Total Capacity (GB)	Capacity Used (GB)	Capacity Unused (GB)
96 Logical Volumes	300.648per LV	300.648 per LV	0.000 per LV

See the Storage Definition (sd) entries in [Appendix D: SPC-2 Workload Generator Storage Commands and Parameter](#) Files on page [76](#) for more detailed configuration information.

SPC-2 BENCHMARK EXECUTION RESULTS

This portion of the Full Disclosure Report documents the results of the various SPC-2 Tests, Test Phases, Test Run Sequences, and Test Runs. An [SPC-2 glossary](#) on page [64](#) contains definitions of terms specific to the SPC-2 Data Repository.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

SPC-2 Tests, Test Phases, Test Run Sequences, and Test Runs

The SPC-2 benchmark consists of the following Tests, Test Phases, Test Run Sequences, and Test Runs:

- **Data Persistence Test**
 - Data Persistence Test Run 1
 - Data Persistence Test Run 2
- **Large File Processing Test**
 - WRITE ONLY Test Phase
 - Test Run Sequence 1
 - ✓ Test Run 1 – 1024 KiB Transfer – maximum number of Streams
 - ✓ Test Run 2 – 1024 KiB Transfer – 50% of Test Run 1’s Streams value
 - ✓ Test Run 3 – 1024 KiB Transfer – 25% of Test Run 1’s Streams value
 - ✓ Test Run 4 – 1024 KiB Transfer – 12.5% of Test Run 1’s Streams value
 - ✓ Test Run 5 – 1024 KiB Transfer – single (1) Stream
 - Test Run Sequence 2
 - ✓ Test Run 6 – 256 KiB Transfer – maximum number of Streams
 - ✓ Test Run 7 – 256 KiB Transfer – 50% of Test Run 6’s Streams value
 - ✓ Test Run 8 – 256 KiB Transfer – 25% of Test Run 6’s Streams value
 - ✓ Test Run 9 – 256 KiB Transfer – 12.5% of Test Run 6’s Streams value
 - ✓ Test Run 10 – 256 KiB Transfer – single (1) Stream
 - READ-WRITE Test Phase
 - Test Run Sequence 3
 - ✓ Test Run 11 – 1024 KiB Transfer – maximum number of Streams
 - ✓ Test Run 12 – 1024 KiB Transfer – 50% of Test Run 11’s Streams value
 - ✓ Test Run 13 – 1024 KiB Transfer – 25% of Test Run 11’s Streams value
 - ✓ Test Run 14 – 1024 KiB Transfer – 12.5% of Test Run 11’s Streams value
 - ✓ Test Run 15 – 1024 KiB Transfer – single (1) Stream
 - Test Run Sequence 4
 - ✓ Test Run 16 – 256 KiB Transfer – maximum number of Streams
 - ✓ Test Run 17 – 256 KiB Transfer – 50% of Test Run 16’s Streams value
 - ✓ Test Run 18 – 256 KiB Transfer – 25% of Test Run 16’s Streams value
 - ✓ Test Run 19 – 256 KiB Transfer – 12.5% of Test Run 16’s Streams value
 - ✓ Test Run 20 – 256 KiB Transfer – single (1) Stream
 - READ ONLY Test Phase
 - Test Run Sequence 5
 - ✓ Test Run 21 – 1024 KiB Transfer – maximum number of Streams

- ✓ Test Run 22 – 1024 KiB Transfer – 50% of Test Run 21’s Streams value
- ✓ Test Run 23 – 1024 KiB Transfer – 25% of Test Run 21’s Streams value
- ✓ Test Run 24 – 1024 KiB Transfer – 12.5% of Test Run 21’s Streams value
- ✓ Test Run 25 – 1024 KiB Transfer – single (1) Stream
- Test Run Sequence 6
 - ✓ Test Run 26 – 256 KiB Transfer – maximum number of Streams
 - ✓ Test Run 27 – 256 KiB Transfer – 50% of Test Run 26’s Streams value
 - ✓ Test Run 28 – 256 KiB Transfer – 25% of Test Run 26’s Streams value
 - ✓ Test Run 29 – 256 KiB Transfer – 12.5% of Test Run 26’s Streams value
 - ✓ Test Run 30 – 256 KiB Transfer – single (1) Stream
- **Large Database Query Test**
 - 1024 KIB TRANSFER SIZE Test Phase
 - Test Run Sequence 1
 - ✓ Test Run 1 – 4 I/O Requests Outstanding – maximum number of Streams
 - ✓ Test Run 2 – 4 I/O Requests Outstanding – 50% of Test Run 1’s Streams value
 - ✓ Test Run 3 – 4 I/O Requests Outstanding – 25% of Test Run 1’s Streams value
 - ✓ Test Run 4 – 4 I/O Requests Outstanding – 12.5% of Test Run 1’s Streams value
 - ✓ Test Run 5 – 4 I/O Requests Outstanding – single (1) Stream
 - Test Run Sequence 2
 - ✓ Test Run 6 – 1 I/O Request Outstanding – maximum number of Streams
 - ✓ Test Run 7 – 1 I/O Request Outstanding – 50% of Test Run 6’s Streams value
 - ✓ Test Run 8 – 1 I/O Request Outstanding – 25% of Test Run 6’s Streams value
 - ✓ Test Run 9 – 1 I/O Request Outstanding – 12.5% of Test Run 6’s Streams value
 - ✓ Test Run 10 – 1 I/O Request Outstanding – single (1) Stream
 - 64 KIB TRANSFER SIZE Test Phase
 - Test Run Sequence 3
 - ✓ Test Run 11 – 4 I/O Requests Outstanding – maximum number of Streams
 - ✓ Test Run 12 – 4 I/O Requests Outstanding – 50% of Test Run 11’s Streams value
 - ✓ Test Run 13 – 4 I/O Requests Outstanding – 25% of Test Run 11’s Streams value
 - ✓ Test Run 14 – 4 I/O Requests Outstanding – 12.5% of Test Run 11’s Streams value
 - ✓ Test Run 15 – 4 I/O Requests Outstanding – single (1) Stream
 - Test Run Sequence 4
 - ✓ Test Run 16 – 1 I/O Request Outstanding – maximum number of Streams
 - ✓ Test Run 17 – 1 I/O Request Outstanding – 50% of Test Run 16’s Streams value
 - ✓ Test Run 18 – 1 I/O Request Outstanding – 25% of Test Run 16’s Streams value
 - ✓ Test Run 19 – 1 I/O Request Outstanding – 12.5% of Test Run 16’s Streams value
 - ✓ Test Run 20 – 1 I/O Request Outstanding – single (1) Stream
- **Video on Demand Delivery Test**
 - Video on Demand Delivery Test Run

Each Test is an atomic unit that must be executed from start to finish before any other Test, Test Phase, or Test Run may be executed. The Tests may be executed in any sequence.

The results from each Test, Test Phase, and Test Run are listed below along with a more detailed explanation of each component.

Large File Processing Test

Clause 6.4.3.1

The Large File Processing Test consists of the I/O operations associated with the type of applications, in a wide range of fields, which require simple sequential processing of one or more large files. Specific examples of those types of applications include scientific computing and large-scale financial processing

Clause 6.4.3.2

The Large File Processing Test has three Test Phases, which shall be executed in the following uninterrupted sequence:

1. *WRITE ONLY*
2. *READ-WRITE*
3. *READ ONLY*

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Large File Processing Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.9.1

The Full Disclosure Report will contain the following content for the Large File Processing Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Large File Processing Test.*
2. *The human readable SPC-2 Test Results File for each of the Test Runs in the Large File Processing Test.*
3. *The following three tables:*
 - *Average Data Rate: The average Data Rate, in MB per second for the Measurement Interval of each Test Run in the Large File Processing Test.*
 - *Average Data Rate per Stream: The average Data Rate per Stream, in MB per second, for the Measurement Interval of each Test Run in the Large File Processing Test.*
 - *Average Response Time: The average response time, in milliseconds (ms), for the Measurement Interval of each Test Run in the Large File Processing Test.*
4. *Average Data Rate, Average Data Rate per Stream and Average Response Time graphs as defined in Clauses 10.1.1, 10.1.2 and 10.1.3.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Large File Processing Test Runs are documented in [Appendix E: SPC-2 Workload Generator Execution Commands and Parameters](#) on Page [145](#).

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Large File Processing Test Runs is listed below.

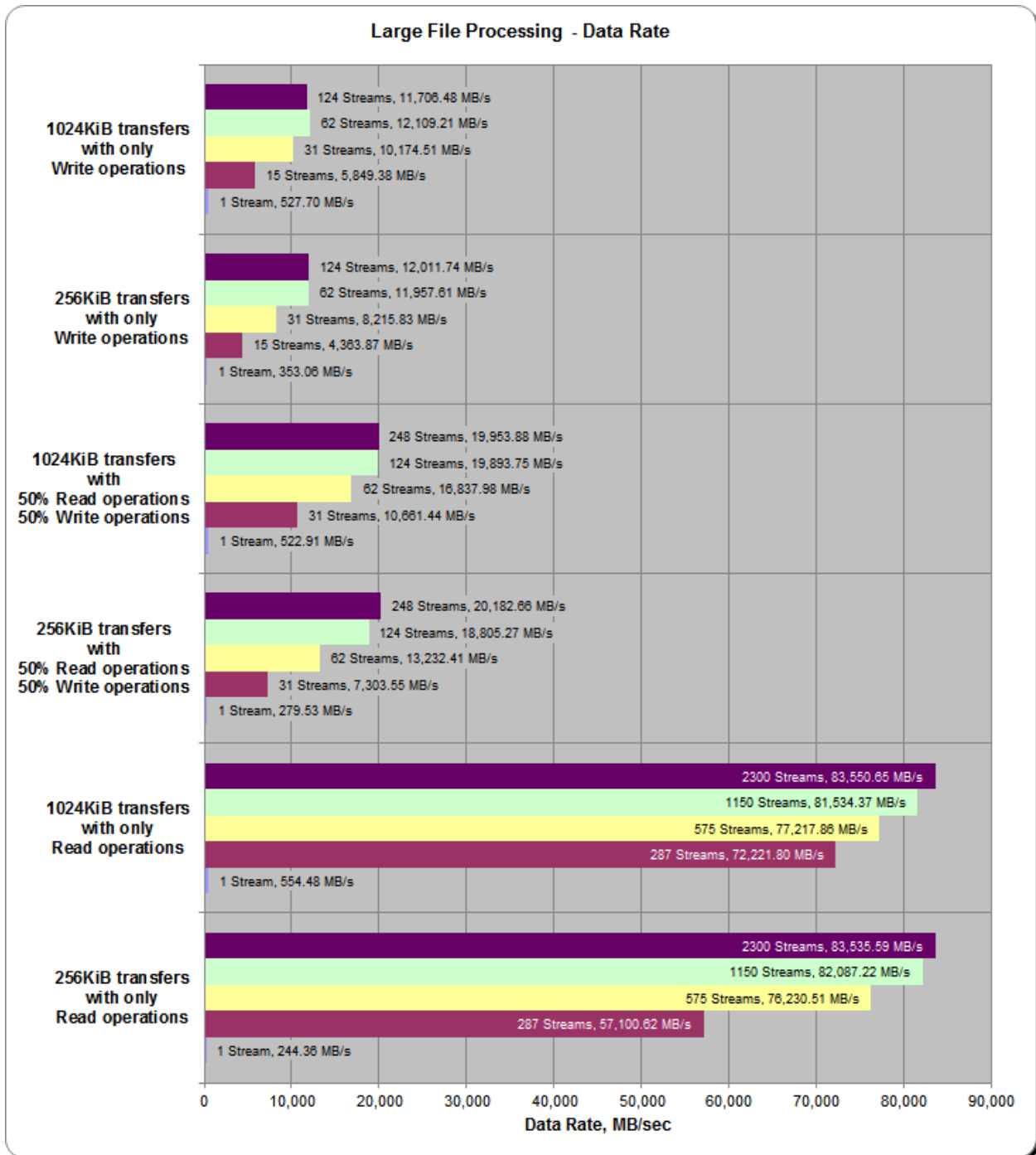
[SPC-2 Large File Processing Test Results File](#)

SPC-2 Large File Processing Average Data Rates (MB/s)

The average Data Rate (MB/s) for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 1024KiB	527.70	5,849.38	10,174.51	12,109.21	11,706.48
Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 256KiB	353.06	4,363.87	8,215.83	11,957.61	12,011.74
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 1024KiB	522.91	10,661.44	16,837.98	19,893.75	19,953.88
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 256KiB	279.53	7,303.55	13,232.41	18,805.27	20,182.66
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 1024KiB	554.48	72,221.80	77,217.86	81,534.37	83,550.65
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 256KiB	244.36	57,100.62	76,230.51	82,087.22	83,535.59

SPC-2 Large File Processing Average Data Rates Graph

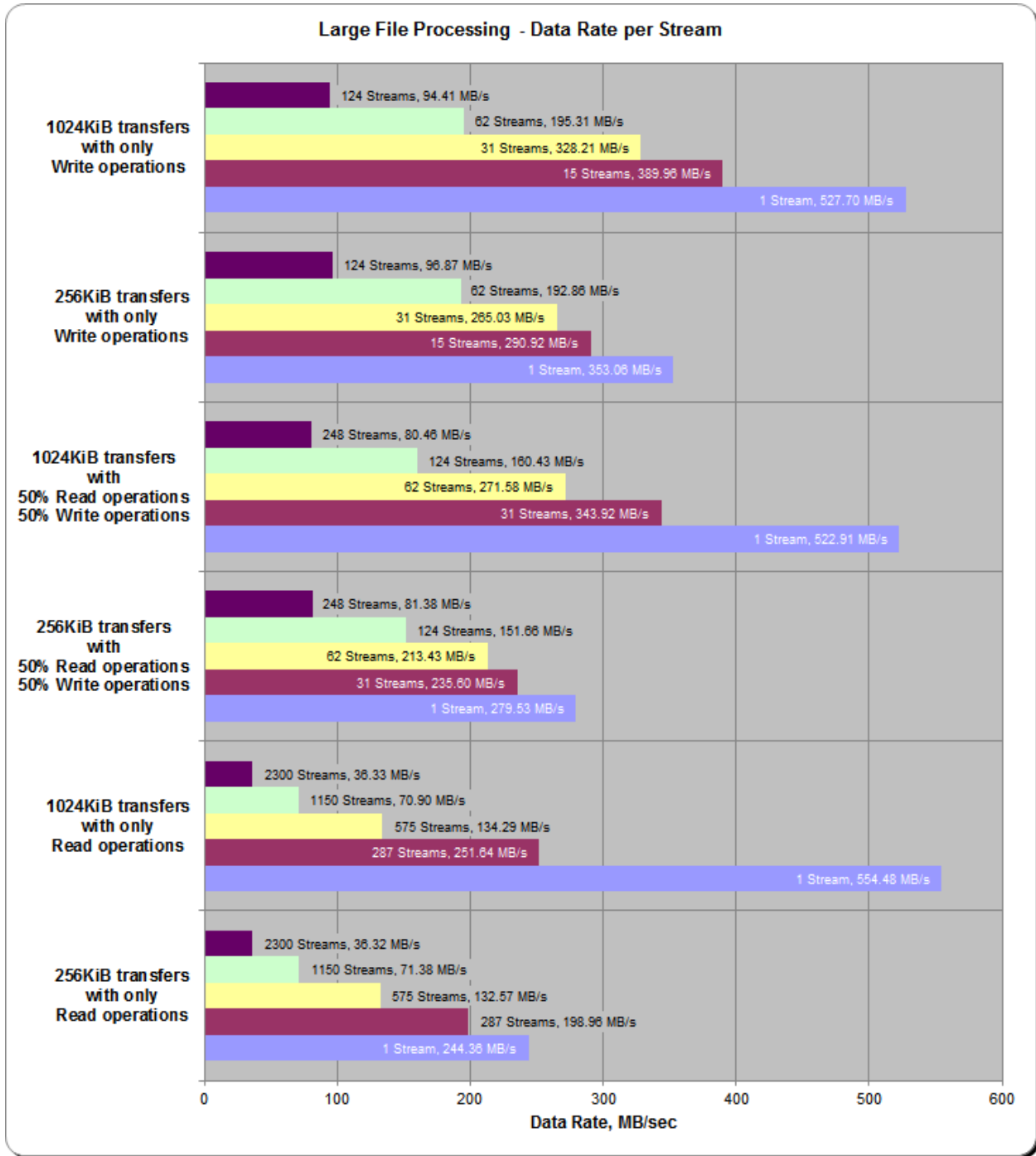


SPC-2 Large File Processing Average Data Rate per Stream

The average Data Rate per Stream for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 1024KiB	527.70	389.96	328.21	195.31	94.41
Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 256KiB	353.06	290.92	265.03	192.86	96.87
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 1024KiB	522.91	343.92	271.58	160.43	80.46
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 256KiB	279.53	235.60	213.43	151.66	81.38
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 1024KiB	554.48	251.64	134.29	70.90	36.33
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 256KiB	244.36	198.96	132.57	71.38	36.32

SPC-2 Large File Processing Average Data Rate per Stream Graph

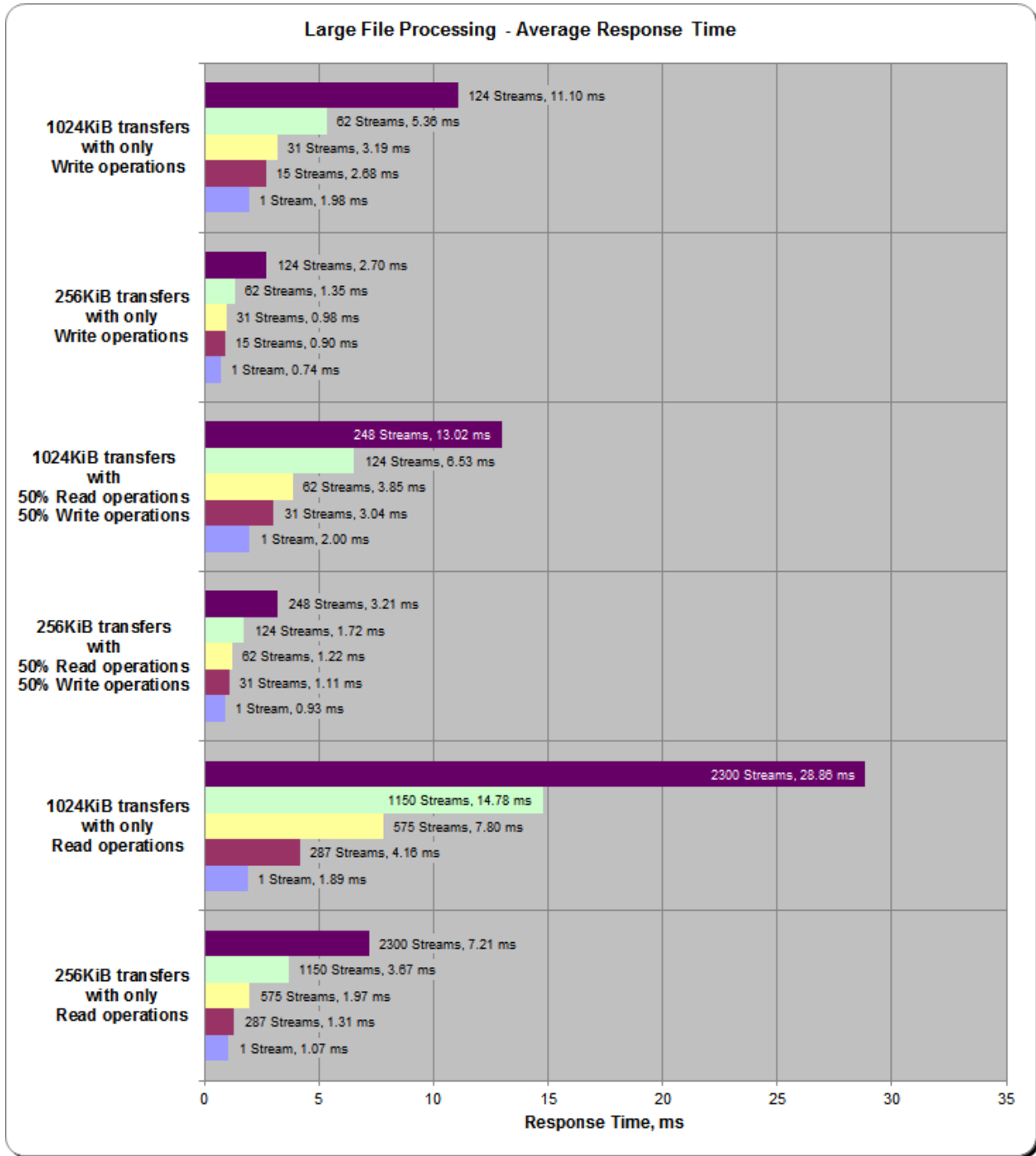


SPC-2 Large File Processing Average Response Time

The average Response Time, milliseconds (ms), for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 1024KiB	1.98	2.68	3.19	5.36	11.10
Test Run Sequence	1 Stream	15 Streams	31 Streams	62 Streams	124 Streams
Write 256KiB	0.74	0.90	0.98	1.35	2.70
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 1024KiB	2.00	3.04	3.85	6.53	13.02
Test Run Sequence	1 Stream	31 Streams	62 Streams	124 Streams	248 Streams
Read/Write 256KiB	0.93	1.11	1.22	1.72	3.21
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 1024KiB	1.89	4.16	7.80	14.78	28.86
Test Run Sequence	1 Stream	287 Streams	575 Streams	1150 Streams	2300 Streams
Read 256KiB	1.07	1.31	1.97	3.67	7.21

SPC-2 Large File Processing Average Response Time Graph



Large File Processing Test – WRITE ONLY Test Phase

Clause 10.6.9.1.1

1. *A table that will contain the following information for each "WRITE ONLY, 1024 KiB Transfer Size" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
2. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "WRITE ONLY, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*
3. *A table that will contain the following information for each "WRITE ONLY, 256 KiB Transfer Size" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
4. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "WRITE ONLY, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

A hyperlink for each of the above tables and graphs may appear in the FDR to provide access to the table or graph.

A hyperlink to a table with the SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" Test Run data appears on the next page. That entry is followed by hyperlinks to graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the above SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" entries will be hyperlinks for SPC-2 "Large File Processing/WRITE ONLY/256 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 “Large File Processing/WRITE ONLY/1024 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/WRITE ONLY/1024 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/WRITE ONLY/1024 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/WRITE ONLY/1024 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

SPC-2 “Large File Processing/WRITE ONLY/256 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/WRITE ONLY/256 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/WRITE ONLY/256 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/WRITE ONLY/256 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

Large File Processing Test – READ-WRITE Test Phase

Clause 10.6.9.1.2

1. *A table that will contain the following information for each "READ-WRITE, 1024 KiB Transfer Size" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
2. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "READ-WRITE, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*
3. *A table that will contain the following information for each "READ-WRITE, 256 KiB Transfer Size" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
4. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "READ-WRITE, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

A hyperlink for each of the above tables and graphs may appear in the FDR to provide access to the table or graph.

A hyperlink to a table with the SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Test Run data appears on the next page. That entry is followed by hyperlinks to graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the above SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" entries will be hyperlinks for SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 “Large File Processing/READ-WRITE/1024 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/READ-WRITE/1024 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/READ-WRITE/1024 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/READ-WRITE/1024 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

SPC-2 “Large File Processing/READ-WRITE/256 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/READ-WRITE/256 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/READ-WRITE/256 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/READ-WRITE/256 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

Large File Processing Test – READ ONLY Test Phase

Clause 10.6.9.1.3

1. A table that will contain the following information for each "READ ONLY, 1024 KiB Transfer Size" Test Run:
 - The number of Streams specified.
 - The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.
2. Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "READ ONLY, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.
3. A table that will contain the following information for each "READ ONLY, 256 KiB Transfer Size" Test Run:
 - The number of Streams specified.
 - The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.
4. Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "READ ONLY, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.

A hyperlink for each of the above tables and graphs may appear in the FDR to provide access to the table or graph.

A hyperlink to a table with the SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Test Run data appears on the next page. That entry is followed by hyperlinks to graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the above SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" entries will be hyperlinks for SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 “Large File Processing/READ ONLY/1024 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/READ ONLY/1024 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/READ ONLY/1024 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/READ ONLY/1024 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

SPC-2 “Large File Processing/READ ONLY/256 KiB Transfer Size” Test Run Data

[SPC-2 “Large File Processing/READ ONLY/256 KiB Transfer Size” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)
(3 pages)

SPC-2 “Large File Processing/READ ONLY/256 KiB Transfer Size” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large File Processing/READ ONLY/256 KiB Transfer Size” graphs](#)
(four pages, 1 graph per page)

Large Database Query Test

Clause 6.4.4.1

The Large Database Query Test is comprised of a set of I/O operations representative of scans or joins of large relational tables such as those performed for data mining or business intelligence.

Clause 6.4.4.2

The Large Database Query Test has two Test Phases, which shall be executed in the following uninterrupted sequence:

- 1. 1024 KiB TRANSFER SIZE*
- 2. 64 KiB TRANSFER SIZE*

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Large File Processing Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.9.2

The Full Disclosure Report will contain the following content for the Large Database Query Test:

- 1. A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Large Database Query Test.*
- 2. The human readable SPC-2 Test Results File for each of the Test Runs in the Large Database Query Test.*
- 3. A table that contains the following information for each Test Run in the two Test Phases of the Large Database Query Test:*
 - Average Data Rate: The average Data Rate, in MB per second for the Measurement Interval of each Test Run in the Large Database Query Test.*
 - Average Data Rate per Stream: The average Data Rate per Stream, in MB per second, for the Measurement Interval of each Test Run in the Large Database Query Test.*
 - Average Response Time: The average response time, in milliseconds (ms), for the Measurement Interval of each Test Run in the Large Database Query Test.*
- 4. Average Data Rate, Average Data Rate per Stream and Average Response time graphs as defined in Clauses 10.1.1, 10.1.2 and 10.1.3.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Large Database Query Test Runs are documented in [Appendix E: SPC-2 Workload Generator Execution Commands and Parameters](#) on Page [145](#).

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Large Database Query Test Runs is listed below.

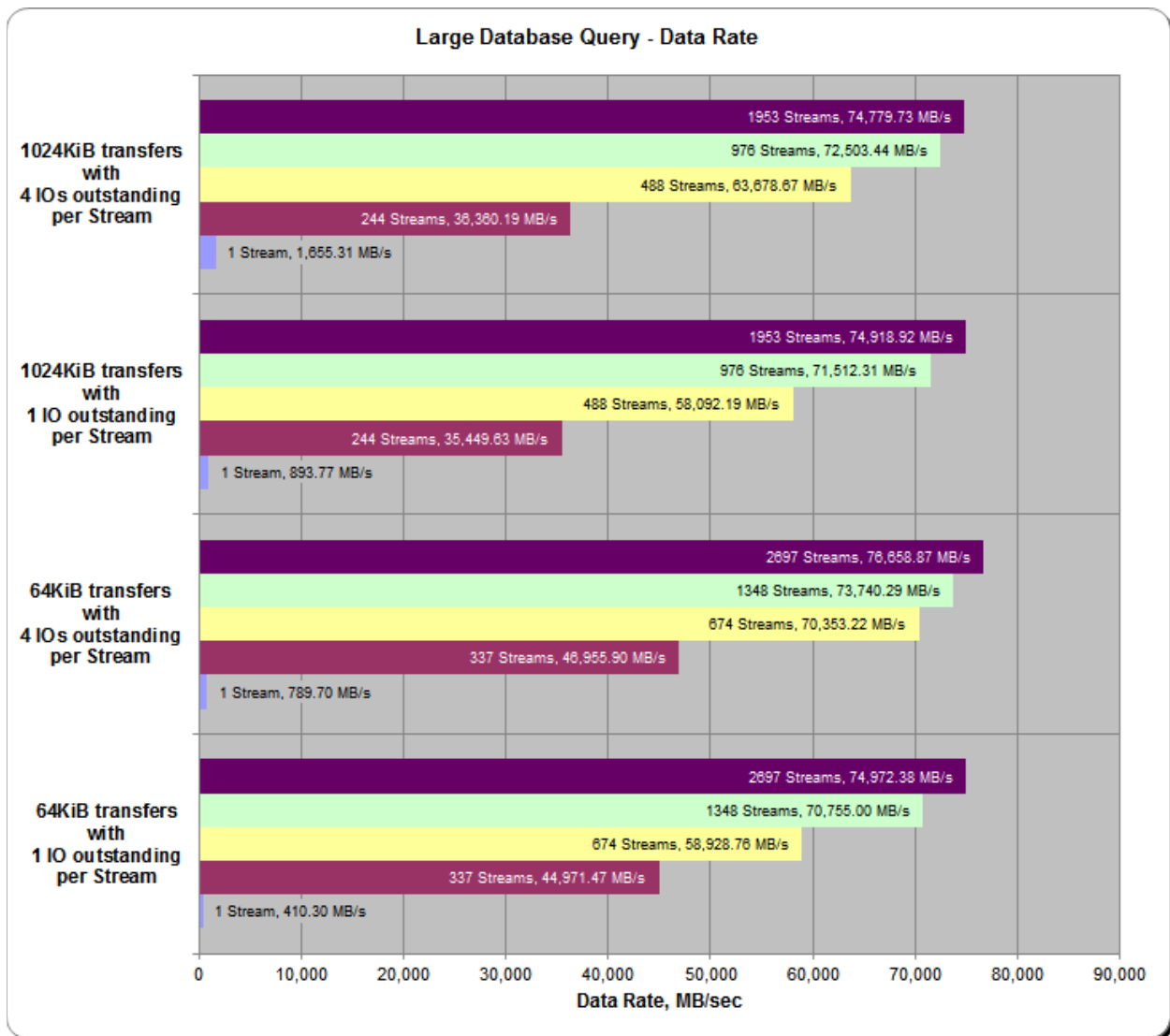
[SPC-2 Large Database Query Test Results File](#)

SPC-2 Large Database Query Average Data Rates (MB/s)

The average Data Rate (MB/s) for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 4 IOs/Stream	1,655.31	36,360.19	63,678.67	72,503.44	74,779.73
Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 1 IO/Stream	893.77	35,449.63	58,092.19	71,512.31	74,918.92
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 4 IOs/Stream	789.70	46,955.90	70,353.22	73,740.29	76,658.87
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 1 IO/Stream	410.30	44,971.47	58,928.76	70,755.00	74,972.38

SPC-2 Large Database Query Average Data Rates Graph

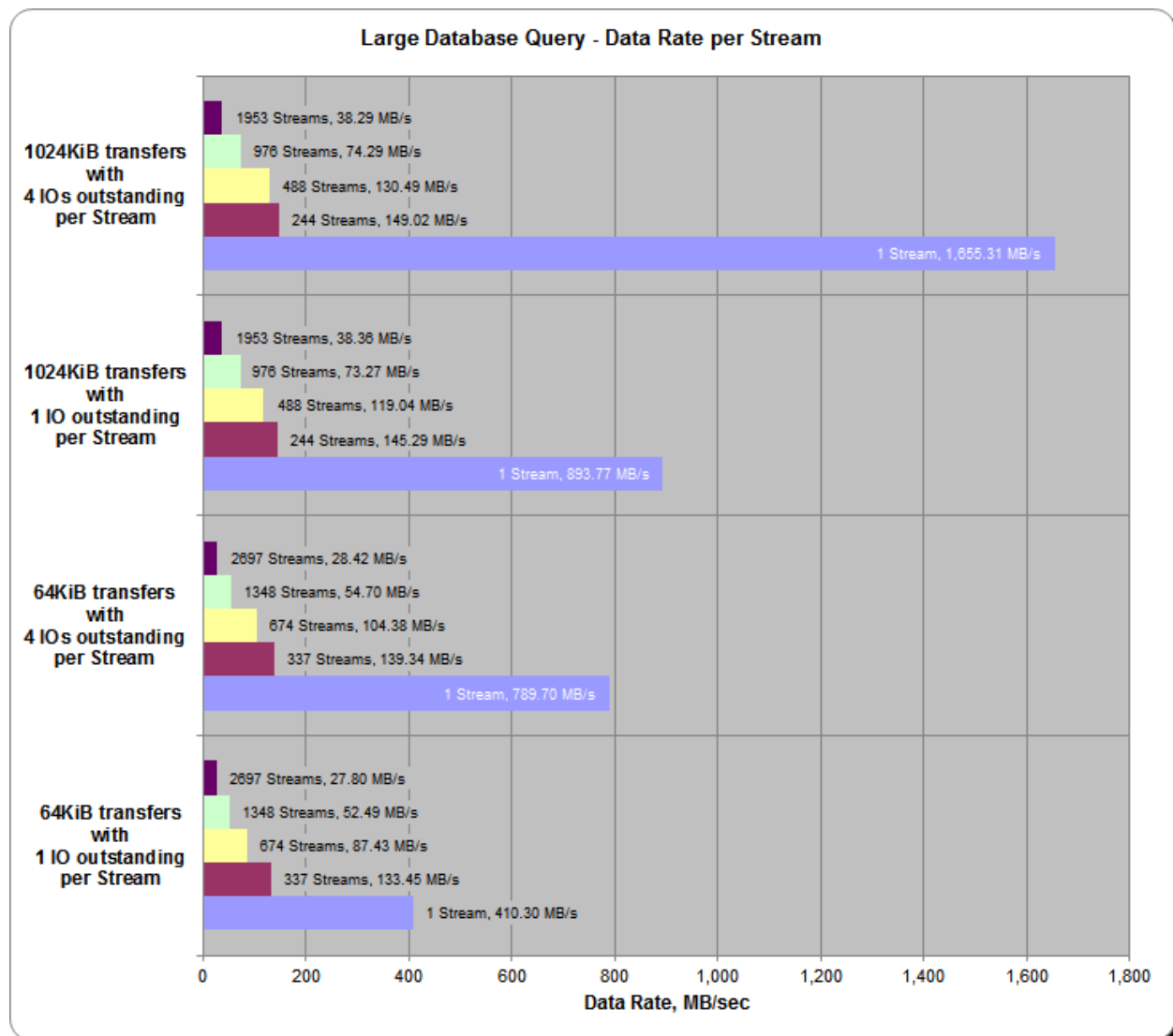


SPC-2 Large Database Query Average Data Rate per Stream

The average Data Rate per Stream for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 4 IOs/Stream	1,655.31	149.02	130.49	74.29	38.29
Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 1 IO/Stream	893.77	145.29	119.04	73.27	38.36
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 4 IOs/Stream	789.70	139.34	104.38	54.70	28.42
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 1 IO/Stream	410.30	133.45	87.43	52.49	27.80

SPC-2 Large Database Query Average Data Rate per Stream Graph

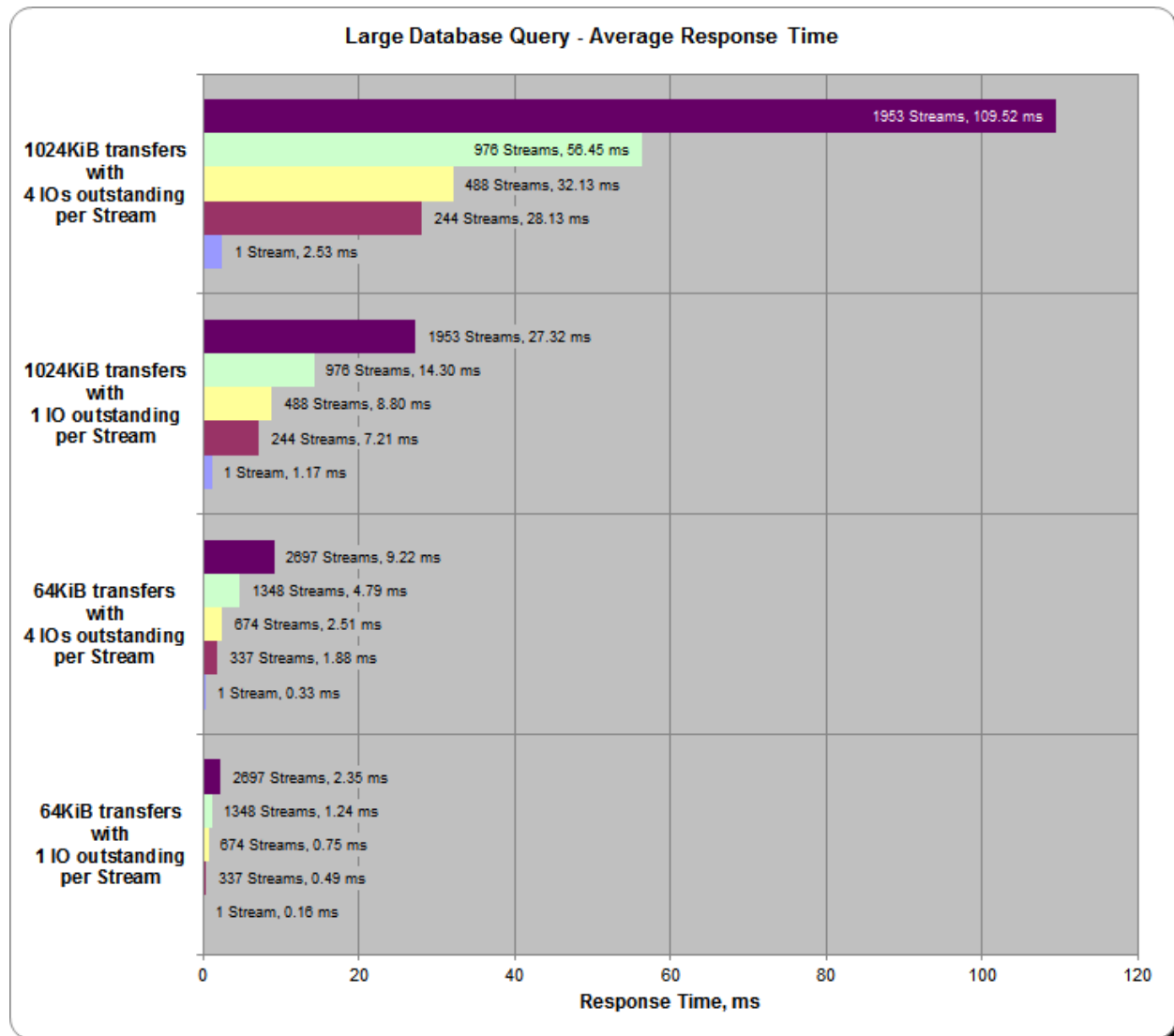


SPC-2 Large Database Query Average Response Time

The average Response Time, in milliseconds, for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 4 IOs/Stream	2.53	28.13	32.13	56.45	109.52
Test Run Sequence	1 Stream	244 Streams	488 Streams	976 Streams	1953 Streams
1024KiB w/ 1 IO/Stream	1.17	7.21	8.80	14.30	27.32
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 4 IOs/Stream	0.33	1.88	2.51	4.79	9.22
Test Run Sequence	1 Stream	337 Streams	674 Streams	1348 Streams	2697 Streams
64KiB w/ 1 IO/Stream	0.16	0.49	0.75	1.24	2.35

SPC-2 Large Database Query Average Response Time Graph



Large Database Query Test – 1024 KiB TRANSFER SIZE Test Phase

Clause 10.6.9.2.1

1. *A table that will contain the following information for each "1024 KiB Transfer Size, 4 Outstanding I/Os" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
2. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "1024 KiB Transfer Size, 4 Outstanding I/Os" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*
3. *A table that will contain the following information for each "1024 KiB Transfer Size, 1 Outstanding I/O" Test Run:*
 - *The number of Streams specified.*
 - *The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.*
4. *Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "1024 KiB Transfer Size, 1 Outstanding I/O" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

A hyperlink for each of the above tables and graphs may appear in the FDR to provide access to the table or graph.

A hyperlink to a table with the SPC-2 "Large Database Query/1024 KiB TRANSFER SIZE/4 Outstanding I/Os" Test Run data appears on the next page. That entry is followed by hyperlinks to graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the above SPC-2 "Large Database Query/1024 KiB TRANSFER SIZE/4 Outstanding I/Os" entries will be hyperlinks for SPC-2 "Large Database Query/1024 KiB TRANSFER SIZE/1 Outstanding I/O" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/4 Outstanding I/Os” Test Run Data

[SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/4 Outstanding I/Os” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)

(3 pages)

SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/4 Outstanding I/Os” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/4 Outstanding I/Os” graphs](#)

(four pages, 1 graph per page)

SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/1 Outstanding I/O” Test Run Data

[SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/1 Outstanding I/O” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)

(3 pages)

SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/1 Outstanding I/O” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large Database Query/1024 KIB TRANSFER SIZE/1 Outstanding I/O” graphs](#)

(four pages, 1 graph per page)

Large Database Query Test – 64 KiB TRANSFER SIZE Test Phase

Clause 10.6.9.2.2

1. A table that will contain the following information for each "64 KiB Transfer Size, 4 Outstanding I/Os" Test Run:
 - The number of Streams specified.
 - The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.
2. Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "64 KiB Transfer Size, 4 Outstanding I/Os" Test Runs as specified in Clauses 10.1.4 – 10.1.6.
3. A table that will contain the following information for each "64 KiB Transfer Size, 1 Outstanding I/O" Test Run:
 - The number of Streams specified.
 - The Average Data Rate, Average Data Rate per Stream, and Average Response Time reported at five second intervals.
4. Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the "64 KiB Transfer Size, 1 Outstanding I/O" Test Runs as specified in Clauses 10.1.4 – 10.1.6.

A hyperlink for each of the above tables and graphs may appear in the FDR to provide access to the table or graph.

A hyperlink to a table with the SPC-2 "Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os" Test Run data appears on the next page. That entry is followed by hyperlinks to graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the above SPC-2 "Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os" entries will be hyperlinks for SPC-2 "Large Database Query/64 KiB TRANSFER SIZE/1 Outstanding I/O" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os” Test Run Data

[SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)

(3 pages)

SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/4 Outstanding I/Os” graphs](#)

(four pages, 1 graph per page)

SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/1 Outstanding I/O” Test Run Data

[SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/1 Outstanding I/O” Test Run Data Tables: Ramp-Up, Measurement Interval, Run-Out, and Ramp-Down Periods](#)

(3 pages)

SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/1 Outstanding I/O” Graphs

Average Data Rate – Complete Test Run

Average Data Rate – Measurement Interval (MI) Only

Average Data Rate per Stream

Average Response Time

[SPC-2 “Large Database Query/64 KiB TRANSFER SIZE/1 Outstanding I/O” graphs](#)

(four pages, 1 graph per page)

Video on Demand Delivery Test

Clause 6.4.5.1

The Video on Demand Delivery Test represents the I/O operations required to enable individualized video entertainment for a community of subscribers, which draw from a digital film library.

Clause 6.4.5.2

The Video on Demand Delivery Test consists of one (1) Test Run.

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Video on Demand Delivery Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.9.3

The Full Disclosure Report will contain the following content for the Video on Demand Delivery Test:

- 1. A listing of the SPC-2 Workload Generator commands and parameters used to execute the Test Run in the Video on Demand Delivery Test.*
- 2. The human readable SPC-2 Test Results File for the Test Run in the Video on Demand Delivery Test.*
- 3. A table that contains the following information for the Test Run in the Video on Demand Delivery Test:*
 - The number Streams specified.*
 - The Ramp-Up duration in seconds.*
 - The Measurement Interval duration in seconds.*
 - The average data rate, in MB per second, for the Measurement Interval.*
 - The average data rate, in MB per second, per Stream for the Measurement Interval.*
- 4. A table that contains the following information for the single Video on Demand Delivery Test Run:*
 - The number Streams specified.*
 - The average data rate, average data rate per stream, average Response Time, and Maximum Response Time reported at 60 second intervals.*
- 5. Average Data Rate by Intervals, Average Data Rate per Stream by Intervals, and Average Response Time by Intervals graphs for the single Video on Demand Delivery Test Run as specified in Clause 10.1.8.*
- 6. A Maximum Response Time (intervals) graph as specified in Clause 10.1.8.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Video on Demand Delivery Test Run are documented in [Appendix E: SPC-2 Workload Generator Execution Commands and Parameters](#) on Page [145](#)..

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Video on Demand Delivery Test Run is listed below.

[SPC-2 Video on Demand Delivery Test Results File](#)

SPC-2 Video on Demand Delivery Test Run Data

The number of Streams specified, Ramp-Up duration in seconds, Measurement Interval duration in seconds, average Data Rate for the Measurement Interval, and average Data Rate per Stream for the Measurement Interval are listed in the following table.

SPC-2-VOD	TR1
Number of Streams	95,000
Ramp-up Time, sec	4,501
Measurement Interval, sec	7,200
Average Data Rate, MB/sec	74,710.71
Per Stream Data Rate, MB/sec	0.79
Average Response Time, ms	1.93
Average Max Response Time, ms	41.72

Video on Demand Delivery Test – TEST RUN DATA BY INTERVAL

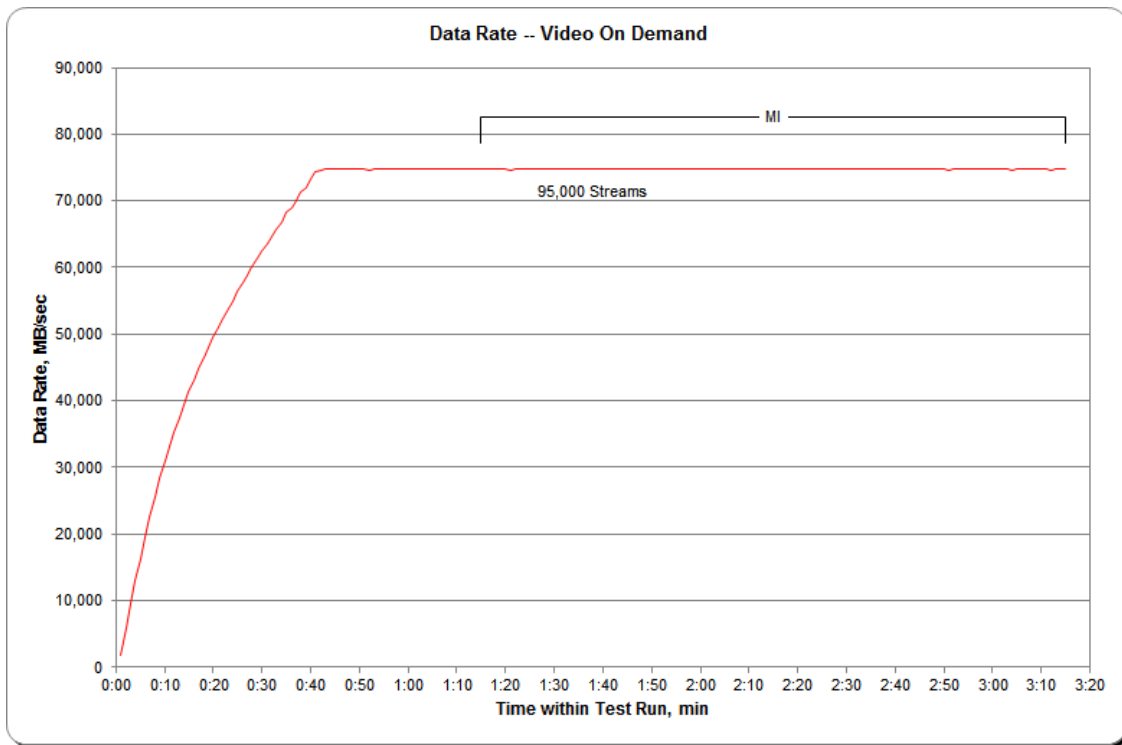
The SPC-2 Video on Demand Delivery Test Run data is contained in the table that appears below. That table is followed by graphs illustrating the average Data Rate and average Data Rate per Stream produced by the same Test Runs. The table and graphs present the data at sixty second intervals.

95,000 Streams					95,000 Streams					95,000 Streams				
TR1	95,000 Streams				TR1	95,000 Streams				TR1	95,000 Streams			
Test Run Sequence Time	Data Rate, MB/sec	/Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	/Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	/Stream, MB/sec	Response Time, ms	Maximum Response Time, ms
0:01:00	1,853.88	0.66	3.71	425.94	0:34:00	66,761.17	0.78	124.01	14,380.17	1:07:00	74,763.05	0.79	1.92	46.31
0:02:00	5,906.70	0.76	11.58	1,092.66	0:35:00	68,207.34	0.79	122.18	16,968.53	1:08:00	74,689.05	0.79	1.92	33.99
0:03:00	9,547.69	0.77	16.61	1,745.64	0:36:00	68,999.93	0.78	126.46	16,623.86	1:09:00	74,751.24	0.79	1.93	43.82
0:04:00	13,032.90	0.77	22.08	2,425.57	0:37:00	70,119.30	0.79	129.14	19,174.83	1:10:00	74,707.19	0.79	1.92	55.06
0:05:00	16,375.73	0.78	27.40	2,878.99	0:38:00	71,242.04	0.79	106.15	14,350.25	1:11:00	74,712.55	0.79	1.92	41.21
0:06:00	19,501.05	0.78	29.52	3,467.28	0:39:00	71,955.98	0.78	63.03	17,362.21	1:12:00	74,738.64	0.79	1.93	40.75
0:07:00	22,574.74	0.78	33.71	3,842.95	0:40:00	73,253.85	0.79	66.46	14,213.65	1:13:00	74,729.34	0.79	1.92	42.76
0:08:00	25,560.14	0.78	36.82	4,505.90	0:41:00	74,325.38	0.79	29.11	7,253.81	1:14:00	74,714.85	0.79	1.90	44.26
0:09:00	28,288.78	0.78	44.71	6,973.47	0:42:00	74,524.49	0.79	2.02	488.91	1:15:00	74,720.22	0.79	1.91	37.66
0:10:00	30,928.80	0.78	49.03	7,792.63	0:43:00	74,678.47	0.79	1.87	87.68	1:16:00	74,713.03	0.79	1.94	41.99
0:11:00	33,184.46	0.78	50.96	8,878.60	0:44:00	74,742.87	0.79	1.87	91.16	1:17:00	74,747.32	0.79	1.88	48.06
0:12:00	35,366.35	0.78	57.08	9,302.72	0:45:00	74,709.88	0.79	1.86	92.08	1:18:00	74,711.41	0.79	1.89	41.09
0:13:00	37,411.88	0.78	63.49	10,099.27	0:46:00	74,727.49	0.79	1.88	95.17	1:19:00	74,747.26	0.79	1.89	35.22
0:14:00	39,417.98	0.78	66.03	9,672.59	0:47:00	74,722.58	0.79	1.91	96.07	1:20:00	74,722.22	0.79	1.91	41.19
0:15:00	41,287.71	0.78	68.88	10,845.44	0:48:00	74,726.49	0.79	1.92	90.00	1:21:00	74,656.56	0.79	1.90	47.21
0:16:00	43,062.98	0.78	73.21	10,621.60	0:49:00	74,685.77	0.79	1.94	97.91	1:22:00	74,731.83	0.79	1.90	38.77
0:17:00	44,726.17	0.79	76.15	11,743.83	0:50:00	74,738.71	0.79	1.94	91.72	1:23:00	74,728.83	0.79	1.92	42.46
0:18:00	46,454.38	0.79	78.48	15,866.58	0:51:00	74,694.66	0.79	1.94	95.65	1:24:00	74,701.66	0.79	1.92	45.86
0:19:00	47,916.55	0.78	79.88	13,078.59	0:52:00	74,647.78	0.79	1.94	93.72	1:25:00	74,723.60	0.79	1.96	45.31
0:20:00	49,416.94	0.78	85.49	12,333.07	0:53:00	74,744.09	0.79	1.97	53.97	1:26:00	74,701.88	0.79	1.93	37.31
0:21:00	50,963.66	0.79	87.49	10,626.69	0:54:00	74,689.32	0.79	1.96	44.35	1:27:00	74,725.73	0.79	1.92	45.89
0:22:00	52,227.78	0.78	96.31	13,501.32	0:55:00	74,709.38	0.79	1.94	62.96	1:28:00	74,727.46	0.79	1.92	49.62
0:23:00	53,753.96	0.79	96.35	12,168.08	0:56:00	74,702.88	0.79	1.95	84.80	1:29:00	74,713.55	0.79	1.95	40.49
0:24:00	54,950.23	0.78	103.24	13,766.81	0:57:00	74,697.48	0.79	1.94	61.58	1:30:00	74,722.99	0.79	1.93	40.56
0:25:00	56,528.32	0.79	104.20	12,359.86	0:58:00	74,717.30	0.79	1.99	42.79	1:31:00	74,704.41	0.79	1.96	46.41
0:26:00	57,793.05	0.79	109.69	13,307.81	0:59:00	74,728.01	0.79	1.92	48.90	1:32:00	74,727.05	0.79	1.95	40.24
0:27:00	58,786.60	0.78	108.46	12,512.59	1:00:00	74,739.50	0.79	1.93	39.91	1:33:00	74,720.63	0.79	1.95	33.05
0:28:00	60,125.82	0.79	108.86	12,711.45	1:01:00	74,706.07	0.79	1.94	65.62	1:34:00	74,702.85	0.79	1.93	41.90
0:29:00	61,320.56	0.79	110.71	16,044.54	1:02:00	74,683.34	0.79	1.94	69.87	1:35:00	74,711.52	0.79	1.96	46.80
0:30:00	62,449.96	0.78	116.98	14,856.69	1:03:00	74,738.44	0.79	1.94	47.42	1:36:00	74,716.49	0.79	1.97	38.17
0:31:00	63,536.84	0.78	115.57	12,190.69	1:04:00	74,674.22	0.79	1.94	38.43	1:37:00	74,679.91	0.79	1.92	33.33
0:32:00	64,625.43	0.78	112.45	13,044.49	1:05:00	74,685.72	0.79	1.93	46.41	1:38:00	74,735.97	0.79	1.93	45.39
0:33:00	65,781.11	0.79	124.70	16,919.07	1:06:00	74,725.67	0.79	1.94	71.00	1:39:00	74,709.24	0.79	1.94	52.34

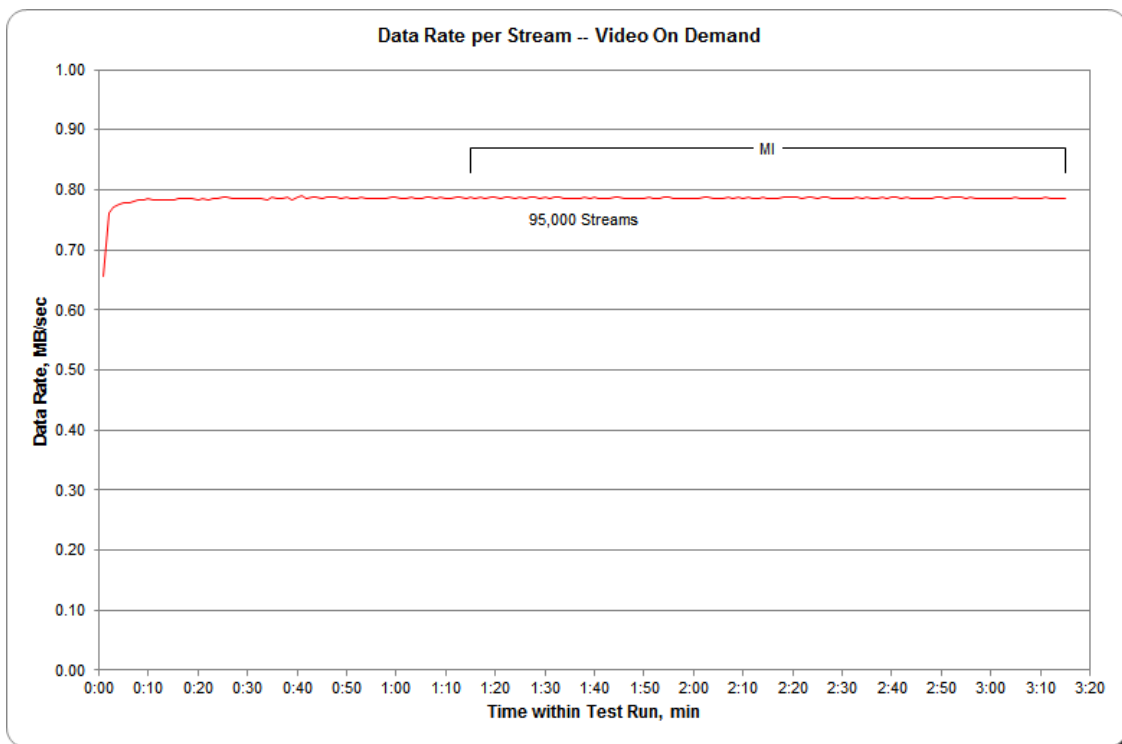
Video on Demand Delivery Test – TEST RUN DATA BY INTERVAL (CONTINUED)

95,000 Streams					95,000 Streams					95,000 Streams				
TR1	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	TR1	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	TR1	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms
1:40:00	74,763.30	0.79	1.92	32.74	2:12:00	74,694.87	0.79	1.91	33.51	2:44:00	74,692.69	0.79	1.91	44.40
1:41:00	74,709.91	0.79	1.92	47.04	2:13:00	74,682.80	0.79	1.90	40.75	2:45:00	74,696.34	0.79	1.92	37.36
1:42:00	74,689.82	0.79	1.93	44.11	2:14:00	74,723.34	0.79	1.90	43.14	2:46:00	74,697.30	0.79	1.91	47.16
1:43:00	74,700.34	0.79	1.93	42.26	2:15:00	74,689.70	0.79	1.92	45.45	2:47:00	74,716.97	0.79	1.91	46.31
1:44:00	74,740.33	0.79	1.93	41.77	2:16:00	74,690.89	0.79	1.91	35.03	2:48:00	74,692.26	0.79	1.93	32.98
1:45:00	74,727.45	0.79	1.95	42.64	2:17:00	74,706.55	0.79	1.91	42.12	2:49:00	74,722.98	0.79	1.93	51.42
1:46:00	74,671.85	0.79	1.95	46.48	2:18:00	74,726.90	0.79	1.91	45.21	2:50:00	74,736.66	0.79	1.93	40.43
1:47:00	74,711.38	0.79	1.94	38.91	2:19:00	74,733.43	0.79	1.92	40.86	2:51:00	74,648.13	0.79	1.94	44.13
1:48:00	74,709.31	0.79	1.96	41.10	2:20:00	74,761.76	0.79	1.90	33.08	2:52:00	74,754.47	0.79	1.95	32.66
1:49:00	74,702.32	0.79	1.94	47.39	2:21:00	74,753.88	0.79	1.90	44.77	2:53:00	74,734.60	0.79	1.97	47.33
1:50:00	74,709.87	0.79	1.94	48.16	2:22:00	74,685.84	0.79	1.90	43.83	2:54:00	74,725.66	0.79	1.97	40.28
1:51:00	74,726.56	0.79	1.95	39.90	2:23:00	74,756.07	0.79	1.90	34.70	2:55:00	74,710.22	0.79	1.96	37.60
1:52:00	74,687.12	0.79	1.96	39.88	2:24:00	74,753.13	0.79	1.92	48.73	2:56:00	74,737.53	0.79	1.97	35.38
1:53:00	74,712.70	0.79	1.96	42.63	2:25:00	74,708.16	0.79	1.91	42.81	2:57:00	74,699.11	0.79	2.00	47.33
1:54:00	74,721.43	0.79	1.96	33.97	2:26:00	74,720.13	0.79	1.91	41.63	2:58:00	74,717.70	0.79	1.99	44.36
1:55:00	74,752.46	0.79	1.94	40.74	2:27:00	74,759.02	0.79	1.93	37.20	2:59:00	74,705.60	0.79	1.98	35.51
1:56:00	74,707.02	0.79	1.95	46.12	2:28:00	74,692.73	0.79	1.91	39.90	3:00:00	74,695.80	0.79	1.99	40.02
1:57:00	74,711.92	0.79	1.94	43.94	2:29:00	74,698.36	0.79	1.92	47.04	3:01:00	74,716.68	0.79	1.95	45.96
1:58:00	74,674.05	0.79	1.92	37.19	2:30:00	74,717.81	0.79	1.94	34.94	3:02:00	74,715.90	0.79	1.96	42.52
1:59:00	74,683.61	0.79	1.95	40.53	2:31:00	74,681.80	0.79	1.92	43.30	3:03:00	74,702.63	0.79	1.95	36.35
2:00:00	74,703.79	0.79	1.95	39.70	2:32:00	74,707.55	0.79	1.93	41.67	3:04:00	74,667.78	0.79	1.90	48.67
2:01:00	74,690.65	0.79	1.95	46.29	2:33:00	74,720.60	0.79	1.94	41.59	3:05:00	74,742.23	0.79	1.91	44.82
2:02:00	74,766.84	0.79	1.94	37.01	2:34:00	74,689.21	0.79	1.93	32.65	3:06:00	74,677.93	0.79	1.93	34.13
2:03:00	74,743.47	0.79	1.92	44.50	2:35:00	74,718.53	0.79	1.92	53.35	3:07:00	74,707.03	0.79	1.94	43.09
2:04:00	74,706.95	0.79	1.91	45.14	2:36:00	74,710.36	0.79	1.93	43.67	3:08:00	74,691.16	0.79	1.90	45.95
2:05:00	74,709.36	0.79	1.91	36.08	2:37:00	74,706.01	0.79	1.91	31.87	3:09:00	74,685.69	0.79	1.91	45.58
2:06:00	74,695.49	0.79	1.93	42.24	2:38:00	74,719.42	0.79	1.93	36.83	3:10:00	74,716.14	0.79	1.98	32.98
2:07:00	74,720.02	0.79	1.93	44.42	2:39:00	74,688.33	0.79	1.93	39.83	3:11:00	74,745.77	0.79	1.90	43.81
2:08:00	74,699.01	0.79	1.92	47.53	2:40:00	74,736.83	0.79	1.94	41.60	3:12:00	74,667.81	0.79	1.90	40.19
2:09:00	74,730.78	0.79	1.97	39.71	2:41:00	74,778.70	0.79	1.94	36.94	3:13:00	74,710.68	0.79	1.92	35.57
2:10:00	74,711.20	0.79	1.91	41.26	2:42:00	74,706.08	0.79	1.91	51.29	3:14:00	74,717.48	0.79	1.90	33.66
2:11:00	74,727.84	0.79	1.91	45.32	2:43:00	74,736.49	0.79	1.93	40.05	3:15:00	74,707.62	0.79	1.90	48.33

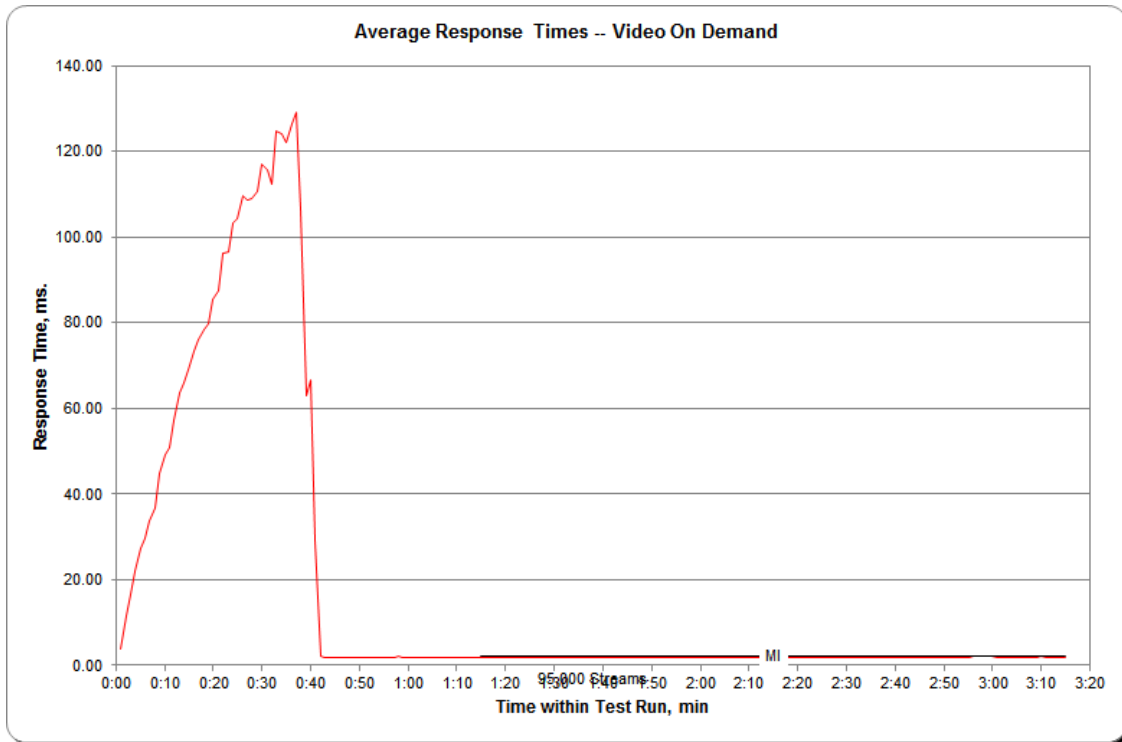
SPC-2 Video on Demand Delivery Average Data Rate Graph



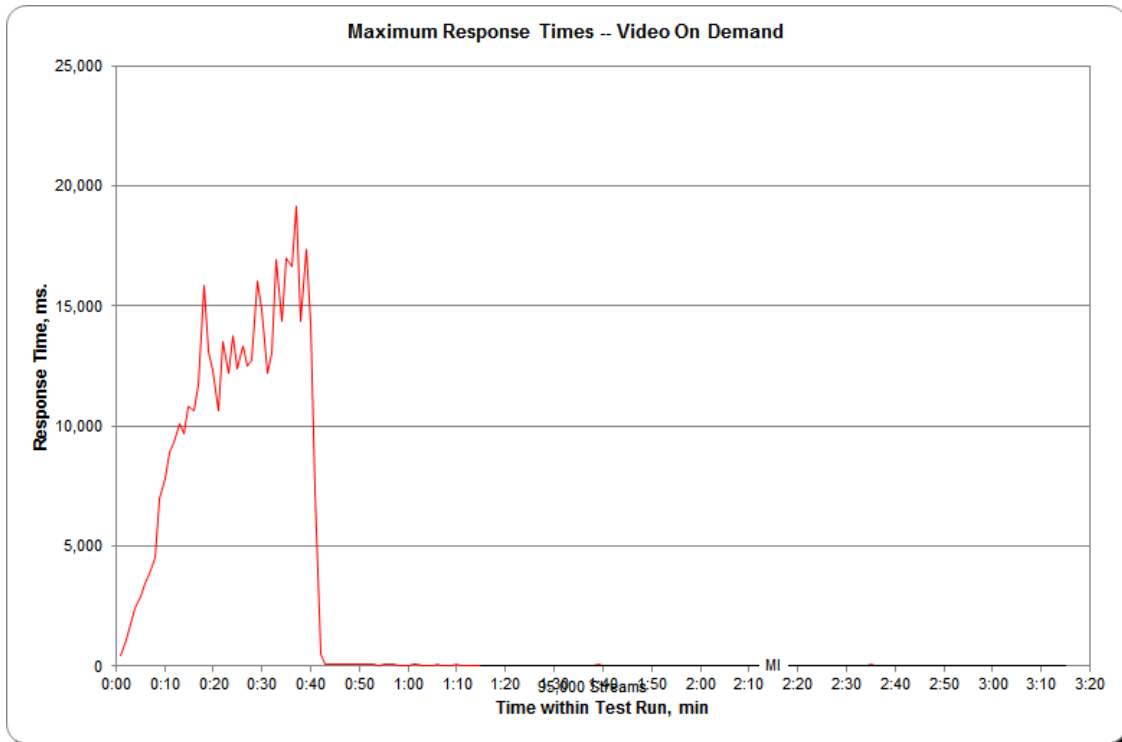
SPC-2 Video on Demand Delivery Average Data Rate per Stream Graph



SPC-2 Video on Demand Delivery Average Response Time Graph



SPC-2 Video on Demand Delivery Maximum Response Time Graph



Data Persistence Test

Clause 7

The Data Persistence Test demonstrates the Tested Storage Configuration (TSC):

- *Is capable of maintain data integrity across a power cycle.*
- *Ensures the transfer of data between Logical Volumes and host systems occurs without corruption or loss.*

The SPC-2 Workload Generator will write a specific pattern at randomly selected locations throughout the Total ASU Capacity (Persistence Test Run 1). The SPC-2 Workload Generator will retain the information necessary to later validate the pattern written at each location.

The Tested Storage Configuration will be shutdown and restarted using a power off/power on cycle at the end of the above sequence of write operations. In addition, any caches employing battery backup must be flushed/emptied.

Restart the TSC, and if the Host System(s) were shutdown and powered off, restart the Host System(s).

The SPC-2 Workload Generator will utilize the retained data from Persistence Test Run 1 to verify (Persistence Run 2) the bit patterns written in Persistence Test Run 1 and their corresponding location.

Clause 10.6.9.4

The Full Disclosure Report will contain the following content for the Data Persistence Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Persistence Test.*
2. *The human readable SPC-2 Test Results File for each of the Test Runs in the Data Persistence Test.*
3. *A table from the successful Persistence Test, which contains the results from the test.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Persistence Test Runs are documented in [Appendix E: SPC-2 Workload Generator Execution Commands and Parameters](#) on Page [145](#).

Data Persistence Test Results File

A link to the test result file generated from each Data Persistence Test Run is listed below.

[Persistence 1 Test Run \(write phase\) Results File](#)

[Persistence 2 Test Run \(read phase\) Results File](#)

Data Persistence Test Results

Data Persistence Test Results	
Data Persistence Test Number: 1	
Total Number of Logical Blocks Written	811,586
Total Number of Logical Blocks Re-referenced	11,847
Total Number of Logical Blocks Verified	799,739
Total Number of Logical Blocks that Failed Verification	0
Number of Failed I/O Requests in the process of the Test	0

PRICED STORAGE CONFIGURATION AVAILABILITY DATE

Clause 10.6.9

The committed delivery date for general availability (Availability Date) of all products that comprise the Priced Storage Configuration must be reported. When the Priced Storage Configuration includes products or components with different availability dates, the reported Availability Date must be the date at which all components are committed to be available. All availability dates, whether for individual components or for the Priced Storage Configuration as a whole, must be disclosed to a precision of one day.

The Availability Data shall be stated in either a combination of specific alphanumeric month, numeric day and numeric year or as “Currently Available”.

The HPE 3PAR StoreServ 20840, as documented in this SPC-2 Full Disclosure Report, is currently available for customer purchase and shipment.

ANOMALIES OR IRREGULARITIES

Clause 10.6.12

The FDR shall include a clear and complete description of any anomalies or irregularities encountered in the course of executing the SPC-2 benchmark that may in any way call into question the accuracy, verifiability, or authenticity of information published in this FDR.

There were no anomalies or irregularities encountered during the SPC-2 Onsite Audit of the HPE 3PAR StoreServ 20840.

APPENDIX A: SPC-2 GLOSSARY

“Decimal” (*powers of ten*) Measurement Units

In the storage industry, the terms “kilo”, “mega”, “giga”, “tera”, “peta”, and “exa” are commonly used prefixes for computing performance and capacity. For the purposes of the SPC workload definitions, all of the following terms are defined in “powers of ten” measurement units.

- A kilobyte (KB) is equal to 1,000 (10^3) bytes.
- A megabyte (MB) is equal to 1,000,000 (10^6) bytes.
- A gigabyte (GB) is equal to 1,000,000,000 (10^9) bytes.
- A terabyte (TB) is equal to 1,000,000,000,000 (10^{12}) bytes.
- A petabyte (PB) is equal to 1,000,000,000,000,000 (10^{15}) bytes
- An exabyte (EB) is equal to 1,000,000,000,000,000,000 (10^{18}) bytes

“Binary” (*powers of two*) Measurement Units

The sizes reported by many operating system components use “powers of two” measurement units rather than “power of ten” units. The following standardized definitions and terms are also valid and may be used in this document.

- A kibibyte (KiB) is equal to 1,024 (2^{10}) bytes.
- A mebibyte (MiB) is equal to 1,048,576 (2^{20}) bytes.
- A gibibyte (GiB) is equal to 1,073,741,824 (2^{30}) bytes.
- A tebibyte (TiB) is equal to 1,099,511,627,776 (2^{40}) bytes.
- A pebibyte (PiB) is equal to 1,125,899,906,842,624 (2^{50}) bytes.
- An exbibyte (EiB) is equal to 1,152,921,504,606,846,967 (2^{60}) bytes.

SPC-2 Data Repository Definitions

Total ASU Capacity: The total storage capacity read and written in the course of executing the SPC-2 benchmark.

Application Storage Unit (ASU): The logical interface between the storage and SPC-2 Workload Generator. The ASU is implemented on one or more Logical Volume.

Logical Volume: The division of Addressable Storage Capacity into individually addressable logical units of storage used in the SPC-2 benchmark. Each Logical Volume is implemented as a single, contiguous address space.

Addressable Storage Capacity: The total storage (sum of Logical Volumes) that can be read and written by application programs such as the SPC-2 Workload Generator.

Configured Storage Capacity: This capacity includes the Addressable Storage Capacity and any other storage (parity disks, hot spares, etc.) necessary to implement the Addressable Storage Capacity.

Physical Storage Capacity: The formatted capacity of all storage devices physically present in the Tested Storage Configuration (TSC).

Data Protection Overhead: The storage capacity required to implement the selected level of data protection.

Required Storage: The amount of Configured Storage Capacity required to implement the Addressable Storage Configuration, excluding the storage required for the ASU.

Global Storage Overhead: The amount of Physical Storage Capacity that is required for storage subsystem use and unavailable for use by application programs.

Total Unused Storage: The sum of unused storage capacity within the Physical Storage Capacity, Configured Storage Capacity, and Addressable Storage Capacity.

SPC-2 Data Protection Levels

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-2 Data Repository.

Protected 2: The single point of failure of any *component* in the configuration will not result in permanent loss of access to or integrity of the SPC-2 Data Repository.

SPC-2 Test Execution Definitions

Completed I/O Request: An I/O Request with a Start Time and a Completion Time (see [“I/O Completion Types”](#) illustrated below).

Completion Time: The time recorded by the Workload Generator when an I/O Request is completed by the Tested Storage Configuration (TSC) as signaled by System Software.

Data Rate: The data volume, in MB, transferred by all Measured I/O Requests in an SPC-2 Test Run divided by the length of the Test Run in seconds.

Failed I/O Request: Any I/O Request issued by the SPC-2 Workload Generator that meets one of the following conditions (see [“I/O Completion Types”](#) illustrated below):

- The I/O Request was signaled as failed by System Software.
- The I/O Request started within the Measurement Interval, but did not complete prior to the end of the appropriate Run-Out period..
- The I/O Request started within the Run-Out period, but did not complete prior to the end of the appropriate Ramp-Down period.

I/O Request Throughput: The total number of Measured I/O Requests in an SPC-2 Test Run divided by the duration of the Measurement Interval in seconds.

Measured I/O Request: A Completed I/O Request that begins (Start Time) within a Measurement Interval and completes (Completion Time) prior to the end of the appropriate Ramp Down (see [“I/O Completion Types”](#) illustrated below).

Measurement Interval: A specified, contiguous period of time, after the TSC has reached Steady State, when data is collected by the Workload Generator to produce the test results for a SPC-2 Test Run (see [“SPC-2 Test Run Components”](#) illustrated below, *Test Run 1: T_2-T_3 and Test Run 2: T_7-T_8*).

Outstanding I/O Requests: The Outstanding I/O Requests parameter specifies the maximum number of concurrent I/O Requests, associated with a give Stream, which have been issued but not yet completed. (*Clause 3.4.4 of the SPC-2 Benchmark Specification*).

Ramp-Down: A specified, contiguous period of time in which the TSC is required to complete I/O Requests started but not completed during the preceding Run-Out period. Ramp-Down begins at the end of the preceding Run-Out period (see [“SPC-2 Test Run Components”](#) illustrated below, *Test Run 1: T_4-T_5 and Test Run 2: T_9-T_{10}*). The Workload Generator will not submit any I/O Requests during the Ramp-Down.

Ramp-Up: A specified, contiguous period of time required for the Benchmark Configuration (BC) to produce Steady State throughput after the Workload Generator begins submitting I/O Requests to the TSC for execution. The Ramp-Up period ends at the beginning of the Measurement Interval (see [“SPC-2 Test Run Components”](#) illustrated below, *Test Run 1: T_0-T_2 and Test Run 2: T_5-T_7*).

Response Time: The Response Time of a Measured I/O Request is its Completion Time minus its Start Time.

Run-Out: A specified, contiguous period of time in which the TSC is required to complete I/O Requests started but not completed during the preceding Measurement Interval. The Run-Out period begins at the end of the preceding Measurement Interval and is a component of the Steady State period (see [“SPC-2 Test Run Components”](#) illustrated below, *Test Run 1: T_3-T_4 and Test Run 2: T_9-T_{10}*). The Workload Generator will continue to submit I/O Requests at the Test Run’s specified rate during the Run-Out period.

Start Time: The time recorded by the Workload Generator when an I/O Request is submitted, by the Workload Generator, to the System Software for execution on the TSC.

Steady State: The period during which the workload presented to the TSC by the SPC-2 Workload Generator is constant and the resulting TSC I/O Request Throughput is both consistent and sustainable. The Steady State period includes both the Measurement Interval and Run-Out periods (see [“SPC-2 Test Run Components”](#) illustrated below, *Test Run 1: T_1-T_4 and Test Run 2: T_6-T_9*).

Steady State is achieved only after caches in the TSC have filled and as a result the I/O Request Throughput of the TSC has stabilized.

Stream: A collection of Stream Segments that started within a Test Run.

Stream Segment: A sequentially organized pattern of I/O requests, which transfers a contiguous range of data.

Test: A collection of Test Phases and or Test Runs sharing a common objective.

Test Phase: A collection of one or more SPC-2 Test Runs sharing a common objective and intended to be run in a specific sequence.

Test Run: The execution of SPC-2 that produces specific SPC-2 test results. SPC-2 Test Runs have specified, measured Ramp-Up, Measurement Interval, Run-Out and Ramp-Down periods. "[SPC-2 Test Run Components](#)" (*see below*) illustrates the Ramp-Up, Steady State, Measurement Interval, Run-Out, and Ramp-Down components contained in two uninterrupted SPC-2 Test Runs (*Test Run 1: T_0-T_5 and Test Run 2: T_5-T_{10}*).

Test Run Sequence: A related sequence of Large File Processing (LFP) or Large Database Query (LDQ) Test Runs. Each Test Run Sequence will consist of five Test Runs, which vary the number of Streams as follows:

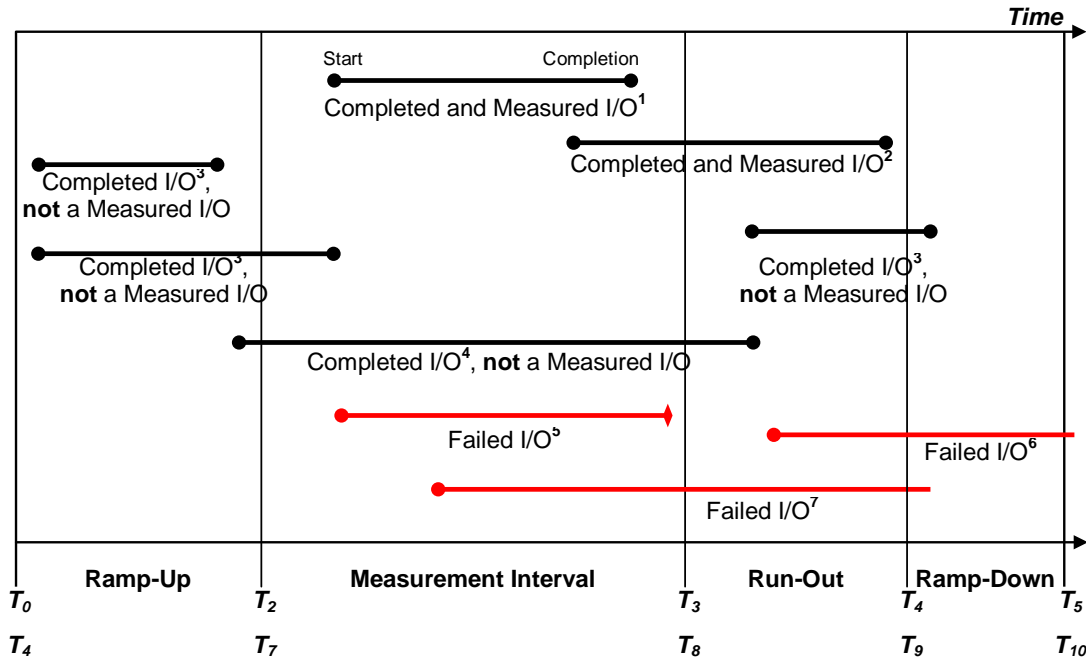
- Test Run 1: Maximum number of Streams, which is selected by the Test Sponsor
- Test Run 2: 50% of the maximum number of Streams used in Test Run 1.
- Test Run 3: 25% of the maximum number of Streams used in Test Run 1.
- Test Run 4: 12.5% of the maximum number of Streams used in Test Run 1.
- Test Run 5: 1 Stream.

Each of the five Test Runs in a Test Run Sequence will share the same attributes with the exception of the number of Streams. For example:

- Large File Processing, Read, 1024 KiB Transfer Size: Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 50% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 25% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 12.5% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 1 Stream

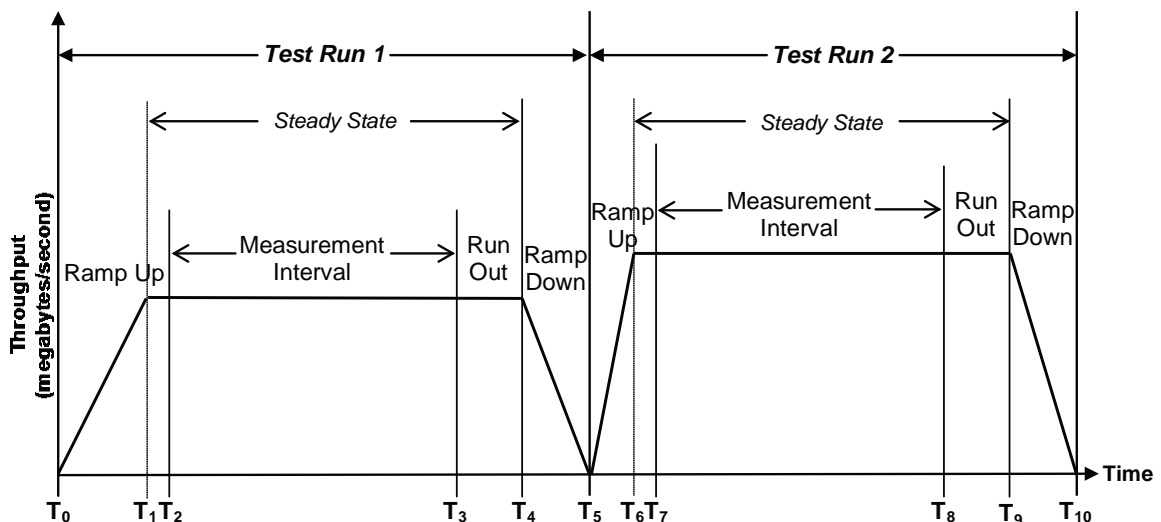
Transfer Size: The Transfer Size parameter specifies the number of bytes in KiB to transfer. (*Clause 3.4.7 of the SPC-2 Benchmark Specification*)

I/O Completion Types



- Completed and Measured I/O¹:** I/O started and completed within the Measurement Interval.
- Completed and Measured I/O²:** I/O started within the Measurement Interval and completed within Ramp Down.
- Completed I/O³:** I/O started before or after the Measurement Interval – not measured.
- Completed I/O⁴:** I/O started before and completed after the Measurement Interval – not measured.
- Failed I/O⁵:** Signaled as failed by System Software.
- Failed I/O⁶:** I/O did not complete prior to the end of Ramp-Down.
- Failed I/O⁷:** I/O did not complete prior to the end of Run-Out.

SPC-2 Test Run Components



APPENDIX B: CUSTOMER TUNABLE PARAMETERS AND OPTIONS

Windows Registry

The QLogic drive max queue length parameter was changed from a default of 32 to 128 and the maximum transfer size of an I/O request was changed from the default of 512 KiB to 2 MiB via the Windows registry.

The Windows registry parameter **Supports64BitAddressing** was QLogic parameters to enable 64-bit addressing.

The details for changing above three parameters on each Host System are documented in the [Host System Configuration](#) section of Appendix C.

Windows Patches

The following Windows 2008 Server patches were installed on each Host System:

Hot Fixes	
Patch	Description
kb2406704	<i>Some IO requests to a storage device fail on a fault tolerant system that is running Windows 2008 or Windows Server 2008 R2 when you perform a surprise removal of one path to the storage device.</i>
kb2460971	<i>MPIO failover fails on computer that is running Windows Server 2008 R2.</i>
kb2468345	<i>Computer intermittently performs poorly or stops responding when the Storport driver is used in Windows Server 2008 R2</i>
kb2468345	<i>Computer intermittently performs poorly or stops responding when the Storport driver is used in Windows Server 2008 R2</i>
kb2496744	<i>A black screen is displayed when a Windows 7 SP1-based or Windows Server 2008 R2 SP1-based computer tries to enter hibernation</i>
kb2522766	<i>The MPIO driver fails over all paths incorrectly when a transient single failure occurs in Windows Server 2008 or in Windows Server 2008 R2</i>
kb2524478	<i>The network location profile changes from "Domain" to "Public" in Windows 7 or Windows Server 2008 R2</i>
kb2529956	<i>Windows Server 2008 R2 installation may hang if more than 64 logical processors are active</i>
kb2536493	<i>Slow SQL Online Transaction Processing performance when SQL database files are stored on an SMB network file share in Windows 7, in Windows Server 2008 R2, or Windows Storage Server 2008 R2</i>
kb2545635	<i>You experience disk IO performance issues on a computer that has an Intel Westmere-EX processor with at least 8 sockets and that is running Windows Server 2008 R2</i>
kb2546706	<i>A Windows Server 2008 R2-based computer that has some NUMA-based processors and more than 256 logical processors runs in SMP mode as a 64-processor system and may experience decreased performance</i>
kb2566205	<i>Scalability of the IO performance decreases in Windows 2008 R2 if more than 256 GB of physical memory is used</i>

Windows Patches (continued)

Security Updates	
Patch	Description
kb2621440	<i>MS12-020: Description of the security update for Remote Desktop Protocol Vulnerability: March 13, 2012</i>
kb2667402	<i>MS12-020: Description of the security update for Terminal Server Denial of Service: March 13, 2012</i>

Updates	
Patch	Description
kb976902	<i>Microsoft released the Update KB976902 on Windows Update which is required to install the Windows 7 SP1 (RTM) Also for Windows Server 2008 R2. Required to install SP1.</i>

APPENDIX C: TESTED STORAGE CONFIGURATION (TSC) CREATION

Customer-Ready Configuration

As part of the customer installation process, an HP Field Engineer will execute a series of default commands that will result in the storage system self-configuring and self-provisioning the appropriate available, spare and metadata capacities based upon the number and capacity of storage devices in the HPE 3PAR StoreServ 20840 configuration.

This process would also include configuration of the storage network as documented below in the [Storage Network Details](#) section.

Create SPC-2 Logical Volumes

The **create_config**, listed below, script performs the following:

- Creates the 96 SPC-2 Logical Volumes
- Exports those logical volumes to the Host System ports

The logical volumes are then visible to Host Systems after a reboot of each Host System.

create_config

```
for n in 0 1 2 3 4 5 6 7
do
  createcpg -ha mag -t r1 -ss 256 -p -devtype SSD -nd $n cpgssd${n}
done

PORTS[0]=":3:1"
PORTS[1]=":4:1"
PORTS[2]=":5:1"
PORTS[3]=":6:1"
PORTS[4]=":3:2"
PORTS[5]=":4:2"
PORTS[6]=":5:2"
PORTS[7]=":6:2"
PORTS[8]=":3:3"
PORTS[9]=":4:3"
PORTS[10]=":5:3"
PORTS[11]=":6:3"

id=10
for i in {0..1} ;
do
  for hba in 0 2 4 6 8 10
  do
    for nd in {0..7}
    do
      createvv -i $id cpgssd${nd} asu.${id} 280G;
      h=hba
      createvln -f asu.${id} ${id} ${nd}${PORTS[$h]}
      h=$((h+1))
      createvln -f asu.${id} ${id} ${nd}${PORTS[$h]}

      id=$((id+1))
    done
  done
done
```

Host System Configuration

Install the PsTools Suite (<http://technet.microsoft.com/en-us/sysinternals/bb896649>) in order to start the required connection between each remote Host System and the Master Host System.

Install the Plink tool (<http://www.chiark.greenend.org.uk/http://www.chiark.greenend.org.uk>), which is similar to SSH, on the Master Host System so that the program to generate the system configuration and storage configuration listings from the SPC-2 ‘master’ execution script.

The following were done on each Host System:

- Install HP 3PAR MPIO
- The following three Windows Registry parameters listed in Appendix B:
 - Qlogic drive parameters, for queue length and maximum transfer size
 - Select:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\ql2300\Parameters\Device
 - Add the following parameters: **qd=128;ts=6;**
 - For Windows patch, “kb2468345”, the following Windows Registry parameter was added to the QLogic parameters to support 64-bit addressing.
 - Select:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\ql2300\Parameters
 - Right click on **Parameter** and select **New**, a list of value types will appear.
 - Click on the **DWORD** value.
 - For them **DWORD** value name enter: **Supports64BitAddressing**
 - Right click on **Supports64BitAddressing** and select **Modify**. In the **Value** data box, type a non-zero value. The number **1** was used for this configuration.

After the three parameters were changed all of the Host Systems were rebooted for the new values to take effect.

Storage Network Details

HBA/Switch Configuration

There were 128 internal mezzanine 16Gb FC connections between the 8 switches and 64 dual-port HBAs.

Switch/Storage Array Configuration

Each of the 8 switches has 12 ports (so 12 FC cables) going to the array.

The 4 switches (fc1, fc2, fc3, fc4) in each enclosure are treated in pairs: fc1 and fc2 as one pair and fc3 and fc4 as the other pair.

The first 8 cables of each switch go to nodes 0 to 7 in that order.

The last 4 cables of the first switch in a pair (so fc1 or fc3) go to the even nodes of the array, and the last 4 cables of the second switch in a pair (so fc2 or fc4) go to the odd nodes of the array.

Thus for each pair of switches, there are 24 FC cables and this cabling results in 3 cables to each of the 8 nodes.

This is done for both enclosures.

There are 4 pairs of switches so 96 FC cables to the array (8 switches x 12).

There are 3 cables to each node per pair of switches, so 4 (pairs) x 3 (cables per pair) = 12 FC inbound cables per node.

There are 8 nodes, so 8 x 12 is 96 ports used (matching the switch port count).

First Enclosure – HPC7000-30

The specific connections for enclosure HPC7000-30 for the first pair of switches (fc1 and fc2) are listed below.

- The first 8 cables from HPC7000-30-fc1 went to 0:3:1 to 7:3:1 (each node, using slot 3 port 1).
- The last 4 cables from HPC7000-30-fc1 went to 0:3:3, 2:3:3, 4:3:3, and 6:3:3 (even nodes, slot 3 port 3).
- The cabling for HPC7000-30-fc2 was similar only the first eight used slot 5 port 1 on each node, and the last four used slot 3 port 3 on the odd nodes.

For the second pair of switches in HPC7000-30 (from fc3 and fc4), the cabling was similar only to different ports on the array:

- The first 8 cables from HPC7000-30-fc3 went to 0:3:2 to 7:3:2 (each node, using slot 3 port 2).
- The last 4 cables from HPC7000-30-fc3 went to 0:5:3, 2:5:3, 4:5:3, and 6:5:3 (even nodes, slot 5 port 3).
- The cabling for HPC7000-30-fc4 was similar only the first eight used slot 5 port 2 on each node, and the last four used slot 5 port 3 on the odd nodes.

Second Enclosure HPC7000-33

The second enclosure was done identically to the first only using slots 4 and 6 where slots 3 and 5 were used, respectively.

- The first 8 cables from HPC7000-33-fc1 went to 0:4:1 to 7:4:1 (each node, using slot 4 port 1).
- The last 4 cables from HPC7000-33-fc1 went to 0:4:3, 2:4:3, 4:4:3, and 6:4:3 (even nodes, slot 4 port 3).
- The cabling for HPC7000-33-fc2 was similar only the first eight used slot 6 port 1 on each node, and the last four used slot 4 port 3 on the odd nodes.

For the second pair of switches in HPC7000-33 (from fc3 and fc4), the cabling was similar only to different ports on the array:

- The first 8 cables from HPC7000-33-fc3 went to 0:4:2 to 7:4:2 (each node, using slot 4 port 2).
- The last 4 cables from HPC7000-33-fc3 went to 0:6:3, 2:6:3, 4:6:3, and 6:6:3 (even nodes, slot 6 port 3).
- The cabling for HPC7000-33-fc4 was similar only the first eight used slot 6 port 2 on each node, and the last four used slot 6 port 3 on the odd nodes.

Mapping Details

The complete set of mapping details are listed below.

<u>HPC7000-30-fc1</u>		<u>HPC7000-33-fc1</u>	
port 17	0:3:1	port 17	0:4:1
port 18	1:3:1	port 18	1:4:1
port 19	2:3:1	port 19	2:4:1
port 20	3:3:1	port 20	3:4:1
port 21	4:3:1	port 21	4:4:1
port 22	5:3:1	port 22	5:4:1
port 23	6:3:1	port 23	6:4:1
port 24	7:3:1	port 24	7:4:1
port 25	0:3:3	port 25	0:4:3
port 26	2:3:3	port 26	2:4:3
port 27	4:3:3	port 27	4:4:3
port 0	6:3:3	port 0	6:4:3

<u>HPC7000-30-fc2</u>		<u>HPC7000-33-fc2</u>	
port 17	0:5:1	port 17	0:6:1
port 18	1:5:1	port 18	1:6:1
port 19	2:5:1	port 19	2:6:1
port 20	3:5:1	port 20	3:6:1
port 21	4:5:1	port 21	4:6:1
port 22	5:5:1	port 22	5:6:1
port 23	6:5:1	port 23	6:6:1
port 24	7:5:1	port 24	7:6:1
port 25	1:3:3	port 25	1:4:3
port 26	3:3:3	port 26	3:4:3
port 27	5:3:3	port 27	5:4:3
port 0	7:3:3	port 0	7:4:3

<u>HPC7000-30-fc3</u>		<u>HPC7000-33-fc3</u>	
port 17	0:3:2	port 17	0:4:2
port 18	1:3:2	port 18	1:4:2
port 19	2:3:2	port 19	2:4:2
port 20	3:3:2	port 20	3:4:2
port 21	4:3:2	port 21	4:4:2
port 22	5:3:2	port 22	5:4:2
port 23	6:3:2	port 23	6:4:2
port 24	7:3:2	port 24	7:4:2
port 25	0:5:3	port 25	0:6:3
port 26	2:5:3	port 26	2:6:3
port 27	4:5:3	port 27	4:6:3
port 0	6:5:3	port 0	6:6:3

<u>HPC7000-30-fc4</u>		<u>HPC7000-33-fc4</u>	
port 17	0:5:2	port 17	0:6:2
port 18	1:5:2	port 18	1:6:2

APPENDIX C:
TESTED STORAGE CONFIGURATION (TSC) CREATION

port 19	2:5:2	port 19	2:6:2
port 20	3:5:2	port 20	3:6:2
port 21	4:5:2	port 21	4:6:2
port 22	5:5:2	port 22	5:6:2

APPENDIX D: SPC-2 WORKLOAD GENERATOR STORAGE COMMANDS AND PARAMETER FILES

ASU Pre-Fill

```
compratio=1.00  
sd=default,th=4
```

```
sd=sd1,lun=\\.\PhysicalDrive1  
sd=sd2,lun=\\.\PhysicalDrive2  
sd=sd3,lun=\\.\PhysicalDrive3  
sd=sd4,lun=\\.\PhysicalDrive4  
sd=sd5,lun=\\.\PhysicalDrive5  
sd=sd6,lun=\\.\PhysicalDrive6  
sd=sd7,lun=\\.\PhysicalDrive7  
sd=sd8,lun=\\.\PhysicalDrive8  
sd=sd9,lun=\\.\PhysicalDrive9  
sd=sd10,lun=\\.\PhysicalDrive10  
sd=sd11,lun=\\.\PhysicalDrive11  
sd=sd12,lun=\\.\PhysicalDrive12  
sd=sd13,lun=\\.\PhysicalDrive13  
sd=sd14,lun=\\.\PhysicalDrive14  
sd=sd15,lun=\\.\PhysicalDrive15  
sd=sd16,lun=\\.\PhysicalDrive16  
sd=sd17,lun=\\.\PhysicalDrive17  
sd=sd18,lun=\\.\PhysicalDrive18  
sd=sd19,lun=\\.\PhysicalDrive19  
sd=sd20,lun=\\.\PhysicalDrive20  
sd=sd21,lun=\\.\PhysicalDrive21  
sd=sd22,lun=\\.\PhysicalDrive22  
sd=sd23,lun=\\.\PhysicalDrive23  
sd=sd24,lun=\\.\PhysicalDrive24  
sd=sd25,lun=\\.\PhysicalDrive25  
sd=sd26,lun=\\.\PhysicalDrive26  
sd=sd27,lun=\\.\PhysicalDrive27  
sd=sd28,lun=\\.\PhysicalDrive28  
sd=sd29,lun=\\.\PhysicalDrive29  
sd=sd30,lun=\\.\PhysicalDrive30  
sd=sd31,lun=\\.\PhysicalDrive31  
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sd=sd35,lun=\\.\PhysicalDrive35  
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sd=sd37,lun=\\.\PhysicalDrive37  
sd=sd38,lun=\\.\PhysicalDrive38  
sd=sd39,lun=\\.\PhysicalDrive39  
sd=sd40,lun=\\.\PhysicalDrive40  
sd=sd41,lun=\\.\PhysicalDrive41  
sd=sd42,lun=\\.\PhysicalDrive42  
sd=sd43,lun=\\.\PhysicalDrive43  
sd=sd44,lun=\\.\PhysicalDrive44  
sd=sd45,lun=\\.\PhysicalDrive45  
sd=sd46,lun=\\.\PhysicalDrive46  
sd=sd47,lun=\\.\PhysicalDrive47  
sd=sd48,lun=\\.\PhysicalDrive48  
sd=sd49,lun=\\.\PhysicalDrive49  
sd=sd50,lun=\\.\PhysicalDrive50  
sd=sd51,lun=\\.\PhysicalDrive51  
sd=sd52,lun=\\.\PhysicalDrive52
```

```
sd=sd53,lun=\\.PhysicalDrive53
sd=sd54,lun=\\.PhysicalDrive54
sd=sd55,lun=\\.PhysicalDrive55
sd=sd56,lun=\\.PhysicalDrive56
sd=sd57,lun=\\.PhysicalDrive57
sd=sd58,lun=\\.PhysicalDrive58
sd=sd59,lun=\\.PhysicalDrive59
sd=sd60,lun=\\.PhysicalDrive60
sd=sd61,lun=\\.PhysicalDrive61
sd=sd62,lun=\\.PhysicalDrive62
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sd=sd65,lun=\\.PhysicalDrive65
sd=sd66,lun=\\.PhysicalDrive66
sd=sd67,lun=\\.PhysicalDrive67
sd=sd68,lun=\\.PhysicalDrive68
sd=sd69,lun=\\.PhysicalDrive69
sd=sd70,lun=\\.PhysicalDrive70
sd=sd71,lun=\\.PhysicalDrive71
sd=sd72,lun=\\.PhysicalDrive72
sd=sd73,lun=\\.PhysicalDrive73
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sd=sd80,lun=\\.PhysicalDrive80
sd=sd81,lun=\\.PhysicalDrive81
sd=sd82,lun=\\.PhysicalDrive82
sd=sd83,lun=\\.PhysicalDrive83
sd=sd84,lun=\\.PhysicalDrive84
sd=sd85,lun=\\.PhysicalDrive85
sd=sd86,lun=\\.PhysicalDrive86
sd=sd87,lun=\\.PhysicalDrive87
sd=sd88,lun=\\.PhysicalDrive88
sd=sd89,lun=\\.PhysicalDrive89
sd=sd90,lun=\\.PhysicalDrive90
sd=sd91,lun=\\.PhysicalDrive91
sd=sd92,lun=\\.PhysicalDrive92
sd=sd93,lun=\\.PhysicalDrive93
sd=sd94,lun=\\.PhysicalDrive94
sd=sd95,lun=\\.PhysicalDrive95
sd=sd96,lun=\\.PhysicalDrive96
```

```
wd=wd1,sd=sd*,seekpct=eof,rdpct=0,xfersize=1m
rd=rd1,wd=wd*,elapsed=72h,interval=60,iorate=max
```

Common Commands/Parameters – LFP, LDQ and VOD Tests

The following command/parameter lines appear in each of the command and parameter files for the Large File Processing (LFP), Large Database Query (LDQ) and Video on Demand (VOD) Tests. The command lines are only listed below to eliminate redundancy.

```
sd=default,host=localhost,size=300647710000
```

```
sd=sd1,lun=\\.PhysicalDrive1  
sd=sd2,lun=\\.PhysicalDrive2  
sd=sd3,lun=\\.PhysicalDrive3  
sd=sd4,lun=\\.PhysicalDrive4  
sd=sd5,lun=\\.PhysicalDrive5  
sd=sd6,lun=\\.PhysicalDrive6  
sd=sd7,lun=\\.PhysicalDrive7  
sd=sd8,lun=\\.PhysicalDrive8  
sd=sd9,lun=\\.PhysicalDrive9  
sd=sd10,lun=\\.PhysicalDrive10  
sd=sd11,lun=\\.PhysicalDrive11  
sd=sd12,lun=\\.PhysicalDrive12  
sd=sd13,lun=\\.PhysicalDrive13  
sd=sd14,lun=\\.PhysicalDrive14  
sd=sd15,lun=\\.PhysicalDrive15  
sd=sd16,lun=\\.PhysicalDrive16  
sd=sd17,lun=\\.PhysicalDrive17  
sd=sd18,lun=\\.PhysicalDrive18  
sd=sd19,lun=\\.PhysicalDrive19  
sd=sd20,lun=\\.PhysicalDrive20  
sd=sd21,lun=\\.PhysicalDrive21  
sd=sd22,lun=\\.PhysicalDrive22  
sd=sd23,lun=\\.PhysicalDrive23  
sd=sd24,lun=\\.PhysicalDrive24  
sd=sd25,lun=\\.PhysicalDrive25  
sd=sd26,lun=\\.PhysicalDrive26  
sd=sd27,lun=\\.PhysicalDrive27  
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sd=sd43,lun=\\.PhysicalDrive43  
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sd=sd47,lun=\\.PhysicalDrive47  
sd=sd48,lun=\\.PhysicalDrive48  
sd=sd49,lun=\\.PhysicalDrive49  
sd=sd50,lun=\\.PhysicalDrive50  
sd=sd51,lun=\\.PhysicalDrive51  
sd=sd52,lun=\\.PhysicalDrive52
```

```
sd=sd53,lun=\\.\PhysicalDrive53
sd=sd54,lun=\\.\PhysicalDrive54
sd=sd55,lun=\\.\PhysicalDrive55
sd=sd56,lun=\\.\PhysicalDrive56
sd=sd57,lun=\\.\PhysicalDrive57
sd=sd58,lun=\\.\PhysicalDrive58
sd=sd59,lun=\\.\PhysicalDrive59
sd=sd60,lun=\\.\PhysicalDrive60
sd=sd61,lun=\\.\PhysicalDrive61
sd=sd62,lun=\\.\PhysicalDrive62
sd=sd63,lun=\\.\PhysicalDrive63
sd=sd64,lun=\\.\PhysicalDrive64
sd=sd65,lun=\\.\PhysicalDrive65
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sd=sd71,lun=\\.\PhysicalDrive71
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sd=sd74,lun=\\.\PhysicalDrive74
sd=sd75,lun=\\.\PhysicalDrive75
sd=sd76,lun=\\.\PhysicalDrive76
sd=sd77,lun=\\.\PhysicalDrive77
sd=sd78,lun=\\.\PhysicalDrive78
sd=sd79,lun=\\.\PhysicalDrive79
sd=sd80,lun=\\.\PhysicalDrive80
sd=sd81,lun=\\.\PhysicalDrive81
sd=sd82,lun=\\.\PhysicalDrive82
sd=sd83,lun=\\.\PhysicalDrive83
sd=sd84,lun=\\.\PhysicalDrive84
sd=sd85,lun=\\.\PhysicalDrive85
sd=sd86,lun=\\.\PhysicalDrive86
sd=sd87,lun=\\.\PhysicalDrive87
sd=sd88,lun=\\.\PhysicalDrive88
sd=sd89,lun=\\.\PhysicalDrive89
sd=sd90,lun=\\.\PhysicalDrive90
sd=sd91,lun=\\.\PhysicalDrive91
sd=sd92,lun=\\.\PhysicalDrive92
sd=sd93,lun=\\.\PhysicalDrive93
sd=sd94,lun=\\.\PhysicalDrive94
sd=sd95,lun=\\.\PhysicalDrive95
sd=sd96,lun=\\.\PhysicalDrive96
```

```
sd=default,host=hpc7000-30-b15,size=300647710000
sd=sd1,lun=\\.\PhysicalDrive1
sd=sd2,lun=\\.\PhysicalDrive2
sd=sd3,lun=\\.\PhysicalDrive3
sd=sd4,lun=\\.\PhysicalDrive4
sd=sd5,lun=\\.\PhysicalDrive5
sd=sd6,lun=\\.\PhysicalDrive6
sd=sd7,lun=\\.\PhysicalDrive7
sd=sd8,lun=\\.\PhysicalDrive8
sd=sd9,lun=\\.\PhysicalDrive9
sd=sd10,lun=\\.\PhysicalDrive10
sd=sd11,lun=\\.\PhysicalDrive11
sd=sd12,lun=\\.\PhysicalDrive12
sd=sd13,lun=\\.\PhysicalDrive13
sd=sd14,lun=\\.\PhysicalDrive14
sd=sd15,lun=\\.\PhysicalDrive15
sd=sd16,lun=\\.\PhysicalDrive16
```

sd=sd17,lun=\\.\PhysicalDrive17
sd=sd18,lun=\\.\PhysicalDrive18
sd=sd19,lun=\\.\PhysicalDrive19
sd=sd20,lun=\\.\PhysicalDrive20
sd=sd21,lun=\\.\PhysicalDrive21
sd=sd22,lun=\\.\PhysicalDrive22
sd=sd23,lun=\\.\PhysicalDrive23
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sd=sd33,lun=\\.\PhysicalDrive33
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sd=sd38,lun=\\.\PhysicalDrive38
sd=sd39,lun=\\.\PhysicalDrive39
sd=sd40,lun=\\.\PhysicalDrive40
sd=sd41,lun=\\.\PhysicalDrive41
sd=sd42,lun=\\.\PhysicalDrive42
sd=sd43,lun=\\.\PhysicalDrive43
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sd=sd49,lun=\\.\PhysicalDrive49
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sd=sd54,lun=\\.\PhysicalDrive54
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sd=sd58,lun=\\.\PhysicalDrive58
sd=sd59,lun=\\.\PhysicalDrive59
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sd=sd61,lun=\\.\PhysicalDrive61
sd=sd62,lun=\\.\PhysicalDrive62
sd=sd63,lun=\\.\PhysicalDrive63
sd=sd64,lun=\\.\PhysicalDrive64
sd=sd65,lun=\\.\PhysicalDrive65
sd=sd66,lun=\\.\PhysicalDrive66
sd=sd67,lun=\\.\PhysicalDrive67
sd=sd68,lun=\\.\PhysicalDrive68
sd=sd69,lun=\\.\PhysicalDrive69
sd=sd70,lun=\\.\PhysicalDrive70
sd=sd71,lun=\\.\PhysicalDrive71
sd=sd72,lun=\\.\PhysicalDrive72
sd=sd73,lun=\\.\PhysicalDrive73
sd=sd74,lun=\\.\PhysicalDrive74
sd=sd75,lun=\\.\PhysicalDrive75
sd=sd76,lun=\\.\PhysicalDrive76
sd=sd77,lun=\\.\PhysicalDrive77
sd=sd78,lun=\\.\PhysicalDrive78
sd=sd79,lun=\\.\PhysicalDrive79


```
sd=sd80,lun=\\.\PhysicalDrive80
sd=sd81,lun=\\.\PhysicalDrive81
sd=sd82,lun=\\.\PhysicalDrive82
sd=sd83,lun=\\.\PhysicalDrive83
sd=sd84,lun=\\.\PhysicalDrive84
sd=sd85,lun=\\.\PhysicalDrive85
sd=sd86,lun=\\.\PhysicalDrive86
sd=sd87,lun=\\.\PhysicalDrive87
sd=sd88,lun=\\.\PhysicalDrive88
sd=sd89,lun=\\.\PhysicalDrive89
sd=sd90,lun=\\.\PhysicalDrive90
sd=sd91,lun=\\.\PhysicalDrive91
sd=sd92,lun=\\.\PhysicalDrive92
sd=sd93,lun=\\.\PhysicalDrive93
sd=sd94,lun=\\.\PhysicalDrive94
sd=sd95,lun=\\.\PhysicalDrive95
sd=sd96,lun=\\.\PhysicalDrive96
```

```
sd=default,host=hpc7000-30-b14,size=300647710000
```

```
sd=sd1,lun=\\.\PhysicalDrive1
sd=sd2,lun=\\.\PhysicalDrive2
sd=sd3,lun=\\.\PhysicalDrive3
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sd=default,host=hpc7000-30-b5,size=300647710000
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sd=sd96,lun=\\.\PhysicalDrive96

sd=default,host=hpc7000-33-b2,size=30064771000
sd=sd1,lun=\\.\PhysicalDrive1
sd=sd2,lun=\\.\PhysicalDrive2
sd=sd3,lun=\\.\PhysicalDrive3
sd=sd4,lun=\\.\PhysicalDrive4
sd=sd5,lun=\\.\PhysicalDrive5
sd=sd6,lun=\\.\PhysicalDrive6
sd=sd7,lun=\\.\PhysicalDrive7
sd=sd8,lun=\\.\PhysicalDrive8
sd=sd9,lun=\\.\PhysicalDrive9
```

```
sd=sd10,lun=\\.\PhysicalDrive10
sd=sd11,lun=\\.\PhysicalDrive11
sd=sd12,lun=\\.\PhysicalDrive12
sd=sd13,lun=\\.\PhysicalDrive13
sd=sd14,lun=\\.\PhysicalDrive14
sd=sd15,lun=\\.\PhysicalDrive15
sd=sd16,lun=\\.\PhysicalDrive16
sd=sd17,lun=\\.\PhysicalDrive17
sd=sd18,lun=\\.\PhysicalDrive18
sd=sd19,lun=\\.\PhysicalDrive19
sd=sd20,lun=\\.\PhysicalDrive20
sd=sd21,lun=\\.\PhysicalDrive21
sd=sd22,lun=\\.\PhysicalDrive22
sd=sd23,lun=\\.\PhysicalDrive23
sd=sd24,lun=\\.\PhysicalDrive24
sd=sd25,lun=\\.\PhysicalDrive25
sd=sd26,lun=\\.\PhysicalDrive26
sd=sd27,lun=\\.\PhysicalDrive27
sd=sd28,lun=\\.\PhysicalDrive28
sd=sd29,lun=\\.\PhysicalDrive29
sd=sd30,lun=\\.\PhysicalDrive30
sd=sd31,lun=\\.\PhysicalDrive31
sd=sd32,lun=\\.\PhysicalDrive32
sd=sd33,lun=\\.\PhysicalDrive33
sd=sd34,lun=\\.\PhysicalDrive34
sd=sd35,lun=\\.\PhysicalDrive35
sd=sd36,lun=\\.\PhysicalDrive36
sd=sd37,lun=\\.\PhysicalDrive37
sd=sd38,lun=\\.\PhysicalDrive38
sd=sd39,lun=\\.\PhysicalDrive39
sd=sd40,lun=\\.\PhysicalDrive40
sd=sd41,lun=\\.\PhysicalDrive41
sd=sd42,lun=\\.\PhysicalDrive42
sd=sd43,lun=\\.\PhysicalDrive43
sd=sd44,lun=\\.\PhysicalDrive44
sd=sd45,lun=\\.\PhysicalDrive45
sd=sd46,lun=\\.\PhysicalDrive46
sd=sd47,lun=\\.\PhysicalDrive47
sd=sd48,lun=\\.\PhysicalDrive48
sd=sd49,lun=\\.\PhysicalDrive49
sd=sd50,lun=\\.\PhysicalDrive50
sd=sd51,lun=\\.\PhysicalDrive51
sd=sd52,lun=\\.\PhysicalDrive52
sd=sd53,lun=\\.\PhysicalDrive53
sd=sd54,lun=\\.\PhysicalDrive54
sd=sd55,lun=\\.\PhysicalDrive55
sd=sd56,lun=\\.\PhysicalDrive56
sd=sd57,lun=\\.\PhysicalDrive57
sd=sd58,lun=\\.\PhysicalDrive58
sd=sd59,lun=\\.\PhysicalDrive59
sd=sd60,lun=\\.\PhysicalDrive60
sd=sd61,lun=\\.\PhysicalDrive61
sd=sd62,lun=\\.\PhysicalDrive62
sd=sd63,lun=\\.\PhysicalDrive63
sd=sd64,lun=\\.\PhysicalDrive64
sd=sd65,lun=\\.\PhysicalDrive65
sd=sd66,lun=\\.\PhysicalDrive66
sd=sd67,lun=\\.\PhysicalDrive67
sd=sd68,lun=\\.\PhysicalDrive68
sd=sd69,lun=\\.\PhysicalDrive69
sd=sd70,lun=\\.\PhysicalDrive70
sd=sd71,lun=\\.\PhysicalDrive71
sd=sd72,lun=\\.\PhysicalDrive72
```

```
sd=sd73,lun=\\.\PhysicalDrive73
sd=sd74,lun=\\.\PhysicalDrive74
sd=sd75,lun=\\.\PhysicalDrive75
sd=sd76,lun=\\.\PhysicalDrive76
sd=sd77,lun=\\.\PhysicalDrive77
sd=sd78,lun=\\.\PhysicalDrive78
sd=sd79,lun=\\.\PhysicalDrive79
sd=sd80,lun=\\.\PhysicalDrive80
sd=sd81,lun=\\.\PhysicalDrive81
sd=sd82,lun=\\.\PhysicalDrive82
sd=sd83,lun=\\.\PhysicalDrive83
sd=sd84,lun=\\.\PhysicalDrive84
sd=sd85,lun=\\.\PhysicalDrive85
sd=sd86,lun=\\.\PhysicalDrive86
sd=sd87,lun=\\.\PhysicalDrive87
sd=sd88,lun=\\.\PhysicalDrive88
sd=sd89,lun=\\.\PhysicalDrive89
sd=sd90,lun=\\.\PhysicalDrive90
sd=sd91,lun=\\.\PhysicalDrive91
sd=sd92,lun=\\.\PhysicalDrive92
sd=sd93,lun=\\.\PhysicalDrive93
sd=sd94,lun=\\.\PhysicalDrive94
sd=sd95,lun=\\.\PhysicalDrive95
sd=sd96,lun=\\.\PhysicalDrive96
```

```
sd=default,host=hpc7000-33-b1,size=300647710000
sd=sd1,lun=\\.\PhysicalDrive1
sd=sd2,lun=\\.\PhysicalDrive2
sd=sd3,lun=\\.\PhysicalDrive3
sd=sd4,lun=\\.\PhysicalDrive4
sd=sd5,lun=\\.\PhysicalDrive5
sd=sd6,lun=\\.\PhysicalDrive6
sd=sd7,lun=\\.\PhysicalDrive7
sd=sd8,lun=\\.\PhysicalDrive8
sd=sd9,lun=\\.\PhysicalDrive9
sd=sd10,lun=\\.\PhysicalDrive10
sd=sd11,lun=\\.\PhysicalDrive11
sd=sd12,lun=\\.\PhysicalDrive12
sd=sd13,lun=\\.\PhysicalDrive13
sd=sd14,lun=\\.\PhysicalDrive14
sd=sd15,lun=\\.\PhysicalDrive15
sd=sd16,lun=\\.\PhysicalDrive16
sd=sd17,lun=\\.\PhysicalDrive17
sd=sd18,lun=\\.\PhysicalDrive18
sd=sd19,lun=\\.\PhysicalDrive19
sd=sd20,lun=\\.\PhysicalDrive20
sd=sd21,lun=\\.\PhysicalDrive21
sd=sd22,lun=\\.\PhysicalDrive22
sd=sd23,lun=\\.\PhysicalDrive23
sd=sd24,lun=\\.\PhysicalDrive24
sd=sd25,lun=\\.\PhysicalDrive25
sd=sd26,lun=\\.\PhysicalDrive26
sd=sd27,lun=\\.\PhysicalDrive27
sd=sd28,lun=\\.\PhysicalDrive28
sd=sd29,lun=\\.\PhysicalDrive29
sd=sd30,lun=\\.\PhysicalDrive30
sd=sd31,lun=\\.\PhysicalDrive31
sd=sd32,lun=\\.\PhysicalDrive32
sd=sd33,lun=\\.\PhysicalDrive33
sd=sd34,lun=\\.\PhysicalDrive34
sd=sd35,lun=\\.\PhysicalDrive35
sd=sd36,lun=\\.\PhysicalDrive36
sd=sd37,lun=\\.\PhysicalDrive37
```

```
sd=sd38,lun=\\.PhysicalDrive38
sd=sd39,lun=\\.PhysicalDrive39
sd=sd40,lun=\\.PhysicalDrive40
sd=sd41,lun=\\.PhysicalDrive41
sd=sd42,lun=\\.PhysicalDrive42
sd=sd43,lun=\\.PhysicalDrive43
sd=sd44,lun=\\.PhysicalDrive44
sd=sd45,lun=\\.PhysicalDrive45
sd=sd46,lun=\\.PhysicalDrive46
sd=sd47,lun=\\.PhysicalDrive47
sd=sd48,lun=\\.PhysicalDrive48
sd=sd49,lun=\\.PhysicalDrive49
sd=sd50,lun=\\.PhysicalDrive50
sd=sd51,lun=\\.PhysicalDrive51
sd=sd52,lun=\\.PhysicalDrive52
sd=sd53,lun=\\.PhysicalDrive53
sd=sd54,lun=\\.PhysicalDrive54
sd=sd55,lun=\\.PhysicalDrive55
sd=sd56,lun=\\.PhysicalDrive56
sd=sd57,lun=\\.PhysicalDrive57
sd=sd58,lun=\\.PhysicalDrive58
sd=sd59,lun=\\.PhysicalDrive59
sd=sd60,lun=\\.PhysicalDrive60
sd=sd61,lun=\\.PhysicalDrive61
sd=sd62,lun=\\.PhysicalDrive62
sd=sd63,lun=\\.PhysicalDrive63
sd=sd64,lun=\\.PhysicalDrive64
sd=sd65,lun=\\.PhysicalDrive65
sd=sd66,lun=\\.PhysicalDrive66
sd=sd67,lun=\\.PhysicalDrive67
sd=sd68,lun=\\.PhysicalDrive68
sd=sd69,lun=\\.PhysicalDrive69
sd=sd70,lun=\\.PhysicalDrive70
sd=sd71,lun=\\.PhysicalDrive71
sd=sd72,lun=\\.PhysicalDrive72
sd=sd73,lun=\\.PhysicalDrive73
sd=sd74,lun=\\.PhysicalDrive74
sd=sd75,lun=\\.PhysicalDrive75
sd=sd76,lun=\\.PhysicalDrive76
sd=sd77,lun=\\.PhysicalDrive77
sd=sd78,lun=\\.PhysicalDrive78
sd=sd79,lun=\\.PhysicalDrive79
sd=sd80,lun=\\.PhysicalDrive80
sd=sd81,lun=\\.PhysicalDrive81
sd=sd82,lun=\\.PhysicalDrive82
sd=sd83,lun=\\.PhysicalDrive83
sd=sd84,lun=\\.PhysicalDrive84
sd=sd85,lun=\\.PhysicalDrive85
sd=sd86,lun=\\.PhysicalDrive86
sd=sd87,lun=\\.PhysicalDrive87
sd=sd88,lun=\\.PhysicalDrive88
sd=sd89,lun=\\.PhysicalDrive89
sd=sd90,lun=\\.PhysicalDrive90
sd=sd91,lun=\\.PhysicalDrive91
sd=sd92,lun=\\.PhysicalDrive92
sd=sd93,lun=\\.PhysicalDrive93
sd=sd94,lun=\\.PhysicalDrive94
sd=sd95,lun=\\.PhysicalDrive95
sd=sd96,lun=\\.PhysicalDrive96
```

```
maxlatestart=0
reportinginterval=5
segmentlength=512m
```

Large File Processing Test (LFP)

* Master Host definition

```
host=localhost,jvms=0,maxstreams=0
```

* Remote Host definitions

```
host=(15.162.67.172,hpc7000-30-b15),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.171,hpc7000-30-b14),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.170,hpc7000-30-b13),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.169,hpc7000-30-b12),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.168,hpc7000-30-b11),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.167,hpc7000-30-b10),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,  
  maxstreams=600
```

```
host=(15.162.67.166,hpc7000-30-b9),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=4,
```



```
maxstreams=600

host=(15.162.67.165,hpc7000-30-b8),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.164,hpc7000-30-b7),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.163,hpc7000-30-b6),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.162,hpc7000-30-b5),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.161,hpc7000-30-b4),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.160,hpc7000-30-b3),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.159,hpc7000-30-b2),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=4,
  maxstreams=600

host=(15.162.67.158,hpc7000-30-b1),
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
```

```
jvms=4,  
maxstreams=600  
  
host=(15.162.65.204,hpc7000-33-b16),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.203,hpc7000-33-b15),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.202,hpc7000-33-b14),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.201,hpc7000-33-b13),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.200,hpc7000-33-b12),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.199,hpc7000-33-b11),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.198,hpc7000-33-b10),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.197,hpc7000-33-b9),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",
```

```
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.196,hpc7000-33-b8),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.195,hpc7000-33-b7),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.194,hpc7000-33-b6),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.193,hpc7000-33-b5),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.192,hpc7000-33-b4),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.191,hpc7000-33-b3),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.190,hpc7000-33-b2),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600  
  
host=(15.162.65.189,hpc7000-33-b1),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
```

```
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=4,  
maxstreams=600
```

Common Commands/Parameters – LFP, LDQ and VOD Tests

```
maxlatestart=0  
reportinginterval=5  
segmentlength=512m
```

```
rd=default,rampup=180,periods=90,measurement=180,runout=45,rampdown=15,buffers=1
```

```
*rd=default,rdpct=100,xfersize=1024k
```

```
* LFP Write Test Phase  
rd=default,rdpct=0,xfersize=1024k  
rd=TR1_SPC-2-FP,streams=124  
rd=TR2_SPC-2-FP,streams=62  
rd=TR3_SPC-2-FP,streams=31  
rd=TR4_SPC-2-FP,streams=15  
rd=TR5_SPC-2-FP,streams=1
```

```
* LFP Write Test Phase  
rd=default,rdpct=0,xfersize=256k  
rd=TR6_SPC-2-FP,streams=124  
rd=TR7_SPC-2-FP,streams=62  
rd=TR8_SPC-2-FP,streams=31  
rd=TR9_SPC-2-FP,streams=15  
rd=TR10_SPC-2-FP,streams=1
```

```
* LFP ReadWrite Test Phase  
rd=default,rdpct=50,xfersize=1024k  
rd=TR11_SPC-2-FP,streams=248  
rd=TR12_SPC-2-FP,streams=124  
rd=TR13_SPC-2-FP,streams=62  
rd=TR14_SPC-2-FP,streams=31  
rd=TR15_SPC-2-FP,streams=1
```

```
* LFP ReadWrite Test Phase  
rd=default,rdpct=50,xfersize=256k  
rd=TR16_SPC-2-FP,streams=248  
rd=TR17_SPC-2-FP,streams=124  
rd=TR18_SPC-2-FP,streams=62  
rd=TR19_SPC-2-FP,streams=31  
rd=TR20_SPC-2-FP,streams=1
```

```
* LFP Read Test Phase  
rd=default,rdpct=100,xfersize=1024k  
rd=TR21_SPC-2-FP,streams=2300  
rd=TR22_SPC-2-FP,streams=1150  
rd=TR23_SPC-2-FP,streams=575  
rd=TR24_SPC-2-FP,streams=287  
rd=TR25_SPC-2-FP,streams=1
```

```
* LFP Read Test Phase  
rd=default,rdpct=100,xfersize=256k  
rd=TR26_SPC-2-FP,streams=2300  
rd=TR27_SPC-2-FP,streams=1150
```

```
rd=TR28_SPC-2-FP,streams=575  
rd=TR29_SPC-2-FP,streams=287  
rd=TR30_SPC-2-FP,streams=1
```

Large Database Query Test (LDQ)

* Master Host definition

```
host=localhost,jvms=0,maxstreams=0
```

* Remote Host definitions

```
host=(15.162.67.172,hpc7000-30-b15),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.171,hpc7000-30-b14),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.170,hpc7000-30-b13),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.169,hpc7000-30-b12),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.168,hpc7000-30-b11),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.167,hpc7000-30-b10),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",  
  shell=spc2,  
  user=root,  
  jvms=12,  
  maxstreams=600
```

```
host=(15.162.67.166,hpc7000-30-b9),  
  java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
  spc2="C:\spc\spc2",
```

```
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.165,hpc7000-30-b8),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.164,hpc7000-30-b7),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.163,hpc7000-30-b6),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.162,hpc7000-30-b5),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.161,hpc7000-30-b4),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.160,hpc7000-30-b3),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.159,hpc7000-30-b2),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=600  
  
host=(15.162.67.158,hpc7000-30-b1),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
```

```
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.204,hpc7000-33-b16),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.203,hpc7000-33-b15),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.202,hpc7000-33-b14),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.201,hpc7000-33-b13),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.200,hpc7000-33-b12),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.199,hpc7000-33-b11),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600

host=(15.162.65.198,hpc7000-33-b10),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=600
```

```
host=(15.162.65.197,hpc7000-33-b9),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.196,hpc7000-33-b8),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.195,hpc7000-33-b7),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.194,hpc7000-33-b6),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.193,hpc7000-33-b5),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.192,hpc7000-33-b4),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.191,hpc7000-33-b3),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```

```
host=(15.162.65.190,hpc7000-33-b2),
  java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
  spc2="C:\spc\spc2",
  shell=spc2,
  user=root,
  jvms=12,
  maxstreams=600
```



```
host=(15.162.65.189,hpc7000-33-b1),
java=("c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=600
```

Common Commands/Parameters – LFP, LDQ and VOD Tests

* Large database Processing:

*

```
maxlatestart=0
reportinginterval=5
segmentlength=512m
* Fixed parameters
```

```
rd=default,rdpct=99,rampup=180,measurement=180,runout=45,rampdown=15,periods=90
```

```
rd=default,xfersize=1024k,buffers=4
rd=TR1_SPC-2-DQ2,streams=1953
rd=TR2_SPC-2-DQ2,streams=976
rd=TR3_SPC-2-DQ2,streams=488
rd=TR4_SPC-2-DQ2,streams=244
rd=TR5_SPC-2-DQ2,streams=1
```

```
rd=default,xfersize=1024k,buffers=1
rd=TR6_SPC-2-DQ2,streams=1953
rd=TR7_SPC-2-DQ2,streams=976
rd=TR8_SPC-2-DQ2,streams=488
rd=TR9_SPC-2-DQ2,streams=244
rd=TR10_SPC-2-DQ2,streams=1
```

```
rd=default,xfersize=64k,buffers=4
rd=TR11_SPC-2-DQ2,streams=2697
rd=TR12_SPC-2-DQ2,streams=1348
rd=TR13_SPC-2-DQ2,streams=674
rd=TR14_SPC-2-DQ2,streams=337
rd=TR15_SPC-2-DQ2,streams=1
```

```
rd=default,xfersize=64k,buffers=1
rd=TR16_SPC-2-DQ2,streams=2697
rd=TR17_SPC-2-DQ2,streams=1348
rd=TR18_SPC-2-DQ2,streams=674
rd=TR19_SPC-2-DQ2,streams=337
rd=TR20_SPC-2-DQ2,streams=1
```

Video on Demand Delivery (VOD)

* Master Host definition

```
host=localhost,jvms=0,maxstreams=0
```

* Remote Host definitions

```
host=(15.162.67.172,hpc7000-30-b15),
java=("c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
```

```
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.171,hpc7000-30-b14),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.170,hpc7000-30-b13),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.169,hpc7000-30-b12),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.168,hpc7000-30-b11),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.167,hpc7000-30-b10),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.166,hpc7000-30-b9),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.165,hpc7000-30-b8),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,  
user=root,  
jvms=12,  
maxstreams=3500  
  
host=(15.162.67.164,hpc7000-30-b7),  
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),  
spc2="C:\spc\spc2",  
shell=spc2,
```

```
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.163,hpc7000-30-b6),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.162,hpc7000-30-b5),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.161,hpc7000-30-b4),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.160,hpc7000-30-b3),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.159,hpc7000-30-b2),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.67.158,hpc7000-30-b1),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.204,hpc7000-33-b16),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.203,hpc7000-33-b15),
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
```

```
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.202,hpc7000-33-b14),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.201,hpc7000-33-b13),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.200,hpc7000-33-b12),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.199,hpc7000-33-b11),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.198,hpc7000-33-b10),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.197,hpc7000-33-b9),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.196,hpc7000-33-b8),
    java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k -Xincgc"),
    spc2="C:\spc\spc2",
    shell=spc2,
    user=root,
    jvms=12,
    maxstreams=3500

host=(15.162.65.195,hpc7000-33-b7),
```

```
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.194,hpc7000-33-b6),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.193,hpc7000-33-b5),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.192,hpc7000-33-b4),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.191,hpc7000-33-b3),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.190,hpc7000-33-b2),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500

host=(15.162.65.189,hpc7000-33-b1),
java=( "c:\Program Files\Java\jre7\bin\java", "-Xmx15536m -Xss128k -Xincgc" ),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=3500
```

[Common Commands/Parameters – LFP, LDQ and VOD Tests](#)

```
maxlatestart=0
videosegmentduration=1200
maxlatevod=0
reportinginterval=5
rd=default,rampup=4500,measurement=7200,runout=45,rampdown=15,buffers=8
rd=TR1_SPC-2-VOD11,streams=95000
```

Common Commands/Parameters – SPC-2 Persistence Test

The following command/parameter lines appear in each of the command and parameter files for the two SPC-2 Persistence Test Runs. The command lines are only listed below to eliminate redundancy.

```
host=localhost,jvms=0,maxstreams=0
java=("c:\Program Files\Java\jre7\bin\java","-Xmx15536m -Xss128k "),
spc2="C:\spc\spc2",
shell=spc2,
user=root,
jvms=12,
maxstreams=4000
```

```
sd=default,host=localhost,size=300647710000
```

```
sd=sd1,lun=\\.\PhysicalDrive1
sd=sd2,lun=\\.\PhysicalDrive2
sd=sd3,lun=\\.\PhysicalDrive3
sd=sd4,lun=\\.\PhysicalDrive4
sd=sd5,lun=\\.\PhysicalDrive5
sd=sd6,lun=\\.\PhysicalDrive6
sd=sd7,lun=\\.\PhysicalDrive7
sd=sd8,lun=\\.\PhysicalDrive8
sd=sd9,lun=\\.\PhysicalDrive9
sd=sd10,lun=\\.\PhysicalDrive10
sd=sd11,lun=\\.\PhysicalDrive11
sd=sd12,lun=\\.\PhysicalDrive12
sd=sd13,lun=\\.\PhysicalDrive13
sd=sd14,lun=\\.\PhysicalDrive14
sd=sd15,lun=\\.\PhysicalDrive15
sd=sd16,lun=\\.\PhysicalDrive16
sd=sd17,lun=\\.\PhysicalDrive17
sd=sd18,lun=\\.\PhysicalDrive18
sd=sd19,lun=\\.\PhysicalDrive19
sd=sd20,lun=\\.\PhysicalDrive20
sd=sd21,lun=\\.\PhysicalDrive21
sd=sd22,lun=\\.\PhysicalDrive22
sd=sd23,lun=\\.\PhysicalDrive23
sd=sd24,lun=\\.\PhysicalDrive24
sd=sd25,lun=\\.\PhysicalDrive25
sd=sd26,lun=\\.\PhysicalDrive26
sd=sd27,lun=\\.\PhysicalDrive27
sd=sd28,lun=\\.\PhysicalDrive28
sd=sd29,lun=\\.\PhysicalDrive29
sd=sd30,lun=\\.\PhysicalDrive30
sd=sd31,lun=\\.\PhysicalDrive31
sd=sd32,lun=\\.\PhysicalDrive32
sd=sd33,lun=\\.\PhysicalDrive33
sd=sd34,lun=\\.\PhysicalDrive34
sd=sd35,lun=\\.\PhysicalDrive35
sd=sd36,lun=\\.\PhysicalDrive36
sd=sd37,lun=\\.\PhysicalDrive37
sd=sd38,lun=\\.\PhysicalDrive38
sd=sd39,lun=\\.\PhysicalDrive39
sd=sd40,lun=\\.\PhysicalDrive40
sd=sd41,lun=\\.\PhysicalDrive41
sd=sd42,lun=\\.\PhysicalDrive42
sd=sd43,lun=\\.\PhysicalDrive43
sd=sd44,lun=\\.\PhysicalDrive44
sd=sd45,lun=\\.\PhysicalDrive45
```

```
sd=sd46,lun=\\.PhysicalDrive46
sd=sd47,lun=\\.PhysicalDrive47
sd=sd48,lun=\\.PhysicalDrive48
sd=sd49,lun=\\.PhysicalDrive49
sd=sd50,lun=\\.PhysicalDrive50
sd=sd51,lun=\\.PhysicalDrive51
sd=sd52,lun=\\.PhysicalDrive52
sd=sd53,lun=\\.PhysicalDrive53
sd=sd54,lun=\\.PhysicalDrive54
sd=sd55,lun=\\.PhysicalDrive55
sd=sd56,lun=\\.PhysicalDrive56
sd=sd57,lun=\\.PhysicalDrive57
sd=sd58,lun=\\.PhysicalDrive58
sd=sd59,lun=\\.PhysicalDrive59
sd=sd60,lun=\\.PhysicalDrive60
sd=sd61,lun=\\.PhysicalDrive61
sd=sd62,lun=\\.PhysicalDrive62
sd=sd63,lun=\\.PhysicalDrive63
sd=sd64,lun=\\.PhysicalDrive64
sd=sd65,lun=\\.PhysicalDrive65
sd=sd66,lun=\\.PhysicalDrive66
sd=sd67,lun=\\.PhysicalDrive67
sd=sd68,lun=\\.PhysicalDrive68
sd=sd69,lun=\\.PhysicalDrive69
sd=sd70,lun=\\.PhysicalDrive70
sd=sd71,lun=\\.PhysicalDrive71
sd=sd72,lun=\\.PhysicalDrive72
sd=sd73,lun=\\.PhysicalDrive73
sd=sd74,lun=\\.PhysicalDrive74
sd=sd75,lun=\\.PhysicalDrive75
sd=sd76,lun=\\.PhysicalDrive76
sd=sd77,lun=\\.PhysicalDrive77
sd=sd78,lun=\\.PhysicalDrive78
sd=sd79,lun=\\.PhysicalDrive79
sd=sd80,lun=\\.PhysicalDrive80
sd=sd81,lun=\\.PhysicalDrive81
sd=sd82,lun=\\.PhysicalDrive82
sd=sd83,lun=\\.PhysicalDrive83
sd=sd84,lun=\\.PhysicalDrive84
sd=sd85,lun=\\.PhysicalDrive85
sd=sd86,lun=\\.PhysicalDrive86
sd=sd87,lun=\\.PhysicalDrive87
sd=sd88,lun=\\.PhysicalDrive88
sd=sd89,lun=\\.PhysicalDrive89
sd=sd90,lun=\\.PhysicalDrive90
sd=sd91,lun=\\.PhysicalDrive91
sd=sd92,lun=\\.PhysicalDrive92
sd=sd93,lun=\\.PhysicalDrive93
sd=sd94,lun=\\.PhysicalDrive94
sd=sd95,lun=\\.PhysicalDrive95
sd=sd96,lun=\\.PhysicalDrive96
```

SPC-2 Persistence Test Run 1 (*write phase*)

Common Commands/Parameters – SPC-2 Persistence Test

```
* Persistence write test
*
maxlatestart=0
reportinginterval=5
segmentlength=512m

* Fixed
rd=default,rampup=180,periods=90,measurement=300,runout=0,rampdown=0,buffers=1

rd=default,rdpct=0,xfersize=1024k
rd=TR1_SPC-2-persist-w,streams=124
```

SPC-2 Persistence Test Run 2 (*read phase*)

Common Commands/Parameters – SPC-2 Persistence Test

```
* Persistence read test
*
maxlatestart=0
reportinginterval=5
segmentlength=512m
maxpersistenceerrors=10

* Fixed
rd=default,rampup=0,periods=0,measurement=300,runout=0,rampdown=0,buffers=1

rd=default,rdpct=100,xfersize=1024k
rd=TR1_SPC-2-persist-r,streams=0
```


APPENDIX E: SPC-2 WORKLOAD GENERATOR EXECUTION COMMANDS AND PARAMETERS

ASU Pre-Fill, Large File Processing Test, Large Database Query Test, Video on Demand Delivery Test, and SPC-2 Persistence Test Run 1 (*write phase*)

The following script, [runfinal.bat](#), was executed to invoke the following in an uninterrupted execution sequence:

- A command to collect the required configuration and storage capacity listings.
- Execute the required ASU pre-fill.
- Create the connections between the remote Host Systems and the Master Host System ([startallspc2.bat](#)).
- Execute the Video on Demand (VOD) Test, Large File Processing (LFP) Test, Large Database Query (LDQ) Test and the SPC-2 Persistence Test Run 1 (*write phase*).

The script, [runfinalpersistfile.bat](#), was executed after the required TSC power off/power on cycle to perform the SPC-2 Persistence Test Run 2 (*read phase*).

runfinal.bat

```
plink root@gnodec279242.3pardata.com "/billmc/getinventory final2inventory"
```

```
chdir c:\vdbench  
call vdbench.bat -f c:\spc\spc2\prefillfile.txt -o  
c:\spc\spc2\spc2_output\final2prefill
```

```
chdir c:\spc\spc2
```

```
call startallspc2.bat
```

```
call spc2.bat -f runlfp.cfg -init -o spc2_output\final2initout
```

```
call spc2.bat -f runvod.cfg -o spc2_output\final2vodout
```

```
call spc2.bat -f runlfp.cfg -o spc2_output\final2lfpout
```

```
call spc2.bat -f runldq.cfg -o spc2_output\final2ldqout
```

```
call spc2.bat -f persistw.cfg -o spc2_output\final2persistwrite
```

```
rem shutdown here - execute next line after power cycle
```

```
rem call spc2.bat -f persistr.cfg -o spc2_output\final2persistread
```

startallspc2.bat

```
rem BAT script to run start1.bat on all the hosts which does the remotestart
```

```
rem This is to run on the master.
```

```
rem
```

```
rem
```

```
rem hpc7000-30 blades b9-b15
```

```
C:\PSTools\psexec \\hpc7000-30-b9 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
```

```
C:\PSTools\psexec \\hpc7000-30-b10 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b11 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b12 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b13 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b14 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b15 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
```

rem hpc7000-30 blades b1-b8

```
C:\PSTools\psexec \\hpc7000-30-b1 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b2 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b3 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b4 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b5 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b6 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b7 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-30-b8 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
```

rem hpc7000-33 blades b9-b16

```
C:\PSTools\psexec \\hpc7000-33-b9 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b10 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b11 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b12 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b13 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b14 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b15 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b16 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
```

rem hpc7000-33 blades b1-b8

```
C:\PSTools\psexec \\hpc7000-33-b1 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b2 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b3 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b4 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b5 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b6 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b7 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
C:\PSTools\psexec \\hpc7000-33-b8 -d -u spcuser -p spc2user! c:\spc\spc2\start1.bat
```

start1.bat

This is the script to actually create the connection between a specific remote Host System and the Master Host system.

```
cd C:\spc\spc2
java -cp C:\spc\spc2 RemoteStart
```

SPC-2 Persistence Test Run 2 (*read phase*)

runfinalpersistrfile.bat

```
rem shutdown here - execute next line after power cycle  
call spc2.bat -f persistr.cfg -o spc2_output\final2persistread
```