



**SPC BENCHMARK 1™  
EXECUTIVE SUMMARY**

**HEWLETT-PACKARD COMPANY  
HP 3PAR STORESERV 7400 STORAGE SYSTEM  
(WITH SSDs)**

**SPC-1 V1.14**

**Submitted for Review: May 23, 2013  
Submission Identifier: A00134**

## EXECUTIVE SUMMARY

### Test Sponsor and Contact Information

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<b>Test Sponsor Primary Contact</b>	Hewlett-Packard Company – <a href="http://www.hp.com">http://www.hp.com</a> Bill McCormack – <a href="mailto:bill.mccormack@hp.com">bill.mccormack@hp.com</a> 4209 Technology Drive Fremont, CA 94538 Phone: (510) 897-2784
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### Revision Information and Key Dates

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<b>SPC-1 Specification revision number</b>	V1.14
<b>SPC-1 Workload Generator revision number</b>	V2.3.0
<b>Date Results were first used publicly</b>	May 23, 2013
<b>Date the FDR was submitted to the SPC</b>	May 23, 2013
<b>Date the Priced Storage Configuration is available for shipment to customers</b>	April 1, 2013
<b>Date the TSC completed audit certification</b>	May 21, 2013

### Tested Storage Product (TSP) Description

The HP 3PAR StoreServ 7400 extends the innovative HP 3PAR StoreServ architecture to the midrange delivering effortless, efficient, bulletproof, and future proof storage to the entire midrange. Tier 1 storage data services and performance are now available to midrange customers. Spend less time managing storage, get more features for less money, and do it all without sacrificing performance or future scalability. The HP 3PAR StoreServ 7400 offers quad controller resiliency, multi-tenant design and mixed workload support. With hardware assisted thin technologies and advanced tiering the HP 3PAR StoreServ 7400 can help significantly reduce capacity. The HP 3PAR StoreServ 7400 is designed to reduce management complexities with built-in autonomic management, allowing effortless and instant response to new workload demands.

HP 3PAR StoreServ is also the first product family with a common architecture that offers midrange affordability and spans to the largest global enterprise, giving midrange customers access to the same features as the world's largest service providers. You can start small and grow without painful upgrades down the road

## Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: HP 3PAR StoreServ 7400 Storage System (with SSDs)	
Metric	Reported Result
SPC-1 IOPS™	258,078.23
SPC-1 Price-Performance™	\$0.58/SPC-1 IOPS™
Total ASU Capacity	1,145.324 GB
Data Protection Level	Protected 2 (Mirroring)
Total Price	\$148,737.80
Currency Used	U.S. Dollars
Target Country for availability, sales and support	USA

SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

SPC-1 Price-Performance™ is the ratio of **Total Price** to SPC-1 IOPS™.

**Total ASU** (Application Storage Unit) **Capacity** represents the total storage capacity available to be read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of **Protected 2** using **Mirroring** 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-1 Data Repository.*

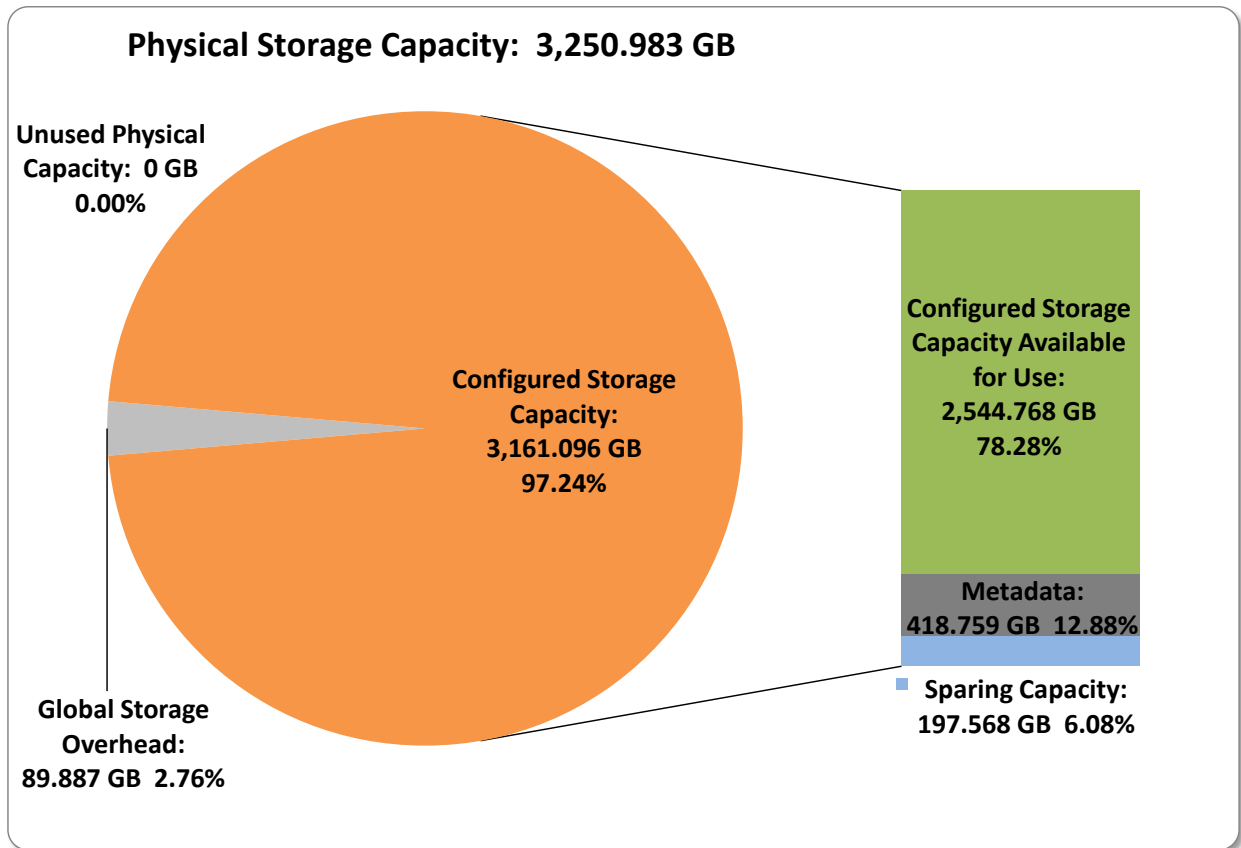
**Total Price** includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 8.

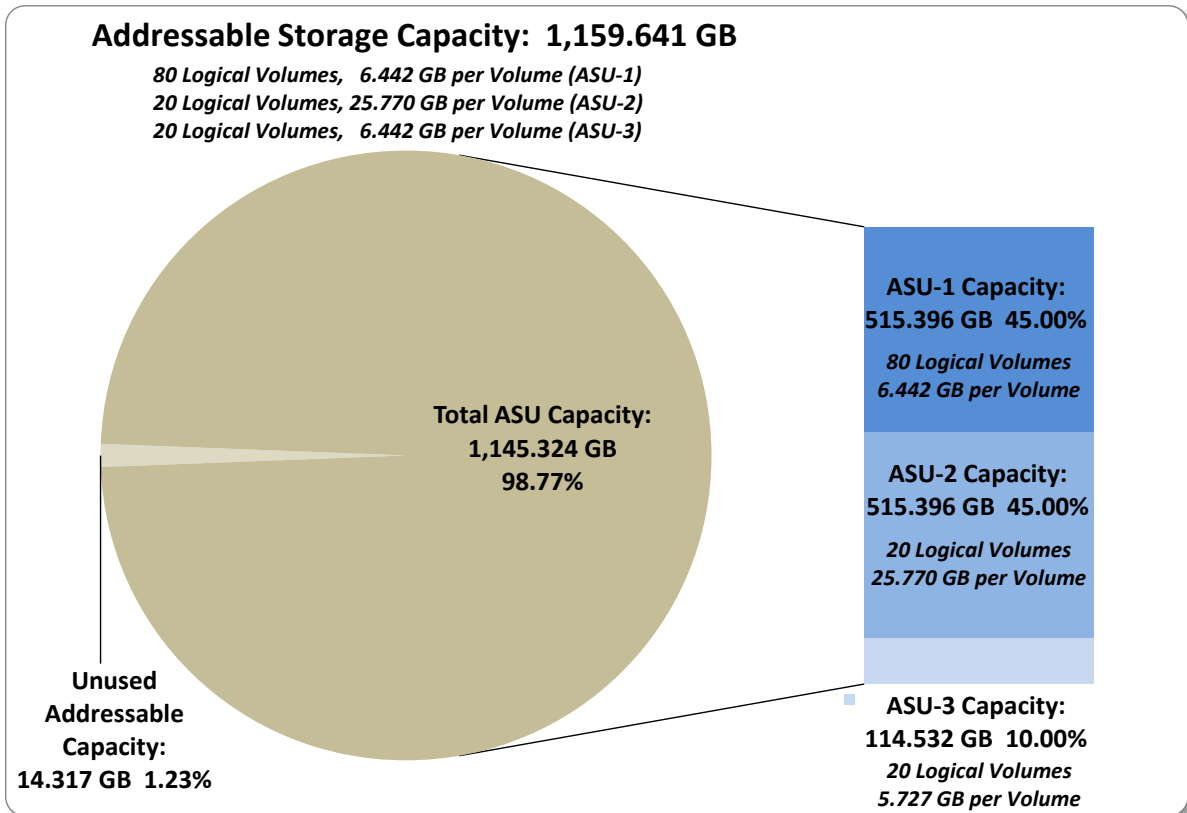
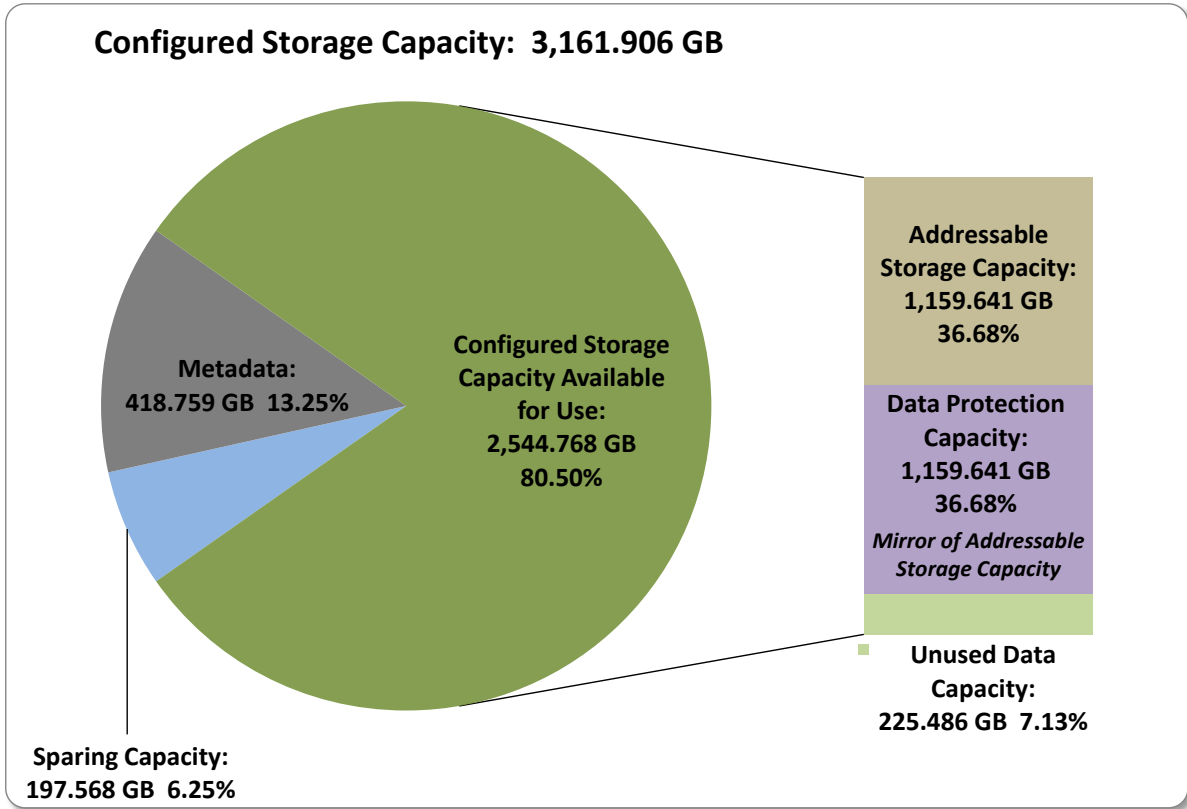
**Currency Used** is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

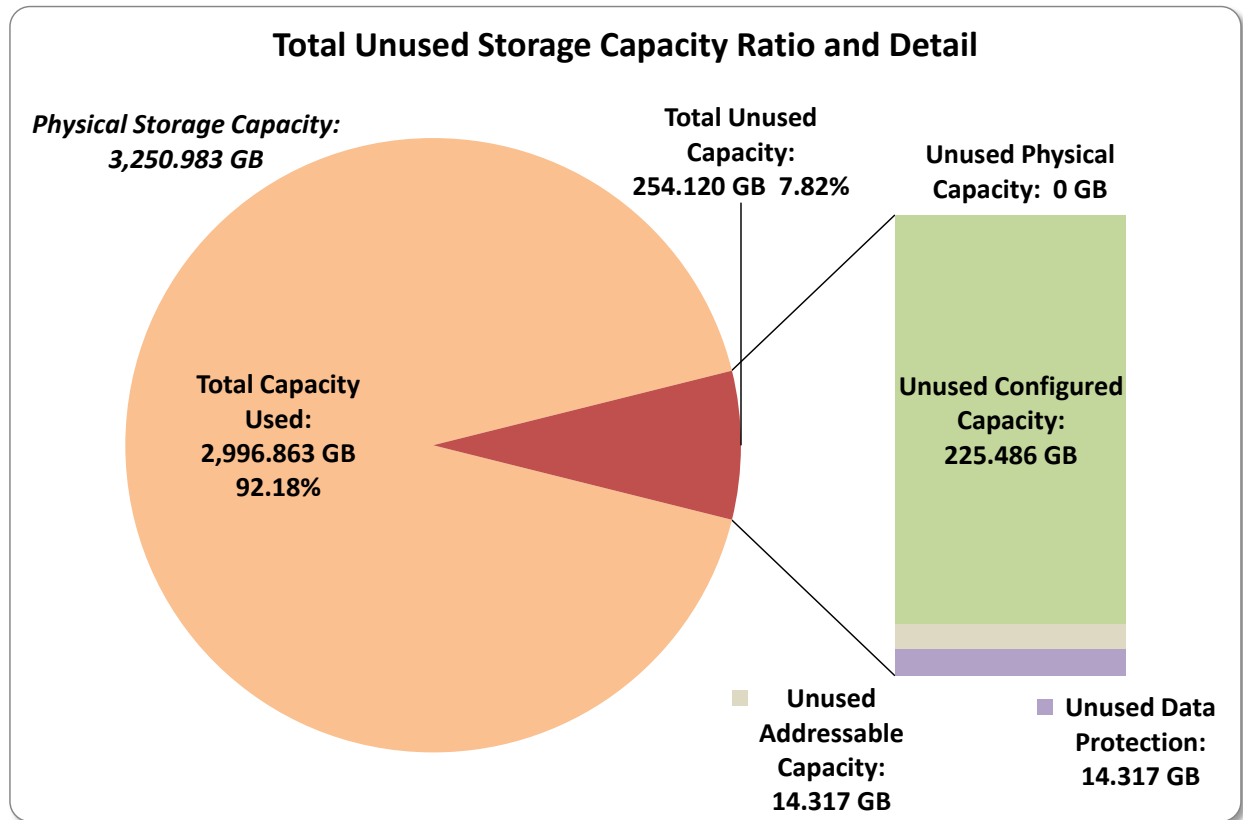
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

### 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.







SPC-1 Storage Capacity Utilization	
Application Utilization	35.23%
Protected Application Utilization	70.46%
Unused Storage Ratio	7.82%

**Application Utilization:** Total ASU Capacity (1,145.324 GB) divided by Physical Storage Capacity (3,250,893 GB).

**Protected Application Utilization:** Total ASU Capacity (1,145.324 GB) plus total Data Protection Capacity (1,159.641 GB) minus unused Data Protection Capacity (14.317 GB) divided by Physical Storage Capacity (3,250,893 GB).

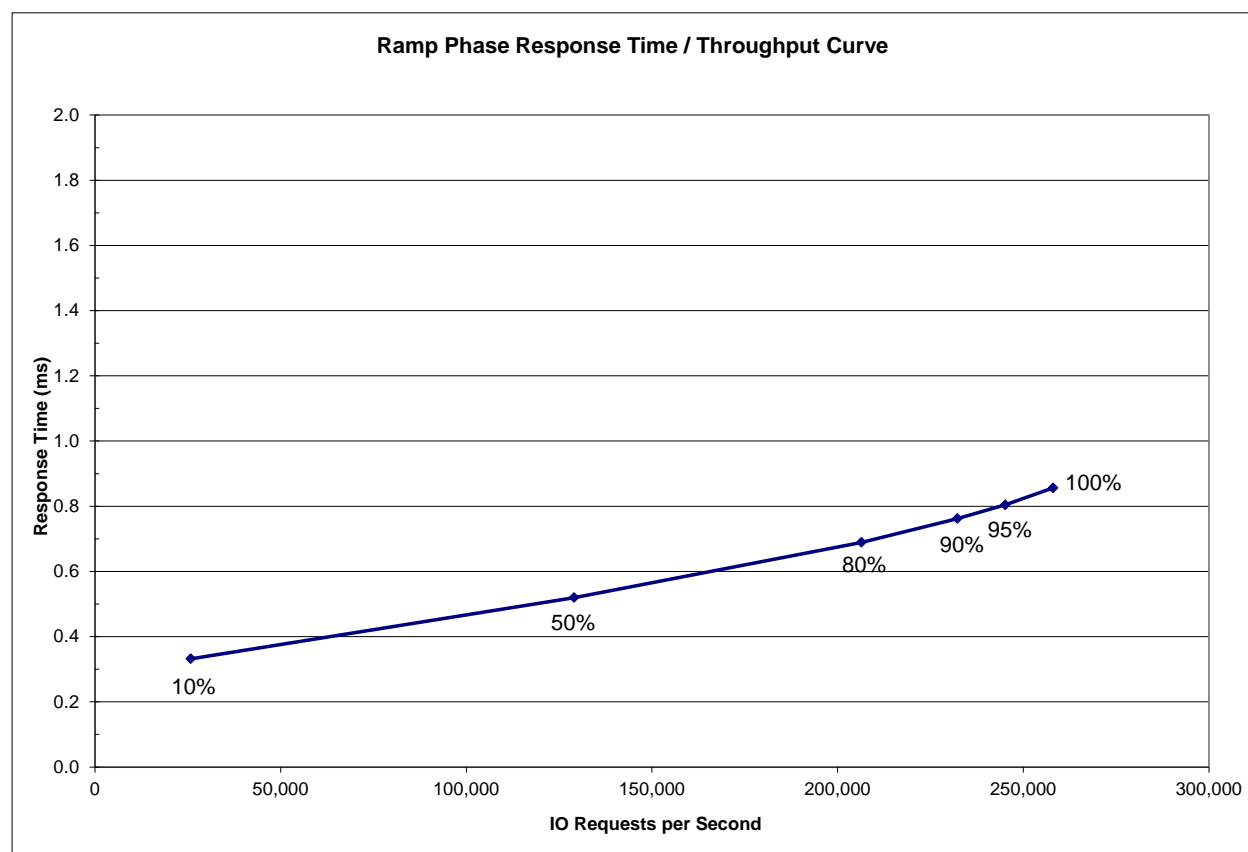
**Unused Storage Ratio:** Total Unused Capacity (254.120 GB) divided by Physical Storage Capacity (3,250,893 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 24-25 in the Full Disclosure Report.

## Response Time – Throughput Curve

The Response Time-Throughput Curve illustrates the Average Response Time (milliseconds) and I/O Request Throughput at 100%, 95%, 90%, 80%, 50%, and 10% of the workload level used to generate the SPC-1 IOPS™ metric.

The Average Response Time measured at the any of the above load points cannot exceed 30 milliseconds or the benchmark measurement is invalid.



## Response Time – Throughput Data

	10% Load	50% Load	80% Load	90% Load	95% Load	100% Load
<b>I/O Request Throughput</b>	25,808.53	129,050.58	206,449.89	232,250.08	245,182.22	258,078.23
<b>Average Response Time (ms):</b>						
<b>All ASUs</b>	0.33	0.52	0.69	0.76	0.80	0.86
<b>ASU-1</b>	0.33	0.55	0.75	0.84	0.88	0.93
<b>ASU-2</b>	0.38	0.56	0.73	0.80	0.84	0.89
<b>ASU-3</b>	0.32	0.43	0.54	0.59	0.63	0.68
<b>Reads</b>	0.40	0.73	1.03	1.16	1.23	1.31
<b>Writes</b>	0.29	0.38	0.47	0.50	0.53	0.56

## Priced Storage Configuration Pricing

QNT	PART NUMBER	DESCRIPTION	UNIT PRICE	EXTENDED PRICE	DISCOUNT	DISCOUNTED PRICE
1	QR485A	HP 3PAR StoreServ 7400 4-N Storage Base	44,387.00	44,387.00	45%	24,412.85
1	QR485A OD1	Factory integrated	-	-	45%	-
4	QR486A	HP 3PAR 7000 4-pt 8Gb/s FC Adapter	3,273.00	13,092.00	45%	7,200.60
4	QR486A OD1	Factory integrated	-	-	45%	-
16	QR502A	HP M6710 100GB 6G SAS 2.5in SLC SSD	4,114.00	65,824.00	45%	36,203.20
16	QR502A OD1	Factory integrated	-	-	45%	-
1	BC773A	HP 3PAR 7400 OS Suite Base LTU	2,035.00	2,035.00	45%	1,119.25
1	BC773A OD1	Factory integrated	-	-	45%	-
32	BC774A	HP 3PAR 7400 OS Suite Drive LTU	407.00	13,024.00	45%	7,163.20
32	BC774A OD1	Factory integrated	-	-	45%	-
16	QR502A	HP M6710 100GB 6G SAS 2.5in SLC SSD	4,114.00	65,824.00	45%	36,203.20
16	QR502A OD1	Factory integrated	-	-	45%	-
1	HA110A3	HP 3y Support Plus 24 SVC	-	-	45%	-
1	HA110A3 RDD	HP 3PAR 7400 OS Suite Base LTU Supp	6,229.00	6,229.00	45%	3,425.95
32	HA110A3 S7D	HP 3PAR 7400 OS Suite Drive LTU Supp	108.00	3,456.00	45%	1,900.80
32	HA110A3 WUV	HP 3PAR 7000 100GB SSD Support	453.00	14,496.00	45%	7,972.80
4	HA110A3 WUX	HP 3PAR 7000 Adapter Support	355.00	1,420.00	45%	781.00
1	HA110A3 WUY	HP 3PAR 7400 4-node Storage Base Support	4,879.00	4,879.00	45%	2,683.45
1	QR516B	HP 3PAR 7000 Service Processor	3,490.00	3,490.00	45%	1,919.50
1	HA110A3	HP 3PAR 7000 Service Processor Support	382.00	382.00	45%	210.10
20	QK735A	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	162.00	3,240.00	45%	1,782.00
5	third-party	Emulex LPe12004-M8 HBA	2,879.46	14,397.30	0%	14,397.30
20	third-party	Avago - AFBR-57D7APZ-HP9 SFPs	68.13	1,362.60	0%	1,362.60
<b>TOTAL PRICE</b>						<b>\$148,737.80</b>

The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

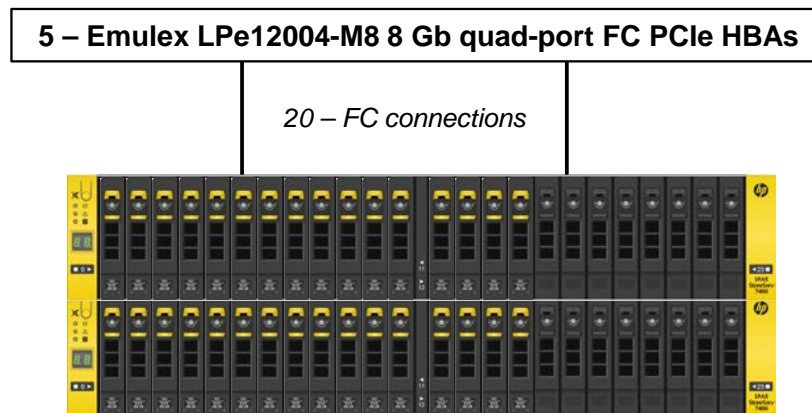
- Acknowledgement of new and existing problems with four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration that can be remedied by the repair or replacement of a Priced Storage Configuration component.

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

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



## Priced Storage Configuration Diagram



### HP 3PAR StoreServ 7400 Storage System

- 4 Controller Nodes, each with:
  - 16 GB of cache (64 GB total)
  - 1 built-in dual-port 8 Gb FC front-end adapter
  - 1 quad-port 8 Gb FC front-end adapter
  - 1 dual-port SAS adapter
- 1 built-in enclosure per node pair  
(maximum of 24 SFF devices per enclosure)
- 32 – 100 GB Solid State Devices (SSDs)  
(16 SSDs per node pair enclosure)

## Priced Storage Configuration Components

<b>Priced Storage Configuration:</b>
5 – Emulex LPe12004-M8 8Gb quad-port FC PCIe HBAs
<b>HP 3PAR StoreServ 7400 Storage System</b> 4 Controller Nodes, each with: 16 GB of cache (64 GB total) 1 built-in dual-port 8 Gb FC front-end adapter (8 ports total, 8 ports used) 1 quad-port 8 Gb FC front-end adapter (16 ports total, 12 ports used, 3 ports per adapter) 1 built-in dual-port SAS adapter (8 ports total, 4 ports used, 1 port per adapter) 1 built-in enclosure per node pair (maximum of 24 SFF devices)
32 – 100 GB Solid State Devices (SSDs) (16 SSDs per node pair enclosure)