# SPC BENCHMARK 1™
# EXECUTIVE SUMMARY

## ACCELSTOR, INC.
## ACCELSTOR NEOSAPPHIRE 3602

**SPC-1 V1.14**

**Submitted for Review: January 13, 2017**
**Submission Identifier: A00183**

# EXECUTIVE SUMMARY

## Test Sponsor and Contact Information

| Test Sponsor and Contact Information | |
|---|---|
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| **Auditor** | Storage Performance Council – http://www.storageperformance.org<br>Walter E. Baker – AuditService@StoragePerformance.org<br>Gradient Systems, Inc.<br>643 Bair Island Road, Suite 211<br>Redwood City, CA 94063<br>Phone: (650) 556-9384<br>FAX: (650) 257-7511 |

## Revision Information and Key Dates

| Revision Information and Key Dates | |
|---|---|
| **SPC-1 Specification revision number** | V1.14 |
| **SPC-1 Workload Generator revision number** | V2.3.0 |
| **Date Results were first used publicly** | January 13, 2017 |
| **Date the FDR was submitted to the SPC** | January 13, 2017 |
| **Date the Priced Storage Configuration is available for shipment to customers** | currently available |
| **Date the TSC completed audit certification** | January 12, 2017 |

## Tested Storage Product (TSP) Description

AccelStor's NeoSapphire 3602 all-flash array provides outstanding performance. This 1U model offers 2TB usable capacity, equipped with dual port 16G Fibre Channels *(backward compatible to 8G Fibre Channel).*

The low latency and high reliability of Fibre Channel makes NeoSapphire 3602 ideal for demanding, time-critical applications and integrating with the existing SANs environment, such as banking, finance, and media production application. These applications will usually generate massive I/O bound and further cause the performance bottleneck. With the NeoSapphire 3602' random write high performance, it helps the IT staff increase productivity and makes the storage topology easy to deploy. As for random I/O processing, the sustained performance of the NeoSapphire 3602 helps resolve the storage bottlenecks that often hamstring operations such as server virtualization and database traversal.

With the power of FlexiRemap technology, thin provisioning and zero page deduplication, the NeoSapphire 3602 makes it easy to manage the storage capacity.

## Summary of Results

| SPC-1 Reported Data | |
|---|---|
| **Tested Storage Product (TSP) Name:** AccelStor NeoSapphire 3602 | |
| **Metric** | **Reported Result** |
| **SPC-1 IOPS™** | 227,970.31 |
| **SPC-1 Price-Performance™** | $0.20/SPC-1 IOPS™ |
| **Total ASU Capacity** | 2,033.256 GB |
| **Data Protection Level** | Protected 1 *(FlexiRemap™)* |
| **Total Price** | $44,637.03 |
| **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 ***FlexiRemap*™**, which divides SSD drives into two groups of independent drives. Data is then evenly distributed across the SSDs of the two groups. Fault tolerance protection (parity) is distributed equally across each of the two groups equal to the capacity of a single SSD, resulting the equivalent of two SSDs dedicated to parity, one per group.

> ***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-1 Data Repository.*

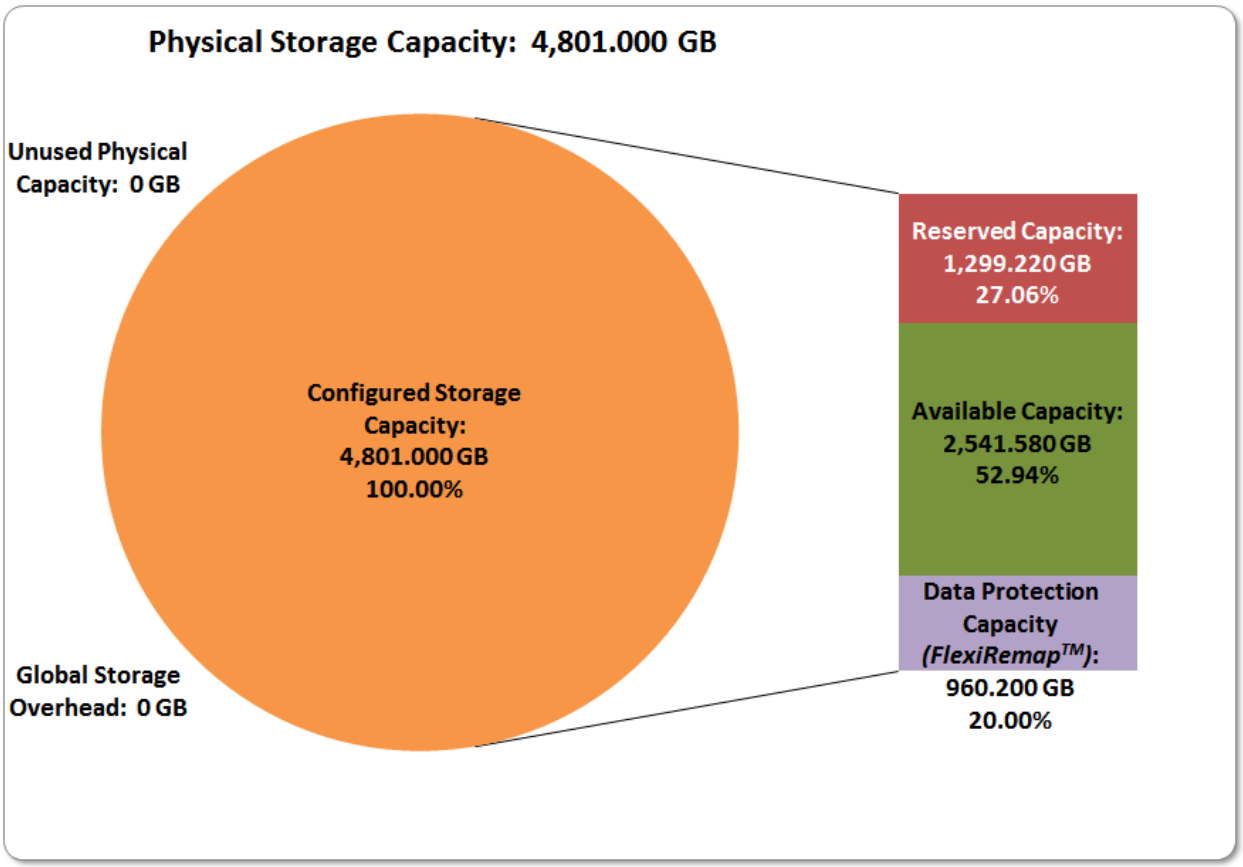
**Total Price** includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 9.

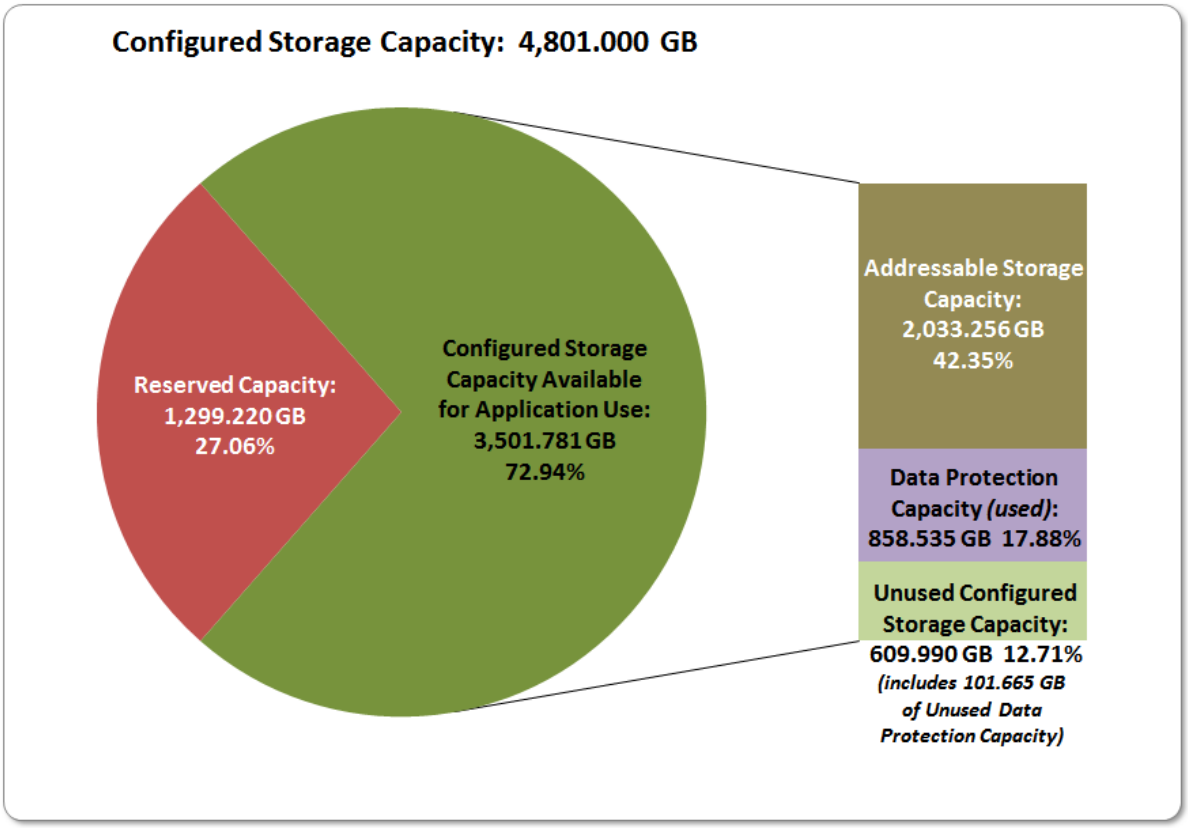
**Currency Used** is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country *(non-local currency)*.

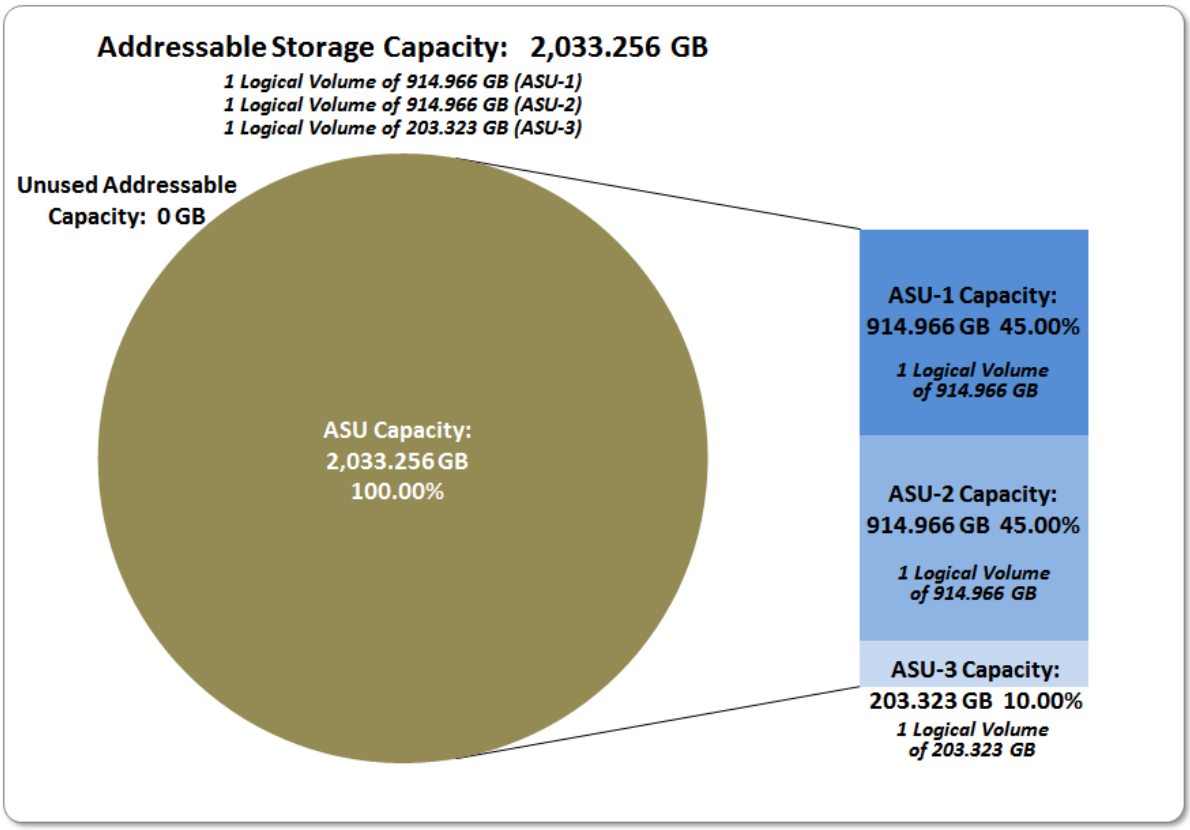
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

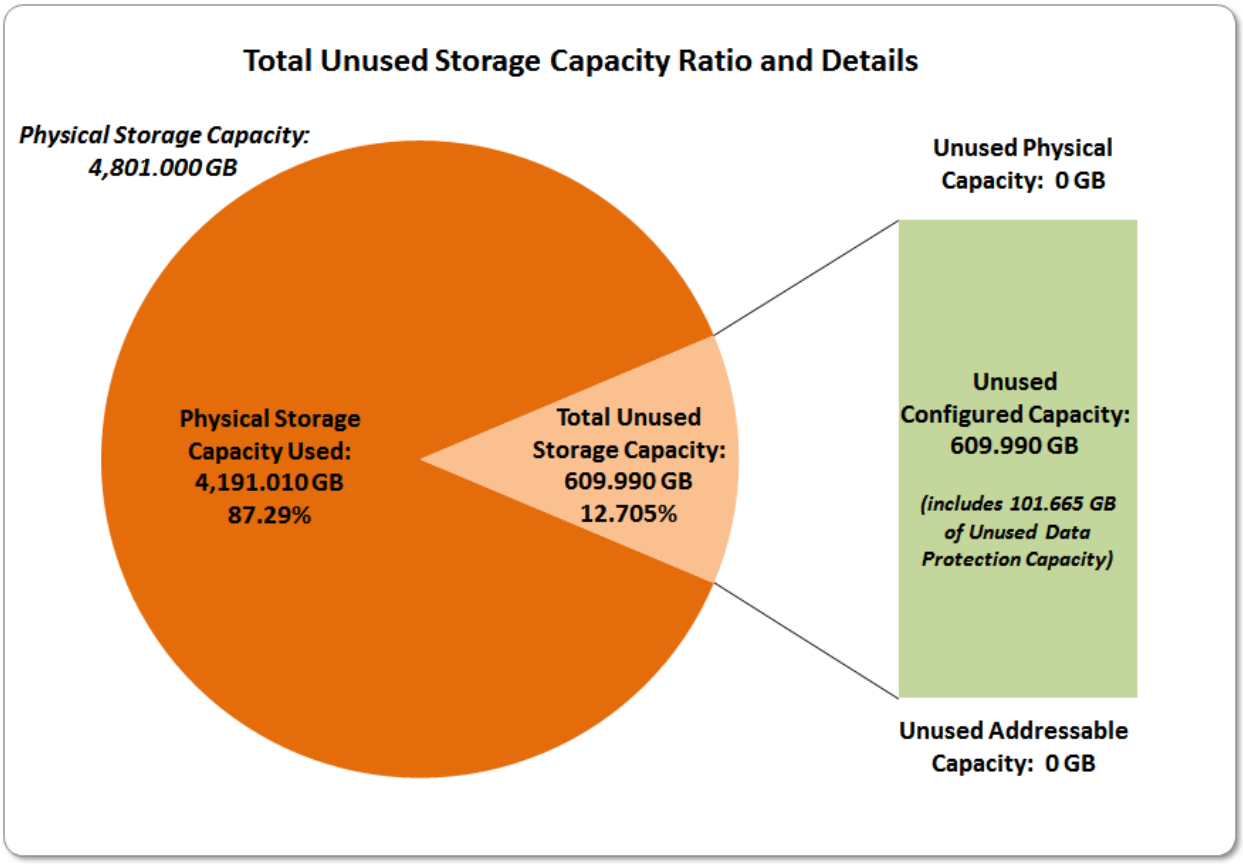
## Storage Capacities, Relationships, and Utilization

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.




Configured Storage Capacity: 4,801.000 GB
Reserved Capacity:
1,299.220 GB
27.06%
Configured Storage Capacity Available for Application Use:
3,501.781 GB
72.94%
Addressable Storage Capacity:
2,033.256 GB
42.35%
Data Protection Capacity (used):
858.535 GB 17.88%
Unused Configured Storage Capacity:
609.990 GB 12.71%
(includes 101.665 GB of Unused Data Protection Capacity)


Addressable Storage Capacity: 2,033.256 GB
1 Logical Volume of 914.966 GB (ASU-1)
1 Logical Volume of 914.966 GB (ASU-2)
1 Logical Volume of 203.323 GB (ASU-3)
Unused Addressable Capacity: 0 GB
ASU Capacity:
2,033.256 GB
100.00%
ASU-1 Capacity:
914.966 GB 45.00%
1 Logical Volume of 914.966 GB
ASU-2 Capacity:
914.966 GB 45.00%
1 Logical Volume of 914.966 GB
ASU-3 Capacity:
203.323 GB 10.00%
1 Logical Volume of 203.323 GB




| SPC-1 Storage Capacity Utilization | |
|---|---|
| Application Utilization | 42.35% |
| Protected Application Utilization | 60.23% |
| Unused Storage Ratio | 12.71% |

**Application Utilization:** Total ASU Capacity *(2,033.256 GB)* divided by Physical Storage Capacity *(4,801.000 GB)*.

**Protected Application Utilization:** (Total ASU Capacity *(2,033.256 GB)* plus total Data Protection Capacity *(960.200 GB)* minus unused Data Protection Capacity *(101.665 GB)*) divided by Physical Storage Capacity *(4,801.000 GB)*.

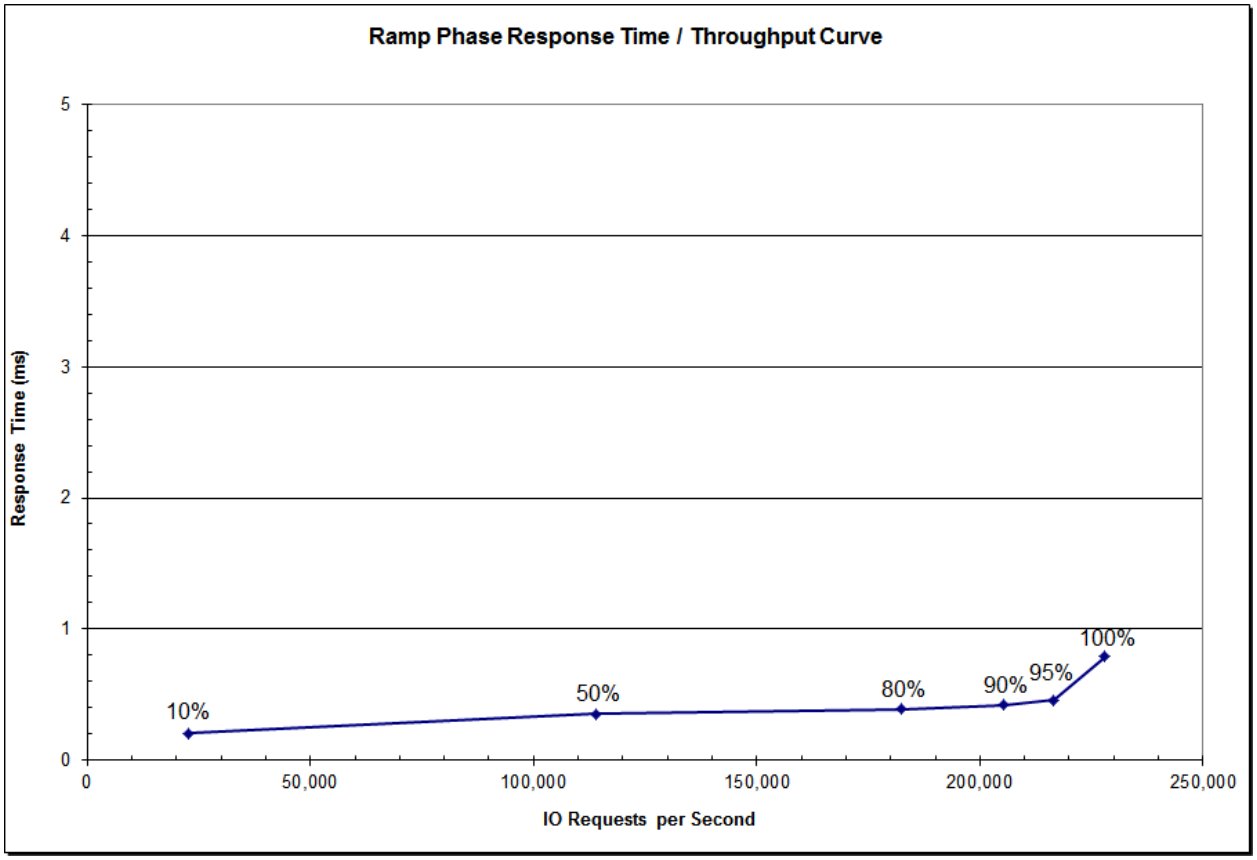
**Unused Storage Ratio:** Total Unused Capacity *(609.990 GB)* divided by Physical Storage Capacity *(4,801.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 23-24 in the associated 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 |
|---|---|---|---|---|---|---|
| I/O Request Throughput | 22,808.63 | 113,983.94 | 182,376.87 | 205,184.34 | 216,593.19 | 227,970.31 |
| *Average Response Time (ms):* | | | | | | |
| All ASUs | 0.21 | 0.35 | 0.39 | 0.42 | 0.46 | 0.79 |
| ASU-1 | 0.22 | 0.38 | 0.44 | 0.48 | 0.54 | 1.05 |
| ASU-2 | 0.23 | 0.39 | 0.45 | 0.47 | 0.50 | 0.65 |
| ASU-3 | 0.16 | 0.27 | 0.27 | 0.25 | 0.26 | 0.29 |
| Reads | 0.29 | 0.50 | 0.60 | 0.67 | 0.75 | 1.30 |
| Writes | 0.15 | 0.26 | 0.25 | 0.25 | 0.27 | 0.46 |

## Priced Storage Configuration Pricing

| Part Number | Name/Description | Quantity | Unit List Price | Extended List Price | Discount | Discounted Price |
|---|---|---|---|---|---|---|
| AF3602-110NS2US-1XX | All-Flash Array, NeoSapphire 3602<br>1U Rack Mount, 10 Drives, | 1 | $ 84,000.00 | $84,000.00 | 50% | $42,000.00 |
| | 3-Year Warranty<br>(24/7 Help Desk & Onsite Parts within 4 Hours) | | | | | |
| | Spare Kit (1 x Optics, 1 x SSD, 1 x PSU) | | | | | |
| **Third Party Components** | | | | | | |
| LPe16002B-M6 | 2 Ports 16GFC Short Wave Optical - LC SFP+ | 1 | $ 2,608.23 | $ 2,608.23 | 0% | $ 2,608.23 |
| Fibre Channel Cables | 10-Gigabit Optical Fiber Patch Cords<br>(OM3 Fibers) | 2 | $ 14.40 | $ 28.80 | 0% | $ 28.80 |
| | | | | **Total** | | **$44,637.03** |

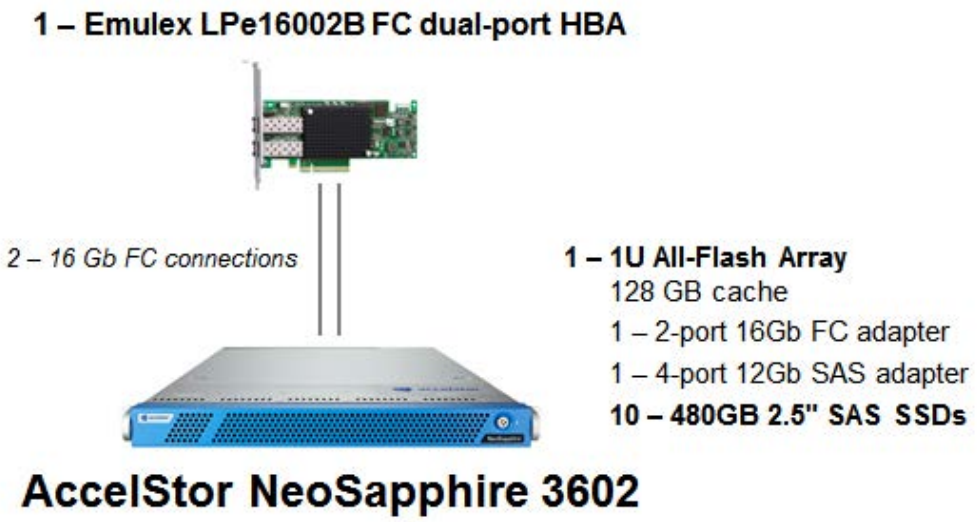
The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems within 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 Price 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 Tested Storage Configuration and the Priced Storage Configuration.

## Priced Storage Configuration Diagram




## Priced Storage Configuration Components

| Priced Storage Configuration |
|---|
| AccelStor FlexiRemap™ |
| 1 – Emulex LPe16002B FC dual-port, 16 Gbps, FC HBA |
| **AccelStor NeoSapphire 3602**<br>1 – 1U All Flash Array<br>128 GB cache<br>1 – 2-port 16 Gb FC adapter<br>1 – 4-port 12 Gb SAS adapter<br>10 – 480 GB, 2.5” SAS SSDs |