



**SPC BENCHMARK 1/ENERGY™
EXECUTIVE SUMMARY**

**XIOTECH CORPORATION
XIOTECH EMPRISE™ 5000
*(600 GB DISK DRIVES)***

SPC-1/E™ V1.12

**Submitted for Review: October 13, 2009
Submission Identifier: AE00002**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

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SPC-1 Specification revision number	V1.12
SPC-1 Workload Generator revision number	V2.1.0
Date Results were first used publicly	October 13, 2009
Date the FDR was submitted to the SPC	October 13, 2009
Date the priced storage configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	October 9, 2009

Tested Storage Product (TSP) Description

Emprise 5000 from Xiotech Corporation is a revolutionary concept in data storage. It is built on a perfectly balanced building block of performance, reliability, and scalability known as Intelligent Storage Element (ISE) technology.

The ISE is a purpose-built storage environment of tightly integrated components, designed to maximize both performance and reliability. Each ISE includes one or two sealed DataPacs (capacity modules) and dual Managed Reliability Controllers, which locally manage cache, data protection processes, and more.

Built on this ISE foundation, Emprise 5000 is a complete, self-enclosed storage solution, which you can configure to meet your specific needs. In just 3U of rack space, you can have up to 16 terabytes of virtualized capacity or a high performance storage powerhouse for your transactional applications.

Emprise 5000 is easy to attach to your network—either directly or via a Fibre Channel switch. And it requires minimal configuration or administration, so it is perfect for departmental or branch office deployment.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Xiotech Emprise™ 5000 (600 GB disk drives)	
Metric	Reported Result
SPC-1 IOPS™	6,065.96
SPC-1 Price-Performance	\$9.55/SPC-1 IOPS™
Total ASU Capacity	4,638.565 GB
Data Protection Level	Protected (Mirroring)
Total TSC Price (including three-year maintenance)	\$57,939

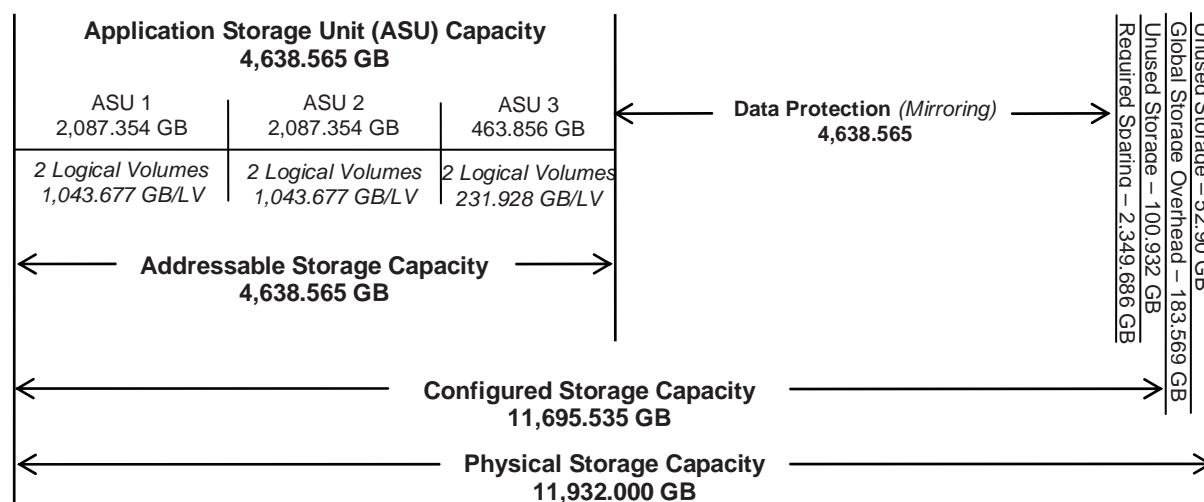
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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

A **Data Protection Level of Protected** using **MIRRORING** configures two or more identical copies of user data.

Storage Capacities and Relationships

The following diagram 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	36.87%
Protected Application Utilization	77.75%
Unused Storage Ratio	1.02%

Application Utilization: Total ASU Capacity (4,638.565 GB) divided by Physical Storage Capacity (11,932.000 GB)

Protected Application Utilization: (Total ASU Capacity (4,638.565 GB) plus total Data Protection Capacity (4,638.565 GB) minus unused Data Protection Capacity (0.000 GB)) divided by Physical Storage Capacity (11,932.000 GB)

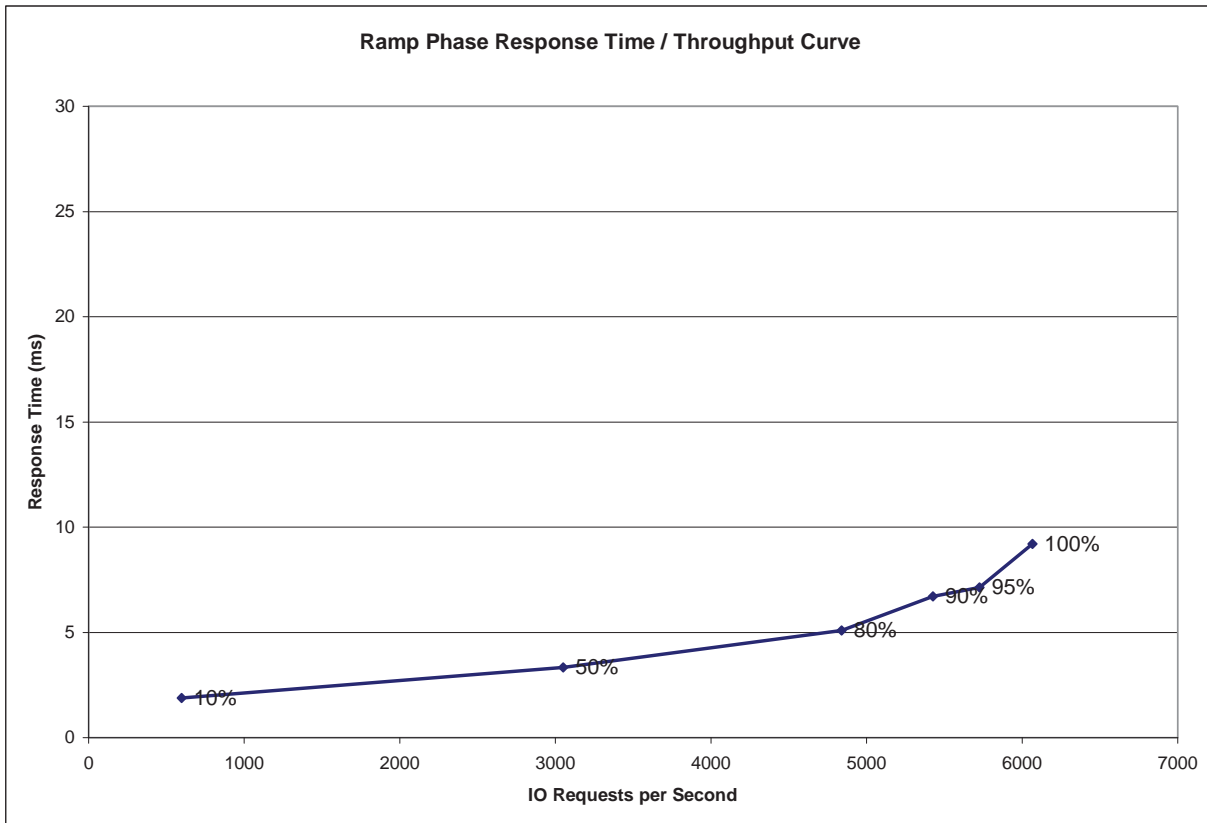
Unused Storage Ratio: Total Unused Capacity (121.615 GB) divided by Physical Storage Capacity (11,932.000 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 22-23 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

Tested Storage Configuration Pricing (*Priced Storage Configuration*)

	10% Load	50% Load	80% Load	90% Load	95% Load	100% Load
I/O Request Throughput	598.34	3,051.05	4,838.66	5,426.25	5,726.22	6,065.96
Average Response Time (ms):						
All ASUs	1.88	3.34	5.09	6.70	7.14	9.21
ASU-1	2.68	4.63	6.82	8.89	9.42	12.35
ASU-2	1.97	4.27	7.83	10.67	11.90	14.48
ASU-3	0.17	0.20	0.23	0.30	0.24	0.24
Reads	4.55	8.19	12.58	16.55	17.77	22.85
Writes	0.16	0.19	0.21	0.28	0.22	0.33

SPC-1/E Reported Data

The initial SPC-1/E energy extension temperature, recorded during the first one minute of the Idle Test was 72.0F. The final SPC-1/E energy extension temperature, recorded during the last one minute of the Primary Metrics Test was 72.7F.

Power Environment				Usage Profile			
Average RMS Voltage:		206.69		Average Power Factor:		0.786	
	Hours of Use per Day			Nominal	Nominal	Nominal	Nominal
	Heavy	Moderate	Idle	Power, W	Traffic, IOPS	IOPS/W	Heat, BTU/hr
Low Daily Usage:	0	8	16	132.42	1017.02	7.68	451.82
Medium Daily Usage:	4	14	6	270.22	2586.22	9.57	922.02
High Daily Usage:	18	6	0	357.52	4391.76	12.28	1,219.89
Composite Metrics:				253.38	2,665.00	10.52	
Annual Energy Use, kWh:	2,219.65						
Energy Cost, \$/kWh:	\$ 0.12			Annual Energy Cost, \$: \$ 266.36			

The above usage profile describes conditions in environments that respectively impose light ("low"), moderate ("medium"), and extensive ("high") demands on the Tested Storage Configuration (TSC).

HEAVY SPC-1 Workload: 359.91W at 80% of maximum reported performance (*4,838.66 SPC-1 IOPS*).

MODERATE SPC-1 Workload: 350.35W at 50% of maximum reported performance (*3,051.05 SPC-1 IOPS*).

IDLE SPC-1 Workload: 23.45W at 0% of maximum reported performance (*0.00 SPC-1 IOPS*).

AVERAGE RMS VOLTAGE: The average supply voltage applied to the Tested Storage Product (TSP) as measured during the Measurement Intervals of the SPC-1/E Tests.

AVERAGE POWER FACTOR: The ratio of average real power, in watts, to the average apparent power, in volt-amps flowing into the Tested Storage Product (TSP) during the Measurement Intervals of the SPC-1/E Tests.

NOMINAL POWER, W: The average power consumption over the course of a day (*24 hours*), taking into account hourly load variations.

NOMINAL TRAFFIC, IOPS: The average level of I/O requests over the course of a day (*24 hours*), taking into account hourly load variations.

NOMINAL IOPS/W: The overall efficiency with which I/O requests can be supported, reflected by the ratio of **NOMINAL TRAFFIC** versus the **NOMINAL POWER**.

NOMINAL HEAT, BTU/HR: The average amount of heat required to be dissipated over the course of a day (*24 hours*), taking into account hourly load variations. (*1 watt = 3.412 BTU/hr*)

COMPOSITE METRICS: The aggregated **NOMINAL POWER**, **NOMINAL TRAFFIC**, and **NOMINAL IOPS/W** for all three environments: **LOW**, **MEDIUM**, and **HIGH DAILY USAGE**.

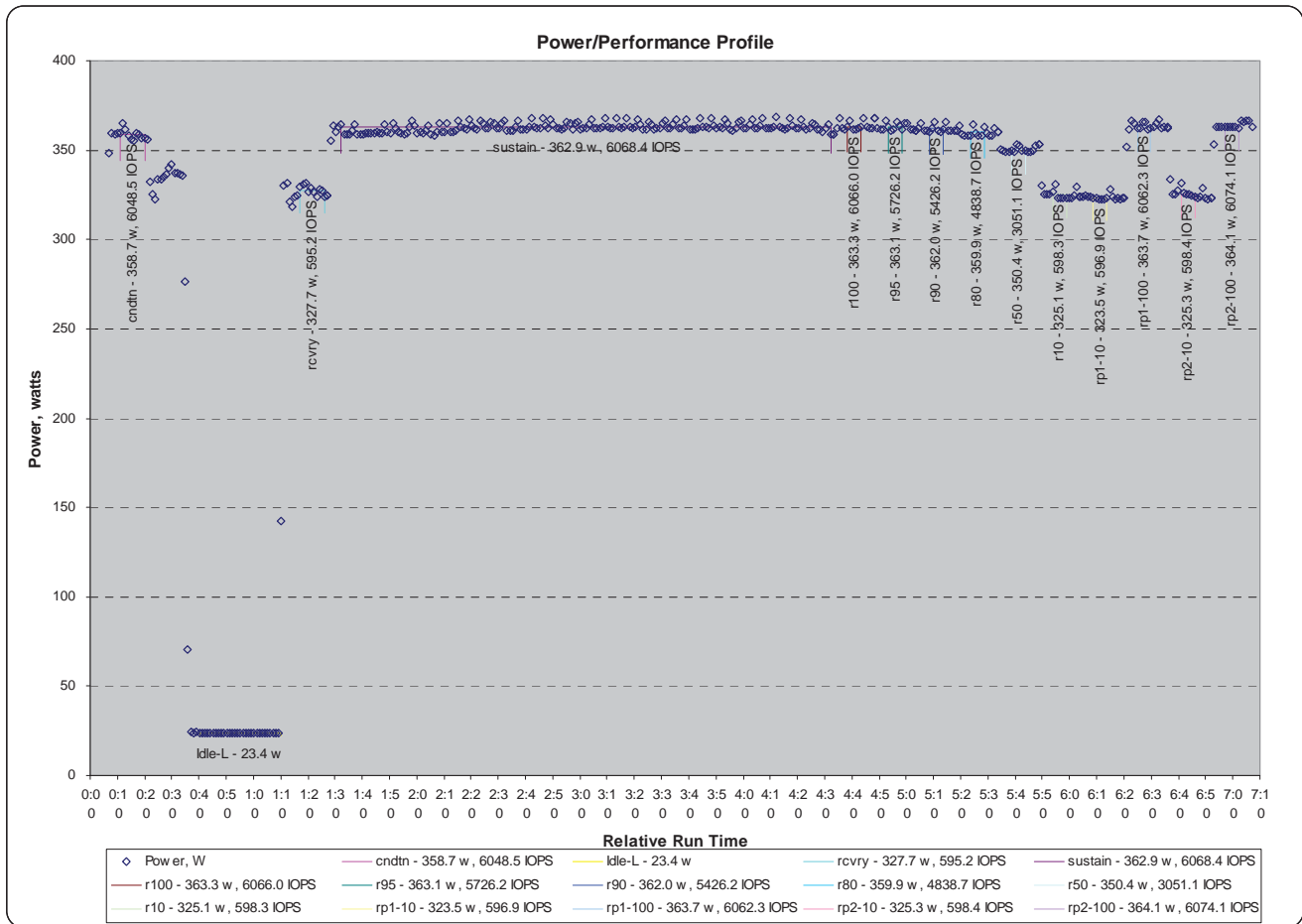
ANNUAL ENERGY USE, KWH: An estimate of the average energy use across the three environments over the course of a year and computed as (**NOMINAL POWER** * 24 * 0.365).

ENERGY COST, \$/KWH: A standardized energy cost per kilowatt hour.

ANNUAL ENERGY COST: An estimate of the annual energy use across the three environments over the course of a year and computed as (**ANNUAL ENERGY USE** * **ENERGY COST**).

SPC-1/E Power/Performance Profile

The SPC-1/E Power/Performance Profile chart provides a complete “at a glance” illustration and report for each SPC-1/E execution component. The power consumption at each step is reported and, where appropriate the measured SPC-1 performance (*SPC-1 IOPS™*) is also reported.



Priced Storage Configuration Pricing

P/N	Description	US List	Qty	Extended List	Discount	Total
	Xiotech Capacity Emprise 5000 (9.6TB), including: • 1 800864-000: ISE array controller • 2 800938-000: 10 DataPac mounted 600 GB 10K FC 3.5" disk drives • 1 Xiotech MPIO driver for Windows 2003 • 1 QLogic QLA2462 4 Gb dual port FC HBA • 2 6.6 foot optical FC cables • Five year 7/24 maintenance coverage with 4-hour response and resolution.	\$94,982	1	\$94,982	39%	\$57,939

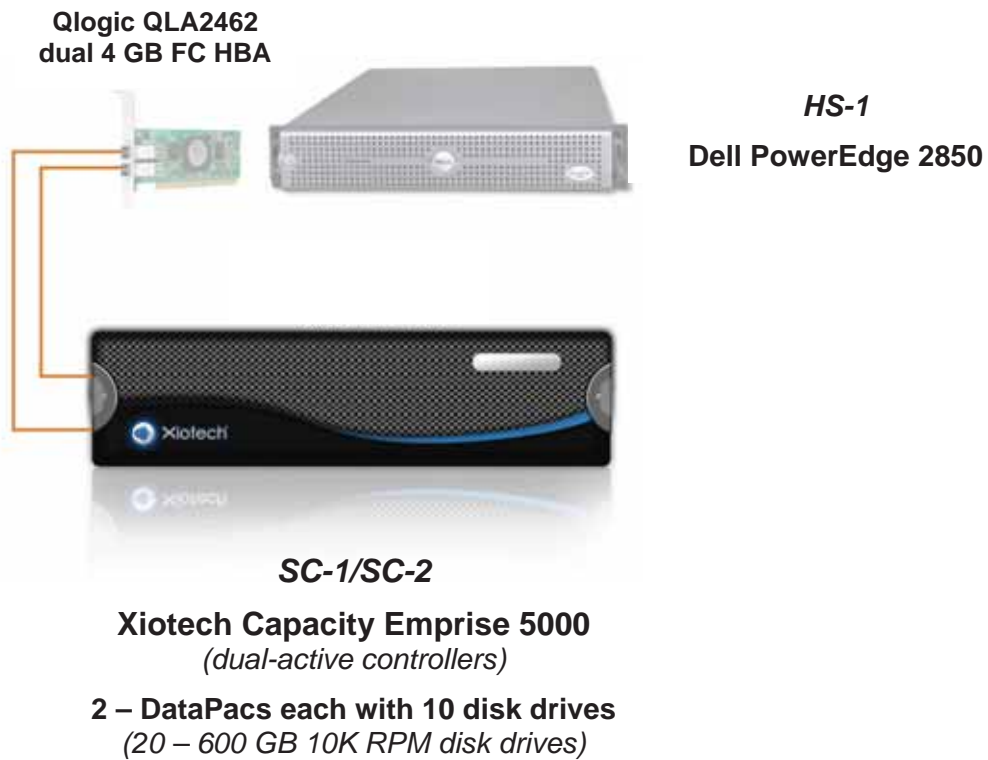
The above pricing includes hardware maintenance and software support for five years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems with four (4) hours.
- Onsite present 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 TSC and Priced Storage Configuration

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Host System:	Tested Storage Configuration (TSC)/ Priced Storage Configuration:
HS-1: Dell PowerEdge 2850	1 – QLogic QLA2462 dual port 4 Gb FC HBA
2 – 3.6 GHz Xeon CPUs with 2 MB L2 cache per CPU	SC-1/SC-2: XioTech PerformanceEmprise 5000 2 – dual-active controllers each with: 512 MB cache 1 – 4 Gb Fibre Channel host connections (2 total, 2 used) 2 – 4 Gb Fibre Channel initiators (4 total, 4 used)
2 GB main memory	
Windows Server 2003 Standard Edition with SP2	
XioTech MPIO driver, Build 280	
PCI-X	
WG	2 – DataPacs each with 10 disk drives
	20 – 600 GB 10K RPM FC 3.5" disk drives