

Lab Evaluation of Astute Networks ViSX G4 iSCSI Flash Storage Appliance

Evaluation report prepared under contract with Astute Networks

Introduction

The demands on IT professionals to meet the performance requirements of the growing number and variety of applications and operating environments have never been greater. Storage professionals need to ensure that the storage systems they deploy today can provide the performance required for these applications. These professionals also seek storage systems that are easy to deploy and maintain.

Astute addresses these challenges with their all-flash ViSX G4 Performance Storage Appliance with its patented 10GbE Data Pump Engine and Networked Flash architecture. The ViSX G4, due to its integrated DataPump Engine, completely offloads and accelerates TCP and iSCSI protocol processing, providing high performance especially in transaction processing environments. The ViSX Performance Storage Appliances are designed to excel at highly random I/O workloads, which are frequently found in database, virtual server and virtual desktop environments.

Astute commissioned Demartek to compare the performance of their all-flash ViSX G4 Storage Appliance with two competing all-flash storage arrays. One of these competing arrays is currently available from a major storage vendor, and the other is currently available from a “start-up” storage vendor.

Executive Summary and Key Findings

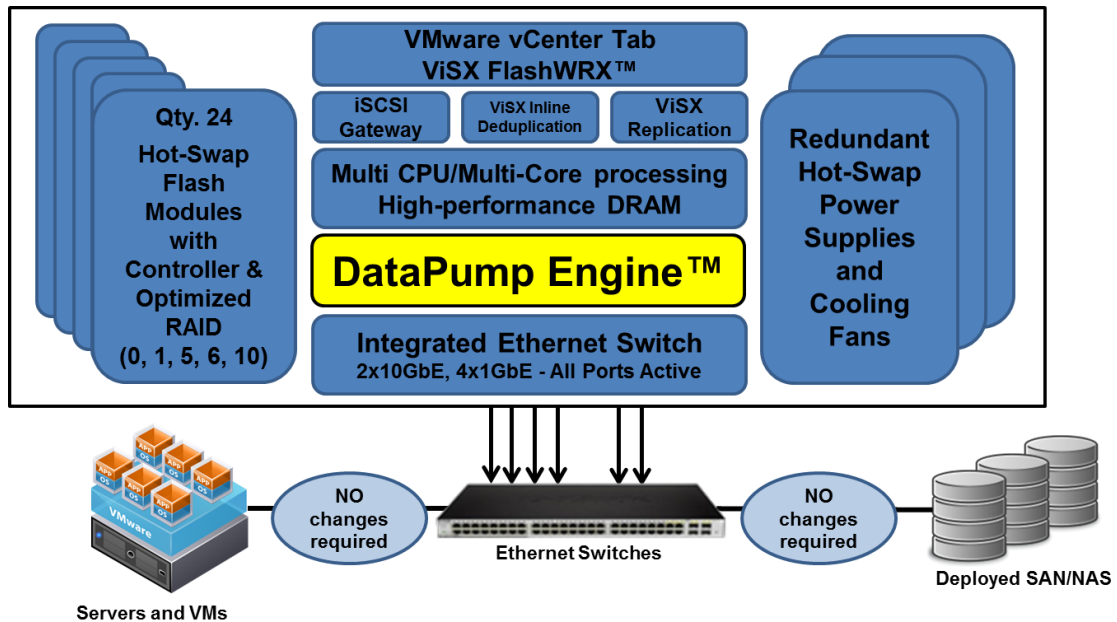
The Astute Networks ViSX G4 provided outstanding performance for random I/O, especially at the smaller block sizes, typically found in database and VDI environments.

- The ViSX G4 achieved more than 130,000 IOPS in the 90% read test case.
- The ViSX G4 achieved more than 77,000 IOPS in the 10% read test case.
- The ViSX G4 outperformed the “Vendor A” storage array at block sizes from 512B up to 8KB.
- The ViSX G4 outperformed the “Vendor B” storage array at block sizes from 512B up to 8KB.

We recommend that users consider the Astute Networks ViSX G4 for high-performance iSCSI storage applications. It provided the highest random I/O, small-block IOPS performance that we have tested in our lab to date.

ViSX Architecture

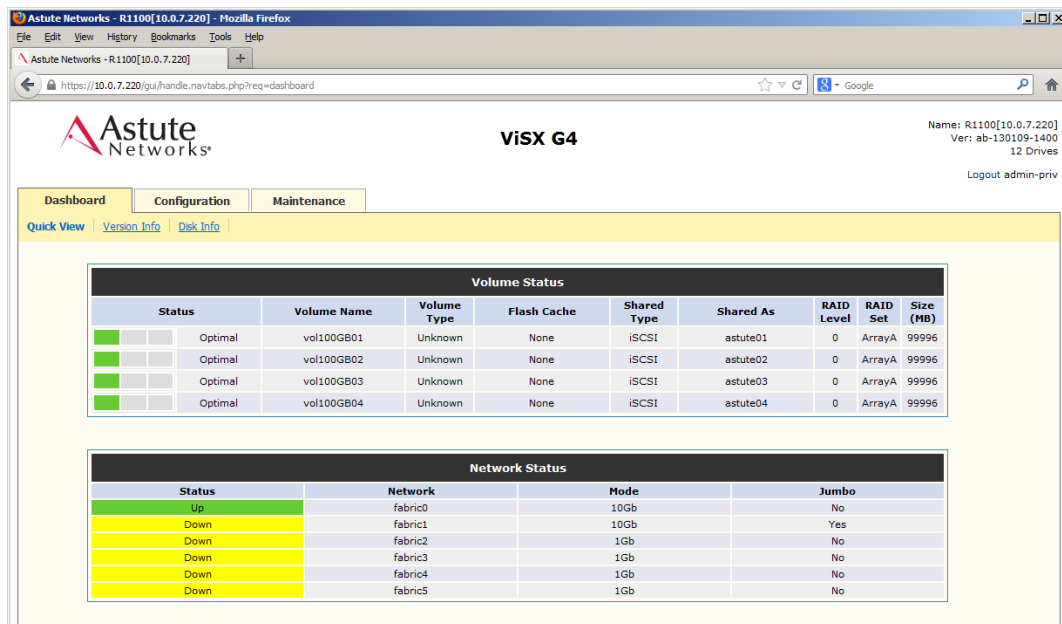
The all-flash ViSX Storage Appliance is designed to work well in physical and virtual environments that have predominantly random I/O workloads. The all-flash design is coupled with the custom high-performance DataPump Engine network and storage protocol processor that completely offloads TCP and iSCSI processing. We found that this design performed very well against competitive 10GbE iSCSI all-flash storage arrays.



ViSX Management Interface

We found that the ViSX management interface was very easy to use and simple to configure. The ViSX system can use DHCP or static IP address assignment when configuring each of its Ethernet interfaces (10GbE and 1GbE); we used static IP addresses. After we logged into the management interface, we configured four volumes and were up and running within minutes.

The ViSX G4 “Quick View” provides the status of the volumes and network connections in a straightforward manner.

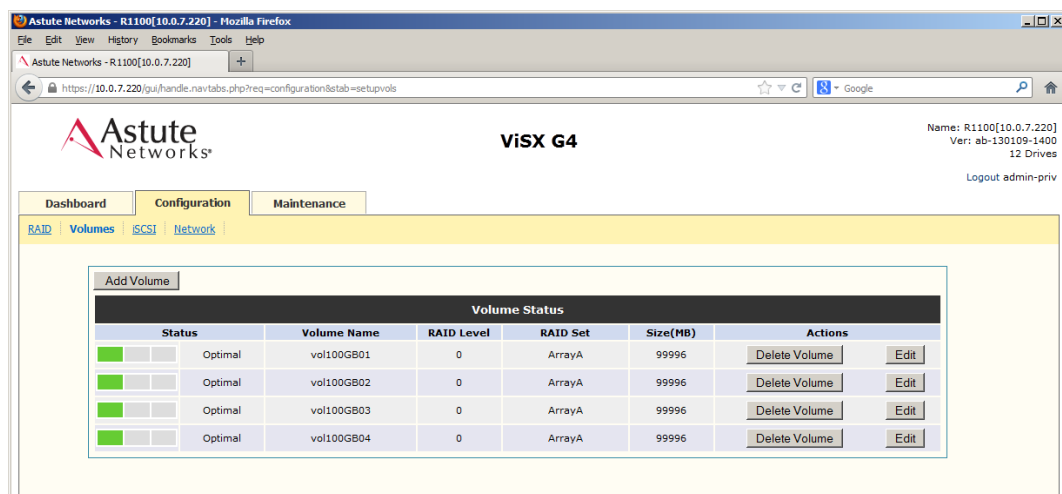


The screenshot shows the 'Quick View' dashboard of the ViSX G4 management interface. It features two main tables: 'Volume Status' and 'Network Status'.

Volume Status								
Status	Volume Name	Volume Type	Flash Cache	Shared Type	Shared As	RAID Level	RAID Set	Size (MB)
Optimal	vol100GB01	Unknown	None	iSCSI	astute01	0	ArrayA	99996
Optimal	vol100GB02	Unknown	None	iSCSI	astute02	0	ArrayA	99996
Optimal	vol100GB03	Unknown	None	iSCSI	astute03	0	ArrayA	99996
Optimal	vol100GB04	Unknown	None	iSCSI	astute04	0	ArrayA	99996

Network Status			
Status	Network	Mode	Jumbo
Up	fabric0	10Gb	No
Down	fabric1	10Gb	Yes
Down	fabric2	1Gb	No
Down	fabric3	1Gb	No
Down	fabric4	1Gb	No
Down	fabric5	1Gb	No

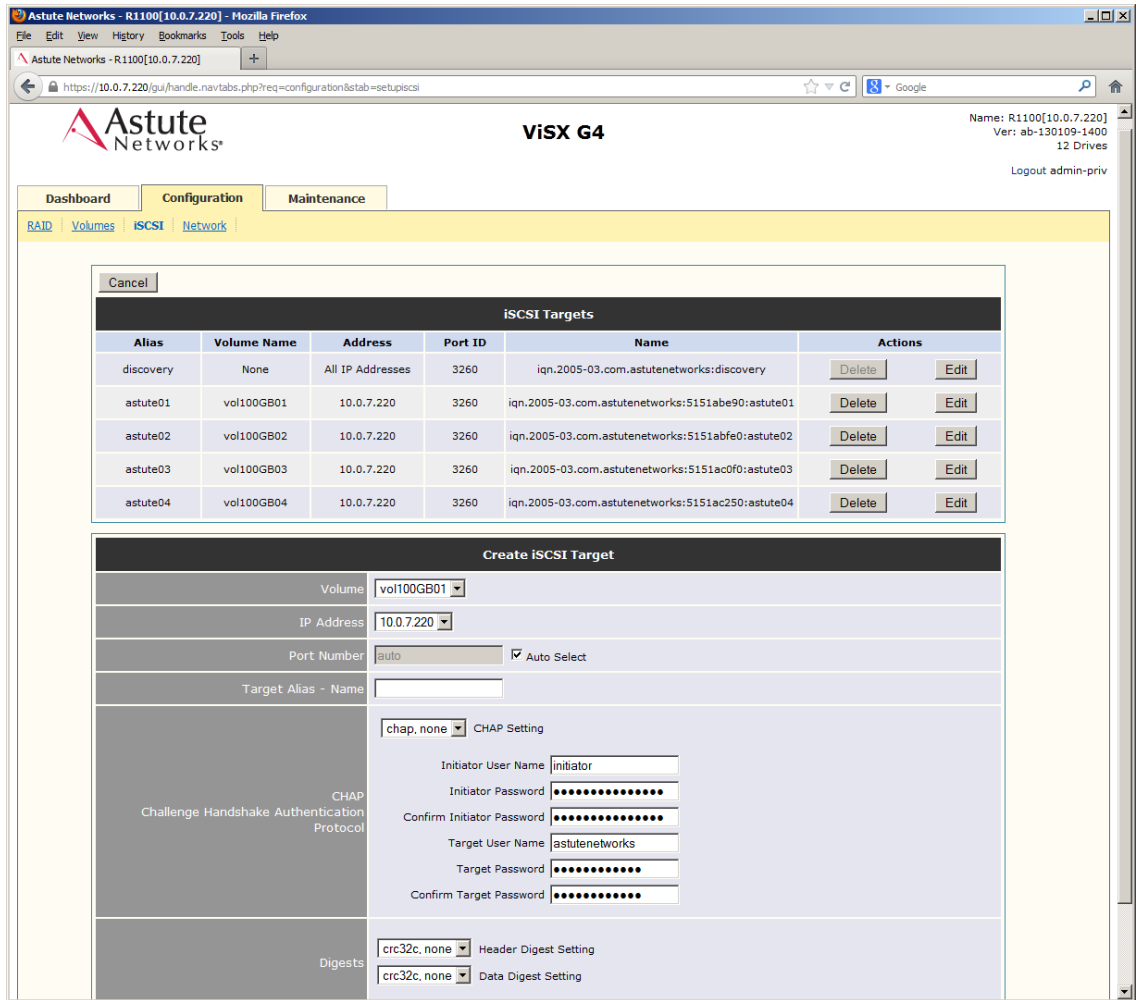
The “Volumes” view provides the status, RAID level and size of the volumes.



The screenshot shows the 'Volumes' configuration view in the ViSX G4 management interface. It includes an 'Add Volume' button and a table with columns for Status, Volume Name, RAID Level, RAID Set, Size (MB), and Actions.

Volume Status						
Status	Volume Name	RAID Level	RAID Set	Size (MB)	Actions	
Optimal	vol100GB01	0	ArrayA	99996	Delete Volume	Edit
Optimal	vol100GB02	0	ArrayA	99996	Delete Volume	Edit
Optimal	vol100GB03	0	ArrayA	99996	Delete Volume	Edit
Optimal	vol100GB04	0	ArrayA	99996	Delete Volume	Edit

Creating iSCSI targets was quite easy, with the entire configuration from a single screen.



The screenshot shows the Astute Networks ViSX G4 web interface. The browser window title is "Astute Networks - R1100[10.0.7.220] - Mozilla Firefox". The URL is "https://10.0.7.220/igu/handle.navtabs.php?req=configuration&stab=setupiscsi". The page header includes the Astute Networks logo, the product name "ViSX G4", and system information: "Name: R1100[10.0.7.220]", "Ver: ab-130109-1400", "12 Drives", and a "Logout admin-priv" link.

The main navigation tabs are "Dashboard", "Configuration", and "Maintenance". Under "Configuration", there are sub-tabs for "RAID", "Volumes", "iSCSI", and "Network". The "iSCSI" tab is selected.

The "iSCSI Targets" section contains a table with the following data:

Alias	Volume Name	Address	Port ID	Name	Actions
discovery	None	All IP Addresses	3260	iqn.2005-03.com.astutenetworks:discovery	Delete Edit
astute01	vol100GB01	10.0.7.220	3260	iqn.2005-03.com.astutenetworks:5151abe90:astute01	Delete Edit
astute02	vol100GB02	10.0.7.220	3260	iqn.2005-03.com.astutenetworks:5151abfe0:astute02	Delete Edit
astute03	vol100GB03	10.0.7.220	3260	iqn.2005-03.com.astutenetworks:5151ac0f0:astute03	Delete Edit
astute04	vol100GB04	10.0.7.220	3260	iqn.2005-03.com.astutenetworks:5151ac250:astute04	Delete Edit

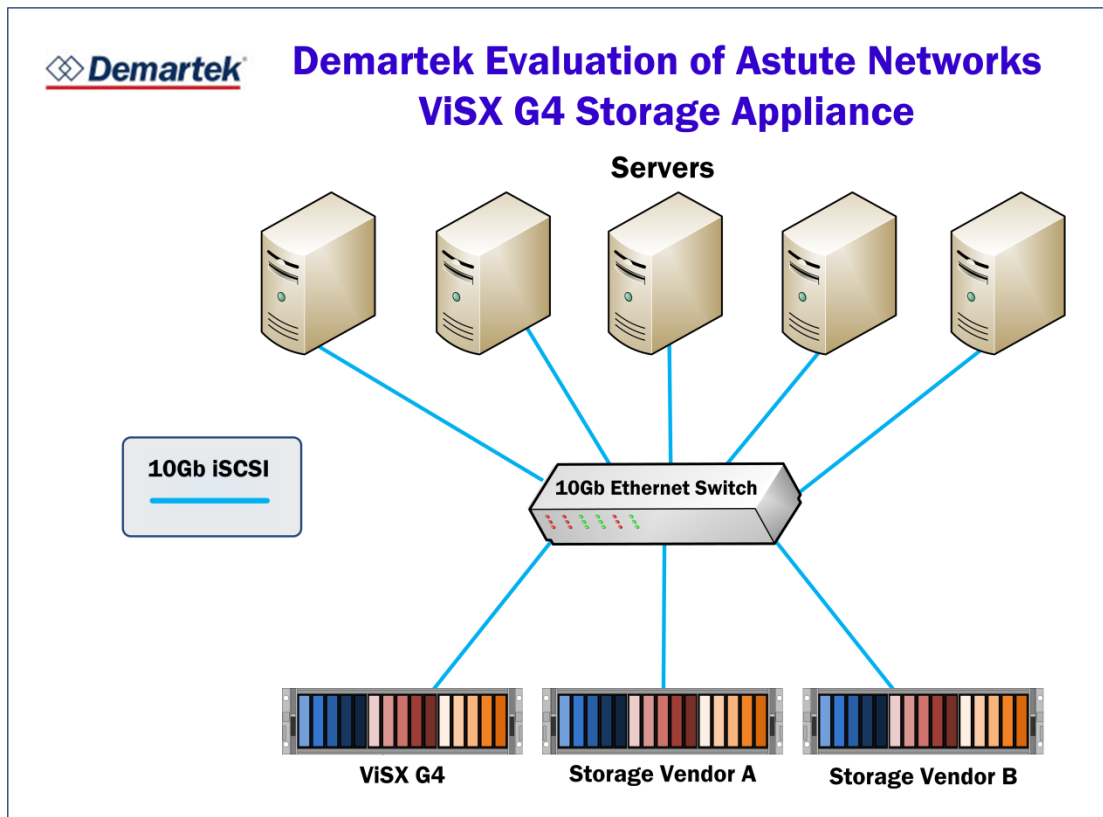
Below the table is the "Create iSCSI Target" form. It includes the following fields and options:

- Volume: vol100GB01
- IP Address: 10.0.7.220
- Port Number: Auto (checked) Auto Select
- Target Alias - Name: [Empty]
- CHAP Setting: chap.none
- CHAP Challenge Handshake Authentication Protocol: [Expanded]
- Initiator User Name: initiator
- Initiator Password: [Masked]
- Confirm Initiator Password: [Masked]
- Target User Name: astutenetworks
- Target Password: [Masked]
- Confirm Target Password: [Masked]
- Digests:
 - Header Digest Setting: crc32c.none
 - Data Digest Setting: crc32c.none

Test Configuration and Procedures

We deployed the Astute Networks ViSX G4, along with two other all-flash storage arrays into our lab in Colorado. We used our existing server and network resources to generate synchronized Iometer 10Gb iSCSI workloads from each of five servers to the respective storage systems.

Test Configuration



Storage Systems

- Each of the storage systems had 12 solid-state drives installed as data drives.
- The 12 SSDs were configured as a single RAID0 storage group. The Vendor B storage array had one extra SSD that was configured as a hot spare for the RAID group.
- Four 100GB volumes were configured on each storage system.
- Each storage system was connected with one 10GbE iSCSI host connection.
- Several hours of pre-conditioning runs were performed on each storage system before the performance tests were run.
- Vendor "A" - a "start-up" flash storage vendor with pricing similar to the Astute ViSX

- Vendor “B” – a well-known, established storage vendor with pricing well over 5X that of the Astute ViSX

IOmeter Parameters

- IOmeter 2006
- 4 workers
- Each worker accessed all four of the 100GB storage volumes
- The storage volumes were accessed as raw partitions (physical drives)

Each of the five servers ran the same IOmeter configuration and they all ran concurrently. A variety of I/O profiles were run, including several block sizes and queue depths.

Servers

1. DMRTK-SRVR-E
 - 2x Intel Xeon E5345, 2.33 GHz, 8 total cores, 8 threads, 48 GB RAM
2. DMRTK-SRVR-H
 - 2x Intel Xeon E5540, 2.53 GHz, 8 total cores, 16 threads, 96 GB RAM
3. DMRTK-SRVR-I
 - 2x Intel Xeon X5690, 3.46 GHz, 12 total cores, 24 threads, 144 GB RAM
4. DMRTK-SRVR-J
 - 2x Intel Xeon X5680, 3.33 GHz, 12 total cores, 24 threads, 144 GB RAM
5. DMRTK-SRVR-K
 - 1x Intel Xeon E3-1280, 3.5 GHz, 4 total cores, 8 threads, 32 GB RAM

All servers were running Windows Server 2012 in a physical server configuration. Each of the servers had 10GbE NICs installed.

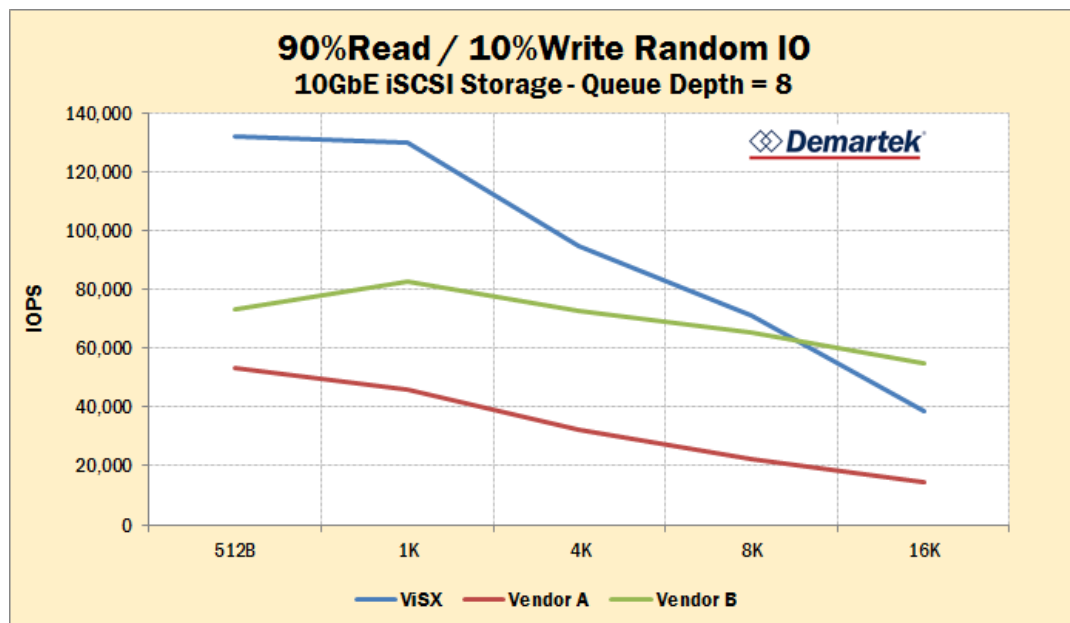
Test Results

Five I/O workload results are shown below. The workloads were:

- 100% Random, 90% Read - 10% Write
- 100% Random, 70% Read - 30% Write
- 100% Random, 50% Read - 50% Write
- 100% Random, 30% Read - 70% Write
- 100% Random, 10% Read - 90% Write

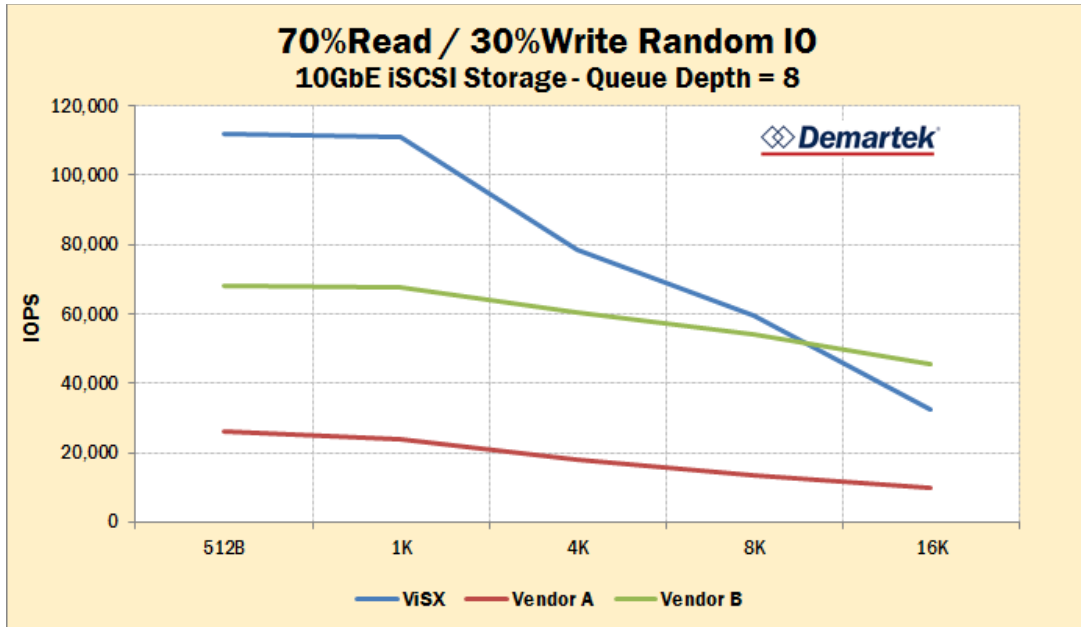
In all cases the Astute Networks ViSX G4 provided higher IOPS, especially at the smaller block sizes up to 8K, than the other all-flash iSCSI storage systems.

90% Read

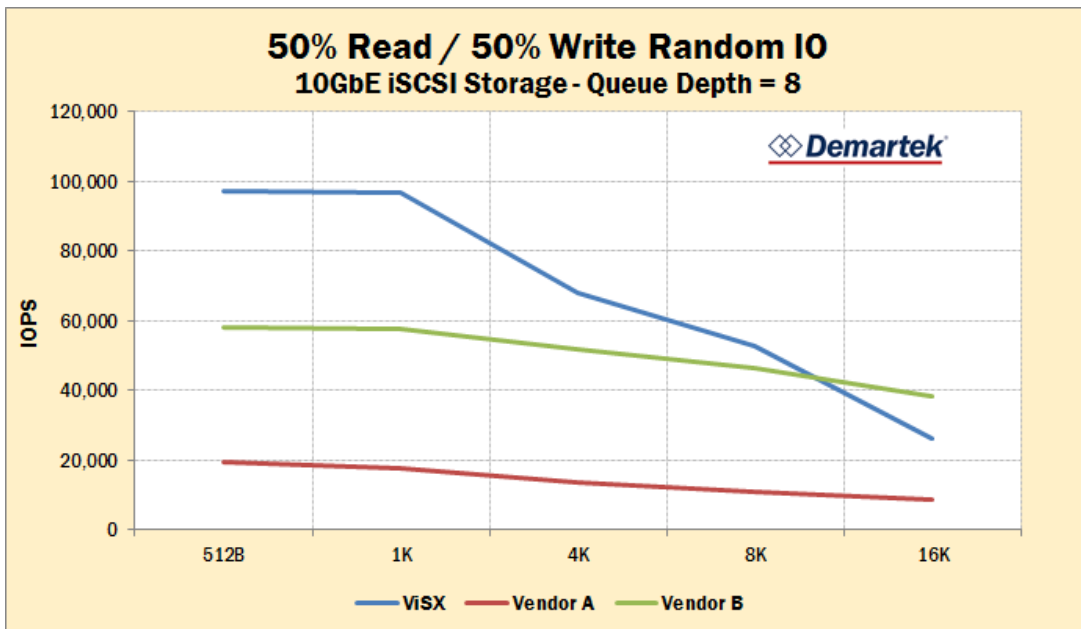


The maximum performance was observed with the 90% read tests, as shown above. The Astute ViSX G4 achieved more than 130,000 IOPS at 512 byte block size with queue depth=8. This is approximately 2.4 times the performance of the “Vendor A” all-flash storage array and 1.8 times the performance of the “Vendor B” all-flash storage array.

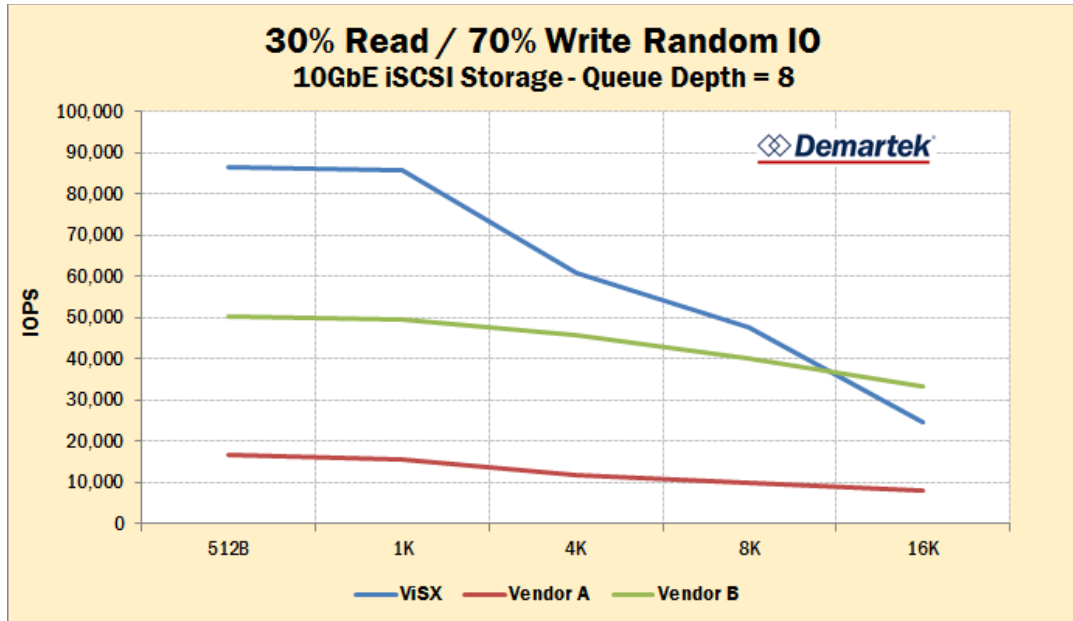
70% Read



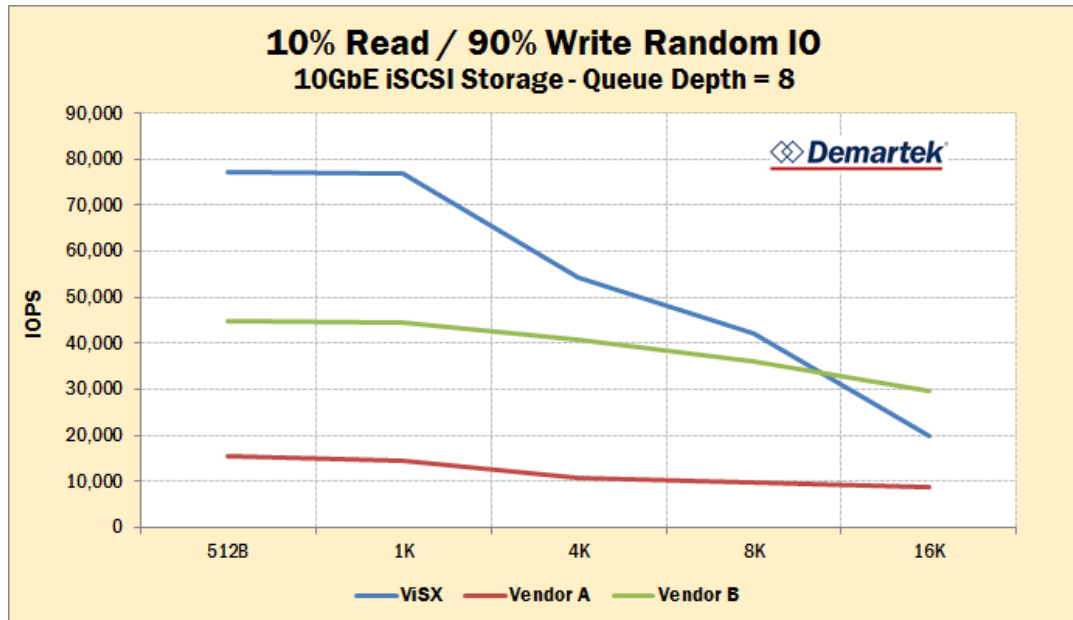
50% Read



30% Read



10% Read



Summary and Conclusion

Astute Networks has produced an excellent iSCSI all-flash storage performance appliance with their ViSX G4, achieving their design goal of high random IOPS, especially at block sizes up to 8K. Small block sizes of 8K or less are typical in most virtualized applications, especially for databases performing transaction processing and virtual desktops.

The performance differences were substantial at the smaller block sizes with random I/O.

- The ViSX G4 achieved more than 130,000 IOPS in the 90% read test case.
- The ViSX G4 achieved more than 77,000 IOPS in the 10% read test case.
- The ViSX G4 outperformed the “Vendor A” storage array at block sizes up to 8KB.
- The ViSX G4 outperformed the “Vendor B” storage array at block sizes up to 8KB.

We recommend that users consider the Astute Networks ViSX G4 for high-performance iSCSI storage applications.

The most current version of this report is available at http://www.demartek.com/Demartek_Astute_ViSX_G4_Evaluation_2013-04.html on the Demartek website.

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