bluechip STORAGEline R54300s NAS-Server system

Executive summary

After performing all tests, the Certification Document bluechip STORAGEline R54300s NAS-Server system has been officially certified according to the **Open-E** Hardware Certification Program Guide 2.1.

During the tests, it was found that the system is functional and efficient. With the **Open-E DSS V7** operating system installed, the bluechip STORAGEline R54300s NAS-Server is stable and performs well.

In general, the system can be used for many different applications, but the following are recommended:

✓ **NAS filer**

The following features make bluechip STORAGEline R54300s NAS-Server a great NAS filer solution:

➢ Twenty four high capacity hard drives and high RAID levels ensure a lot of safe storage space.

➢ Four 1GbE and four 10GbE interfaces for an independent connection to different networks or link aggregation for improved throughput.

➢ SSD cache for faster access to frequently used files.

✓ **Storage for databases**

The following features decides that bluechip STORAGEline R54300s NAS-Server is a great Storage for databases:

➢ Hardware RAID10 for high performance, best I/Ops ratio and data safety.

➢ Twenty four high class enterprise SATA drives combined with fast RAID controller, with built-in SSD cache, ensure fast random data access and reliability.

➢ Four 10GbE interfaces which can be aggregated for improved fault tolerance and

➢ increased performance for fast database connection.

➢ Redundant power supply for system reliability.

✓ **Storage for Virtualization**

For this application the following can be used:

➢ Hardware RAID5, RAID6, RAID10, RAID50 or RAID60 for high performance and data safety.

➢ Four 1GbE interfaces for flexible network topology or fast MPIO connection.

➢ Four 10GbE interfaces for efficient network connections to virtualization platforms.

➢ SSD cache for I/O bottlenecks elimination and increased virtual machine density.

Certification notes

It is recommended to use Balance-alb bonding mode.

bluechip STORAGEline R54300s NAS-Server hardware components

Technical specifications about the certified system are listed below:

Model	bluechip STORAGEline R54300s NAS-Server
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	Supermicro CSE-846E16-R1200B
CPU	2x Intel Xeon E5-2620 2.0GHz
Motherboard	Supermicro X9DRi-F
Memory	4x 16GB Samsung M393B2G70BH0-CK0
Network	Intel I350 Dual Port Gigabit Ethernet (on-board)
Network	Intel Ethernet Server Adapter I350-T2
Network	2x Emulex OCe-11102-NT
HW RAID	LSI Nytro MegaRaid NMR 8110-4i
Hard disk drives	24x 3TB HGST Ultrastar 7K3000 HUS723030ALS640

TABLE 1: Hardware components list of Certified System with Open-E DSS V7

bluechip STORAGEline R54300s NAS-Server photos

FIGURE 1: *Front photo*
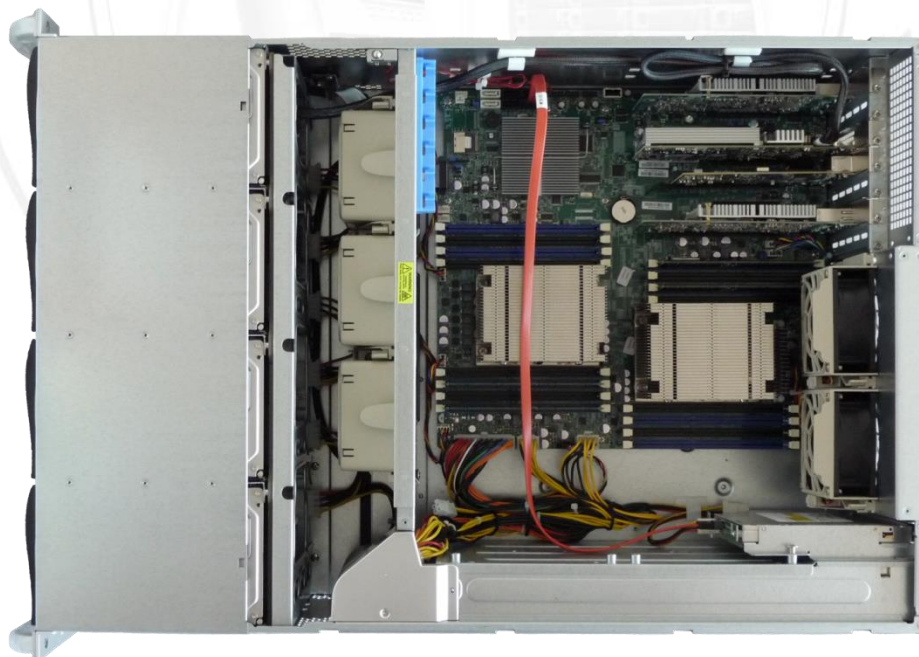

FIGURE 2: *Rear photo*

FIGURE 3: *Top photo*

Auxiliary systems hardware components

Auxiliary systems with MS Windows or Open-E DSS V7 installed, used in Open-E Hardware Certification Process.

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter-Tech IPC 4088 4HE
Motherboard	Asus P8B-E/4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	3x 4GB DDR3 Kingston KVR1333D3E9S/4G
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Network	2x Intel Ethernet Server Adapter X540-T2
Hard disk drives	1TB Hitachi Ultrastar A7K2000 HUA722010CLA330

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter-Tech IPC 4088 4HE
Motherboard	Asus P8B-E/4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	3x 4GB DDR3 Kingston KVR1333D3E9S/4G
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Network	2x Intel Ethernet Server Adapter X540-T2
Hard disk drives	1TB Hitachi Ultrastar A7K2000 HUA722010CLA330

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	Inter-Tech IPC 4088 4HE
CPU	Intel Xeon Processor E3-1230 3.20 GHz
Motherboard	Asus P8B-E/4L
Memory	3x 4GB DDR3 Kingston KVR1333D3E9S/4G
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Network	Intel Ethernet Server Adapter X540-T2
HW RAID	Intel RAID Controller RS2WC080
Hard disk drives	500GB Hitachi Deskstar 7K1000.C HDS721050CLA362
Hard disk drives	8x 1TB Hitachi Ultrastar A7K2000 HUA722010CLA330

TABLE 4: Hardware components of Workstation with Open-E DSS V7

Model	Netgear ProSafe Plus XS708E
Description	8 ports 10GbE cooper and 10GbE shared fiber port

TABLE 5: Network switch details for 10GbE connections

Administration functionality

The following functionality has been tested.

Drive identifier	OK
Power button	OK
Front and rear LEDs	OK

TABLE 6: Administration functionality test results

Network functionality

Tests performed in this section check the functionality, performance and stability of the network solutions available in the Open-E DSS V7 product on the certified system.

The tests rely on configuring the iSCSI targets and copying the data from many *Workstations with MS Windows* through various network connections with big block size using appropriate testing tools.

Network test topology

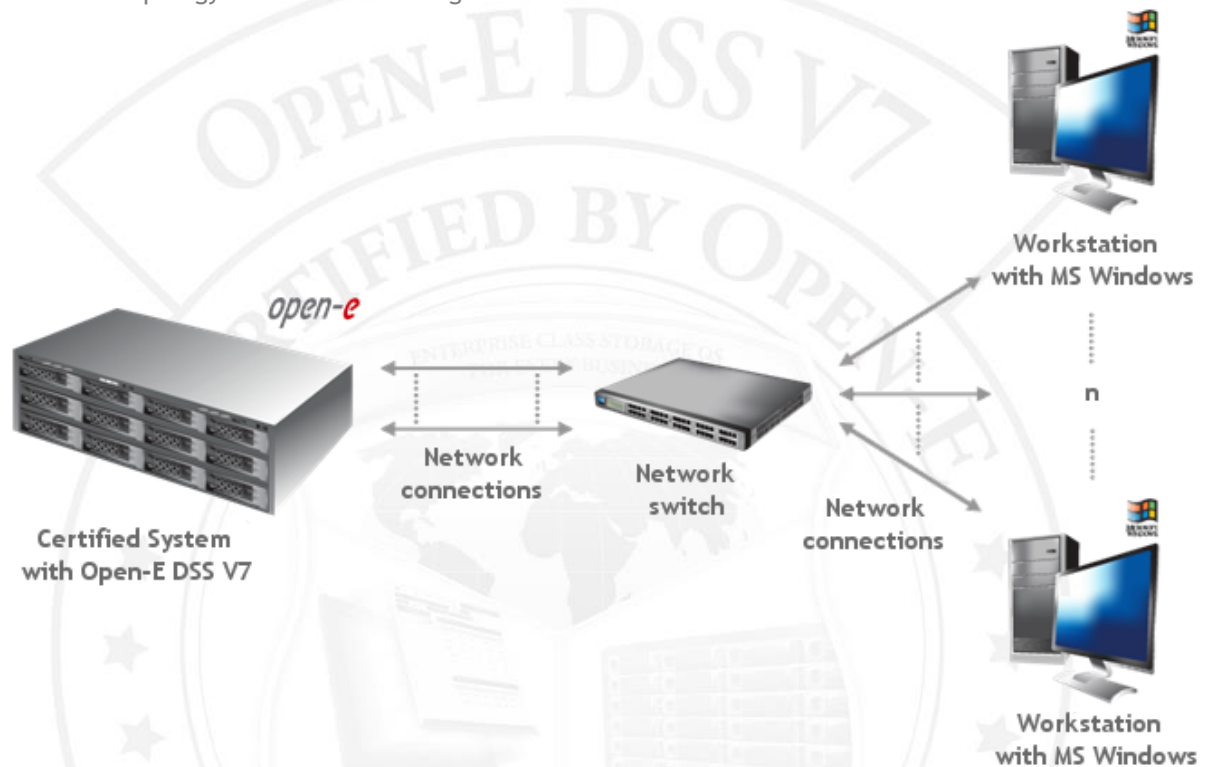Network topology for Network testing is shown below.

FIGURE 4: Network topology for Network testing

802.3ad bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from many *Workstations with MS Windows* through an 802.3ad bonding mode network connection with a 4MB block size using the Iometer testing tool.

2. Test results for 802.3ad bonding mode test performed on Intel Ethernet Server Adapter I350

802.3ad bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter I350		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	89.40	75.86	passed
2nd Workstation	107.41	74.63	passed
3rd Workstation	109.10	81.07	passed
4th Workstation	86.68	75.24	passed

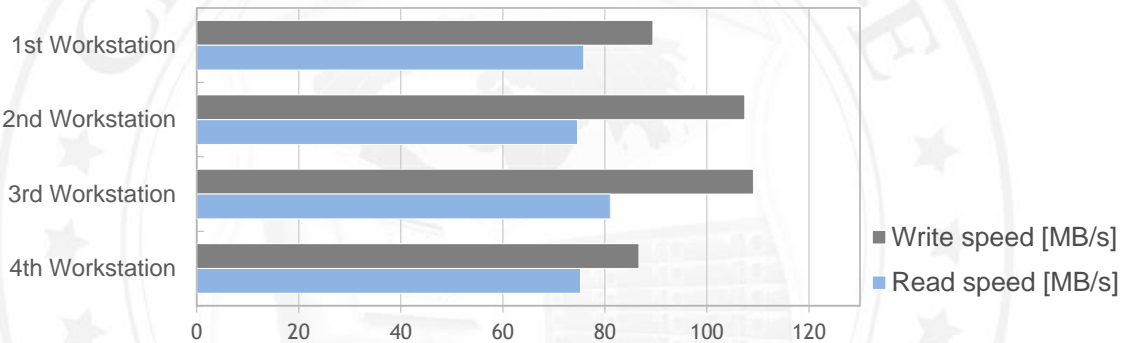TABLE 7: *802.3ad bonding mode performance test results table for Intel Ethernet Server Adapter I350*

FIGURE 5: *802.3ad bonding mode performance test results chart for Intel Ethernet Server Adapter I350*

Balance-alb bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from many *Workstations with MS Windows* through a Balance-alb bonding mode network connection with a 4MB block size using the Iometer testing tool.

2. Test results for Balance-alb bonding mode test performed Intel Ethernet Server Adapter I350

Balance-alb bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter I350		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	109.20	111.94	passed
2nd Workstation	108.79	111.73	passed
3rd Workstation	108.97	111.86	passed
4th Workstation	109.67	111.83	passed

TABLE 8: *Balance-alb bonding mode performance test results table for Intel Ethernet Server Adapter I350*
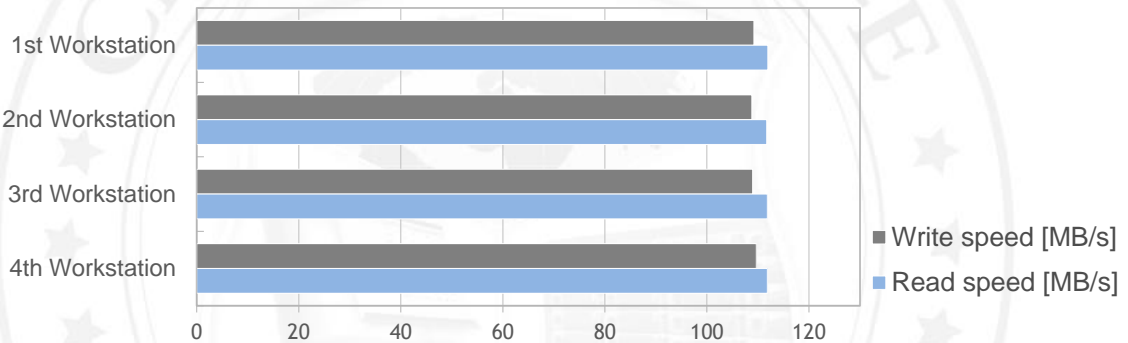

FIGURE 6: *Balance-alb bonding mode performance test results chart for Intel Ethernet Server Adapter I350*

3. Test results for Balance-alb bonding mode test performed Emulex OCe-11102-NT

Balance-alb bonding mode performance test results			
NIC model	Emulex OCe-11102-NT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	449.07	534.03	passed
2nd Workstation	511.02	572.85	passed
3rd Workstation	436.23	656.39	passed
4th Workstation	406.34	666.09	passed

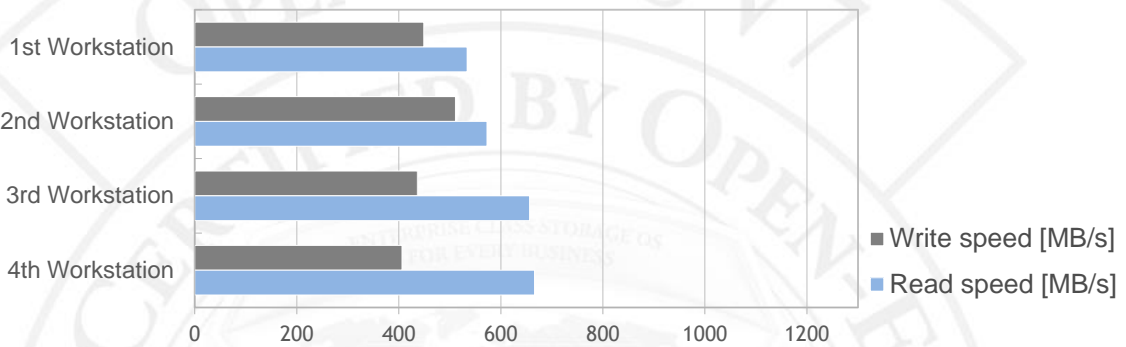TABLE 9: Balance-alb bonding mode performance test results table for Emulex OCe-11102-NT

FIGURE 7: Balance-alb bonding mode performance test results chart for Emulex OCe-11102-NT

Balance-rr bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from many *Workstations with MS Windows* through a Balance-rr bonding mode network connection with a 4MB block size using the Iometer testing tool.

2. Test results for Balance-rr bonding mode test performed Intel Ethernet Server Adapter I350

Balance-rr bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter I350		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	111.26	67.98	passed
2nd Workstation	108.84	90.63	passed
3rd Workstation	110.53	86.02	passed
4th Workstation	109.97	89.15	passed

TABLE 10: *Balance-rr bonding mode performance test results table for Intel Ethernet Server Adapter I350*
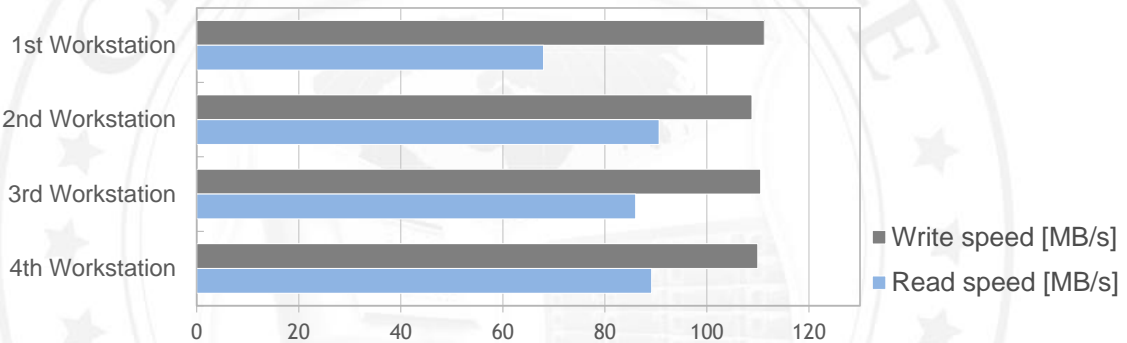

FIGURE 8: *Balance-rr bonding mode performance test results chart for Intel Ethernet Server Adapter I350*

3. Test results for Balance-rr bonding mode test performed Emulex OCe-11102-NT

Balance-rr bonding mode performance test results			
NIC model	Emulex OCe-11102-NT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	423.54	280.61	passed
2nd Workstation	504.73	324.46	passed
3rd Workstation	541.03	268.63	passed
4th Workstation	578.06	233.00	passed

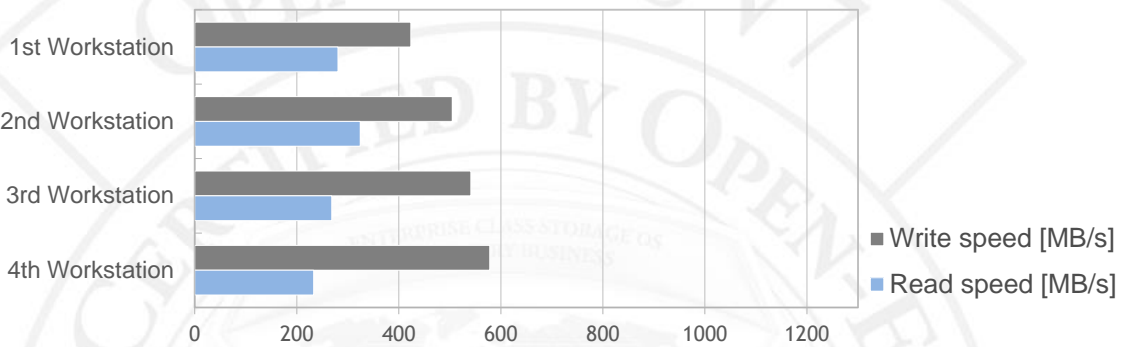*TABLE 11: Balance-rr bonding mode performance test results table for Emulex OCe-11102-NT*

FIGURE 9: Balance-rr bonding mode performance test results chart for Emulex OCe-11102-NT

Single NIC performance test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from *Workstations with MS Windows* through single NIC with a 4MB block size using the Iometer testing tool.

2. Test results for single NIC test performed Intel Ethernet Server Adapter I350

Single NIC performance test results			
NIC model	Intel Ethernet Server Adapter I350		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	107.90	122.03	passed

TABLE 12: Single NIC performance test results table for Intel Ethernet Server Adapter I350
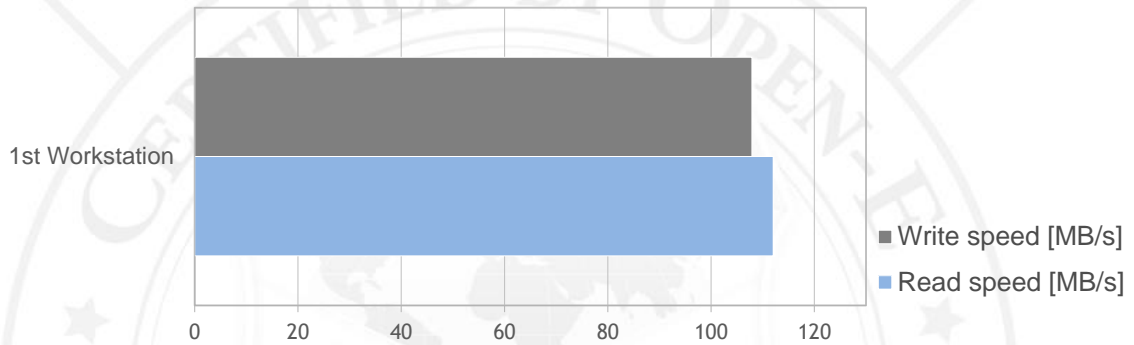

FIGURE 10: Single NIC performance test results chart for Intel Ethernet Server Adapter I350

3. Test results for single NIC test performed Emulex OCe-11102-NT

Single NIC performance test results			
NIC model	Emulex OCe-11102-NT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	1025.05	691.65	passed

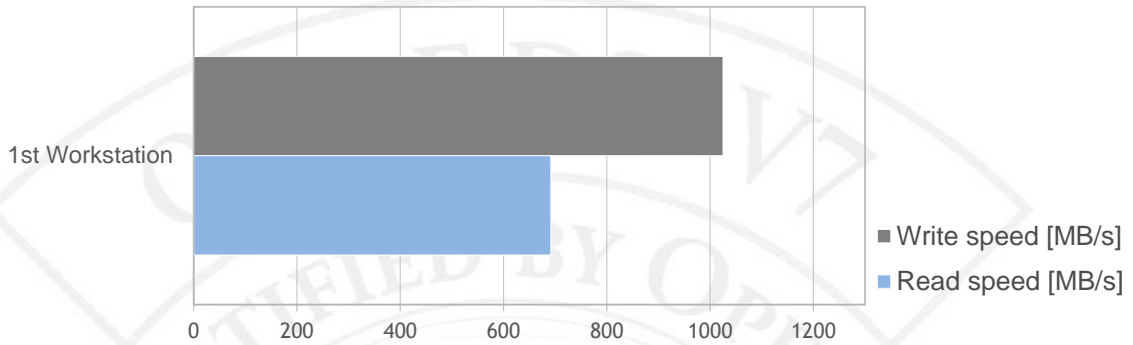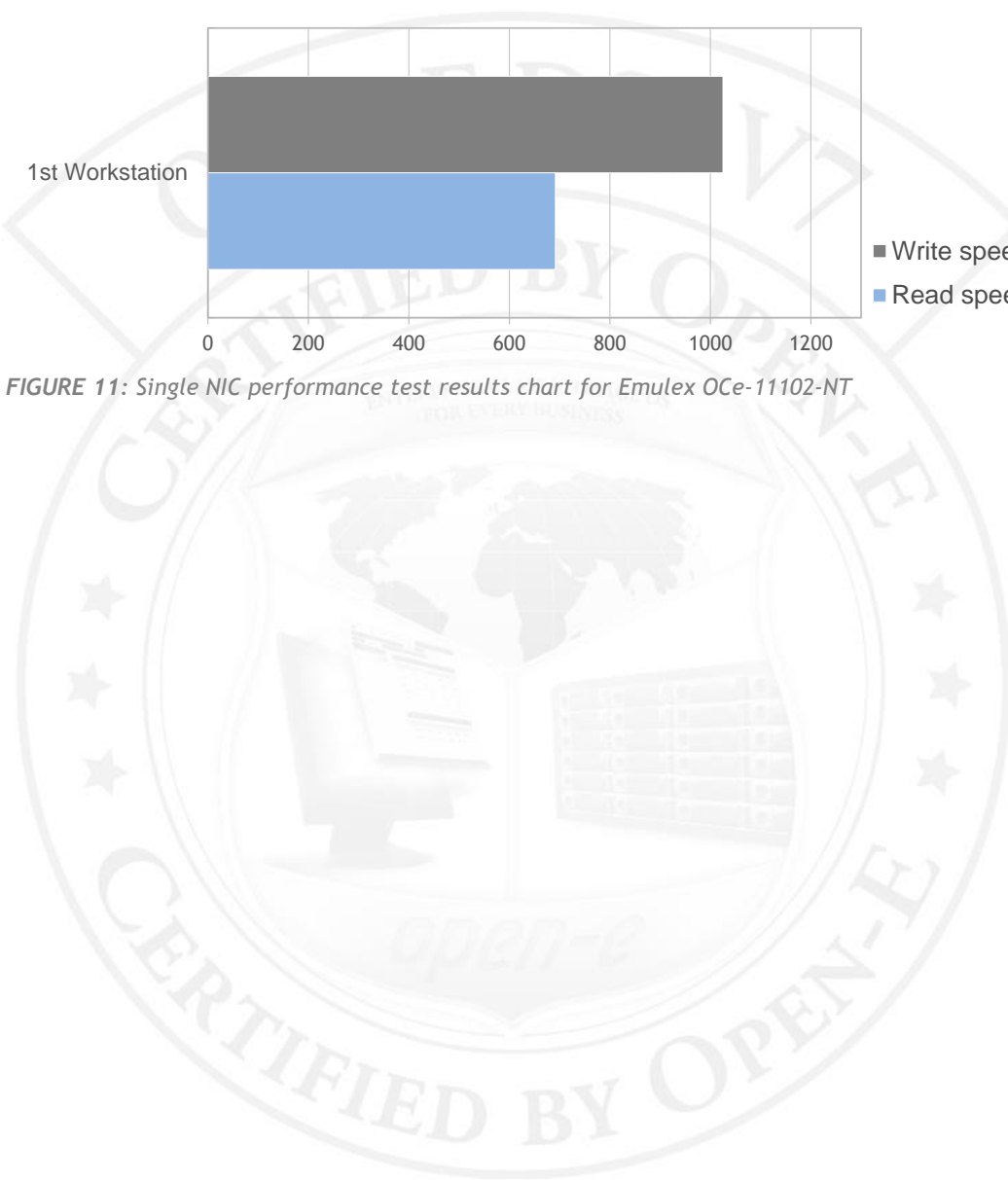TABLE 13: Single NIC performance test results table for Emulex OCe-11102-NT

FIGURE 11: Single NIC performance test results chart for Emulex OCe-11102-NT

RAID functionality

Tests performed in this section check the functionality, performance and stability of Open-E DSS V7 storage devices on the certified system.

Tests in this section rely on the creation of the RAID units on 0, 5, 6, 10, 50 and 60 levels, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

RAID test topology
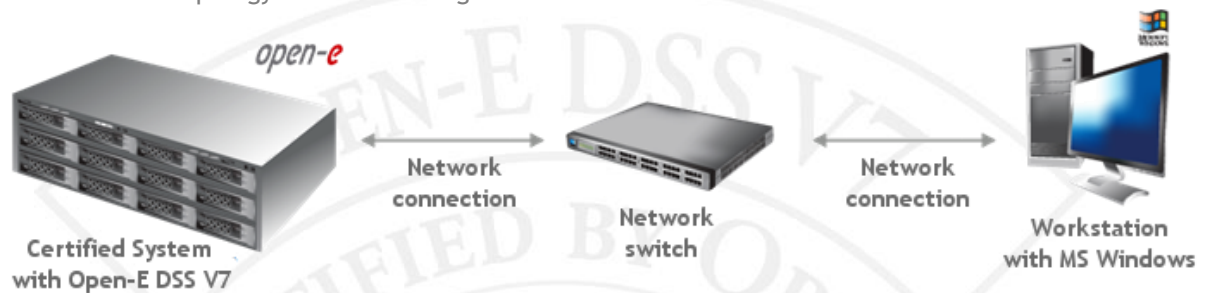
Network test topology for RAID testing is shown below

FIGURE 12: Network test topology for RAID testing

Hardware RAID0 test

1. Test description

The test relies on creation of the RAID0 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID0 and Emulex OCe-11102-NT

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	54.89	61.38	passed
32	367.31	456.04	passed
64	564.30	540.03	passed
128	741.51	512.69	passed
256	865.82	576.13	passed
512	901.82	594.81	passed
1024	880.29	694.81	passed
4096	882.12	693.14	passed

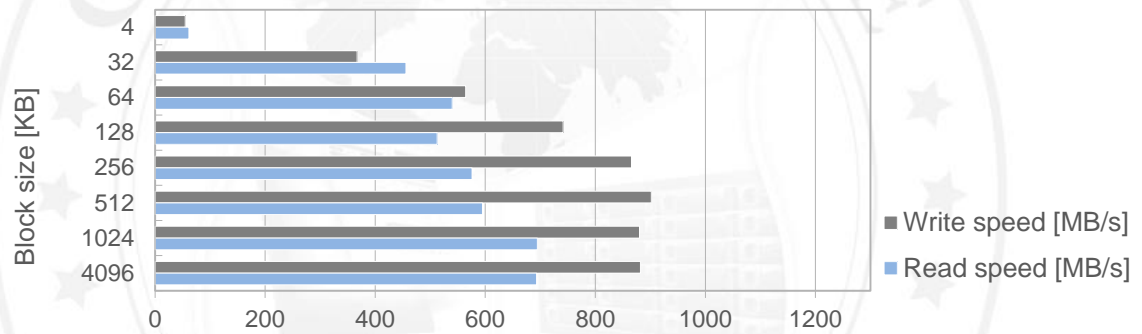*TABLE 14: RAID0 performance test results table for Emulex OCe-11102-NT*

FIGURE 13: RAID0 performance test results chart for Emulex OCe-11102-NT

Hardware RAID5 test

1. Test description

The test relies on creation of the RAID5 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID5 and Emulex OCe-11102-NT

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	54.24	59.53	passed
32	352.83	465.35	passed
64	559.97	607.35	passed
128	752.84	719.95	passed
256	897.21	736.14	passed
512	931.66	701.75	passed
1024	930.58	721.16	passed
4096	994.46	728.57	passed

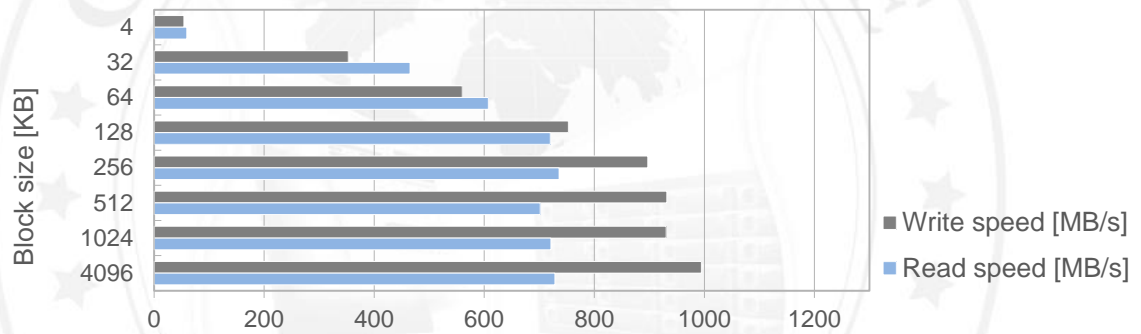*TABLE 15: RAID5 performance test results table for Emulex OCe-11102-NT*

FIGURE 14: RAID5 performance test results chart for Emulex OCe-11102-NT

Hardware RAID6 test

1. Test description

The test relies on creation of the RAID6 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID6 and Emulex OCe-11102-NT

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	54.33	59.83	passed
32	373.66	486.50	passed
64	590.84	620.71	passed
128	820.45	552.33	passed
256	1009.92	722.65	passed
512	1037.76	698.04	passed
1024	1008.72	722.82	passed
4096	1021.25	721.58	passed

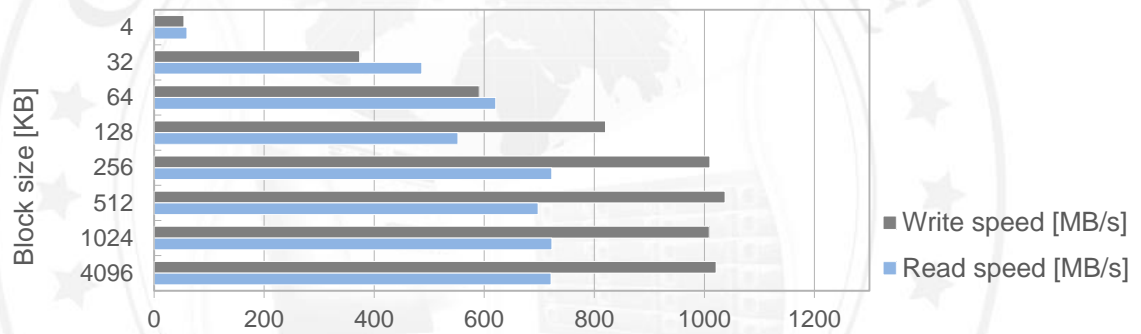*TABLE 16: RAID6 performance test results table for Emulex OCe-11102-NT*

FIGURE 15: RAID6 performance test results chart for Emulex OCe-11102-NT

Hardware RAID10 test

1. Test description

The test relies on creation of the RAID10 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID10 and Emulex OCe-11102-NT

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	54.86	58.46	passed
32	368.06	440.71	passed
64	590.73	576.81	passed
128	811.59	636.96	passed
256	1007.70	704.44	passed
512	1014.09	651.96	passed
1024	1032.04	658.09	passed
4096	1017.77	691.70	passed

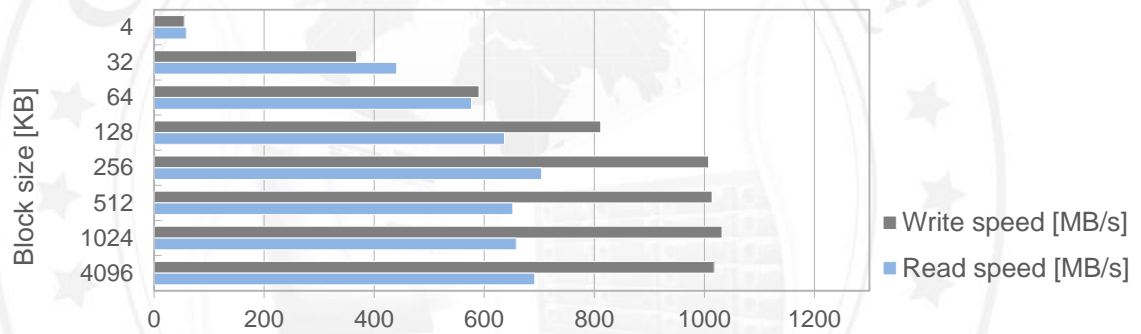TABLE 17: *RAID10 performance test results table for Emulex OCe-11102-NT*

FIGURE 16: *RAID10 performance test results chart for Emulex OCe-11102-NT*

Hardware RAID50 test

1. Test description

The test relies on creation of the RAID50 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID50 and Emulex OCe-11102-NT

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	54.85	58.75	passed
32	366.60	483.51	passed
64	577.23	613.65	passed
128	819.01	705.09	passed
256	1006.86	770.49	passed
512	1023.67	713.19	passed
1024	1042.41	722.13	passed
4096	1009.85	714.92	passed

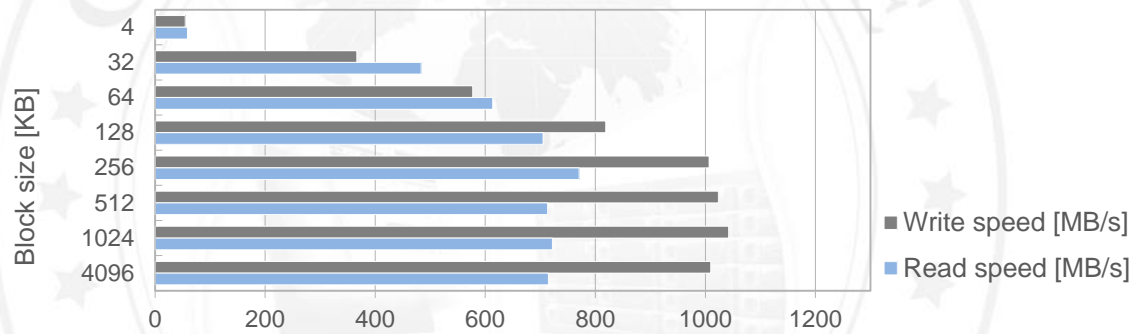TABLE 18: RAID50 performance test results table for Emulex OCe-11102-NT

FIGURE 17: RAID50 performance test results chart for Emulex OCe-11102-NT

Hardware RAID60 test

1. Test description

The test relies on creation of the RAID60 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID60 and Emulex OCe-11102-NT

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	55.79	62.65	passed
32	378.86	434.00	passed
64	604.55	520.93	passed
128	840.77	715.38	passed
256	1015.14	623.15	passed
512	1012.07	699.51	passed
1024	1014.74	681.21	passed
4096	1046.42	699.04	passed

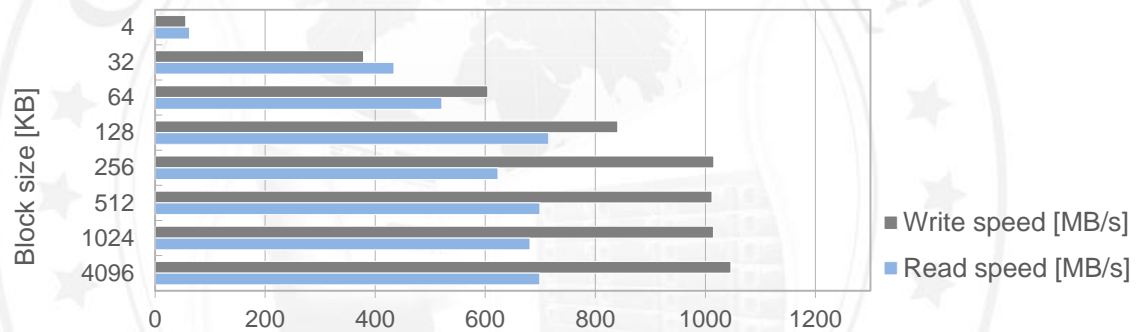*TABLE 19: RAID60 performance test results table for Emulex OCe-11102-NT*

FIGURE 18: RAID60 performance test results chart for Emulex OCe-11102-NT

22

NAS functionality

Tests performed in this section check the functionality, performance and stability of the NAS protocols in the Open-E DSS V7 product on the certified system.

The tests rely on creating NAS shares and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

NAS test topology

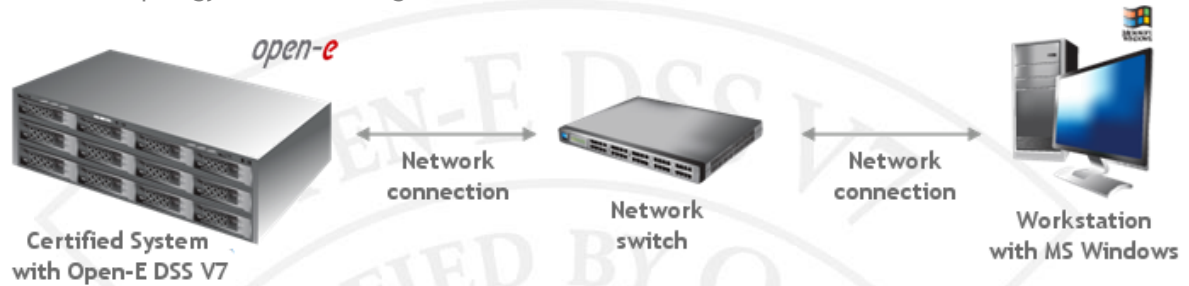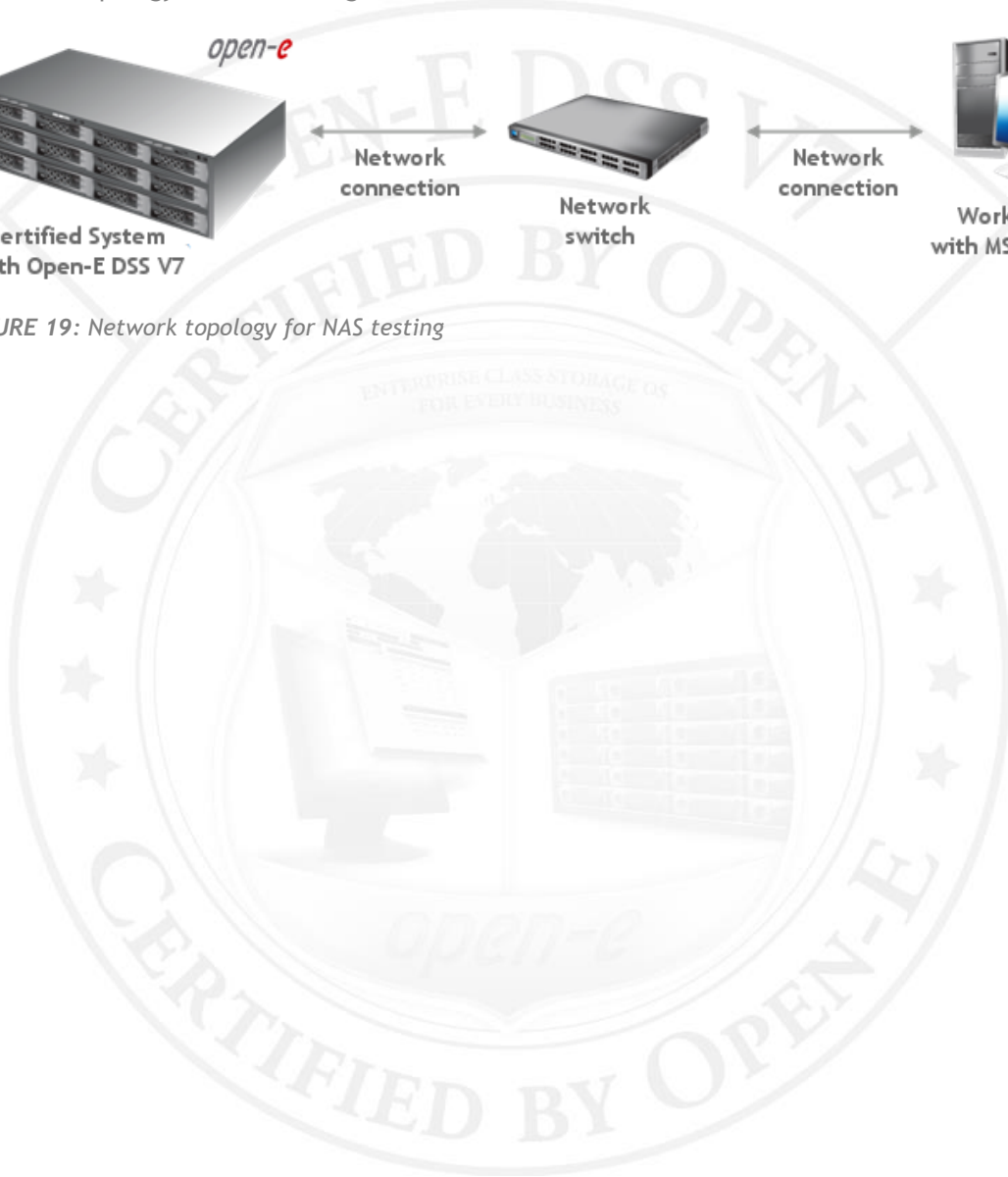Network topology for NAS testing is shown below.

FIGURE 19: Network topology for NAS testing

SMB test

1. Test description

The tests rely on creating NAS shares and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the Iometer testing tool.

2. Test results for SMB and Emulex OCe-11102-NT

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	120.32	117.29	passed
32	598.16	597.77	passed
64	737.95	584.25	passed
128	791.58	615.42	passed
256	755.24	602.17	passed
512	751.85	583.87	passed
1024	752.96	575.32	passed
4096	704.97	578.10	passed

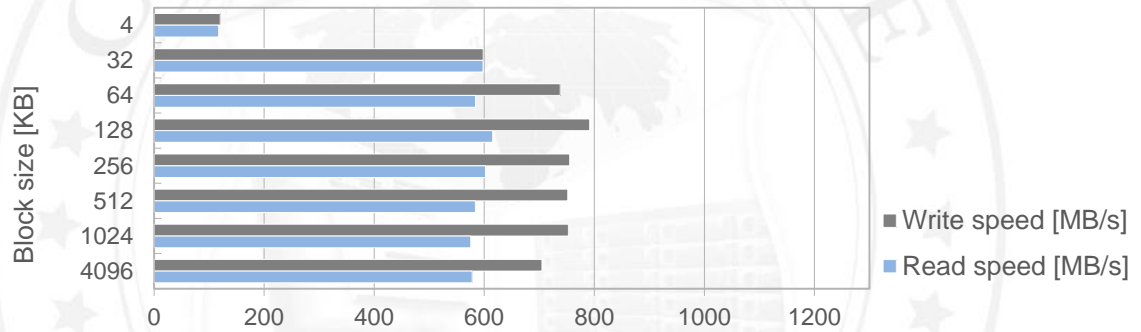TABLE 20: SMB performance test results table for Emulex OCe-11102-NT

FIGURE 20: SMB performance test results chart for Emulex OCe-11102-NT

iSCSI functionality

Tests performed in this section check the functionality, performance and stability of the iSCSI protocol in the Open-E DSS V7 product on the certified system.

iSCSI Initiator test topology

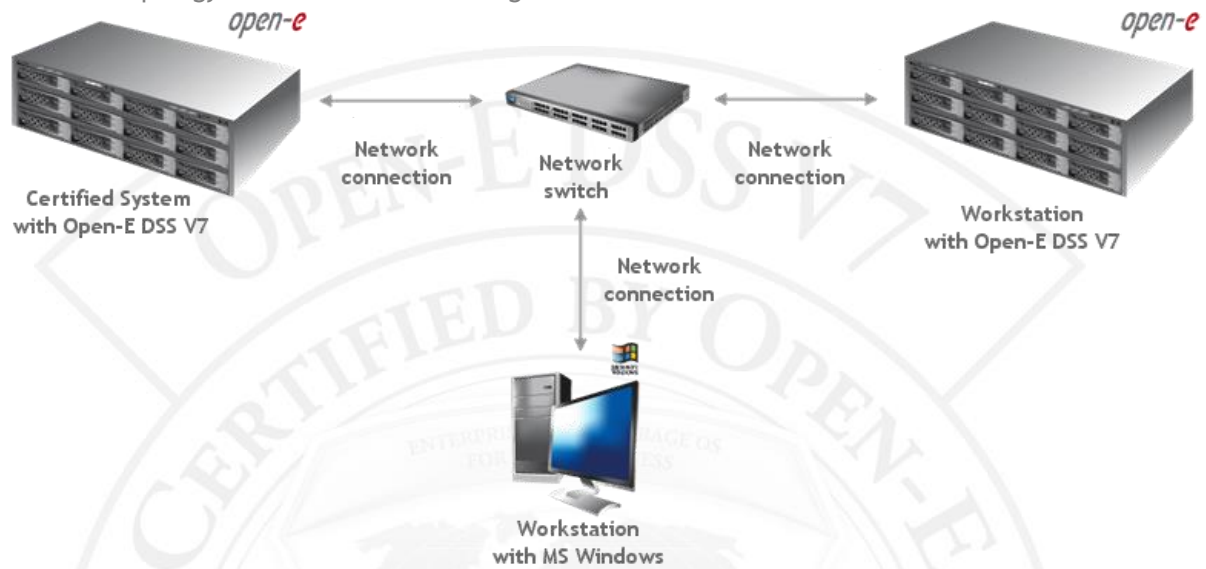Network topology for iSCSI Initiator testing is shown below.

FIGURE 21: Network topology for iSCSI Initiator testing

iSCSI Target test topology

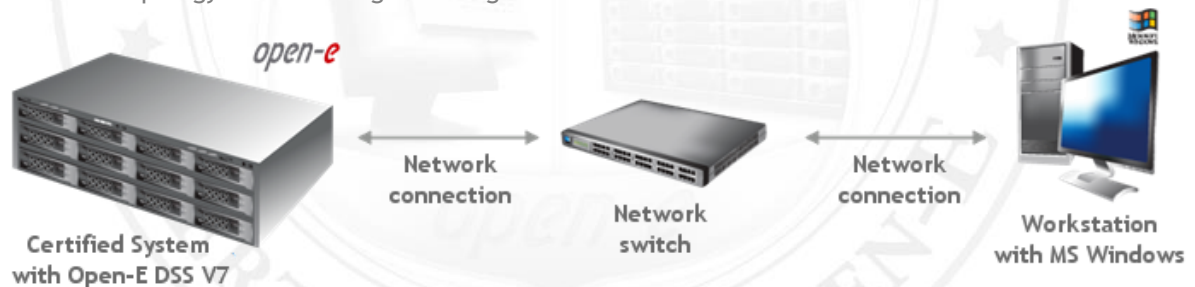Network topology for iSCSI Target testing is shown below.

FIGURE 22: Network topology for iSCSI Target testing

iSCSI Initiator test

1. Test description

The test relies on using the storage connected via the built-in iSCSI Initiator for NAS volumes, creating SMB shares on these NAS volumes and copying data from a *Workstation with MS Windows* to them with various block sizes using the Iometer testing tool.

2. Test results for iSCSI Initiator Emulex OCe-11102-NT

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	119.69	115.30	passed
32	549.95	616.99	passed
64	778.26	574.95	passed
128	790.30	601.37	passed
256	784.87	581.53	passed
512	757.56	564.07	passed
1024	776.14	550.74	passed
4096	759.96	547.50	passed

TABLE 21: iSCSI Initiator performance test results table for Emulex OCe-11102-NT
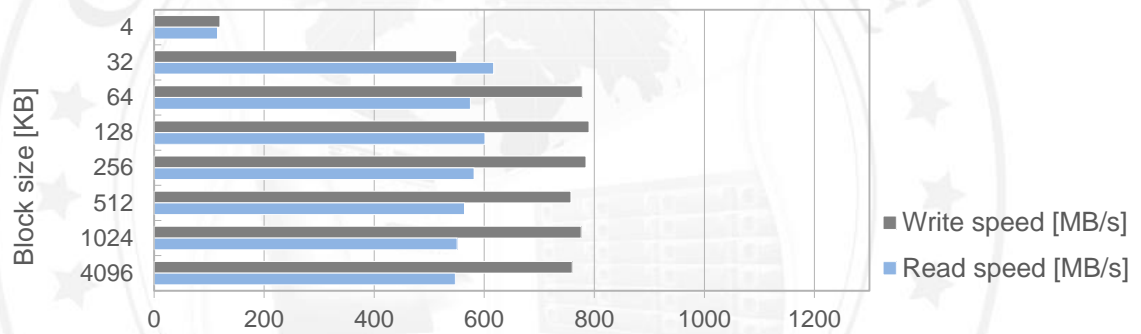

FIGURE 23: iSCSI Initiator performance test results chart for Emulex OCe-11102-NT

iSCSI Target test

1. Test description

The test relies on creating the iSCSI target on the certified system and copying the data from a *Workstation with MS Windows* to it with various block sizes using the Iometer tool.

2. Test results for iSCSI Target Emulex OCe-11102-NT

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	55.30	68.78	passed
32	391.14	456.87	passed
64	645.09	585.29	passed
128	900.46	709.50	passed
256	1032.54	694.47	passed
512	1050.77	713.34	passed
1024	1059.11	708.43	passed
4096	1037.14	670.30	passed

TABLE 22: iSCSI Target performance test results table for Emulex OCe-11102-NT
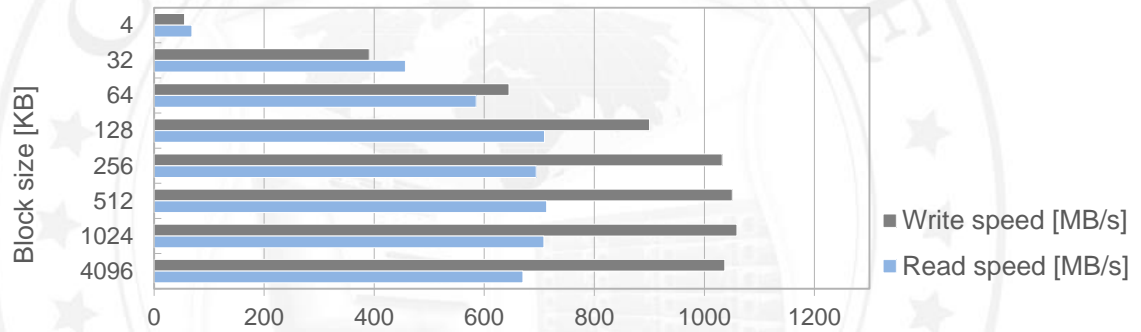

FIGURE 24: iSCSI Target performance test results chart for Emulex OCe-11102-NT

SSD Cache performance

Tests performed in this section check the performance of SSD cache in the Open-E DSS V7 product on the certified system.

SSD Cache test topology
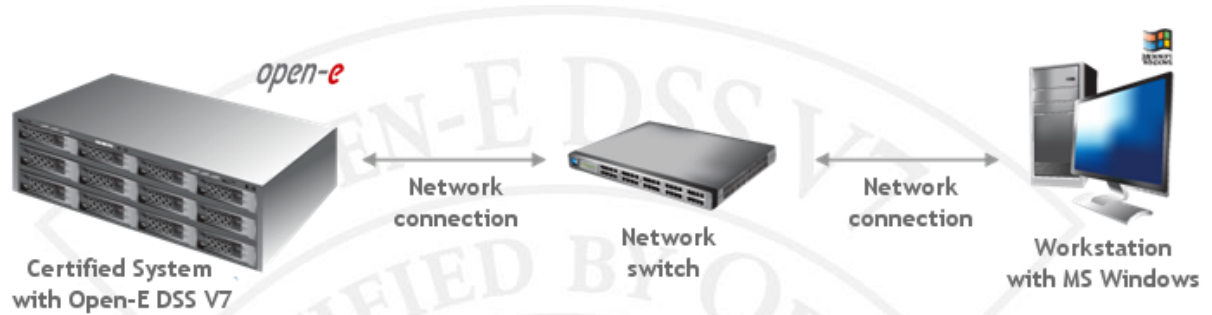
Network topology for SSD Cache testing is shown below.

FIGURE 25: Network topology for SSD Cache testing

SSD Cache with real life pattern test

1. Test description

The test relies on creating the iSCSI target on the certified system, writing (35%) and reading (65%) random data from a *Workstation with MS Windows* to it with various block sizes using the Iometer tool.

2. Test results for SSD Cache with real life pattern and Emulex OCe-11102-NT

SSD Cache with real life pattern test results		
Block size [KB]	**Performance [IOPS]**	**Performance test results**
1	17764.07	passed
2	19032.69	passed
4	17945.67	passed

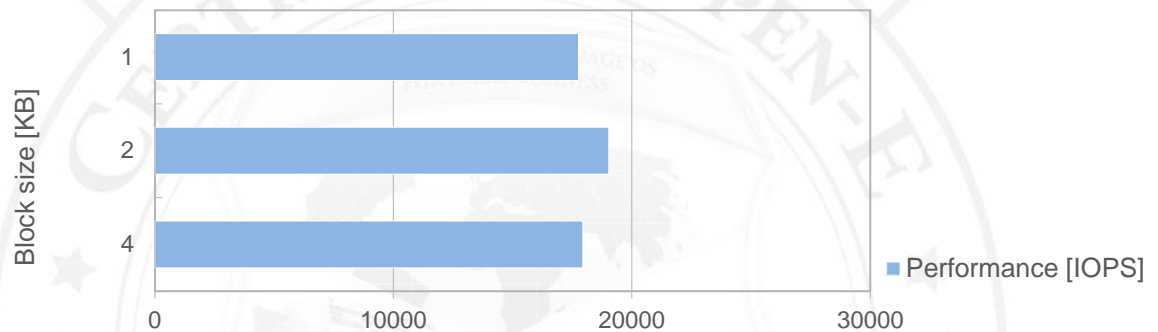*TABLE 23: SSD Cache with real life pattern test results table for Emulex OCe-11102-NT*

FIGURE 26: SSD Cache with real life pattern test results chart for Emulex OCe-11102-NT

SSD Cache with random read/write pattern test

1. Test description

The test relies on creating the iSCSI target on the certified system and copying random data from a *Workstation with MS Windows* to it with various block sizes using the Iometer tool.

2. Test results for SSD cache with random read/write pattern Emulex OCe-11102-NT

SSD cache with random read/write pattern test results			
Block size [KB]	**Write speed [IOPS]**	**Read speed [IOPS]**	**Performance test results**
1	19562.80	20728.99	passed
2	19057.67	20737.18	passed
4	18803.96	20265.39	passed

TABLE 24: SSD cache with random read/write pattern test results table for Emulex OCe-11102-NT
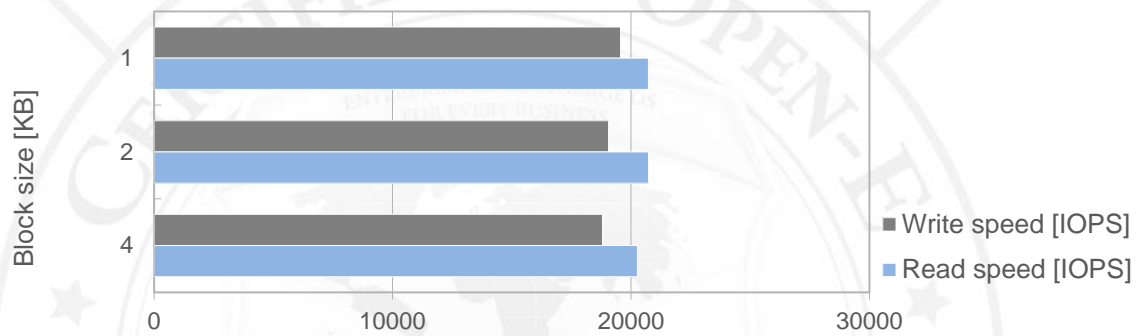

FIGURE 27: SSD cache with random read/write pattern test results chart for Emulex OCe-11102-NT