Boston Igloo 2U-30T-Stor-10GSFP storage system

Executive summary

After performing all tests, the Boston Igloo 2U-30T-Stor-10GSFP has been officially certified according to the Open-E Hardware Certification Program.

During the tests, it was found that the system is functional and efficient. With the Open-E DSS V7 operating system installed, the Boston Igloo 2U-30T-Stor-10GSFP 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 Boston Igloo 2U-30T-Stor-10GSFP a good NAS filer solution:

- Ten high class SATA hard drives provide a lot of space for user files.
- Hardware RAID5, RAID50, RAID6 and RAID60 for fault tolerance and the most efficient use of available disk space.
- Two 10GbE interfaces for independent connection to different networks or link aggregation for improved throughput.
- SSD cache for faster access to frequently used files

✓ Storage for virtualization

For this application the following can be used:

- HW RAID5 RAID50, RAID6 or RAID 60 for high performance and data safety.
- Two 10GbE interfaces for efficient network connections to virtualization systems.
- Redundant power supply for system reliability.
- SSD cache for I/O bottlenecks elimination and increased virtual machine density.

✓ iSCSI storage

The following features make Boston Igloo 2U-30T-Stor-10GSFP good iSCSI storage:

- HW RAID5 RAID50, RAID6 or RAID 60 for high performance and data safety.
- Two 10GbE interfaces for fast MPIO connection.
- Redundant power supply for system reliability.

Certification notes

For link aggregation, it is recommended to use 802.3ad bonding mode.

RAID 10 test was performed on eight hard drives due to odd number of disk per span. For best available space usage, it is recommended to use different RAID levels.

Boston Igloo 2U-30T-Stor-10GSFP hardware components

Technical specifications about the certified system are listed below:

Model	Boston Igloo 2U-30T-Stor-10GSFP
Operating system	Open-E DSS V7 build 6491
Enclosure/chassis	Supermicro SuperChassis 826E16-R1200LPB
CPU	Intel Xeon E3-1220 3.10GHz
Motherboard	Supermicro X9SCL-F
Memory	4x 4GB DDR3 Hynix HMT351U7BFR8C-H9
Network	Intel Gigabit Network Adapter (82579LM) (on-board)
Network	Intel Gigabit CT Desktop Adapter (82574L) (on-board)
Network	Intel Ethernet Server Adapter X520-SR2
HW RAID	LSI MegaRAID SAS 9280-4i4e
Hard disk drives	10x 3TB Hitachi Ultrastar 7K3000 HUA723030ALA640
Hard disk drives	2x 100GB STEC MACH16IOPS SSD 100GB

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

All components were detected and properly recognized.

Boston Igloo 2U-30T-Stor-10GSFP photos

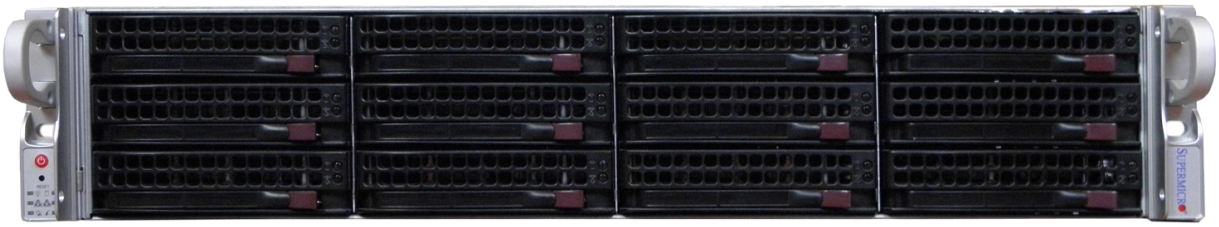

FIGURE 1: Front photo

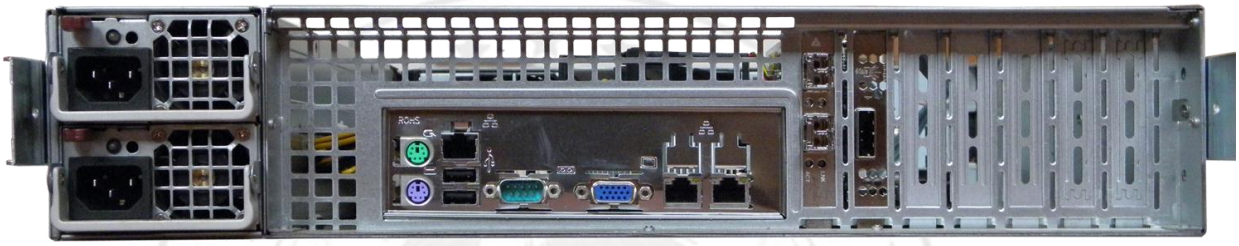

FIGURE 2: Rear photo

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	Supermicro SYS-6026TT-BIBQRF
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Supermicro CSE-827H-R1400B
Motherboard	Supermicro X8DTT-IBQF
CPU	Intel Xeon E5620 2.40GHz
Memory	6x 4GB DDR3 1333 ECC-REG ATP AL12M72E4BJH9S
Network	Intel Gigabit ET Dual Port Server Adapter (i82576) (on board)
Network	Intel Ethernet Server Adapter X520-SR2
Hard disk drives	1x 750GB Seagate Barracuda ST3750330NS

TABLE 2: *Hardware components of first Workstation with MS Windows*

Model	Supermicro SYS-6026TT-BIBQRF
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Supermicro CSE-827H-R1400B
Motherboard	Supermicro X8DTT-IBQF
CPU	Intel Xeon E5620 2.40GHz
Memory	6x 4GB DDR3 1333 ECC-REG ATP AL12M72E4BJH9S
Network	Intel Gigabit ET Dual Port Server Adapter (i82576) (on board)
Network	Intel Ethernet Server Adapter X520-SR2
Hard disk drives	1x 750GB Seagate Barracuda ST3750330NS

TABLE 3: *Hardware components of second Workstation with MS Windows*

Model	Supermicro SYS-1026T-6RFT+
Operating system	Open-E DSS V7 build 6491
Enclosure/chassis	Supermicro CSE-119TQ-R700UB
Motherboard	Supermicro X8DTU-6TF+
CPU	Intel Xeon E5620 2.40GHz
Memory	6x 4GB DDR3 1333 ECC-REG ATP AL12M72E4BJH9S
Network	Intel Gigabit ET Dual Port Server Adapter (i82576) (on board)
Network	Intel Ethernet Server Adapter X520-SR2
HW RAID controller	LSI MPTSAS 2108 (on board)
Hard disk drives	8x 73.5GB Toshiba MBC2073RC

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

Model	Supermicro SSE-G24-TG4
Description	24-ports 1GbE and 4-ports 10GbE switch

TABLE 5: *Network switch details*

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.

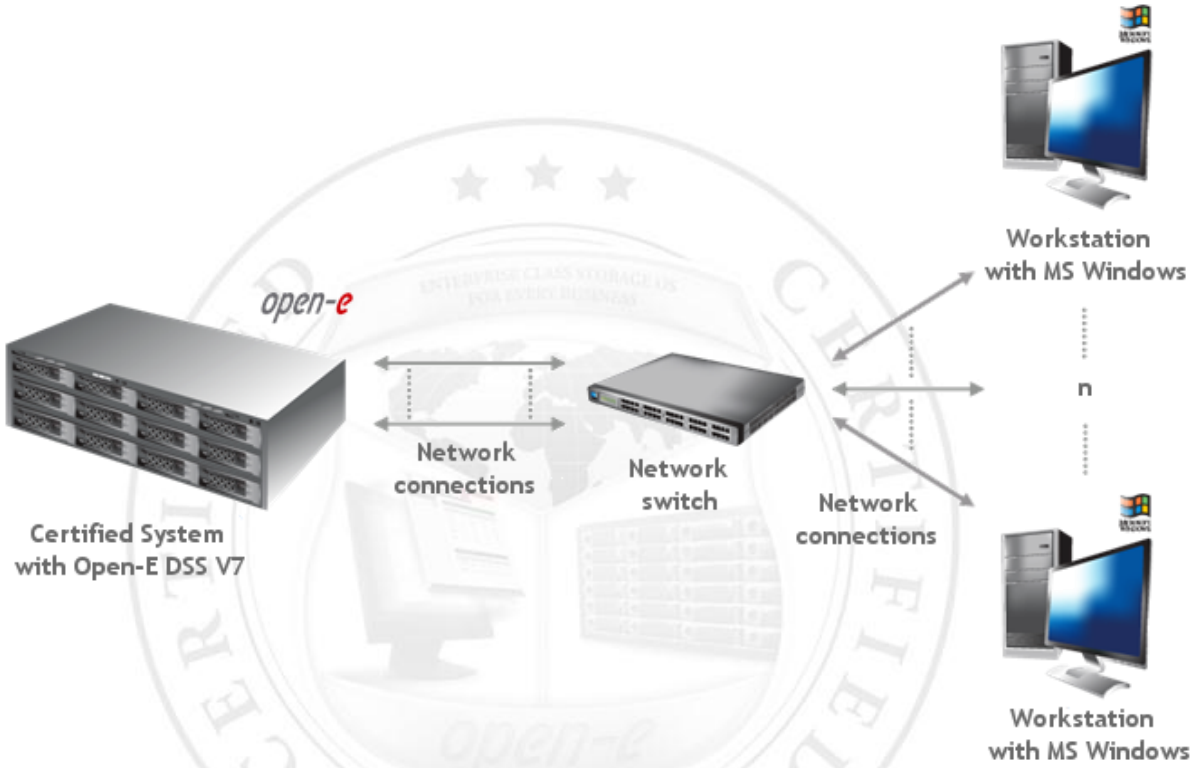

FIGURE 4: Network topology for Network testing

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 X520-SR2

802.3ad bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter X520-SR2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	559.24	492.91	passed
2nd Workstation	547.75	450.73	passed

TABLE 7: 802.3ad bonding mode performance test results table for Intel Ethernet Server Adapter X520-SR2

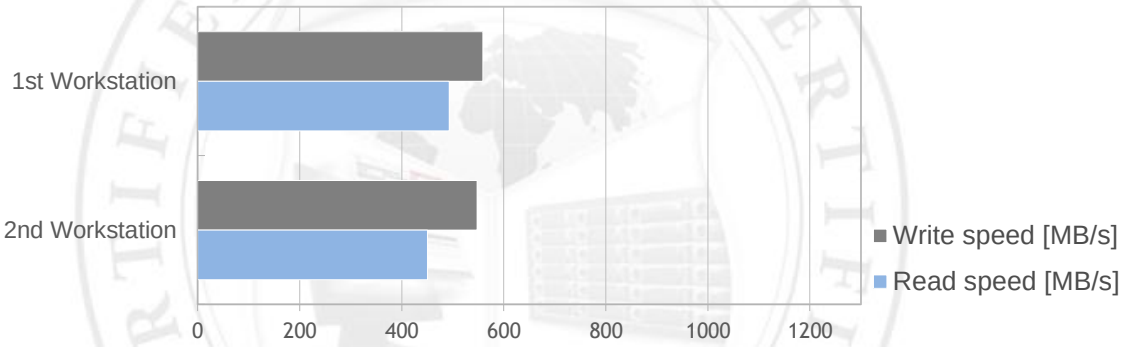

FIGURE 5: 802.3ad bonding mode performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 on Intel Ethernet Server Adapter X520-SR2

Balance-alb bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter X520-SR2		
Workstations with MS Windows	**Write speed [MB/s]**	**Read speed [MB/s]**	**Performance test results**
1st Workstation	619.43	398.90	passed
2nd Workstation	636.17	446.77	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel Ethernet Server Adapter X520-SR2

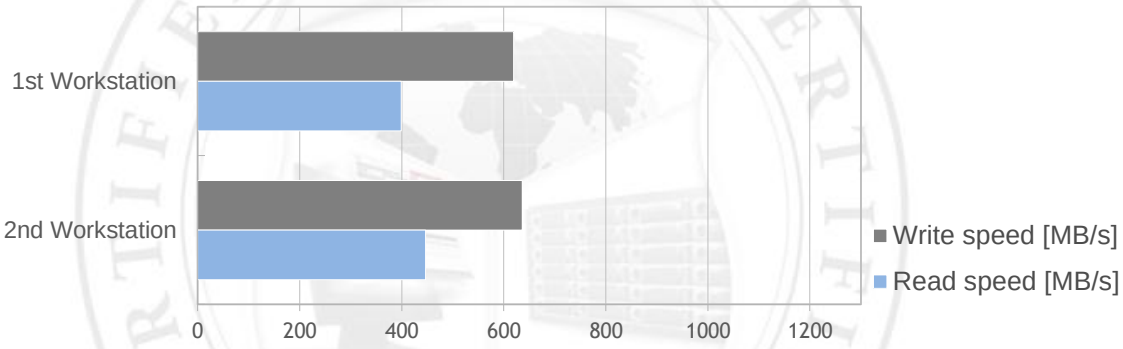

FIGURE 6: Balance-alb bonding mode performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 on Intel Ethernet Server Adapter X520-SR2

Balance-rr bonding mode performance test results			
NIC model	Intel Ethernet Server Adapter X520-SR2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	609.58	176.93	passed
2nd Workstation	656.74	219.26	passed

TABLE 9: Balance-rr bonding mode performance test results table for Intel Ethernet Server Adapter X520-SR2

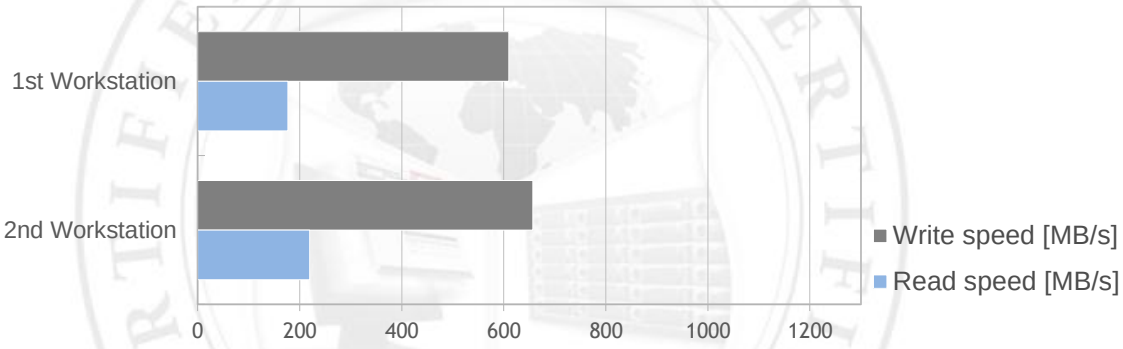

FIGURE 7: Balance-rr bonding mode performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 on Intel Ethernet Server Adapter X520-SR2

Single NIC performance test results			
NIC model	Intel Ethernet Server Adapter X520-SR2		
Workstations with MS Windows	**Write speed [MB/s]**	**Read speed [MB/s]**	**Performance [passed/failed]**
1st Workstation	566.65	502.24	passed

TABLE 10: Single NIC test results table for Intel Ethernet Server Adapter X520-SR2

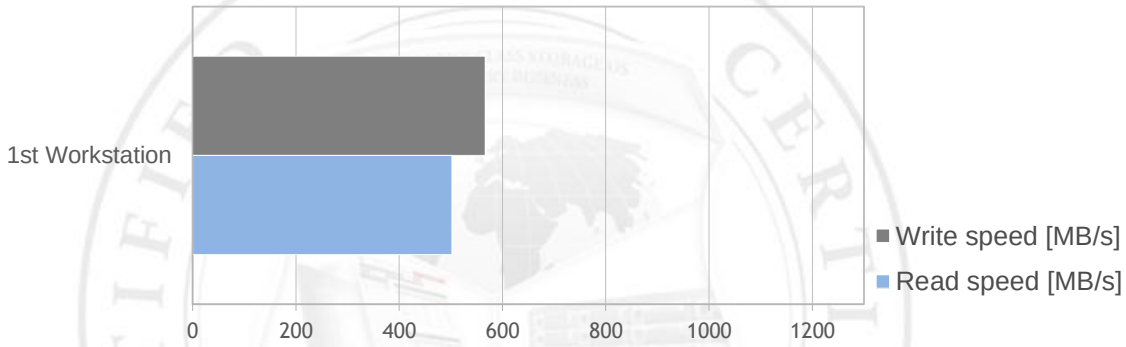

FIGURE 8: Single NIC performance test results chart for Intel Ethernet Server Adapter X520-SR2

3. Test results for single NIC test performed on Intel Gigabit Network Adapter (82579LM) (on-board)

Single NIC performance test results			
NIC model	Intel Gigabit Network Adapter (82579LM)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1st Workstation	110.10	110.08	passed

TABLE 11: Single NIC test results table for Intel Gigabit Network Adapter (82579LM) (on-board)

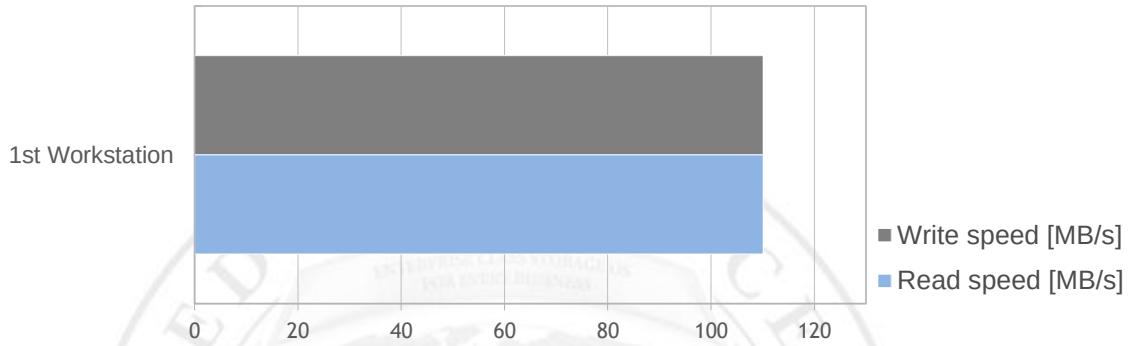

FIGURE 9: Single NIC performance test results chart for Intel Gigabit Network Adapter (82579LM) (on-board)

4. Test results for single NIC test performed on Intel Gigabit CT Desktop Adapter (on-board)

Single NIC performance test results			
NIC model	Intel Gigabit CT Desktop Adapter (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1st Workstation	110.58	105.00	passed

TABLE 12: Single NIC test results table for Intel Gigabit CT Desktop Adapter (on-board)

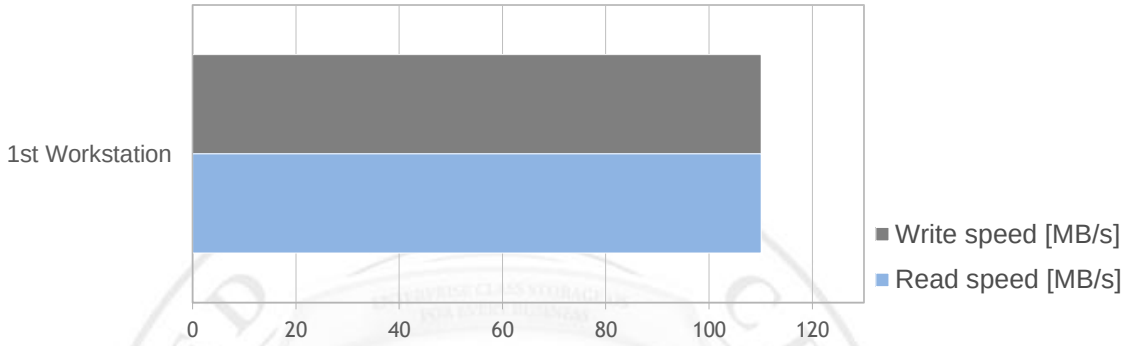

FIGURE 10: Single NIC performance test results chart for Intel Gigabit CT Desktop Adapter (on-board)

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

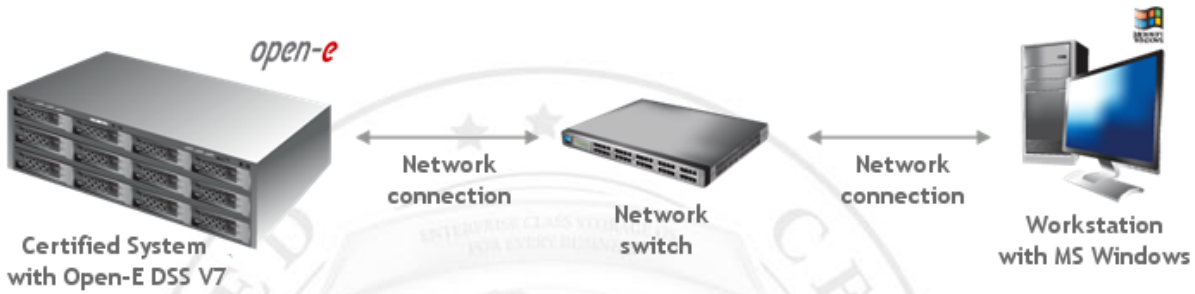

FIGURE 11: Network test topology for RAID testing

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 Intel Ethernet Server Adapter X520-SR2

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	19.65	80.80	passed
32	121.41	355.34	passed
64	272.95	448.28	passed
128	385.10	498.23	passed
256	454.52	557.98	passed
512	453.76	471.69	passed
1024	464.69	475.82	passed
4096	501.40	471.09	passed

TABLE 13: RAID0 performance test results table for Intel Ethernet Server Adapter X520-SR2

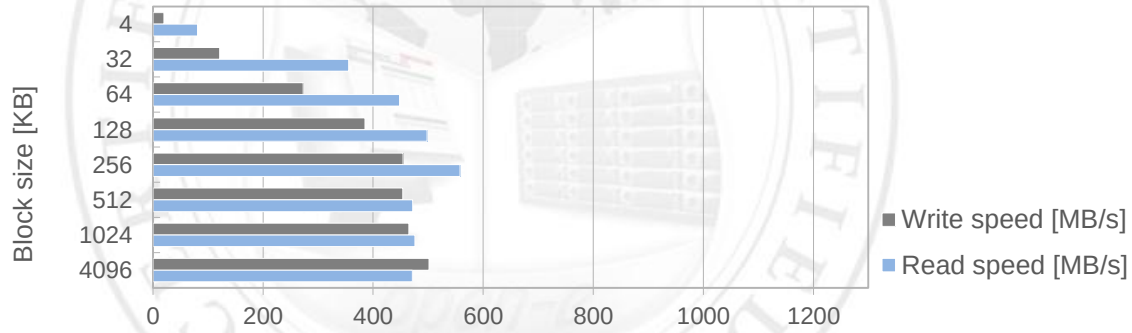

FIGURE 12: RAID0 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 Intel Ethernet Server Adapter X520-SR2

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	21.47	82.16	passed
32	131.76	389.57	passed
64	289.22	481.26	passed
128	417.36	538.21	passed
256	495.49	567.47	passed
512	500.70	487.74	passed
1024	506.13	483.67	passed
4096	507.41	484.12	passed

TABLE 14: RAID5 performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 13: RAID5 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 Intel Ethernet Server Adapter X520-SR2

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	12.92	81.46	passed
32	81.50	390.72	passed
64	274.77	472.80	passed
128	411.51	541.08	passed
256	493.70	565.54	passed
512	500.31	478.80	passed
1024	505.30	479.30	passed
4096	509.00	475.02	passed

TABLE 15: RAID6 performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 14: RAID6 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 Intel Ethernet Server Adapter X520-SR2

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	18.68	80.83	passed
32	115.41	378.60	passed
64	263.99	468.26	passed
128	385.44	521.96	passed
256	470.34	562.95	passed
512	478.26	482.71	passed
1024	480.45	472.30	passed
4096	482.00	478.11	passed

TABLE 16: RAID10 performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 15: RAID10 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 Intel Ethernet Server Adapter X520-SR2

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	20.69	80.53	passed
32	124.67	383.54	passed
64	279.03	464.58	passed
128	407.64	517.22	passed
256	489.46	577.07	passed
512	491.73	482.94	passed
1024	505.67	481.28	passed
4096	501.45	475.93	passed

TABLE 17: RAID50 performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 16: RAID50 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 Intel Ethernet Server Adapter X520-SR2

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	18.96	79.76	passed
32	117.49	377.00	passed
64	266.80	471.38	passed
128	400.30	528.55	passed
256	487.15	572.30	passed
512	500.58	474.64	passed
1024	504.19	473.30	passed
4096	501.09	472.62	passed

TABLE 18: RAID60 performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 17: RAID60 performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 18: 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 Intel Ethernet Server Adapter X520-SR2

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	118.30	107.90	passed
32	470.88	611.74	passed
64	509.13	414.07	passed
128	506.49	457.22	passed
256	503.33	474.41	passed
512	495.41	465.33	passed
1024	453.50	456.75	passed
4096	489.85	479.75	passed

TABLE 19: SMB performance test results table for Intel Ethernet Server Adapter X520-SR2

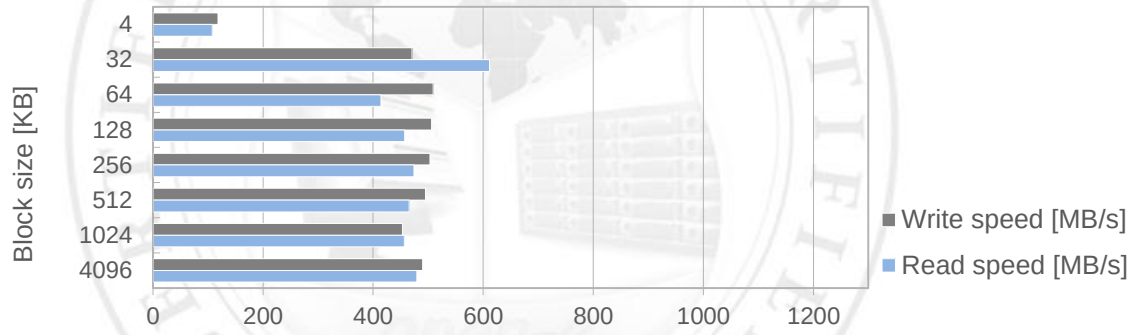

FIGURE 19: SMB performance test results chart for Intel Ethernet Server Adapter X520-SR2

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.

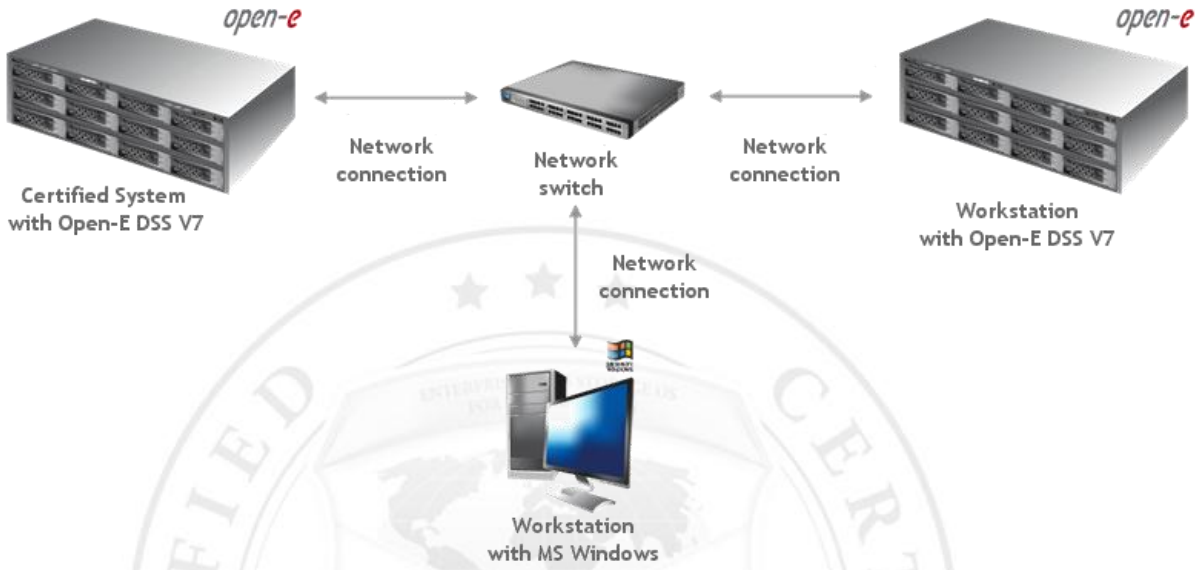

FIGURE 20: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

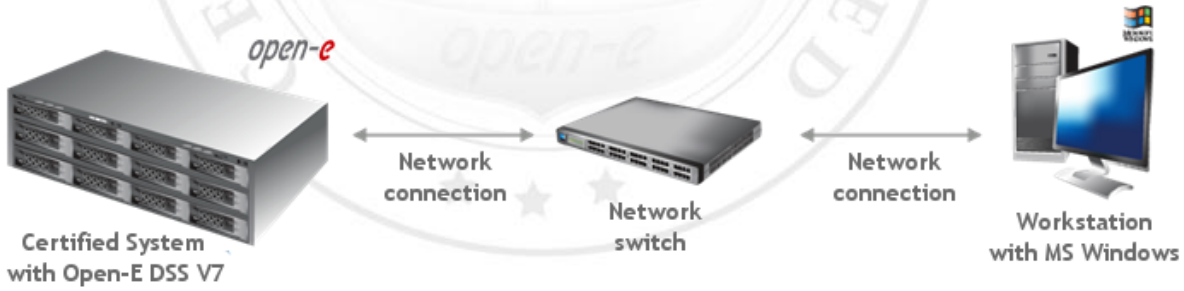

FIGURE 21: Network topology for iSCSI Target testing

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 and Intel Ethernet Server Adapter X520-SR2

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	48.81	71.78	passed
32	268.11	309.29	passed
64	346.78	395.16	passed
128	429.95	462.73	passed
256	542.43	548.35	passed
512	542.12	496.25	passed
1024	546.08	494.19	passed
4096	551.51	488.96	passed

TABLE 20: iSCSI Initiator performance test results table for Intel Ethernet Server Adapter X520-SR2

FIGURE 22: iSCSI Initiator performance test results chart for Intel Ethernet Server Adapter X520-SR2

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 and Intel Ethernet Server Adapter X520-SR2

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	21.18	82.53	passed
32	132.58	375.66	passed
64	280.02	465.56	passed
128	405.12	525.11	passed
256	486.76	567.95	passed
512	500.68	483.11	passed
1024	493.67	478.50	passed
4096	497.87	479.06	passed

TABLE 21: iSCSI Target performance test results table for Intel Ethernet Server Adapter X520-SR2

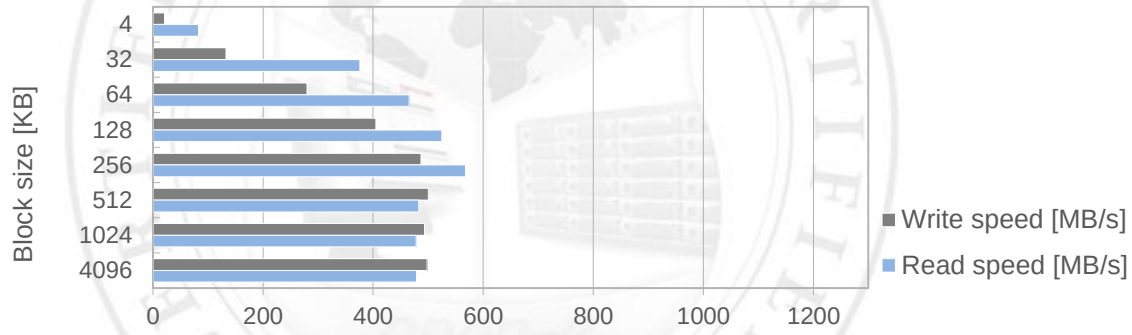

FIGURE 23: iSCSI Target performance test results chart for Intel Ethernet Server Adapter X520-SR2

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.

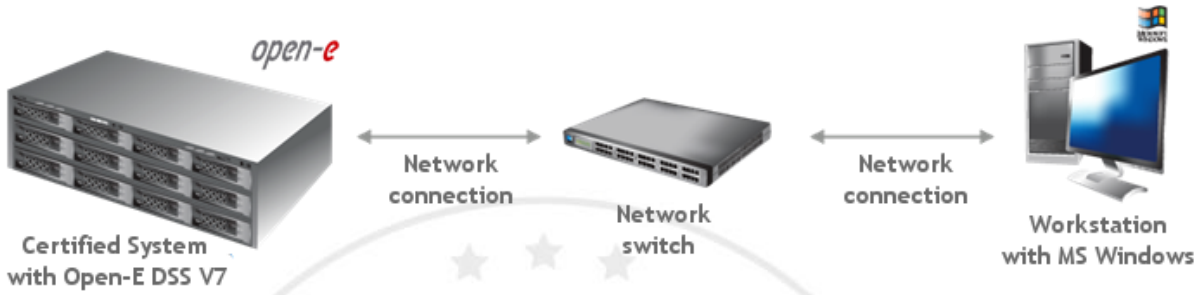

FIGURE 24: Network topology for SSD Cache testing

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 Intel Ethernet Server Adapter X520-SR2

SSD Cache with real life pattern test results		
Block size [KB]	Performance [IOPS]	Performance test results
1	2644	passed
2	7067	passed
4	7054	passed

TABLE 22: SSD Cache with real life pattern test results table for Intel Ethernet Server Adapter X520-SR2

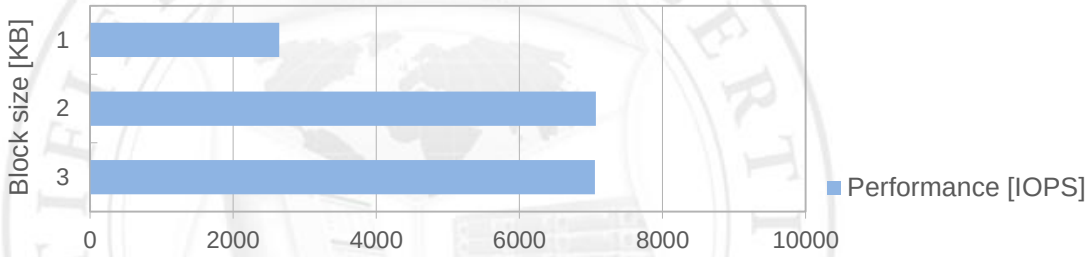

FIGURE 25: SSD Cache with real life pattern test results chart for Intel Ethernet Server Adapter X520-SR2

SSD Cache with random read/write pattern test

3. 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.

4. Test results for SSD cache with random read/write pattern Intel Ethernet Server Adapter X520-SR2

SSD cache with random read/write pattern test results			
Block size [KB]	Write speed [IOPS]	Read speed [IOPS]	Performance test results
1	13429	23229	passed
2	12250	21614	passed
4	12420	18502	passed

TABLE 23: SSD cache with random read/write pattern test results table for Intel Ethernet Server Adapter X520-SR2

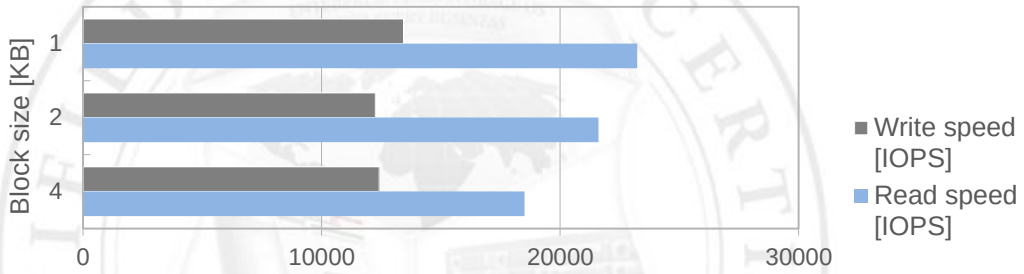

FIGURE 26: SSD cache with random read/write pattern test results chart for Intel Ethernet Server Adapter X520-SR2