Boston Server & Storage Solutions GmbH Igloo 2U-12T-Stor storage system

Executive summary

After performing all tests the Boston Server & Storage Solutions Igloo 2U-2T-Stor system has been officially certified according to the Open-E Hardware Certification Program. During the tests it was found that the system is very functional and efficient.

Under the Open-E DSS V6 operating system, Boston Server & Storage Solutions Igloo 2U-2T-Stor is stable and performs well.

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

✓ HA cluster

For this application two identical systems are required. The following features can be used:

- HW RAID5 or RAID6 for high performance and data safety
- 12 enterprise class SATA Drives for failure-free work and speed disk transfers
- Four 1GbE interfaces for efficient network connection between nodes and network clients

✓ iSCSI storage

For this application the following can be used:

- HW RAID5 or RAID6 for high performance and data safety
- Four 1GbE interfaces for efficient iSCSI connections to many network clients
- 12 enterprise class SATA Drives designed for RAID arrays

✓ Storage for database

For this application the following can be used:

- Server platform with fast CPU for high transaction rate
- HW RAID5 or RAID6 for high performance and data safety, HW RAID10 for the highest database performance
- 12 enterprise class SATA Drives for better I/O performance
- Four 1GbE interfaces that provide very fast access from many clients to many databases

✓ Storage for virtualization

For this application the following can be used:

- HW RAID5 or RAID6 for high performance and data safety
- Four 1GbE interfaces for efficient iSCSI MPIO network connections to virtualization systems
- Redundant power supply for system reliability

Boston Server & Storage Solutions GmbH Igloo 2U-12T-Stor hardware components

Below is listed technical information about the certified system.

Model	Boston Server & Storage Solutions GmbH Igloo 2U-12T-Stor
Operating system	Open-E DSS V6 build 5845
Enclosure/chassis	Supermicro SC826E16
CPU	Intel Xeon E3-1220 3.10GHz
Motherboard	Supermicro X9SCI-LN4F
Memory	2x Hynix HMT125U7TFR8C-H9 2GB
Network	Intel quad port (i82574L)
HW RAID	Adaptec ASR-6805
Hard disk drives	12x 1000GB Western Digital Caviar Raid Edition WD1003FBYX

TABLE 1: Hardware components list of Certified System with Open-E DSS V6

All components were detected and properly recognized.

Boston Server & Storage Solutions GmbH Igloo 2U-12T-Stor photos

FIGURE 1: Front photo

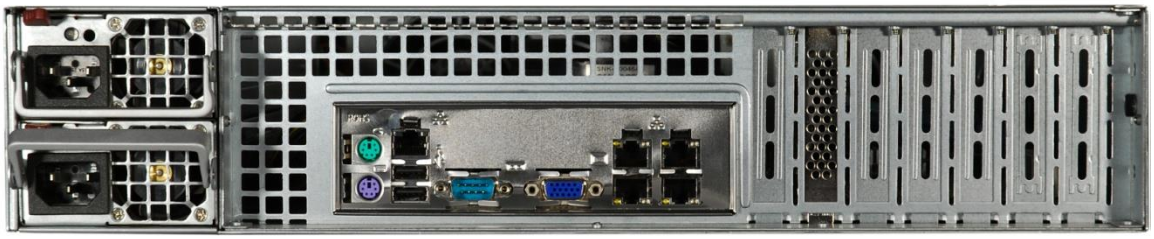

FIGURE 2: Rear photo

FIGURE 3: Top photo

Auxiliary systems hardware components

Auxiliary system with MS Windows or Open-E DSS V6 installed on it, used in Open-E hardware certification process.

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Ipc-4u-600
Motherboard	Supermicro X7DVL-E
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000EB Dual Port Adapter (i80003ES2LAN)
Network controller	Intel Ethernet Server Adapter X520-DA2 (i82599ES)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Ipc-4u-600
Motherboard	Tyan Tempest i5400PW (S5397)
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000EB Dual Port Adapter (i80003ES2LAN)
Network controller	Intel Ethernet Server Adapter X520-DA2 (i82599ES)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V6 build 5845
Enclosure/chassis	Ipc-4u-600
Motherboard	Supermicro X8DTH-IF
CPU	Intel Xeon E5630 2.53GHz
Memory	3x 4GB DDR3 ECC-REG Samsung M393B5270CH0-CH9
Network controller	Intel dual port (on-board) (i82575EB)
Network controller	Intel PRO/1000 PT Quad LP Server Adapter (i82571GB)
Network controller	Intel Ethernet Server Adapter X520-DA2 (i82599ES)
Fibre Channel HBA	Qlogic QLE2562
Hard disk drives	12x 2TB Hitachi Ultrastar 7K3000 HUS723020ALS640

TABLE 4: Hardware components of Workstation with Open-E DSS V6

Model	Supermicro SSE-G24-TF4
Description	24-ports 1GbE and 4-ports 1GbE 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

In order to monitor the server please use external IPMI client.

Network functionality

Tests performed in this section check the functionality, performance, and stability of the network solutions available in the Open-E DSS V6 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.

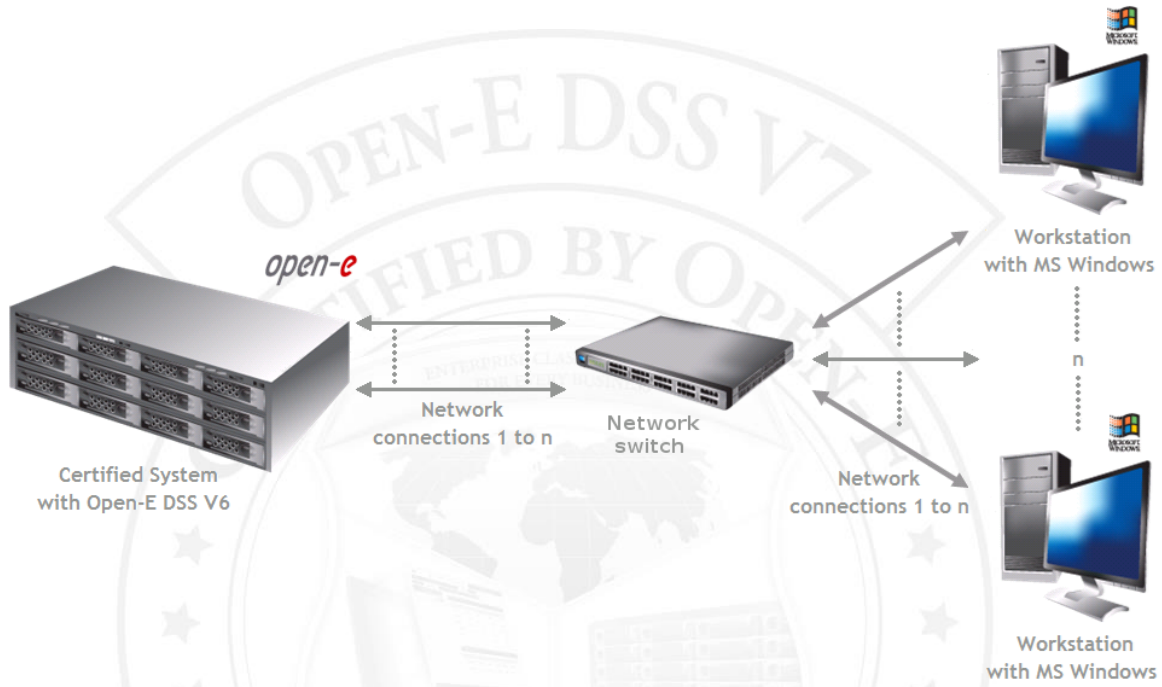

FIGURE 4: Network topology for Network testing

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 1GbE Intel quad port (on-board) (i82574L)

802.3ad bonding mode performance test results			
NIC model	1GbE Intel quad port (on-board) (i82574L)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1st Workstation	113.01	84.32	passed
2nd Workstation	112.98	89.91	passed
3rd Workstation	113.12	96.19	passed
4th Workstation	112.11	94.36	passed

TABLE 7: 802.3ad bonding mode performance test results table for 1GbE Intel quad port (on-board) (i82574L)

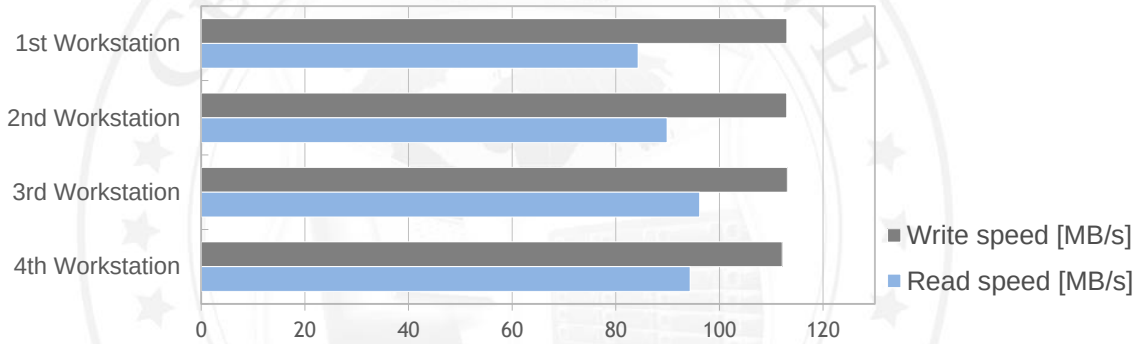

FIGURE 5: 802.3ad bonding mode performance test results chart for 1GbE Intel quad port (on-board) (i82574L)

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 1GbE Intel quad port (on-board) (i82574L)

Balance-alb bonding mode performance test results			
NIC model	1GbE Intel quad port (on-board) (i82574L)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1st Workstation	113.26	112.18	passed
2nd Workstation	112.94	112.25	passed
3rd Workstation	112.87	111.75	passed
4th Workstation	112.36	111.89	passed

TABLE 8: Balance-alb bonding mode performance test results table for 1GbE Intel quad port (on-board) (i82574L)

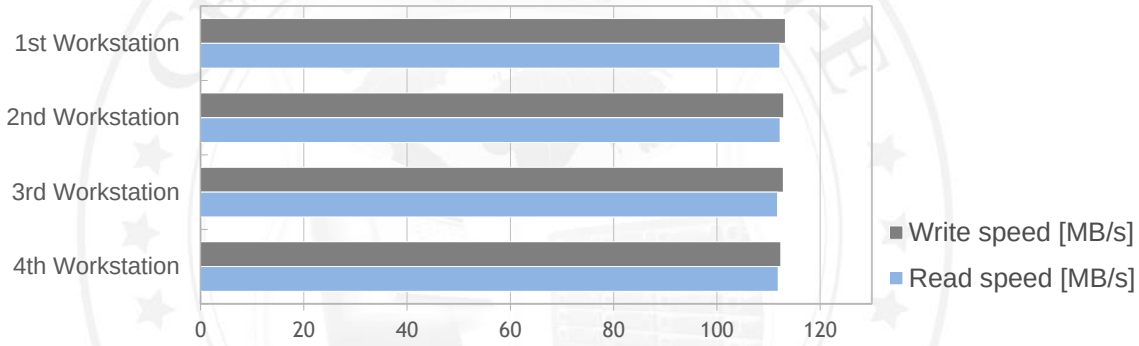

FIGURE 6: Balance-alb bonding mode performance test results chart for 1GbE Intel quad port (on-board) (i82574L)

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 1GbE Intel quad port (on-board) (i82574L)

Balance-rr bonding mode performance test results			
NIC model	1GbE Intel quad port (on-board) (i82574L)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1st Workstation	40.48	63.20	passed
2nd Workstation	28.64	66.83	passed
3rd Workstation	41.34	56.46	passed
4th Workstation	45.55	67.29	passed

TABLE 9: Balance-rr bonding mode performance test results table for 1GbE Intel quad port (on-board) (i82574L)

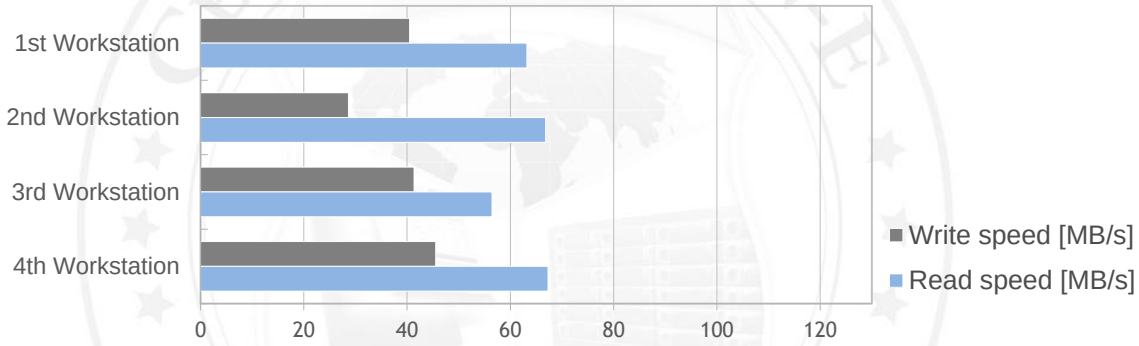

FIGURE 7: Balance-rr bonding mode performance test results chart for 1GbE Intel quad port (on-board) (i82574L)

RAID functionality

Tests performed in this section check the functionality, performance, and stability of Open-E DSS V6 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 level, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via a 1GbE network connection with various block sizes using the Iometer testing tool.

RAID test topology

Network test topology for RAID testing is shown below

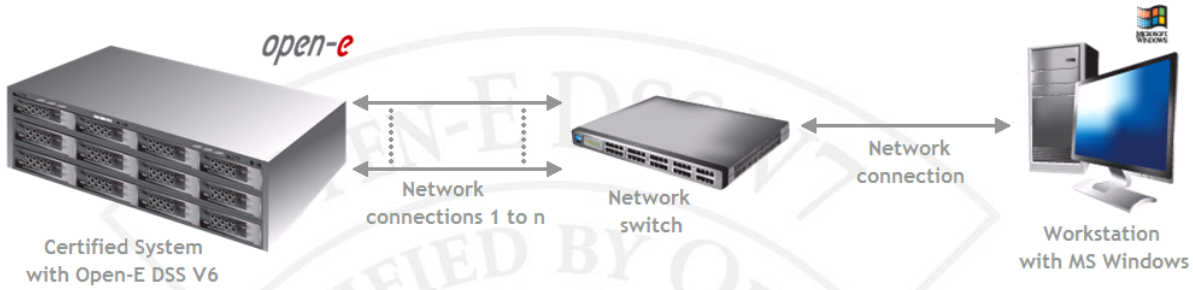

FIGURE 8: Network test topology for RAID testing

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID0 and 1GbE Intel quad port (on-board) (i82574L)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	55.60	56.53	passed
32	111.68	107.90	passed
64	108.69	106.04	passed
128	109.59	107.43	passed
256	112.39	110.03	passed
512	112.80	109.73	passed
1024	112.82	109.86	passed
4096	112.78	109.73	passed

TABLE 10: RAID0 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

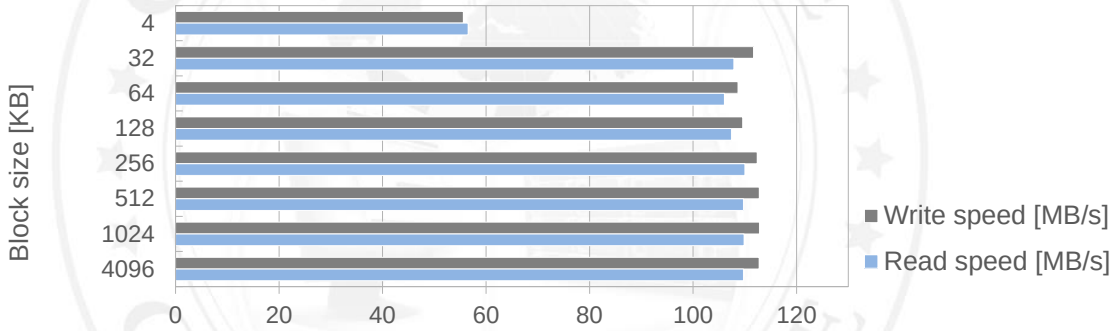

FIGURE 9: RAID0 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID5 and 1GbE Intel quad port (on-board) (i82574L)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	56.47	60.42	passed
32	108.11	107.83	passed
64	108.70	105.99	passed
128	109.76	107.48	passed
256	112.40	109.75	passed
512	112.69	109.67	passed
1024	112.82	109.61	passed
4096	112.65	109.59	passed

TABLE 11: RAID5 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

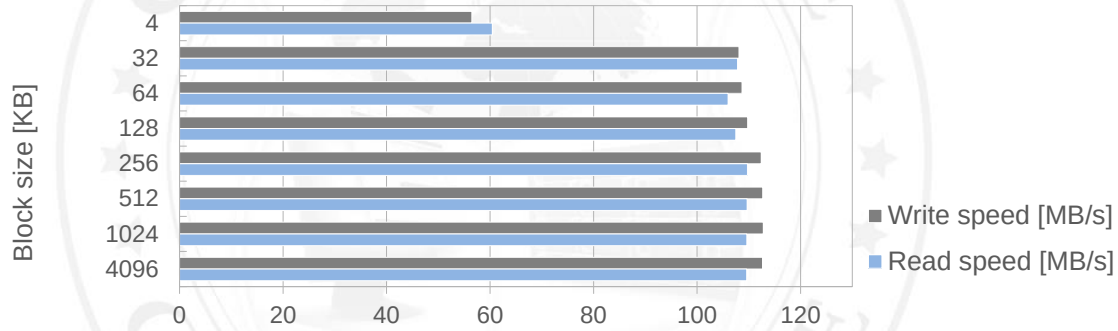

FIGURE 10: RAID5 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID6 and 1GbE Intel quad port (on-board) (i82574L)

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	58.38	64.05	passed
32	111.97	109.01	passed
64	112.31	109.55	passed
128	112.13	109.10	passed
256	112.68	110.26	passed
512	112.85	109.67	passed
1024	112.82	109.70	passed
4096	112.67	109.60	passed

TABLE 12: RAID6 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

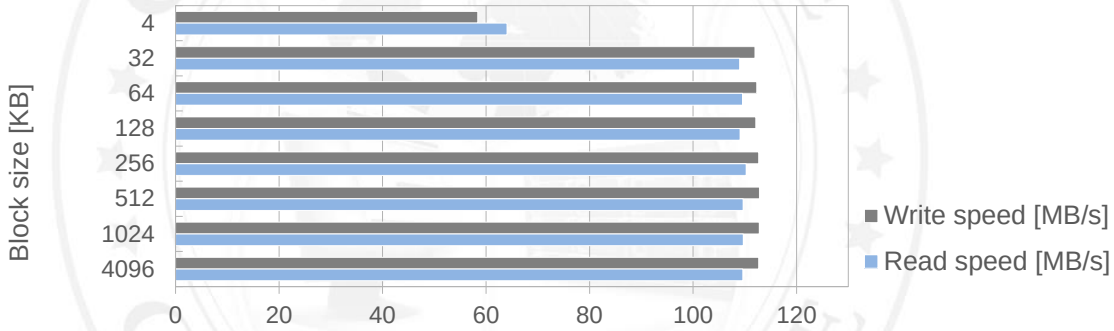

FIGURE 11: RAID6 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

1. Test results for RAID10 and 1GbE Intel quad port (on-board) (i82574L)

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	52.28	63.78	passed
32	112.53	105.57	passed
64	108.85	107.31	passed
128	109.88	109.07	passed
256	112.69	111.25	passed
512	112.96	111.59	passed
1024	113.00	111.57	passed
4096	112.88	111.41	passed

TABLE 13: RAID10 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

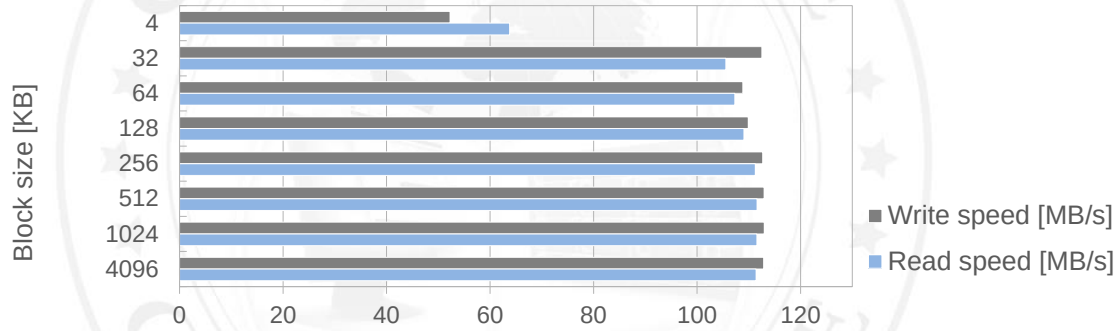

FIGURE 12: RAID10 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID50 and 1GbE Intel quad port (on-board) (i82574L)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	56.75	70.40	passed
32	109.62	109.47	passed
64	109.03	110.00	passed
128	109.73	110.55	passed
256	112.81	111.34	passed
512	113.04	111.18	passed
1024	113.01	111.45	passed
4096	112.89	111.30	passed

TABLE 14: RAID50 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

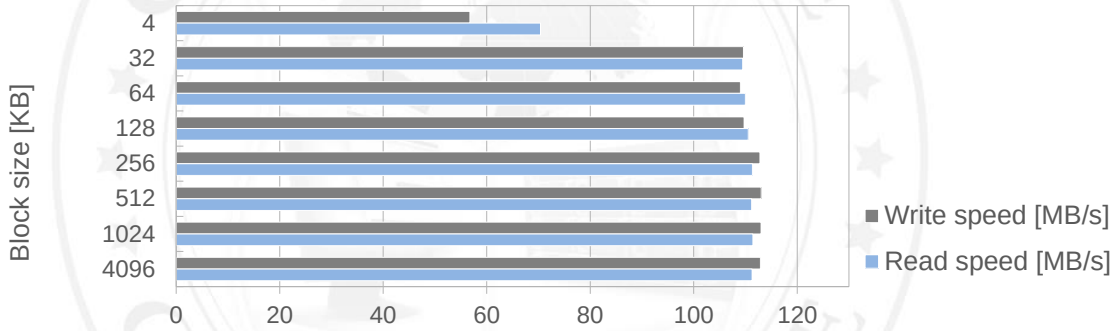

FIGURE 13: RAID50 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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 a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for RAID60 and 1GbE Intel quad port (on-board) (i82574L)

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	57.69	69.87	passed
32	109.32	109.71	passed
64	108.92	109.81	passed
128	109.75	110.40	passed
256	112.84	111.65	passed
512	113.01	111.56	passed
1024	113.01	111.53	passed
4096	112.81	111.44	passed

TABLE 15: RAID60 performance test results table with 1GbE Intel quad port (on-board) (i82574L)

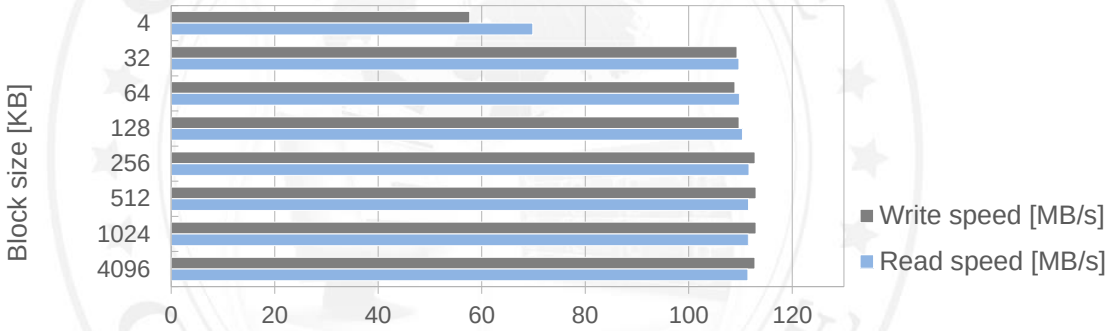

FIGURE 14: RAID60 performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

NAS functionality

Tests performed in this section check the functionality, performance and stability of the NAS protocols in the Open-E DSS V6 product on the certified system.

The tests rely on creating NAS shares and copying the data from a *Workstation with MS Windows* via a 1GbE network connection with various block sizes using the Iometer testing tool.

NAS test topology

Network topology for NAS testing is shown below.

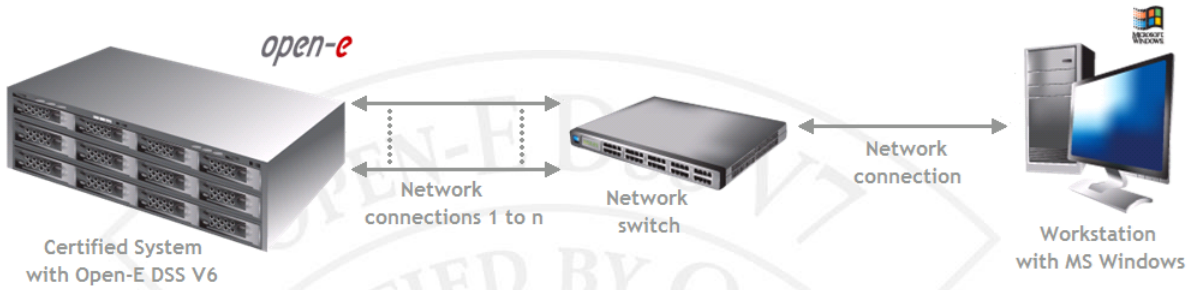

FIGURE 15: Network topology for NAS testing

SMB test

1. Test description

The tests rely on creating NAS shares and copying the data from a *Workstation with MS Windows* via a 1GbE network connection with various block sizes using the Iometer testing tool.

2. Test results for SMB and 1GbE Intel quad port (on-board) (i82574L)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	89.15	93.99	passed
32	112.35	112.33	passed
64	112.89	112.22	passed
128	112.96	112.24	passed
256	113.00	112.39	passed
512	112.95	112.23	passed
1024	112.92	112.86	passed
4096	112.89	111.97	passed

TABLE 16: SMB performance test results table with 1GbE Intel quad port (on-board) (i82574L)

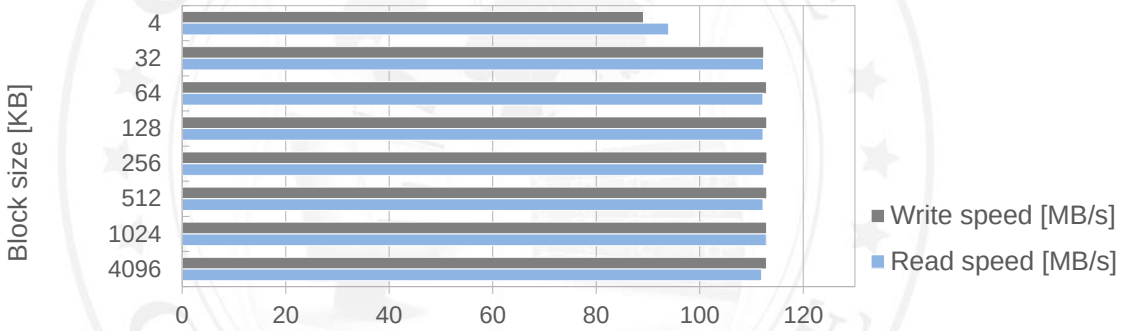

FIGURE 16: SMB performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

iSCSI functionality

Tests performed in this section check the functionality, performance, and stability of the iSCSI protocol in the Open-E DSS V6 product on the certified system.

iSCSI Initiator test topology

Network topology for iSCSI Inititator testing is shown below.

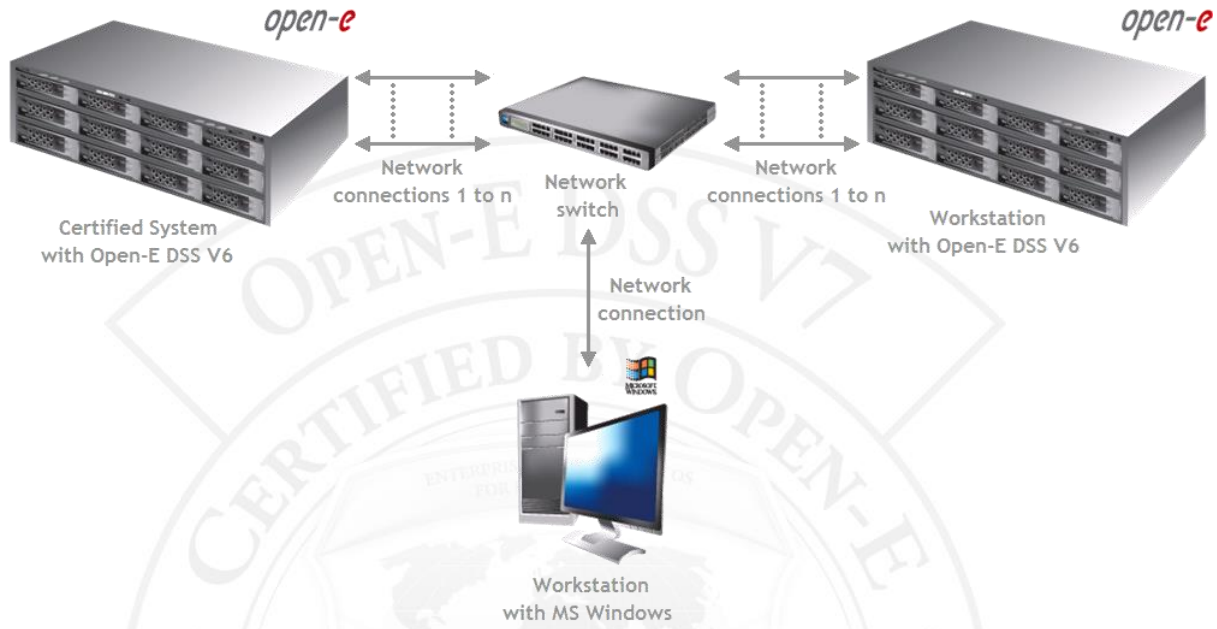

FIGURE 17: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

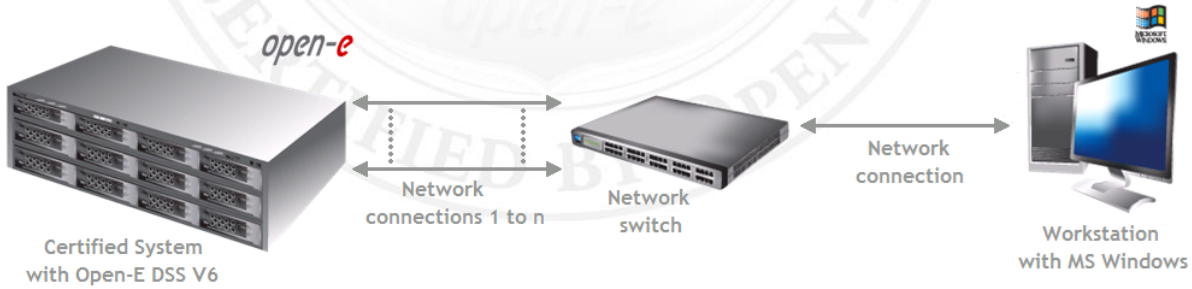

FIGURE 18: Network topology for iSCSI Target testing

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.
Tests were performed using a 1GbE network connection.

2. Test results for iSCSI Initiator and 1GbE Intel quad port (on-board) (i82574L)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	83.28	82.35	passed
32	112.62	112.69	passed
64	112.93	112.39	passed
128	112.92	112.73	passed
256	113.00	112.82	passed
512	112.98	112.82	passed
1024	112.98	112.75	passed
4096	112.89	112.66	passed

TABLE 17: iSCSI Initiator performance test results table with 1GbE Intel quad port (on-board) (i82574L)

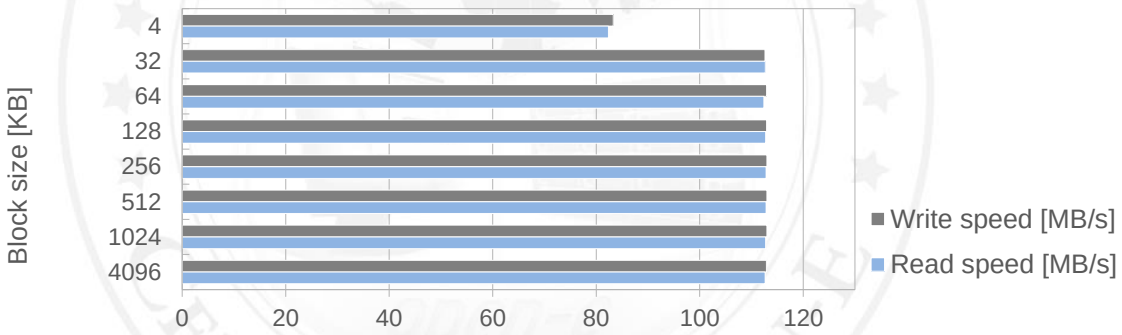

FIGURE 19: iSCSI Initiator performance test results chart with 1GbE Intel quad port (on-board) (i82574L)

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.
Tests were performed using a 1GbE network connection.

2. Test results for iSCSI Target and 1GbE Intel quad port (on-board) (i82574L)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	53.75	67.22	passed
32	108.23	102.90	passed
64	108.92	106.12	passed
128	109.81	108.16	passed
256	112.60	110.02	passed
512	113.07	110.02	passed
1024	112.96	110.00	passed
4096	112.97	109.9	passed

TABLE 18: iSCSI Target performance test results table with 1GbE Intel quad port (on-board) (i82574L)

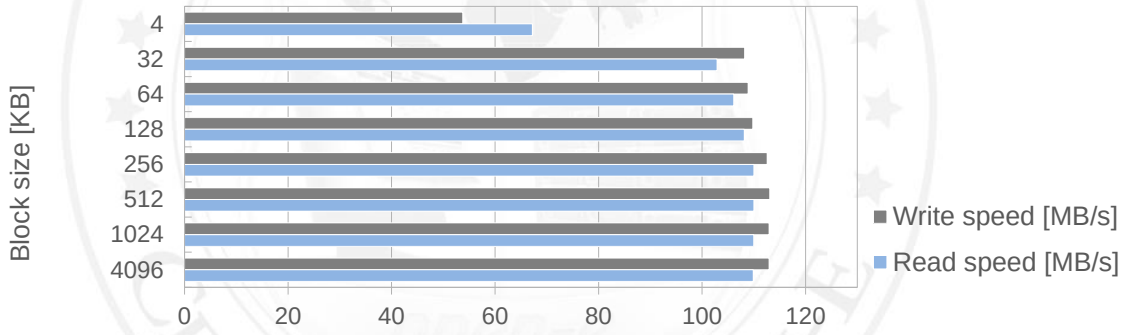

FIGURE 20: iSCSI Target performance test results chart with 1GbE Intel quad port (on-board) (i82574L)