TWP 2U 12BAY Certified Open-E system

Executive summary

After performing all tests, the TWP 2U 12BAY Certified Open-E system 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 TWP 2U 12BAY Certified Open-E system is stable and performs well.

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

- ✓ **iSCSI Storage**

  The following features make TWP 2U 12BAY Certified Open-E system good iSCSI storage:

  - **Hardware RAID10, RAID5, RAID50, RAID6 or RAID60 with BBU for high performance and data safety.**
  - **Four 1GbE interfaces for fast MPIO connection.**
  - **Redundant power supply for system reliability.**

- ✓ **NAS filer**

  The following features make TWP 2U 12BAY Certified Open-E system a good NAS filer solution:

  - **Twelve enterprise class SAS hard drives provide a plenty of space for user files.**
  - **Hardware RAID5, RAID6, RAID50 and RAID60 with BBU for fault tolerance and the most efficient use of available disk space.**

- ✓ **Storage for CCTV**

  For this application the following can be used:

  - **Twelve enterprise class SAS hard drives provide a lot of space for CCTV records.**
  - **Four 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.**
  - **Redundant power supply for system reliability.**

Certification notes

For link aggregation, it is recommended to use balance-alb bonding mode. Due to stability issues it is recommended to disable NUMA in server BIOS. It's recommended to use Lm-sensors for processor temperature monitoring.

Where to buy

TWP 2U 12BAY Certified Open-E system can be found at http://www.twp.nl/server-TWPSS1321533344

TWP 2U 12BAY Certified Open-E system hardware components

Technical specifications about the certified system are listed below:

Model	TWP 2U 12BAY Certified Open-E system
Operating system	Open-E DSS V7 build 7356
Enclosure/chassis	Supermicro CSE-826E26-R1200LPB
CPU	2x Intel Xeon E5-2609 2.40GH
Motherboard	Supermicro X9DRi-LN4F+
Memory	2x 8GB DDR3 ECC-REG Kingston KVR1333D3D4R9S/8G
Network	Intel I350 Quad Port Ethernet Controller (on-board)
HW RAID	LSI MegaRAID SAS 9270-4i
Hard disk drives	12x 2TB Seagate Constellation ES.2 ST32000645SS

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

All components were detected and properly recognized.

TWP 2U 12BAY Certified Open-E system photos

FIGURE 1: Front photo

FIGURE 2: Rear photo

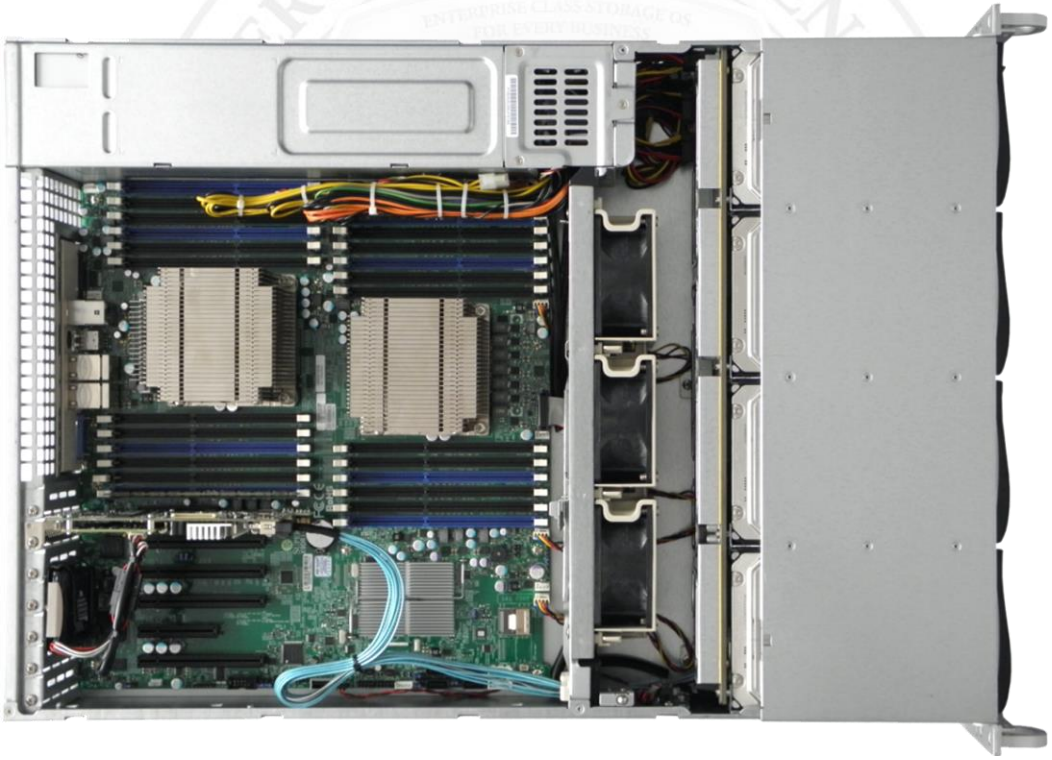

FIGURE 3: Top photo

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 (i82599ES)
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 (i82599ES)
Hard disk drives	1x 750GB Seagate Barracuda ST3750330NS

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

Model	Custom
Operating system	Open-E DSS V7 build 7356
Enclosure/chassis	Ipc-4u-600
CPU	Intel Xeon E5630 2.53GHz
Motherboard	Supermicro X8DTH-IF
Memory	4x 4GB DDR3 ECC-REG Samsung M393B5270CH0-CH9
Network	Intel dual port (on-board) (i82576)
Network	Intel PRO/1000 PT Quad LP Server Adapter (i82571GB)
Network	Intel Ethernet Server Adapter X520-SR2 (i82599ES)
HW RAID	LSI MegaRAID SAS 9280-4i4e
Hard disk drives	4x 32GB Kingston SSDNow V100 SV100S2/32G

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.

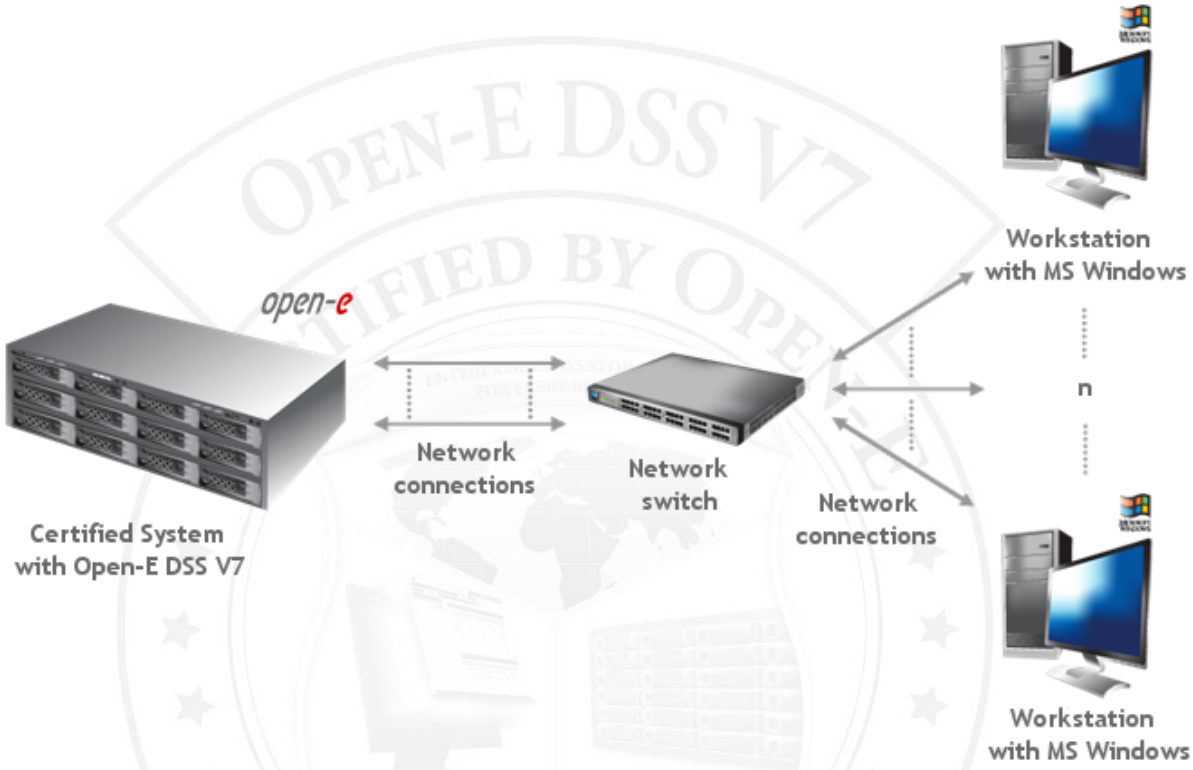

FIGURE 4: Network topology for Network testing

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 I350 Quad Port Ethernet Controller (on-board)

802.3ad bonding mode performance test results			
NIC model	Intel I350 Quad Port Ethernet Controller (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	48.90	48.93	passed
2nd Workstation	109.74	63.66	passed
3rd Workstation	46.00	54.01	passed
4th Workstation	111.28	58.80	passed

TABLE 7: 802.3ad bonding mode performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

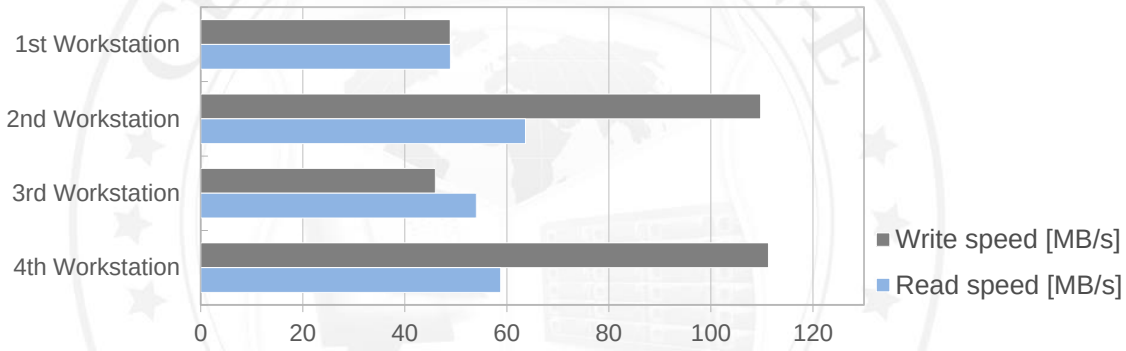

FIGURE 5: 802.3ad bonding mode performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

Balance-alb bonding mode performance test results			
NIC model	Intel I350 Quad Port Ethernet Controller (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	111.56	111.81	passed
2nd Workstation	112.18	111.76	passed
3rd Workstation	112.23	108.59	passed
4th Workstation	111.53	111.93	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

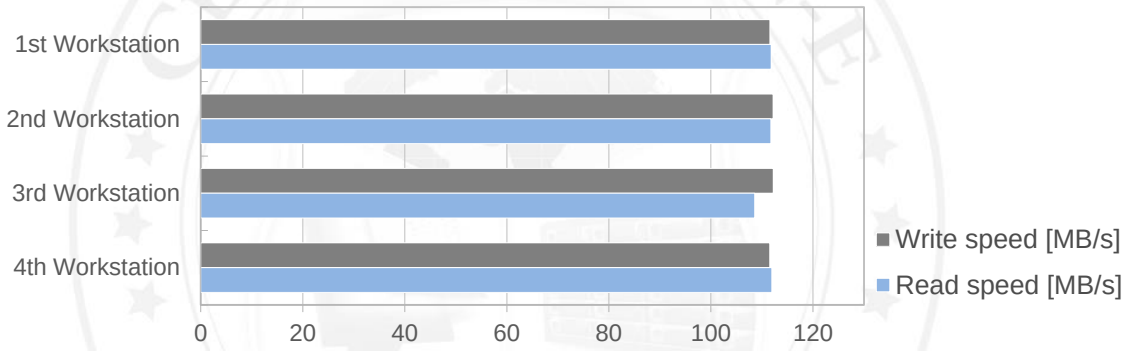

FIGURE 6: Balance-alb bonding mode performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

Balance-rr bonding mode performance test results			
NIC model	Intel I350 Quad Port Ethernet Controller (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	48.24	71.71	passed
2nd Workstation	112.10	53.77	passed
3rd Workstation	47.12	45.88	passed
4th Workstation	111.63	70.33	passed

TABLE 9: Balance-rr bonding mode performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

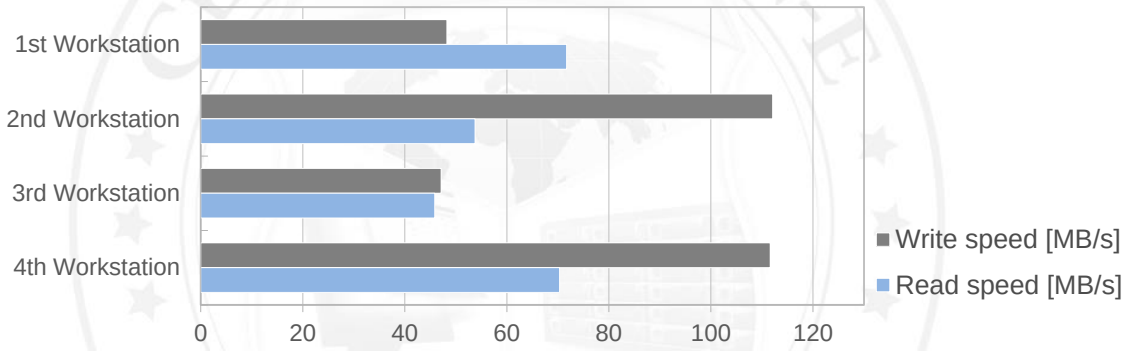

FIGURE 7: Balance-rr bonding mode performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

Single NIC performance test results			
NIC model	Intel I350 Quad Port Ethernet Controller (on-board)		
Workstations with MS Windows	**Write speed [MB/s]**	**Read speed [MB/s]**	**Performance test results**
1st Workstation	110.21	111.98	passed

TABLE 10: *Single NIC test results table for Intel I350 Quad Port Ethernet Controller (on-board)*

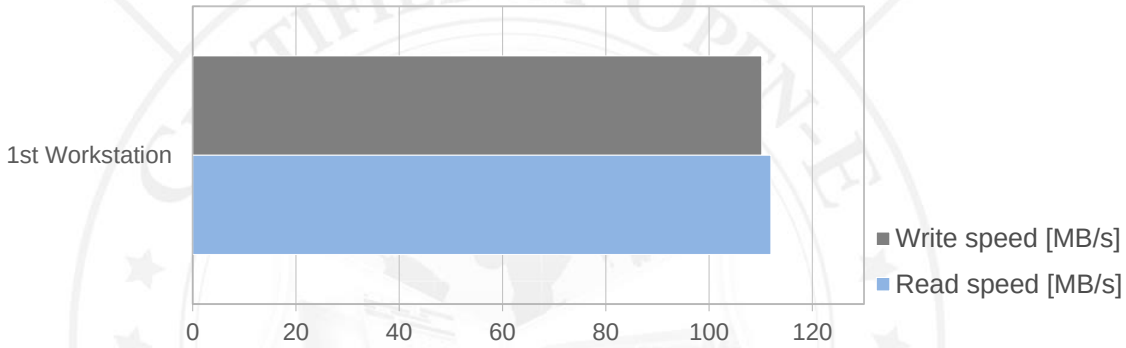

FIGURE 8: *Single NIC performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)*

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

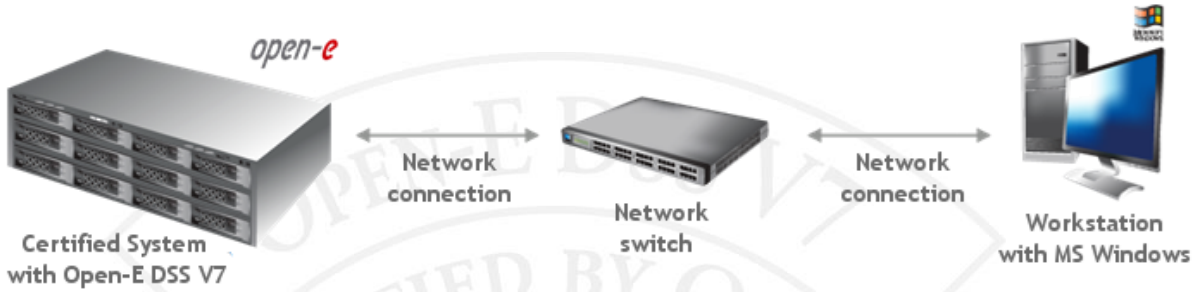

FIGURE 9: Network test topology for RAID testing

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 I350 Quad Port Ethernet Controller (on-board)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	7.30	61.02	passed
32	106.12	111.01	passed
64	108.13	112.01	passed
128	107.37	112.30	passed
256	109.07	112.30	passed
512	108.79	112.02	passed
1024	108.82	112.02	passed
4096	109.00	111.98	passed

TABLE 11: RAID0 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

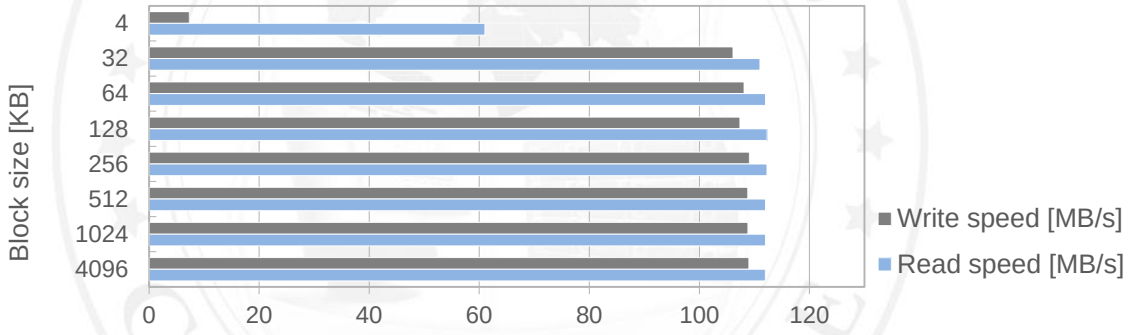

FIGURE 10: RAID0 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	7.43	61.66	passed
32	106.83	110.99	passed
64	109.31	112.20	passed
128	107.92	112.31	passed
256	109.14	112.31	passed
512	109.02	112.04	passed
1024	109.26	111.89	passed
4096	108.87	111.83	passed

TABLE 12: RAID5 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

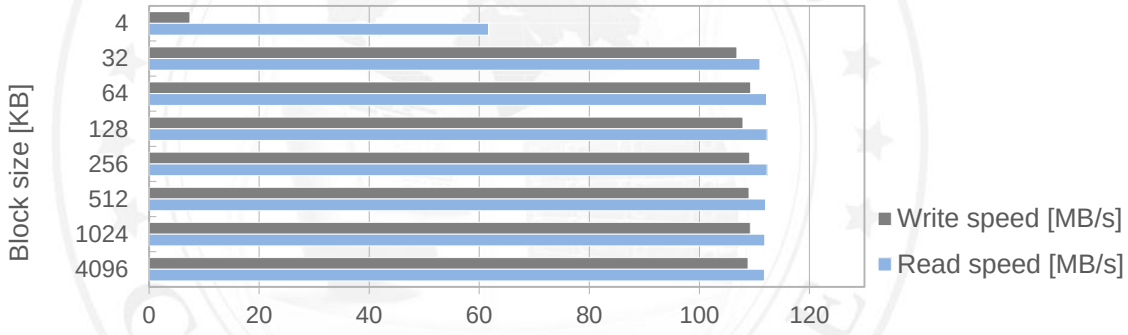

FIGURE 11: RAID5 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	7.00	61.48	passed
32	106.22	111.49	passed
64	108.03	112.15	passed
128	107.18	112.31	passed
256	108.74	112.32	passed
512	108.84	111.97	passed
1024	108.89	111.95	passed
4096	108.72	111.94	passed

TABLE 13: RAID6 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

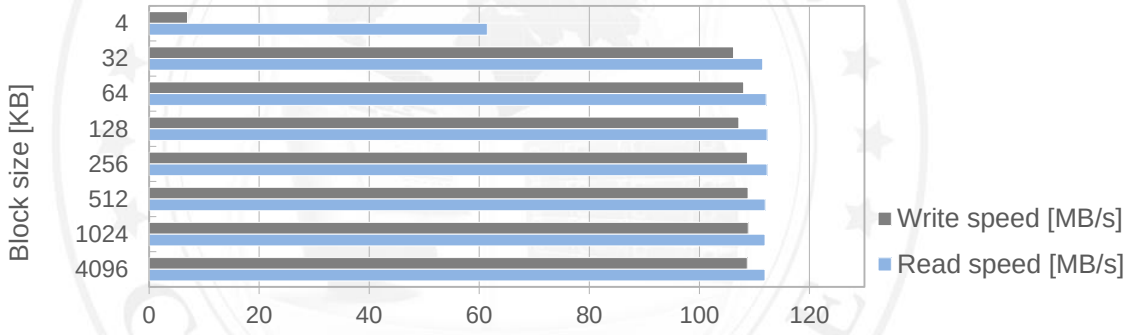

FIGURE 12: RAID6 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	7.39	60.35	passed
32	104.69	111.70	passed
64	105.03	112.22	passed
128	105.53	112.30	passed
256	109.07	112.32	passed
512	109.13	111.92	passed
1024	108.88	112.00	passed
4096	108.73	111.93	passed

TABLE 14: RAID10 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

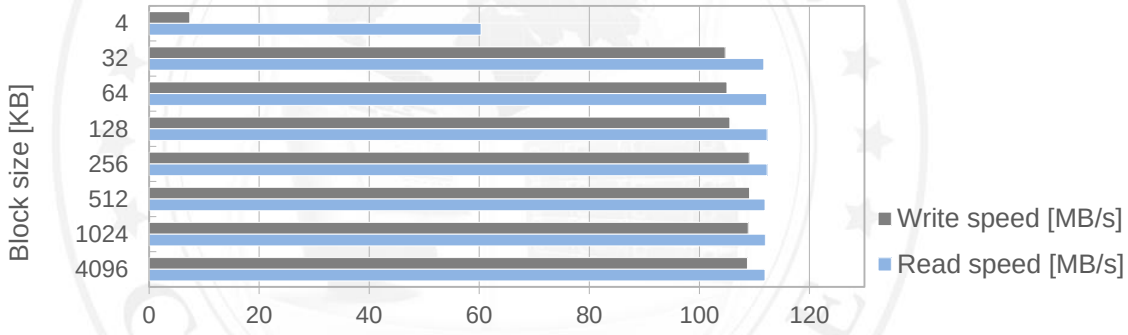

FIGURE 13: RAID10 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	3.25	61.28	passed
32	101.95	111.73	passed
64	104.71	112.21	passed
128	105.50	112.32	passed
256	108.90	112.32	passed
512	108.78	111.98	passed
1024	108.67	111.97	passed
4096	109.15	111.71	passed

TABLE 15: RAID50 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

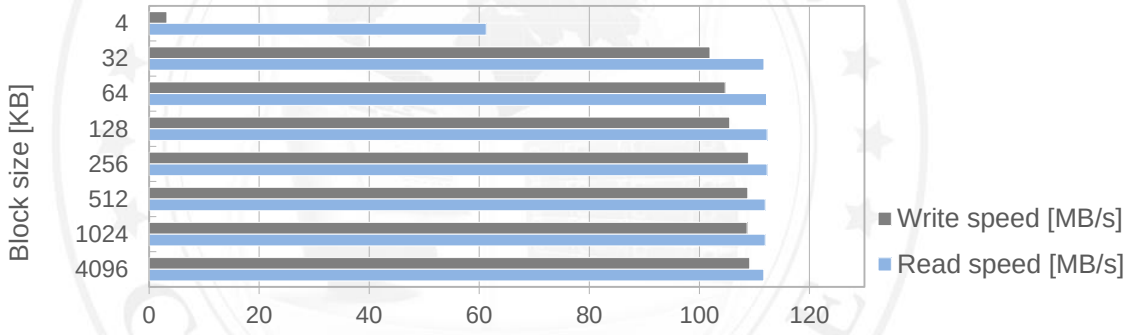

FIGURE 14: RAID50 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	6.92	60.15	passed
32	104.06	111.31	passed
64	104.58	112.18	passed
128	105.58	112.13	passed
256	108.99	112.32	passed
512	108.93	111.99	passed
1024	108.72	111.88	passed
4096	108.84	111.89	passed

TABLE 16: RAID60 performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

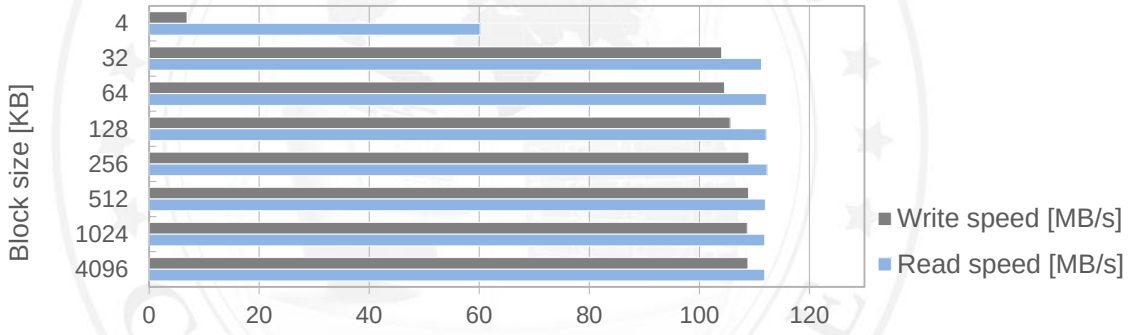

FIGURE 15: RAID60 performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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.

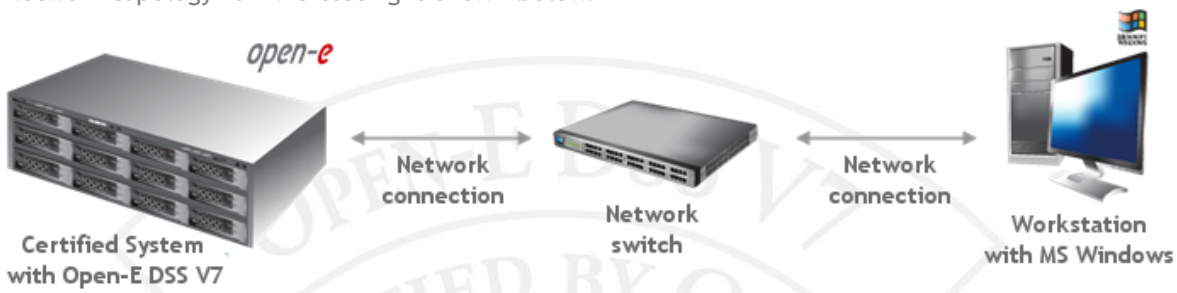

FIGURE 16: Network topology for NAS testing

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 I350 Quad Port Ethernet Controller (on-board)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	70.04	72.30	passed
32	111.91	112.53	passed
64	112.26	111.39	passed
128	112.25	112.65	passed
256	112.25	112.70	passed
512	112.30	112.76	passed
1024	112.27	112.80	passed
4096	112.19	112.55	passed

TABLE 17: SMB performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

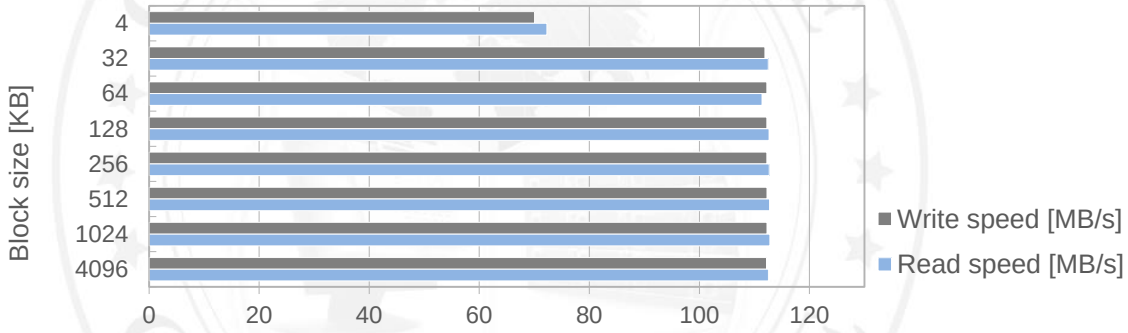

FIGURE 17: SMB performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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.

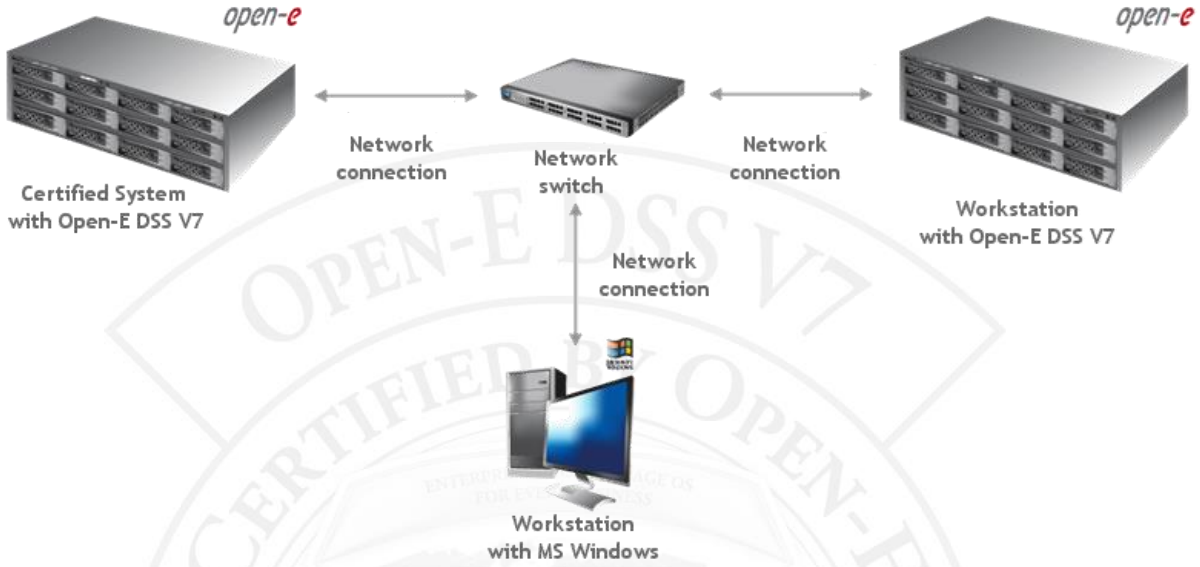

FIGURE 18: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

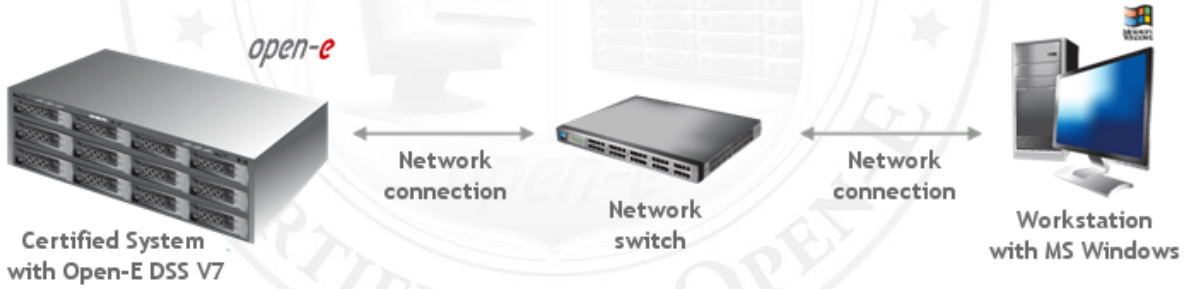

FIGURE 19: Network topology for iSCSI Target testing

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 I350 Quad Port Ethernet Controller (on-board)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	67.12	61.80	passed
32	109.78	111.71	passed
64	111.30	109.41	passed
128	111.14	110.71	passed
256	111.20	112.42	passed
512	110.68	111.26	passed
1024	111.49	112.60	passed
4096	110.66	112.19	passed

TABLE 18: iSCSI Initiator performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

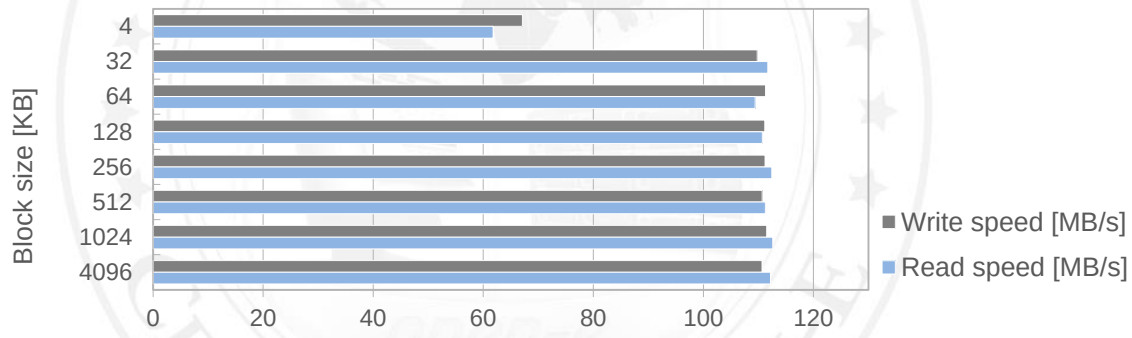

FIGURE 20: iSCSI Initiator performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)

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 I350 Quad Port Ethernet Controller (on-board)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	9.43	68.26	passed
32	108.67	111.26	passed
64	107.18	111.23	passed
128	112.12	113.10	passed
256	112.70	112.07	passed
512	111.64	113.54	passed
1024	112.90	112.21	passed
4096	110.95	112.76	passed

TABLE 19: iSCSI Target performance test results table for Intel I350 Quad Port Ethernet Controller (on-board)

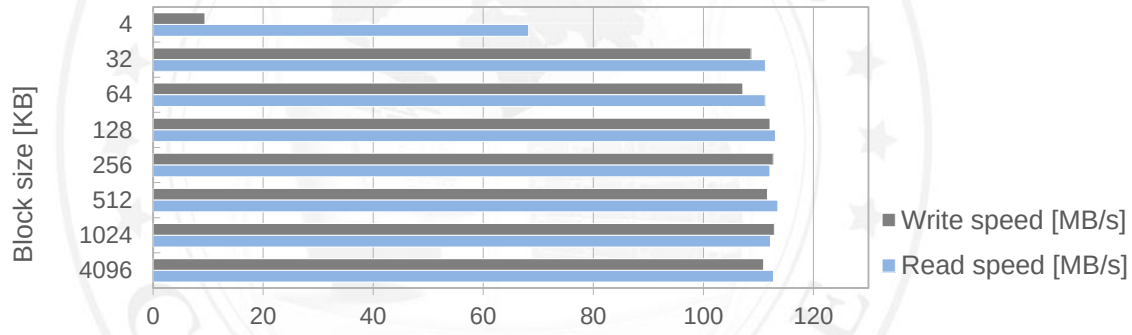

FIGURE 21: iSCSI Target performance test results chart for Intel I350 Quad Port Ethernet Controller (on-board)