Rackserver Open-E Unified Storage 15 TB O2212iR system

Executive summary

After performing all tests, the Rackserver Open-E Unified Storage 15 TB O2212iR 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 Rackserver Open-E Unified Storage 15 TB O2212iR 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 Rackserver Open-E Unified Storage 15 TB O2212iR good iSCSI storage:

> ➢ Hardware RAID 10 with hot spare disk for high performance and data safety.

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

> ➢ Redundant power supply for system reliability.

✓ **NAS filer**

> For this application the following can be used:

> ➢ Eleven high capacity, enterprise class SAS hard drives provide a plenty of space for user files.

> ➢ Hardware RAID 10 with hot spare disk for increased IOPS and data safety.

> ➢ Four 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.
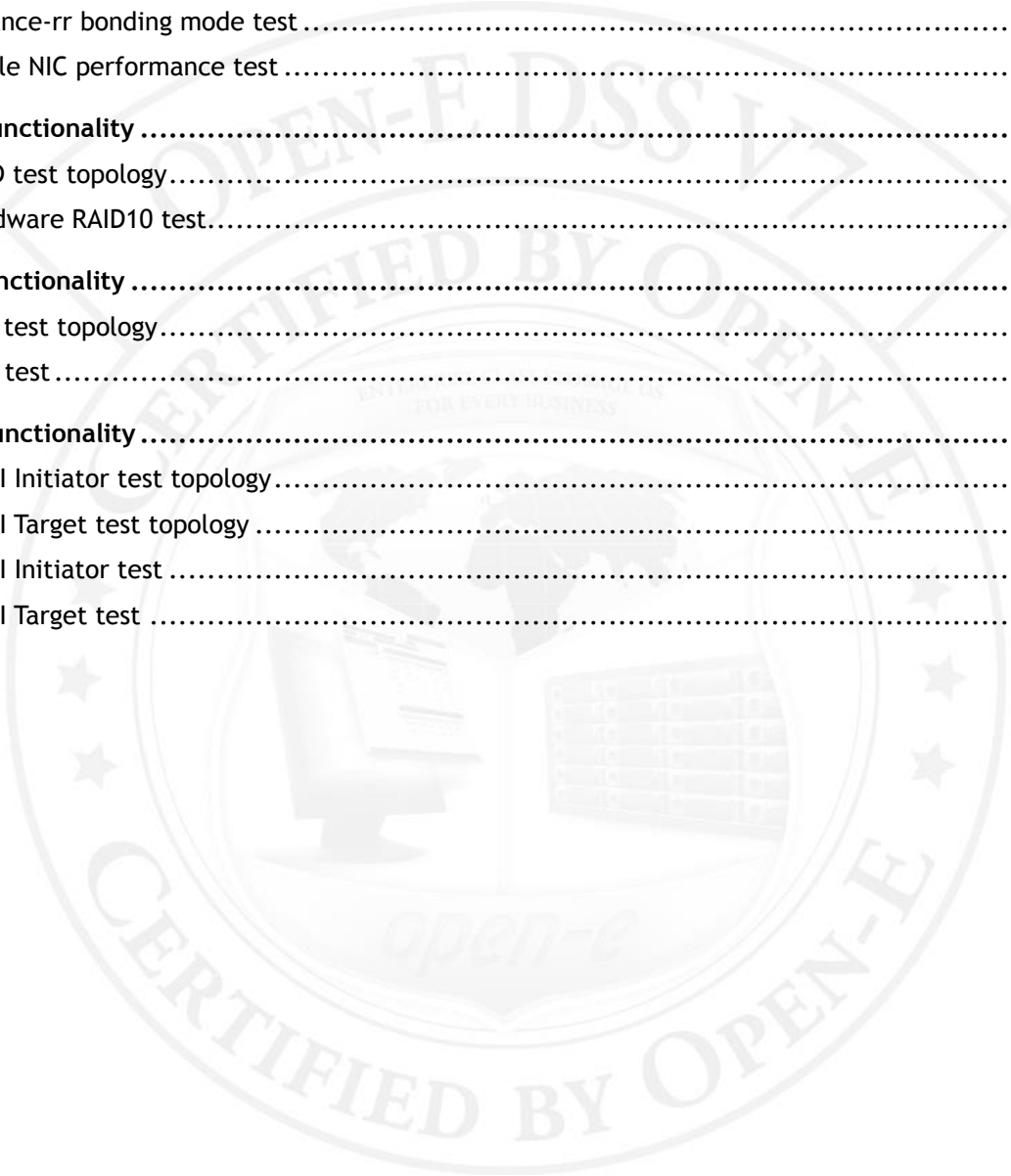
✓ **Storage for CCTV**

> For this application the following can be used:

> ➢ Eleven 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

We recommend using Balance-alb bonding mode for link aggregation.

Rackserver Open-E Unified Storage 15 TB O2212iR hardware components

Technical specifications about the certified system are listed below:

Model	Rackserver Open-E Unified Storage 15 TB O2212iR
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	Chenbro RM23512E2-LE
CPU	Intel Xeon E5-2403 1.80GHz
Motherboard	Intel Server Board S1400FP4
Memory	8GB Kingston KVR16E11/8 DDR3 ECC
Network	Intel Ethernet Controller I350-AM4
HW RAID	LSI MegaRAID SAS 9271-4i
Hard disk drives	11x 3TB HGST Ultrastar 7K4000 HUS724030ALS640

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

Rackserver Open-E Unified Storage 15 TB O2212iR photos

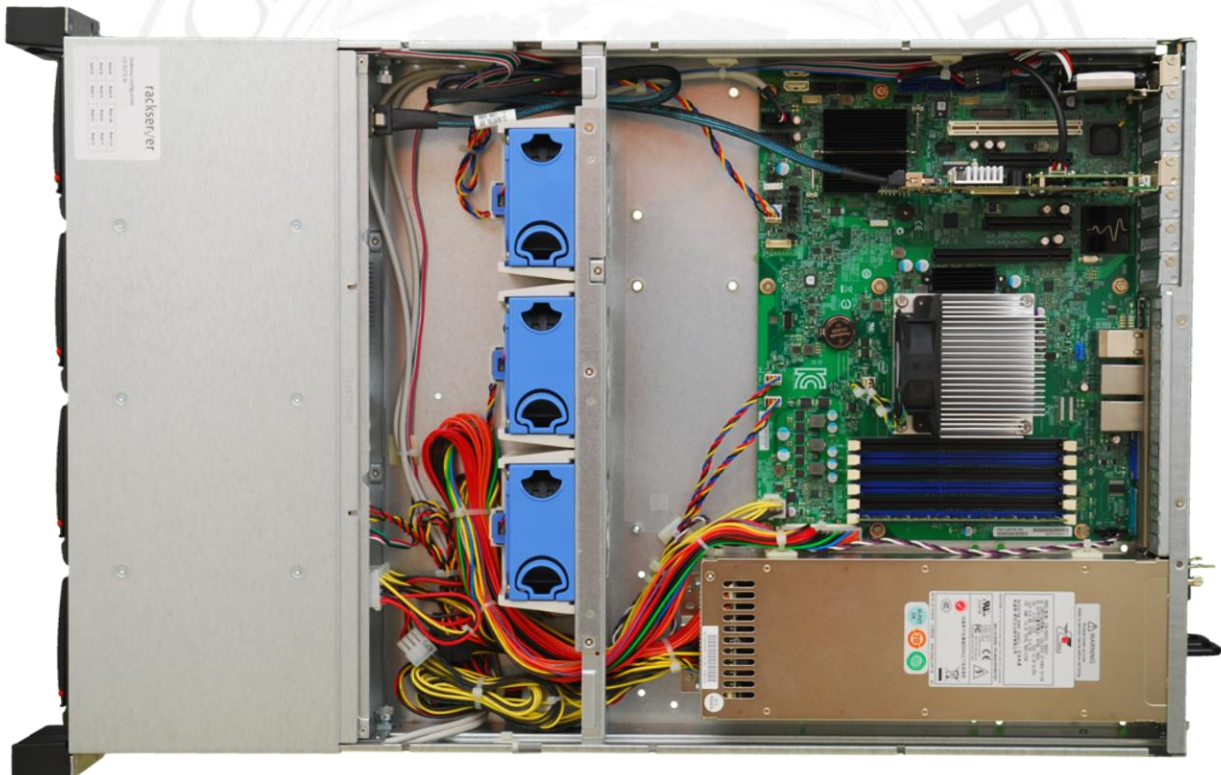*FIGURE 1: Front photo*

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 2012 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
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 2012 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
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
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
Hard disk controller	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	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

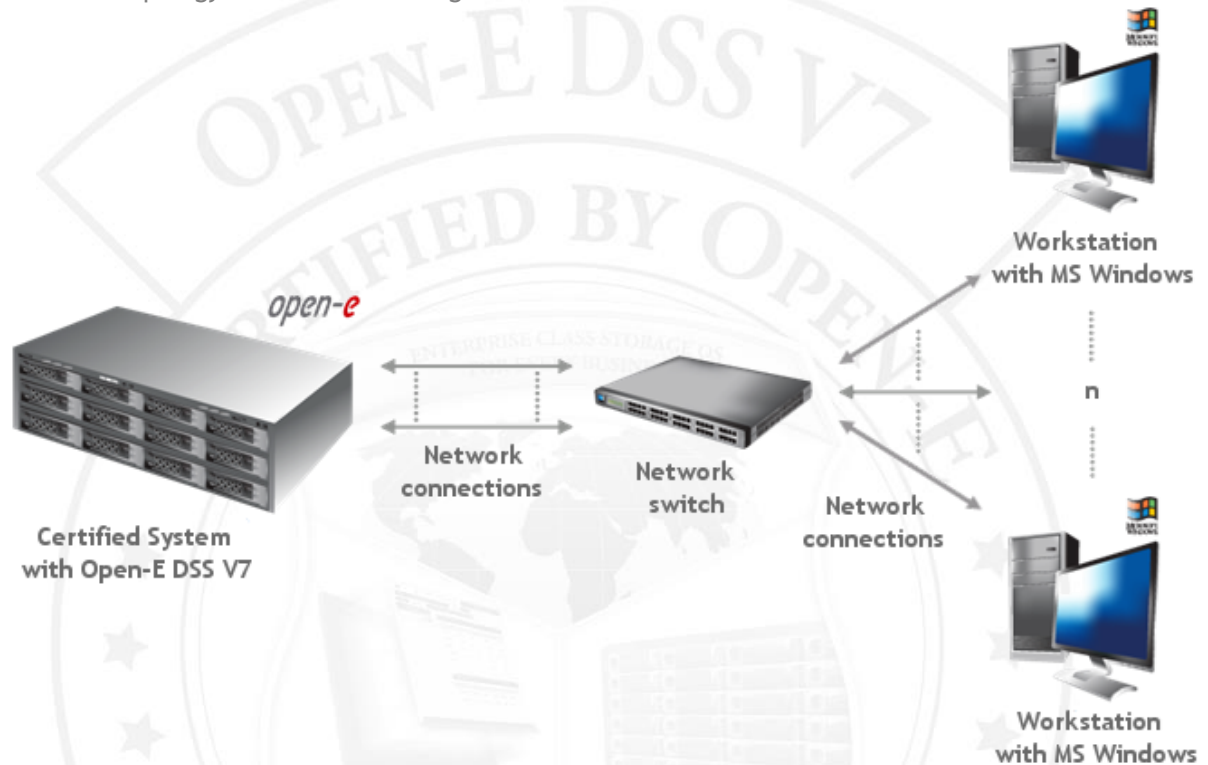Network topology for Network testing is shown below.

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 Controller I350-AM4

802.3ad bonding mode performance test results			
NIC model	Intel Ethernet Controller I350-AM4		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	109.19	111.97	passed
2nd Workstation	108.21	111.93	passed
3rd Workstation	110.27	55.59	passed
4th Workstation	109.34	56.91	passed

TABLE 7: *802.3ad bonding mode performance test results table for Intel Ethernet Controller I350-AM4*
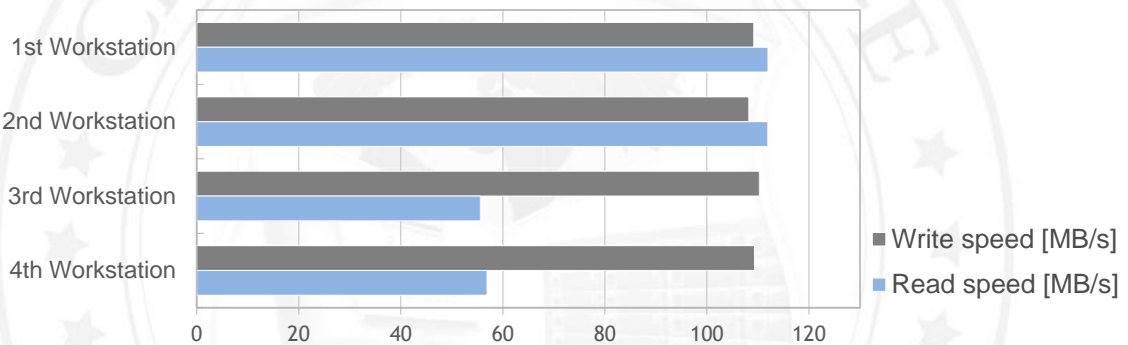

FIGURE 5: *802.3ad bonding mode performance test results chart for Intel Ethernet Controller I350-AM4*

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 Controller I350-AM4

Balance-alb bonding mode performance test results			
NIC model	Intel Ethernet Controller I350-AM4		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	108.87	111.95	passed
2nd Workstation	109.19	111.97	passed
3rd Workstation	110.05	111.94	passed
4th Workstation	109.11	111.94	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel Ethernet Controller I350-AM4
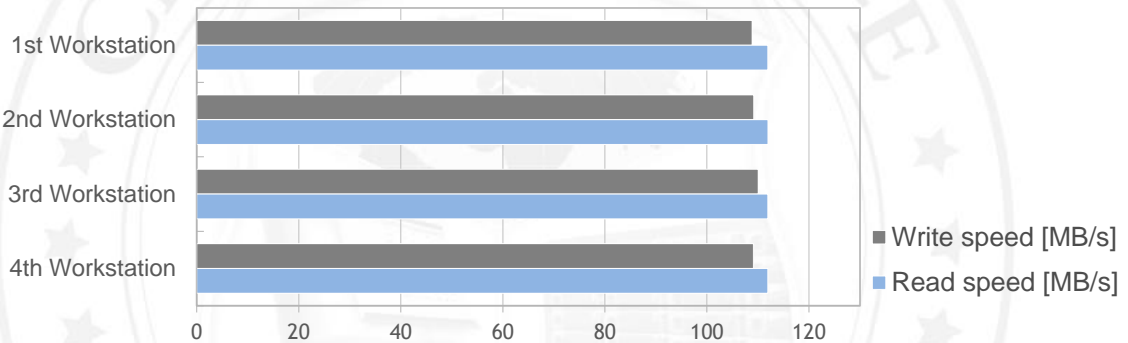
FIGURE 6: Balance-alb bonding mode performance test results chart for Intel Ethernet Controller I350-AM4

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 Controller I350-AM4

Balance-rr bonding mode performance test results			
NIC model	Intel Ethernet Controller I350-AM4		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	110.54	69.54	passed
2nd Workstation	109.75	69.53	passed
3rd Workstation	110.18	68.95	passed
4th Workstation	110.68	69.08	passed

TABLE 9: *Balance-rr bonding mode performance test results table for Intel Ethernet Controller I350-AM4*
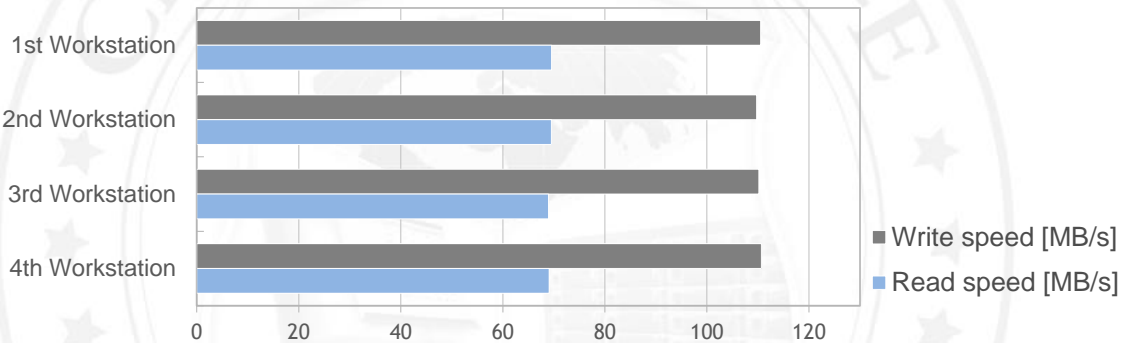

FIGURE 7: *Balance-rr bonding mode performance test results chart for Intel Ethernet Controller I350-AM4*

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 Controller I350-AM4

Single NIC performance test results			
NIC model	Intel Ethernet Controller I350-AM4		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	110.51	111.93	passed

TABLE 10: Single NIC performance test results table for Intel Ethernet Controller I350-AM4
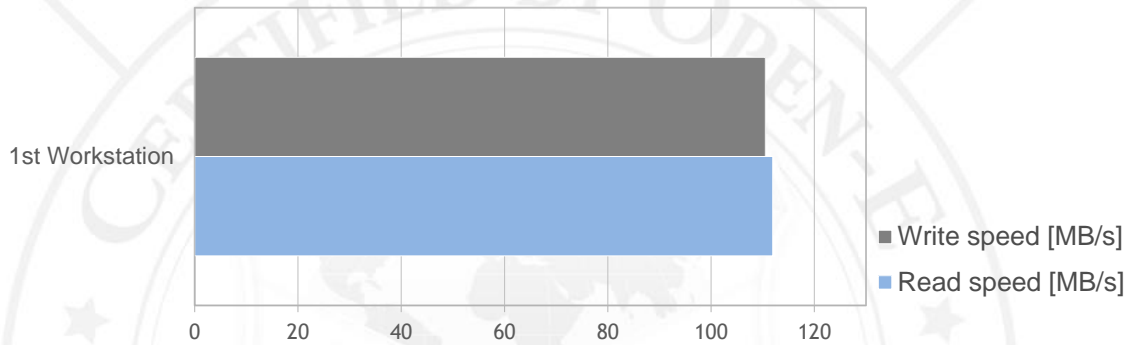

FIGURE 8: Single NIC performance test results chart for Intel Ethernet Controller I350-AM4

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 10 level, 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

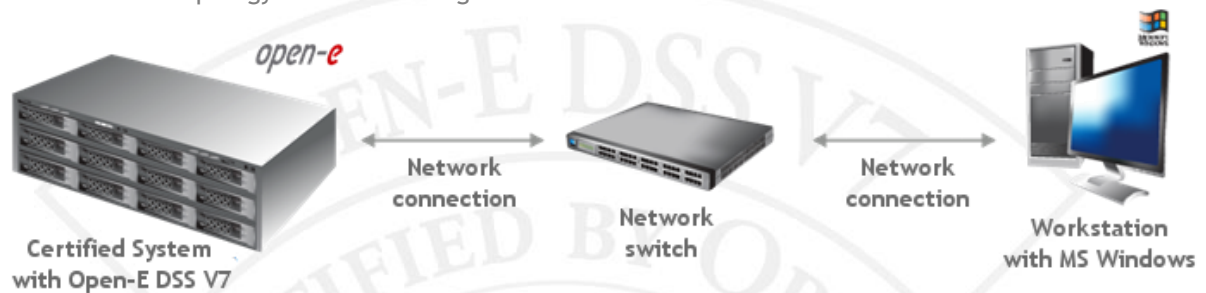Network test topology for RAID testing is shown below

FIGURE 9: Network test topology for RAID testing

Hardware 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 Controller I350-AM4

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	31.18	46.13	passed
32	71.95	110.94	passed
64	79.87	111.88	passed
128	90.41	111.78	passed
256	107.95	111.97	passed
512	110.59	112.02	passed
1024	107.94	112.01	passed
4096	110.44	111.88	passed

TABLE 11: *RAID10 performance test results table for Intel Ethernet Controller I350-AM4*
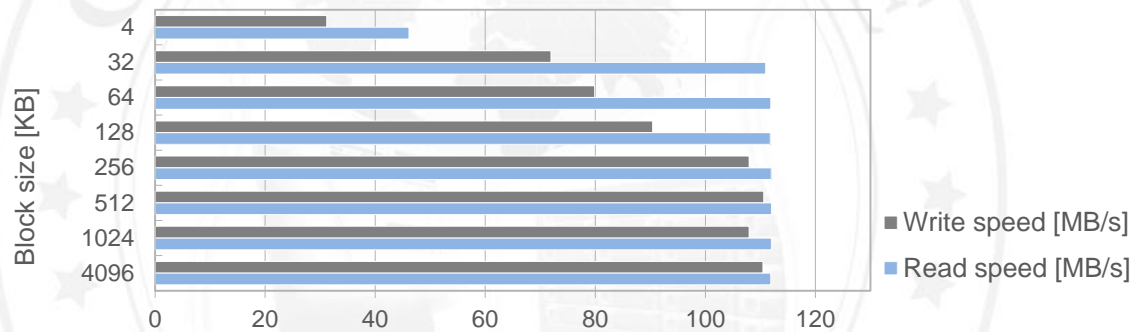

FIGURE 10: *RAID10 performance test results chart for Intel Ethernet Controller I350-AM4*

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

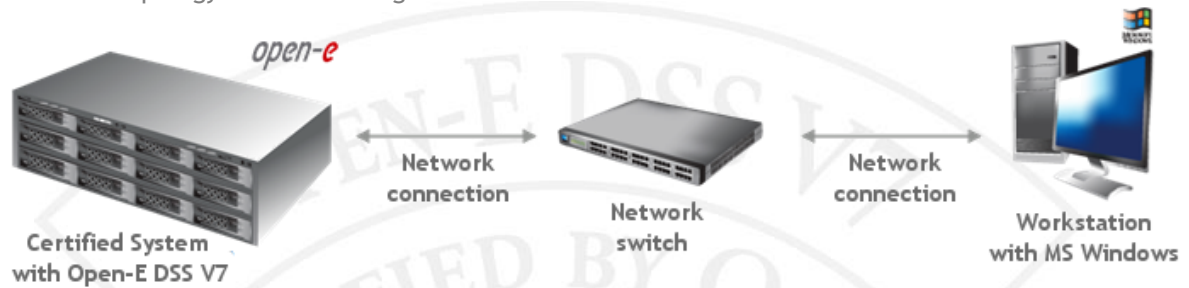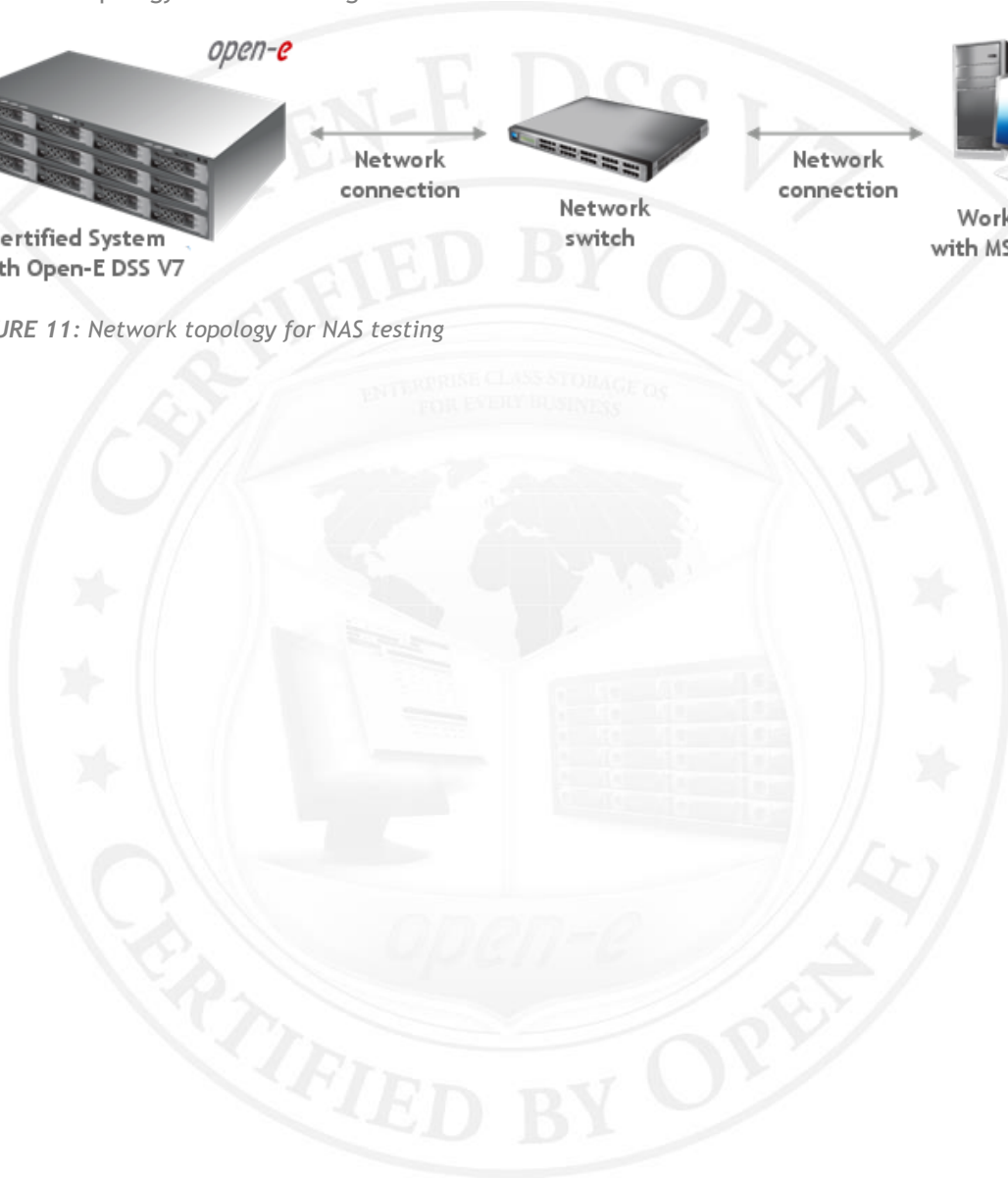Network topology for NAS testing is shown below.

FIGURE 11: 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 Controller I350-AM4

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	66.13	59.58	passed
32	112.47	112.65	passed
64	112.10	112.67	passed
128	112.21	112.74	passed
256	112.85	112.76	passed
512	112.90	112.78	passed
1024	112.87	112.69	passed
4096	112.76	112.60	passed

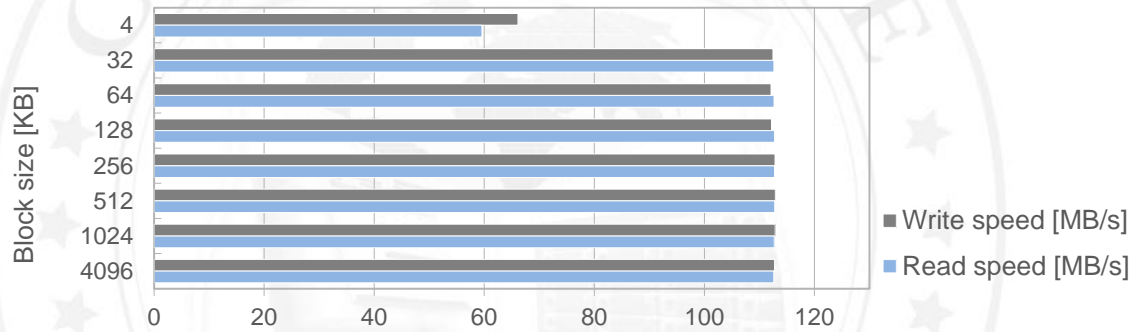TABLE 12: SMB performance test results table for Intel Ethernet Controller I350-AM4

FIGURE 12: SMB performance test results chart for Intel Ethernet Controller I350-AM4

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

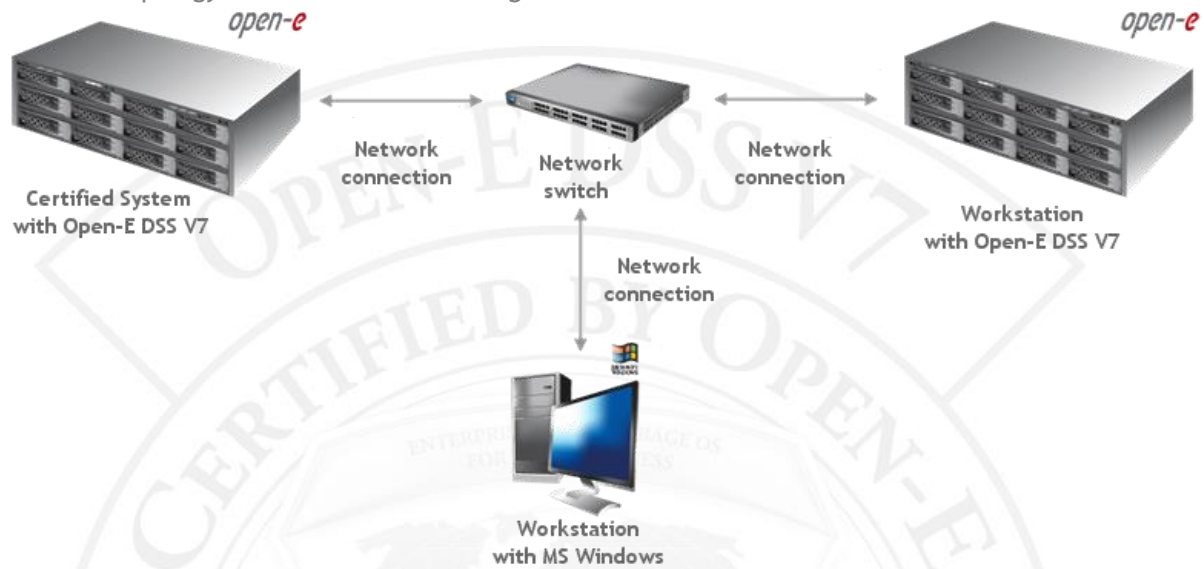Network topology for iSCSI Initiator testing is shown below.

FIGURE 13: *Network topology for iSCSI Initiator testing*

iSCSI Target test topology

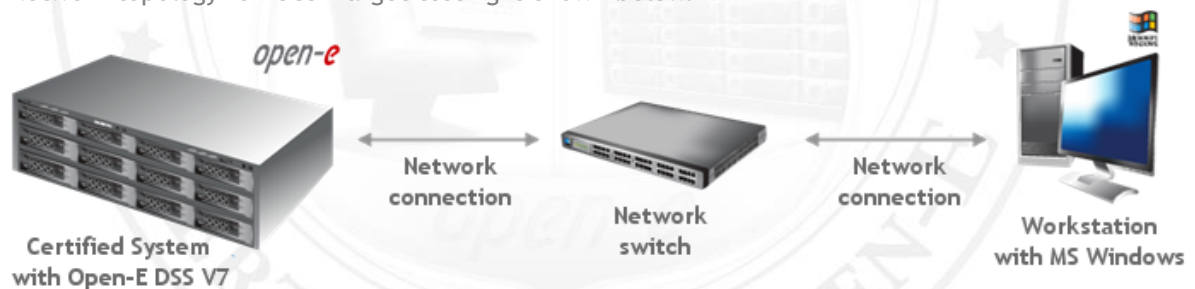Network topology for iSCSI Target testing is shown below.

FIGURE 14: *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 Controller I350-AM4

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	64.90	60.14	passed
32	109.63	112.60	passed
64	110.35	112.54	passed
128	109.75	112.73	passed
256	109.71	112.77	passed
512	110.63	112.76	passed
1024	109.94	112.60	passed
4096	109.52	112.59	passed

TABLE 13: iSCSI Initiator performance test results table for Intel Ethernet Controller I350-AM4
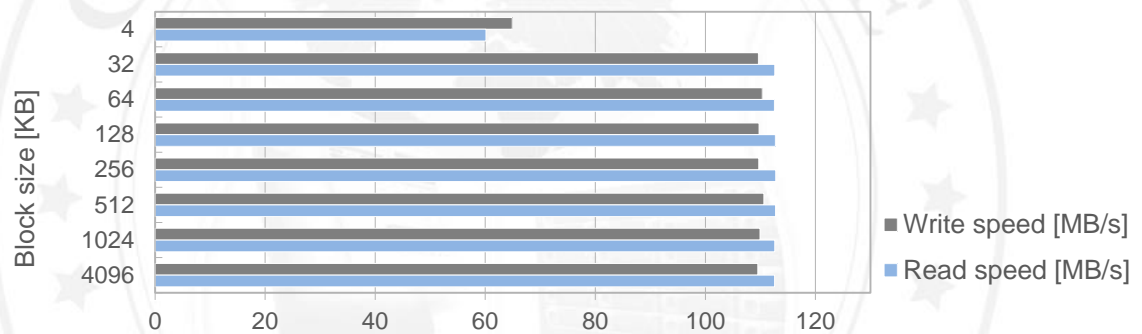

FIGURE 15: iSCSI Initiator performance test results chart for Intel Ethernet Controller I350-AM4

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 Controller I350-AM4

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	32.05	47.10	passed
32	65.46	110.67	passed
64	72.56	111.77	passed
128	86.62	111.97	passed
256	107.59	111.98	passed
512	110.39	112.00	passed
1024	108.69	111.97	passed
4096	110.68	111.89	passed

TABLE 14: iSCSI Target performance test results table for Intel Ethernet Controller I350-AM4
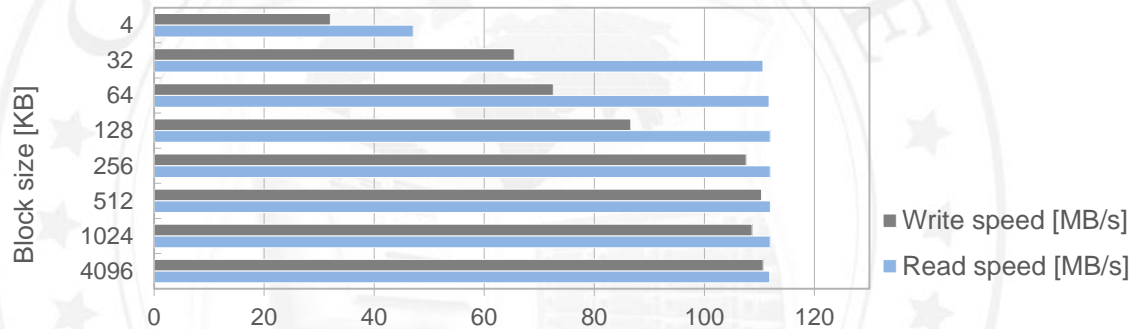

FIGURE 16: iSCSI Target performance test results chart for Intel Ethernet Controller I350-AM4