

FUJITSU PRIMERGY SX150 S8 Storage system



Executive summary

After performing all tests, the FUJITSU PRIMERGY SX150 S8 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 FUJITSU PRIMERGY SX150 S8 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 FUJITSU PRIMERGY SX150 S8 good iSCSI storage in SOHO environment:

- HW RAID5 and RAID6 for high performance and data safety.
- Two 10GbE interfaces for fast MPIO connection

✓ NAS filer

For this application the following can be used:

- Four high capacity SATA hard drives provide a good amount of space for user files.
- Hardware RAID5 or RAID6 for fault tolerance and the most efficient use of available disk space or RAID10 for increased IOPS.
- Two 10GbE and two 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.

✓ Storage for CCTV

The following features make FUJITSU PRIMERGY SX150 S8 good storage for small video monitoring installations:

- Four high capacity SATA hard drives with RAID5 or RAID6 provide lots of redundant storage for CCTV records.
- Two 10GbE interfaces for independent connection to different networks or link aggregation for improved throughput.

Certification notes

For link aggregation, it is recommended to use balance-alb bonding mode.

The system was kindly provided by the Open-E partner BYTEC GmbH.

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FUJITSU PRIMERGY SX150 S8 hardware components

Technical specifications about the certified system are listed below:

Model	FUJITSU PRIMERGY SX150 S8
Operating system	Open-E DSS V7 build 16323
Enclosure/chassis	ABN:K1424-V201-764
CPU	Intel® Xeon® Processor E5-2420 1.90GHz
Motherboard	Fujitsu D3079-A1
Memory	16x 8GB Princeton V26808-B4924-D521 DDR3 ECC REG
Network	2x Intel® 82574L Gigabit Network Connection (on-board)
Network	Intel® Ethernet Converged Network Adapter X540-T2
HW RAID	Fujitsu RAID Controller D2616
Hard disk drives	4x 2TB Western Digital RE WD2000FYYZ

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



FUJITSU PRIMERGY SX150 S8 photos



FIGURE 1: Front photo



FIGURE 2: Rear photo

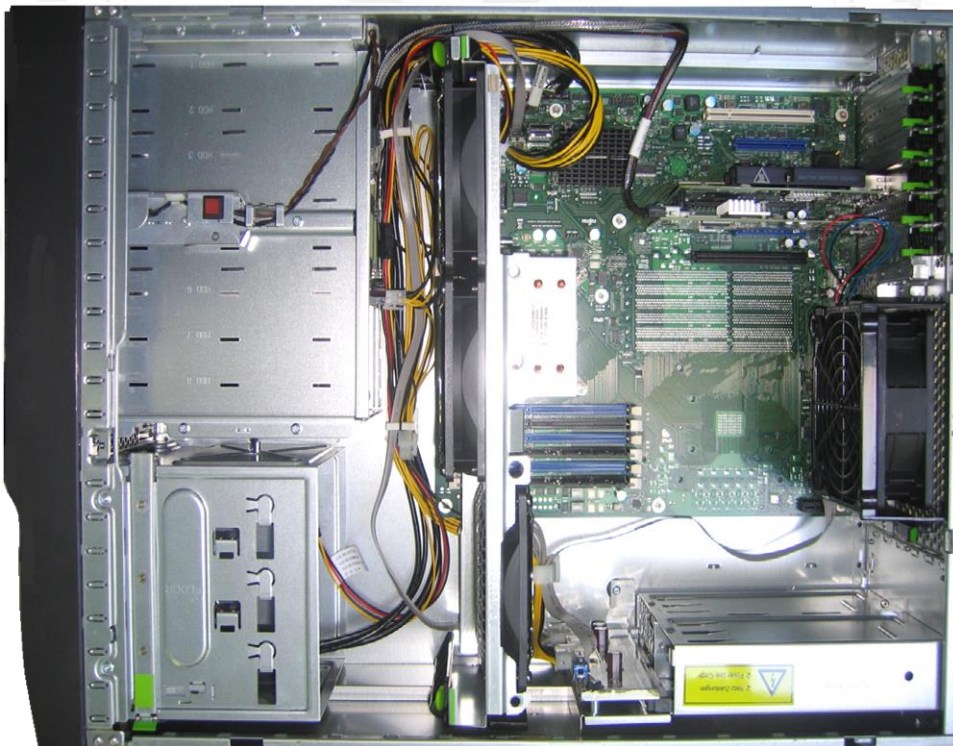


FIGURE 3: Top photo

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	ABN:K1456-V401-298
Motherboard	Fujitsu D2949-B1x
CPU	Intel® Xeon® Processor E5-2620 v2 2.10GHz
Memory	16x 8GB Princeton V26808-B4924-D521 DDR3 ECC REG
Network	Intel® Ethernet Server Adapter I350 (on-board)
Network	Intel® Ethernet Converged Network Adapter X540-T2
Hard disk controller	Fujitsu RAID Controller D2616
Hard disk drives	2TB Western Digital RE WD2000FYYZ

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2012 R2
Enclosure/chassis	ABN:K1463-V401-411
Motherboard	Fujitsu D3099-B1x
CPU	Intel® Xeon® Processor E5-2420 v2 2.20GHz
Memory	2x 8GB Princeton V26808-B4924-D521 DDR3 ECC REG
Network	Intel® Ethernet Server Adapter I210 (on-board)
Network	Intel® Ethernet Converged Network Adapter X540-T2
Hard disk controller	Fujitsu RAID Controller D3116C
Hard disk drives	2TB Western Digital RE WD2000FYYZ

TABLE 3: Hardware components of second Workstation with MS Windows

Model	FUJITSU PRIMERGY SX150 S8
Operating system	Open-E DSS V7 build 16323
Enclosure/chassis	ABN:K1424-V201-764
Motherboard	Intel® Xeon® Processor E5-2420 1.90GHz
CPU	Fujitsu D3079-A1
Memory	16x 8GB Princeton V26808-B4924-D521 DDR3 ECC REG
Network	2x Intel® 82574L Gigabit Network Connection (on-board)
Network	Intel® Ethernet Converged Network Adapter X540-T2
Hard disk controller	Fujitsu RAID Controller D2616
Hard disk drives	4x 2TB Western Digital RE WD2000FYYZ

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

Model	NETGEAR ProSAFE GS116NA
Description	16 ports 1Gbps

TABLE 5: Network switch details for connection with 1GbE

Model	NETGEAR ProSAFE XS708E
Description	8 ports 10Gbps

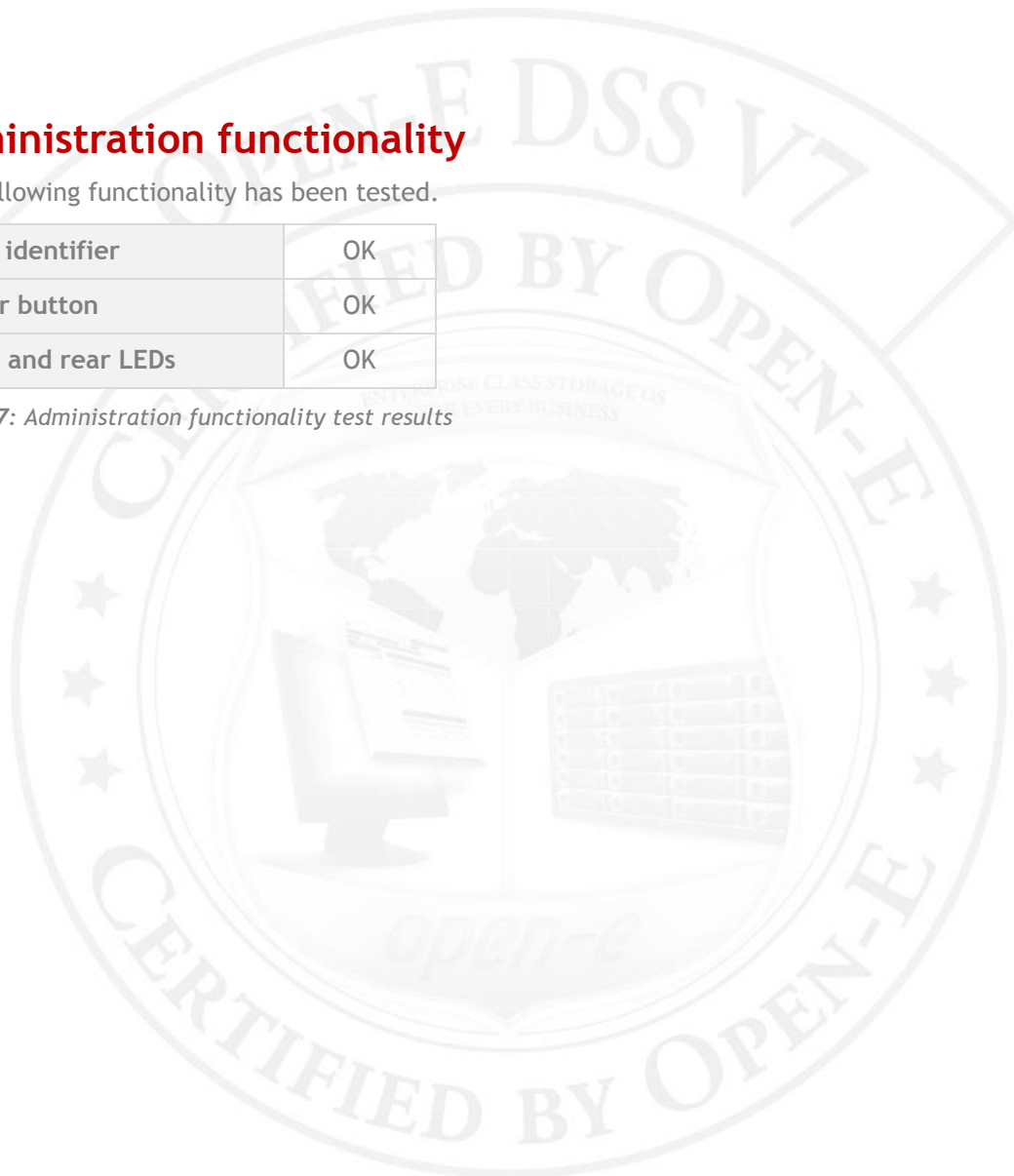
TABLE 6: Network switch details for connection with 10GbE

Administration functionality

The following functionality has been tested.

Drive identifier	OK
Power button	OK
Front and rear LEDs	OK

TABLE 7: 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.

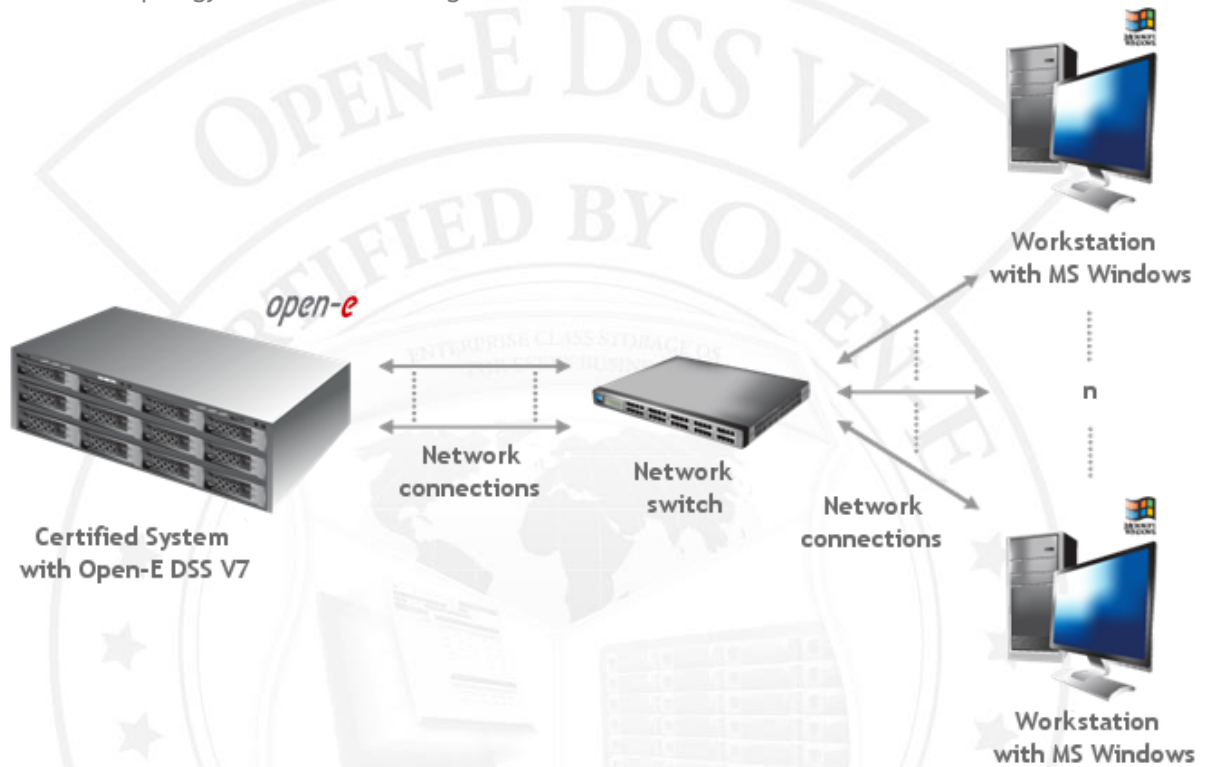


FIGURE 4: Network topology for Network testing

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 lometer testing tool.

2. Test results for 802.3ad bonding mode test performed on Intel® 82574L Gigabit Network Connection (on-board)

802.3ad bonding mode performance test results			
NIC model	Intel® 82574L Gigabit Network Connection		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	48	61	passed
2 nd Workstation	41	60	passed

TABLE 8: 802.3ad bonding mode performance test results table for Intel® 82574L Gigabit Network Connection (on-board)

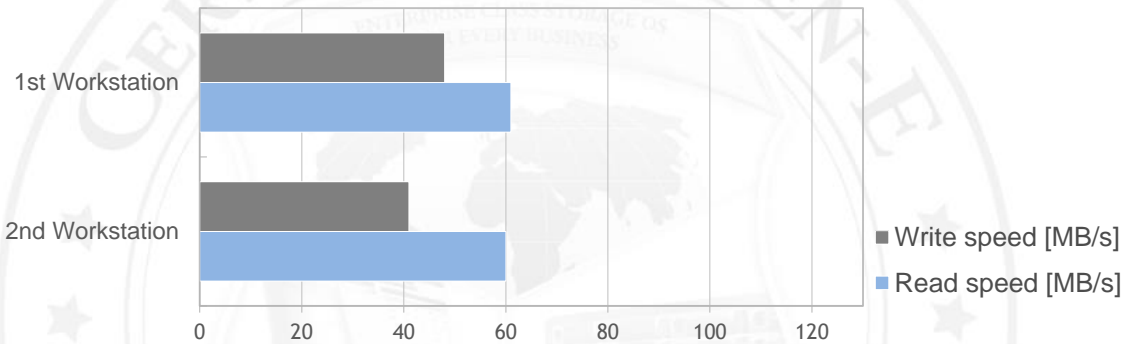


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel® 82574L Gigabit Network Connection (on-board)

3. Test results for 802.3ad bonding mode test performed on Intel® Ethernet Converged Network Adapter X540-T2

802.3ad bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X540		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	55	135	passed
2 nd Workstation	51	537	passed

TABLE 9: 802.3ad bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

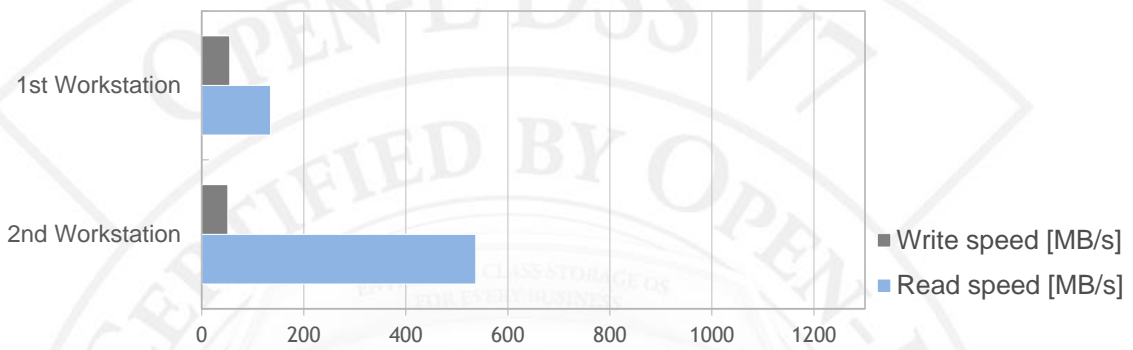


FIGURE 6: 802.3ad bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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® 82574L Gigabit Network Connection (on-board)

Balance-alb bonding mode performance test results			
NIC model	Intel® 82574L Gigabit Network Connection		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	42	111	passed
2 nd Workstation	37	110	passed

TABLE 10: Balance-alb bonding mode performance test results table for Intel® 82574L Gigabit Network Connection (on-board)

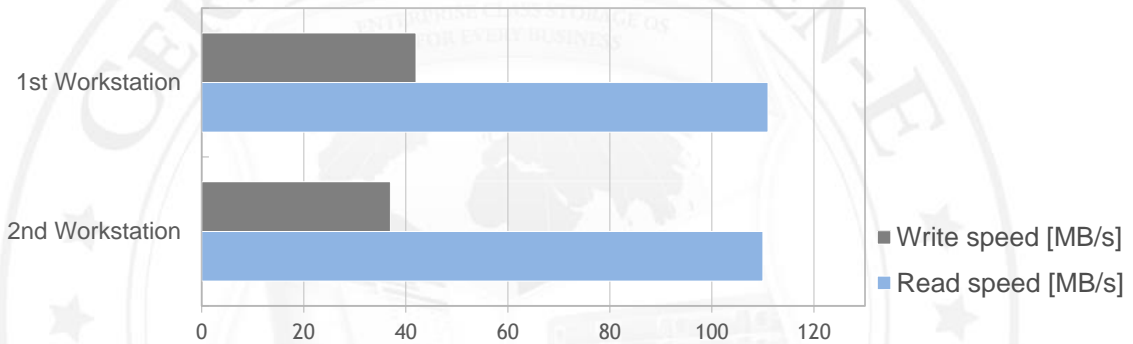


FIGURE 7: Balance-alb bonding mode performance test results chart for Intel® 82574L Gigabit Network Connection (on-board)

3. Test results for Balance-alb bonding mode test performed on Intel® Ethernet Converged Network Adapter X540-T2

Balance-alb bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X540		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	55	93	passed
2 nd Workstation	50	625	passed

TABLE 11: Balance-alb bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

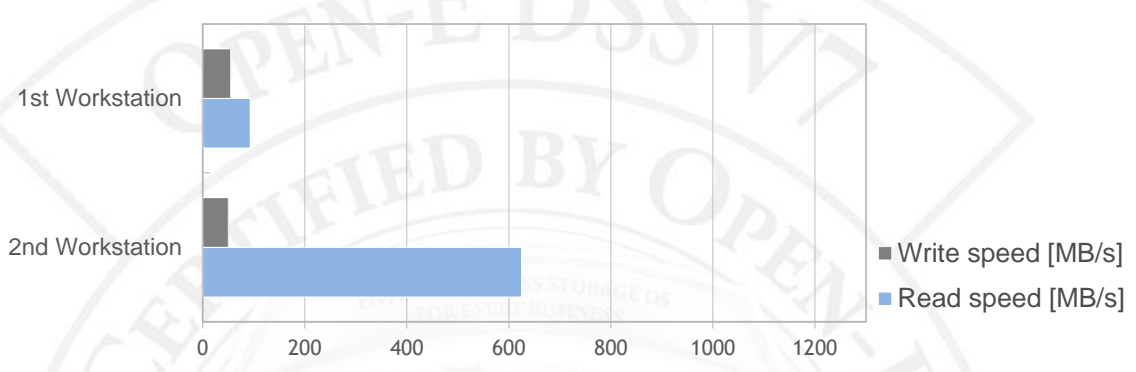


FIGURE 8: Balance-alb bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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® 82574L Gigabit Network Connection (on-board)

Balance-rr bonding mode performance test results			
NIC model	Intel® 82574L Gigabit Network Connection		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	43	111	passed
2 nd Workstation	37	111	passed

TABLE 12: Balance-rr bonding mode performance test results table for Intel® 82574L Gigabit Network Connection (on-board)

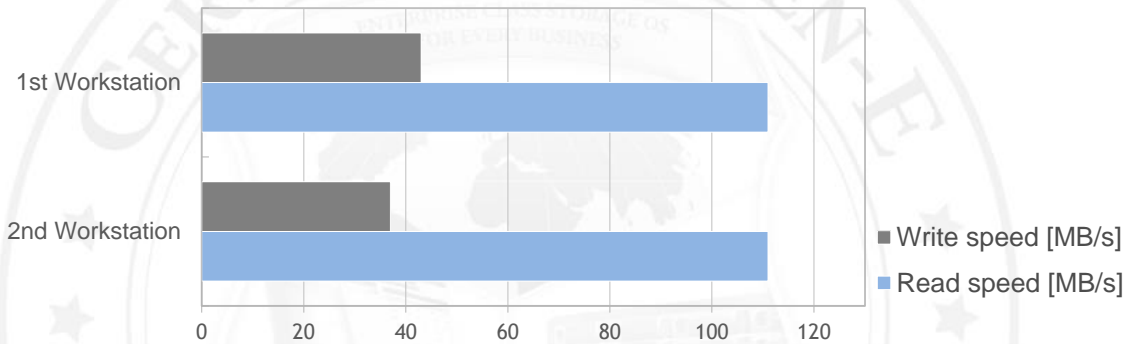


FIGURE 9: Balance-rr bonding mode performance test results chart for Intel® 82574L Gigabit Network Connection (on-board)

3. Test results for Balance-rr bonding mode test performed on Intel® Ethernet Converged Network Adapter X540-T2

Balance-rr bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X540		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	50	195	passed
2 nd Workstation	47	198	passed

TABLE 13: Balance-rr bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

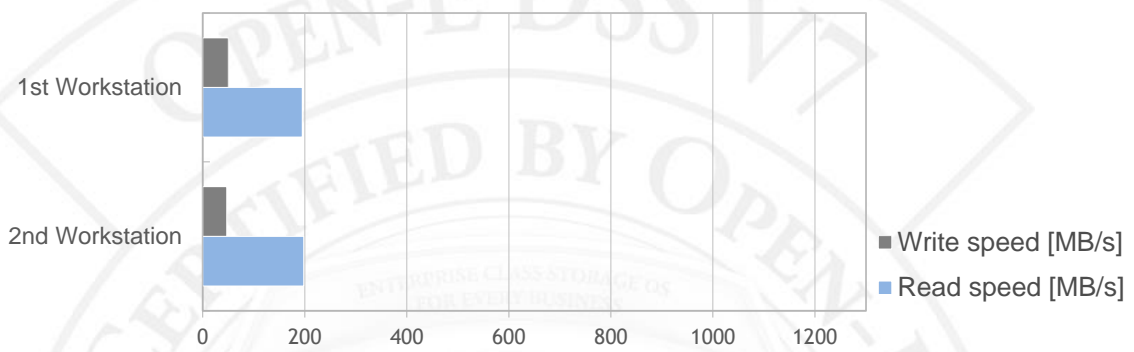


FIGURE 10: Balance-rr bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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® 82574L Gigabit Network Connection (on-board)

Single NIC performance test results			
NIC model	Intel® 82574L Gigabit Network Connection		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	92	118	passed

TABLE 14: Single NIC performance test results table for Intel® 82574L Gigabit Network Connection (on-board)

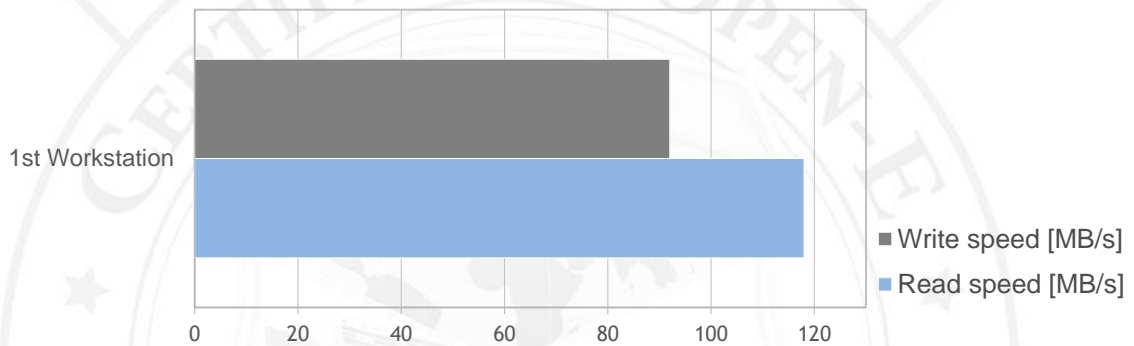


FIGURE 11: Single NIC performance test results chart for Intel® 82574L Gigabit Network Connection (on-board)

3. Test results for single NIC test performed on Intel® Ethernet Converged Network Adapter X540-T2

Single NIC performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X540		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	585	533	passed

TABLE 15: Single NIC performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

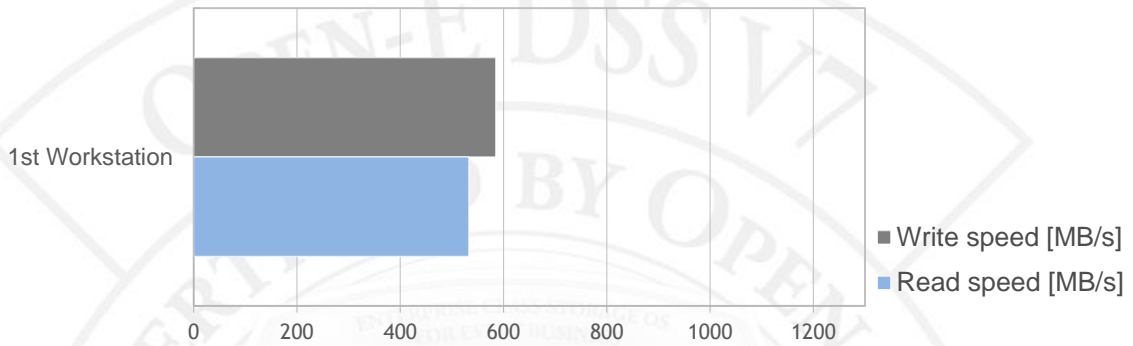


FIGURE 12: Single NIC performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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, 1, 5, 6 and 10 levels, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the lometer testing tool.

RAID test topology

Network test topology for RAID testing is shown below

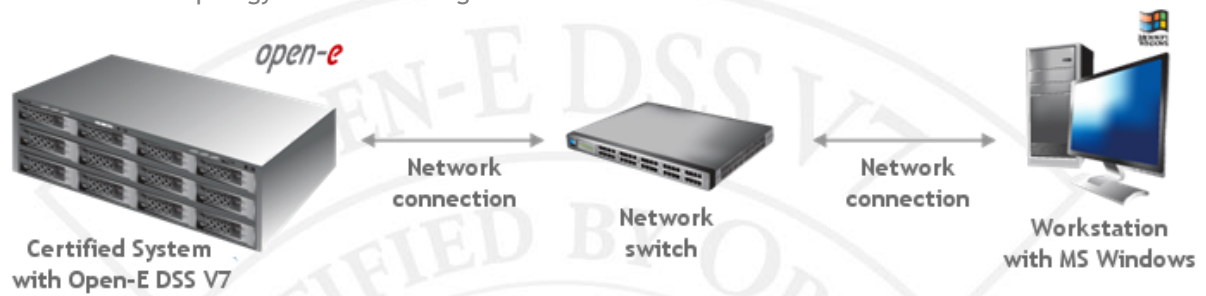


FIGURE 13: Network test topology for RAID testing

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 lometer testing tool.

2. Test results for RAID0 and Intel® Ethernet Converged Network Adapter X540-T2

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49	15	passed
32	329	412	passed
64	413	608	passed
128	510	252	passed
256	609	243	passed
512	578	295	passed
1024	645	281	passed
4096	598	503	passed

TABLE 16: RAID0 performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

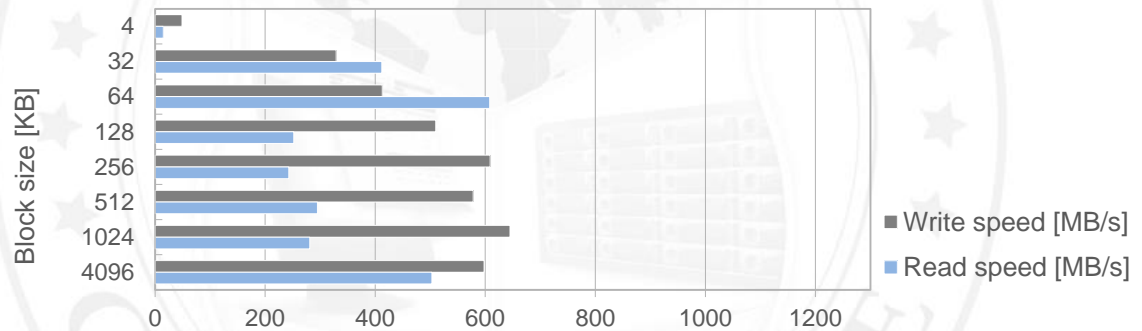


FIGURE 14: RAID0 performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

Hardware RAID1 test

1. Test description

The test relies on creation of the RAID1 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 lometer testing tool.

2. Test results for RAID1 and Intel® Ethernet Converged Network Adapter X540-T2

RAID1 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49	66	passed
32	329	376	passed
64	406	209	passed
128	508	141	passed
256	571	201	passed
512	595	341	passed
1024	587	214	passed
4096	586	147	passed

TABLE 17: RAID1 performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

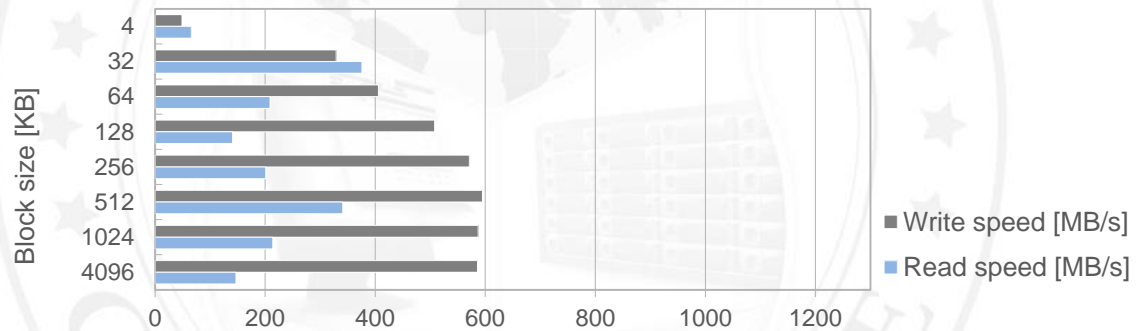


FIGURE 15: RAID1 performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for RAID5 and Intel® Ethernet Converged Network Adapter X540-T2

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49	11	passed
32	330	261	passed
64	423	291	passed
128	516	257	passed
256	679	337	passed
512	717	371	passed
1024	703	357	passed
4096	713	383	passed

TABLE 18: RAID5 performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

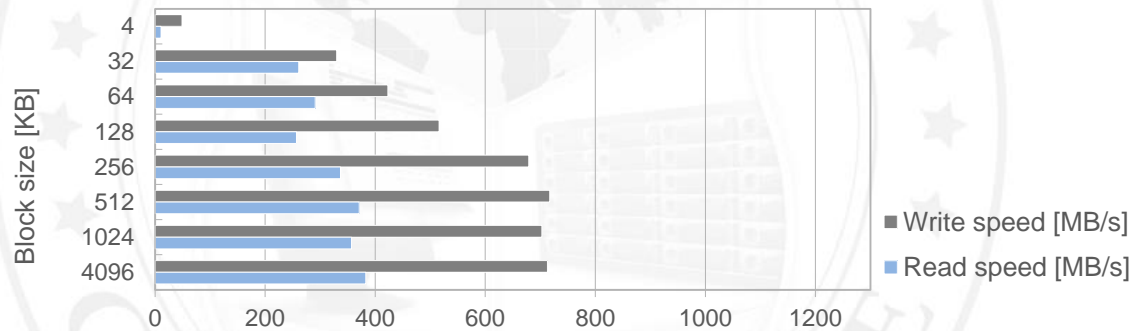


FIGURE 16: RAID5 performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for RAID6 and Intel® Ethernet Converged Network Adapter X540-T2

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49	12	passed
32	329	292	passed
64	416	548	passed
128	512	219	passed
256	645	257	passed
512	632	274	passed
1024	648	229	passed
4096	639	309	passed

TABLE 19: RAID6 performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

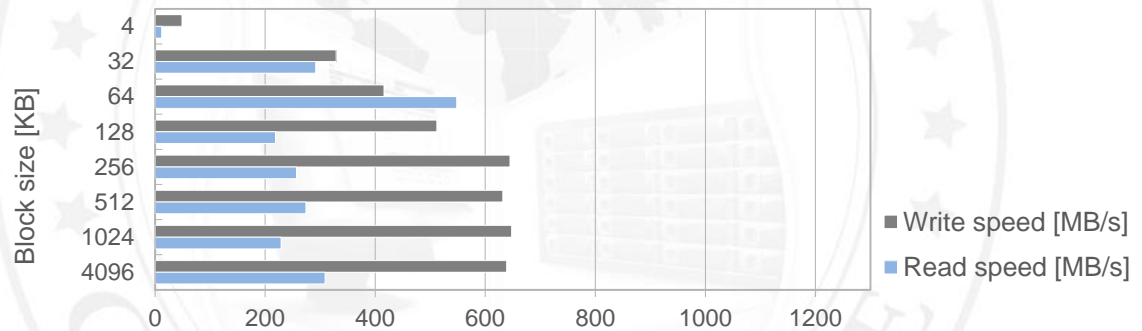


FIGURE 17: RAID6 performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for RAID10 and Intel® Ethernet Converged Network Adapter X540-T2

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	20	50	passed
32	329	335	passed
64	423	476	passed
128	498	208	passed
256	592	305	passed
512	594	232	passed
1024	597	263	passed
4096	602	266	passed

TABLE 20: RAID10 performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

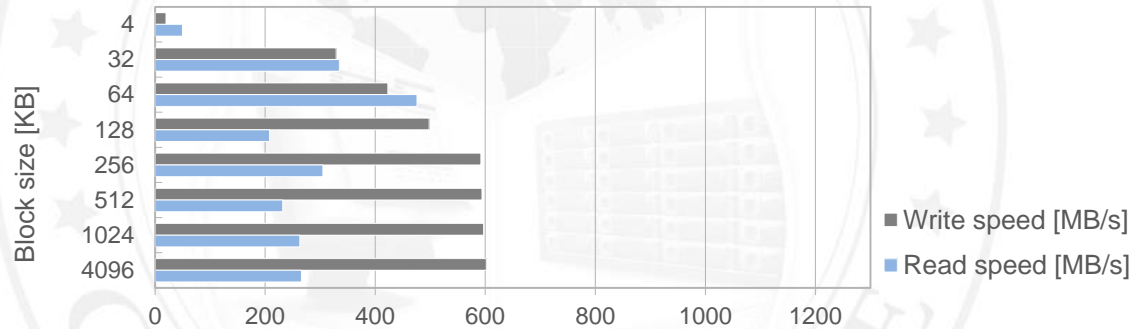


FIGURE 18: RAID10 performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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.

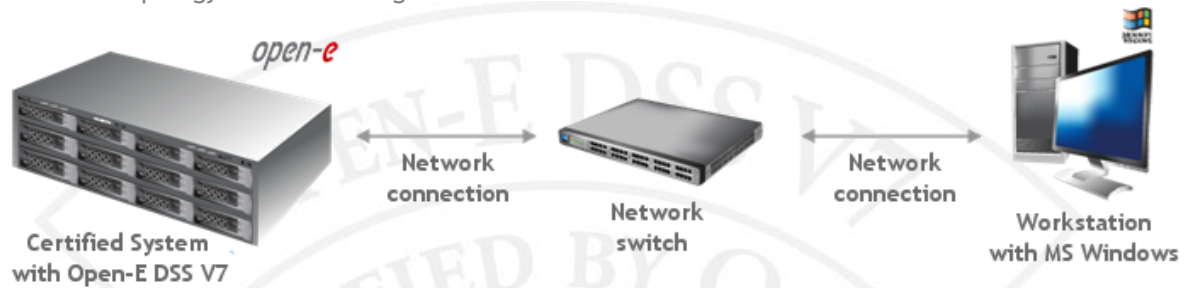


FIGURE 19: Network topology for NAS testing

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 Intel® Ethernet Converged Network Adapter X540-T2

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	106	111	passed
32	764	804	passed
64	764	708	passed
128	837	885	passed
256	862	1053	passed
512	785	1019	passed
1024	725	1028	passed
4096	862	1039	passed

TABLE 21: SMB performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

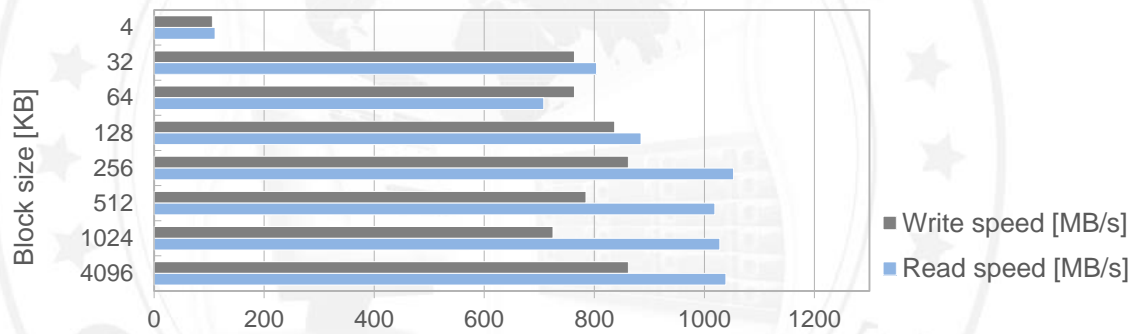


FIGURE 20: SMB performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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.

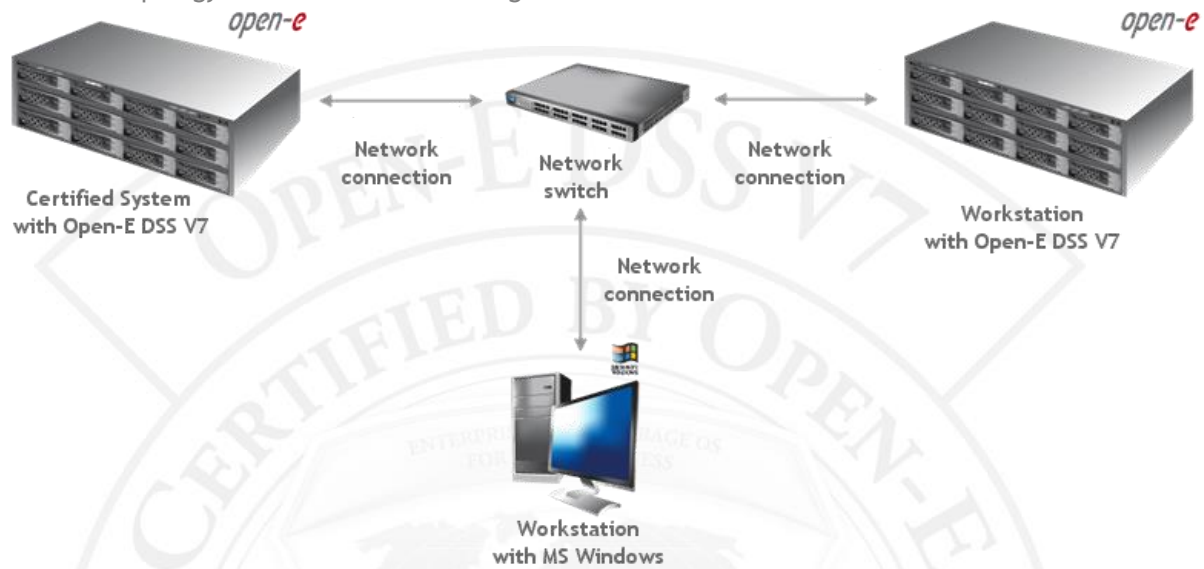


FIGURE 21: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

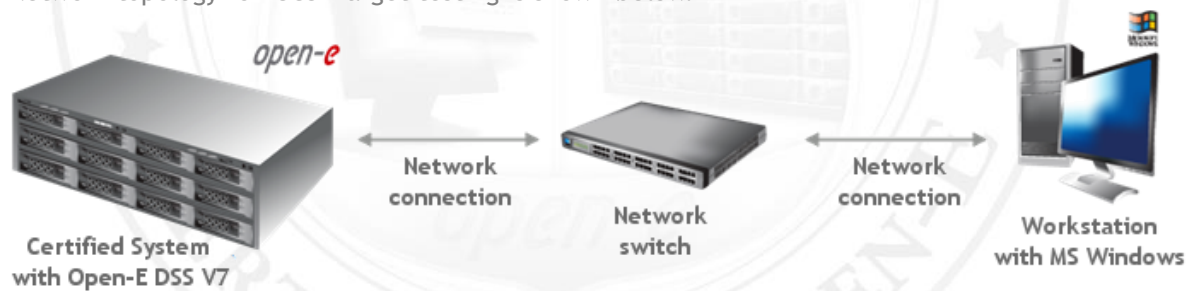


FIGURE 22: Network topology for iSCSI Target testing

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 and Intel® Ethernet Converged Network Adapter X540-T2

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	104	111	passed
32	439	795	passed
64	571	716	passed
128	582	901	passed
256	572	1031	passed
512	541	1090	passed
1024	541	1097	passed
4096	559	1102	passed

TABLE 22: iSCSI Initiator performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

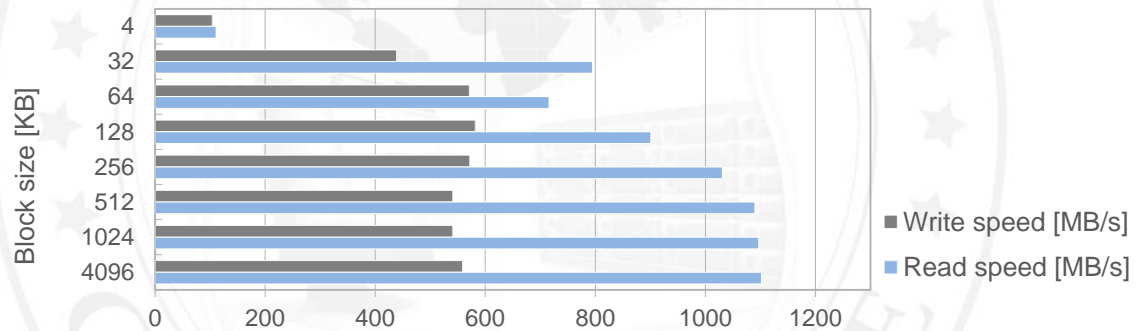


FIGURE 23: iSCSI Initiator performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2

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 Converged Network Adapter X540-T2

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49	53	passed
32	330	367	passed
64	412	424	passed
128	515	243	passed
256	642	264	passed
512	631	306	passed
1024	636	238	passed
4096	650	506	passed

TABLE 23: iSCSI Target performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

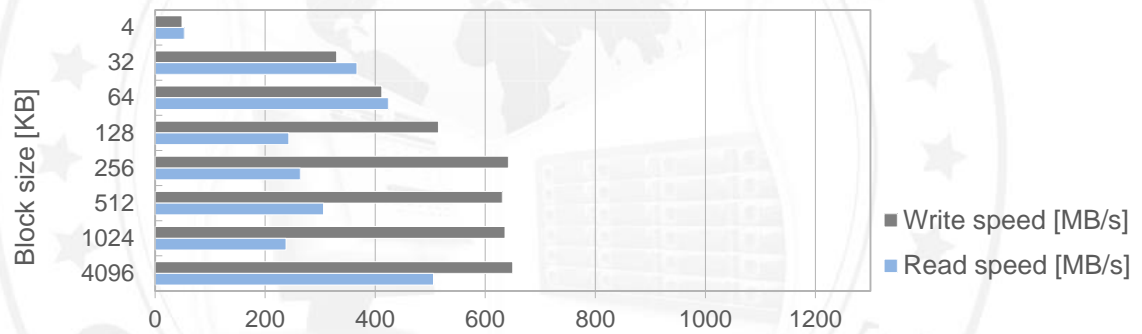


FIGURE 24: iSCSI Target performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2