Supermicro SSG-6027R-E1R12T system

Executive summary

After performing all tests, the Supermicro SSG-6027R-E1R12T 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 Supermicro SSG-6027R-E1R12T 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 Supermicro SSG-6027R-E1R12T good iSCSI storage:

  - Hardware RAID5, RAID6, RAID50 or RAID60 for high performance and data safety.
  - Two 10GbE interfaces for fast MPIO connection and flexible network topology.
  - Redundant power supply for system reliability.

- ✓ **NAS filer**

  The following features make Supermicro SSG-6027R-E1R12T a great NAS filer solution:

  - Twelve high capacity SATA hard drives provide a lot of space for user files.
  - Hardware RAID5, RAID6, RAID50 or RAID60 for fault tolerance and the most efficient use of available disk space or RAID10 for increased IOps.
  - Two 10GbE interfaces for independent connection to different networks or link aggregation for improved throughput.

- ✓ **Storage for backup**

  For this application the following can be used:

  - Two 10GbE network interfaces provides enough throughput for demanding backup networks.
  - Redundant power supply for system reliability.
  - Twelve high capacity SATA hard drives and RAID50 or RAID60, ensures a lot of safe storage space for backups.

Certification notes

For link aggregation, it is recommended to use balance-alb or 802.3ad bonding mode.

Supermicro SSG-6027R-E1R12T hardware components

Technical specifications about the certified system are listed below:

Model	Supermicro SSG-6027R-E1R12T
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	Supermicro CSE-826BE16-R920LPB
CPU	Intel® Xeon® Processor E5-2697 v2 2.70GHz
Motherboard	Supermicro MBD-X9DRH-7TF
Memory	8x 8GB Samsung DDR3 ECC-REG M393B1K70CH0-CH9
Network	Intel® Ethernet Controller X540-AT2
HW RAID	LSI SAS 2208 6Gb/s SAS Raid-on-Chip
Hard disk drives	12x 3TB TOSHIBA MG03SCA300

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

Supermicro SSG-6027R-E1R12T 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	Supermicro CSE-827HQ-R1400B
Motherboard	Supermicro MBD-X8DTT-HIBQF+-B
CPU	2x Intel® Xeon® Processor L5520 2.26GHz
Memory	2x 8GB Samsung DDR3 ECC-REG M393B1K70CH0-CH9
Network	Intel® 82574L Gigabit Ethernet Controller
Network	Intel® Ethernet Controller X540-AT2
Hard disk drives	500GB Seagate ES ST500NM001

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2012 R2
Enclosure/chassis	Supermicro CSE-827HQ-R1400B
Motherboard	Supermicro MBD-X8DTT-HIBQF+-B
CPU	2x Intel® Xeon® Processor L5520 2.26GHz
Memory	2x 8GB Samsung DDR3 ECC-REG M393B1K70CH0-CH9
Network	Intel® 82574L Gigabit Ethernet Controller
Network	Intel® Ethernet Controller X540-AT2
Hard disk drives	500GB Seagate ES ST500NM001

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	Supermicro CSE-826BE16-R920LPB
CPU	Intel® Xeon® Processor E5-2697 v2 2.70GHz
Motherboard	Supermicro MBD-X9DRH-7TF
Memory	8x 8GB Samsung DDR3 ECC-REG M393B1K70CH0-CH9
Network	Intel® Ethernet Controller X540-AT2
HW RAID	LSI SAS 2208 6Gb/s SAS Raid-on-Chip
Hard disk drives	12x 3TB TOSHIBA MG03SCA300

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

Model	Supermicro SSE-X3348TR
Description	48-ports 10GbE switch

TABLE 5: Network switch details for 10 GbE connections

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.

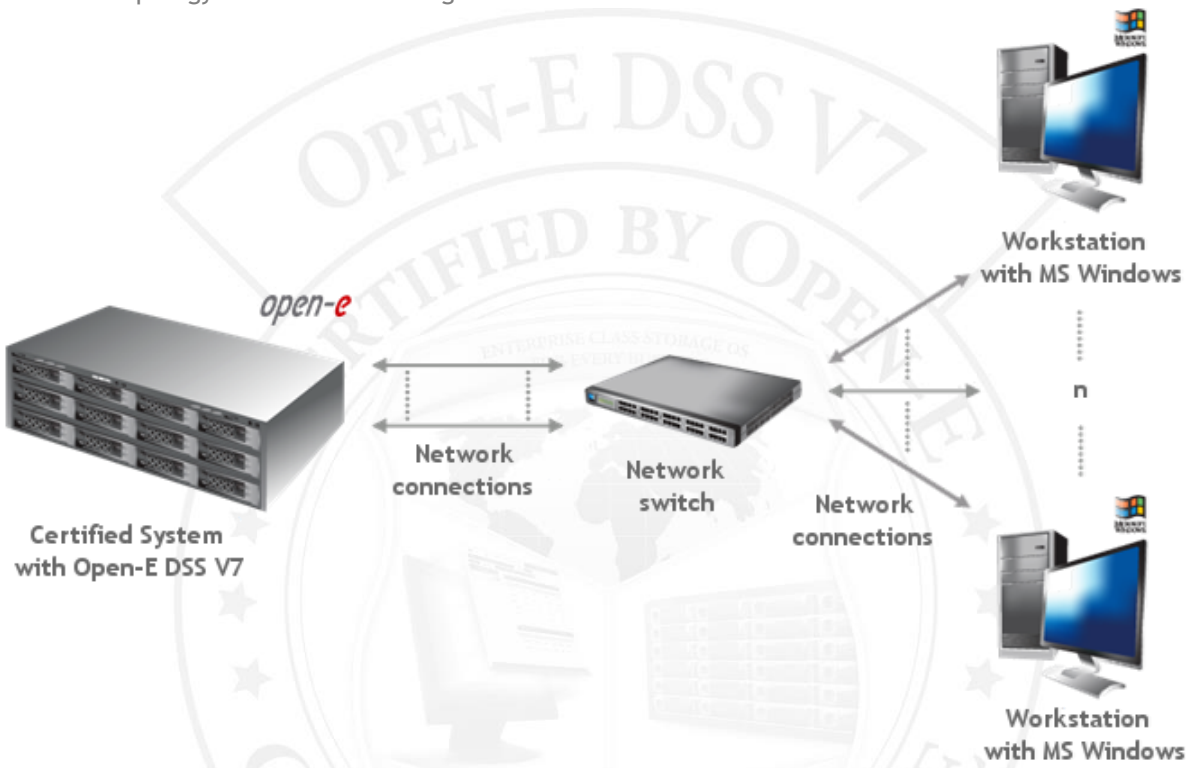

FIGURE 4: Network topology for Network testing

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 X540-AT2

802.3ad bonding mode performance test results			
NIC model	Intel® Ethernet Controller X540-AT2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	695	737	passed
2nd Workstation	734	784	passed

TABLE 7: 802.3ad bonding mode performance test results table for Intel® Ethernet Controller X540-AT2

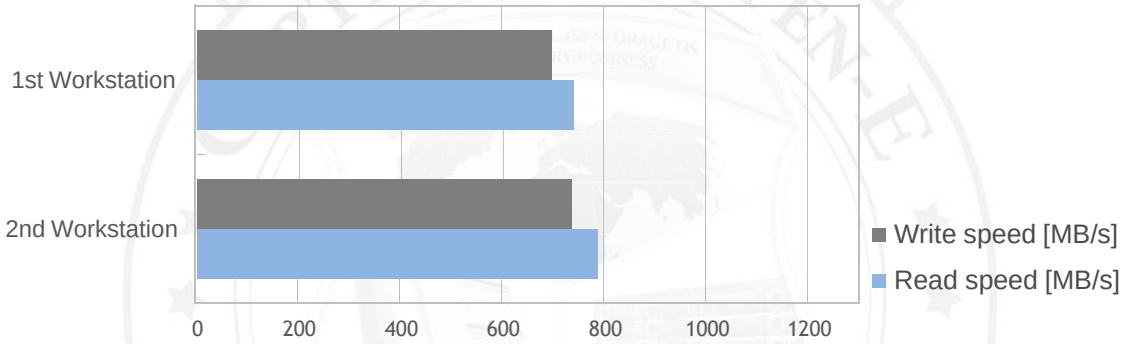

FIGURE 5: 802.3ad bonding mode performance test results chart for Intel® Ethernet Controller X540-AT2

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 X540-AT2

Balance-alb bonding mode performance test results			
NIC model	Intel® Ethernet Controller X540-AT2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	554	750	passed
2nd Workstation	783	771	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel® Ethernet Controller X540-AT2

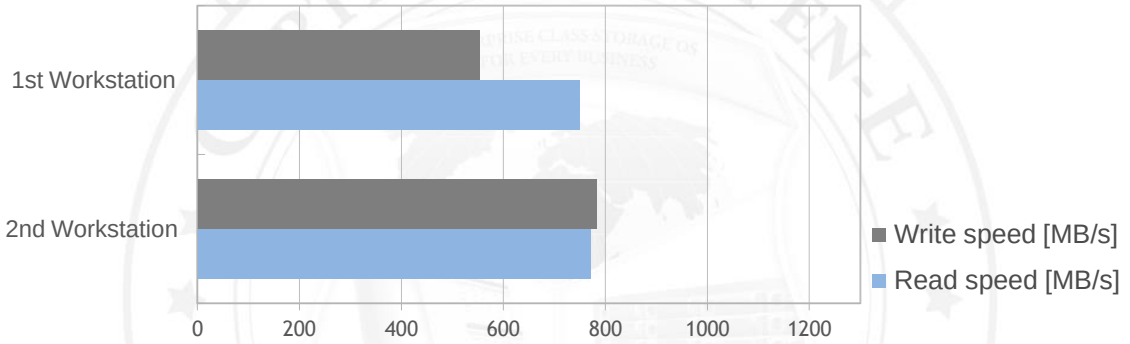

FIGURE 6: Balance-alb bonding mode performance test results chart for Intel® Ethernet Controller X540-AT2

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 X540-AT2

Balance-rr bonding mode performance test results			
NIC model	Intel® Ethernet Controller X540-AT2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	739	244	passed
2nd Workstation	729	249	passed

TABLE 9: Balance-rr bonding mode performance test results table for Intel® Ethernet Controller X540-AT2

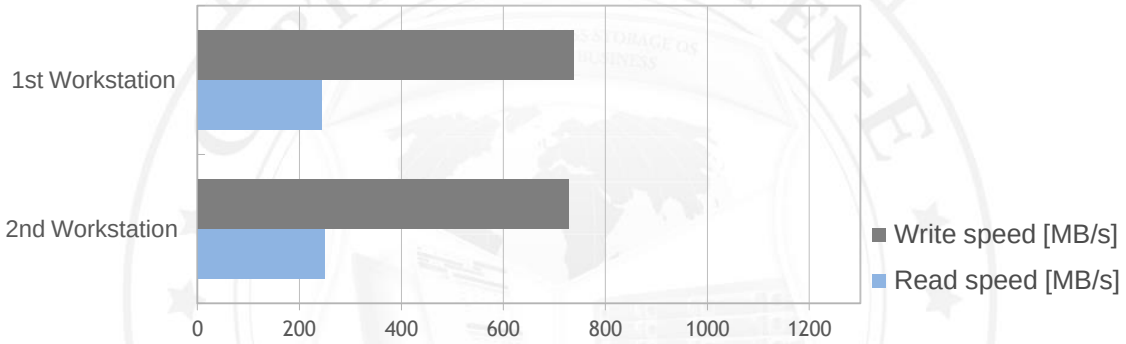

FIGURE 7: Balance-rr bonding mode performance test results chart for Intel® Ethernet Controller X540-AT2

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 X540-AT2

Single NIC performance test results			
NIC model	Intel® Ethernet Controller X540-AT2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1st Workstation	463	238	passed

TABLE 10: Single NIC performance test results table for Intel® Ethernet Controller X540-AT2

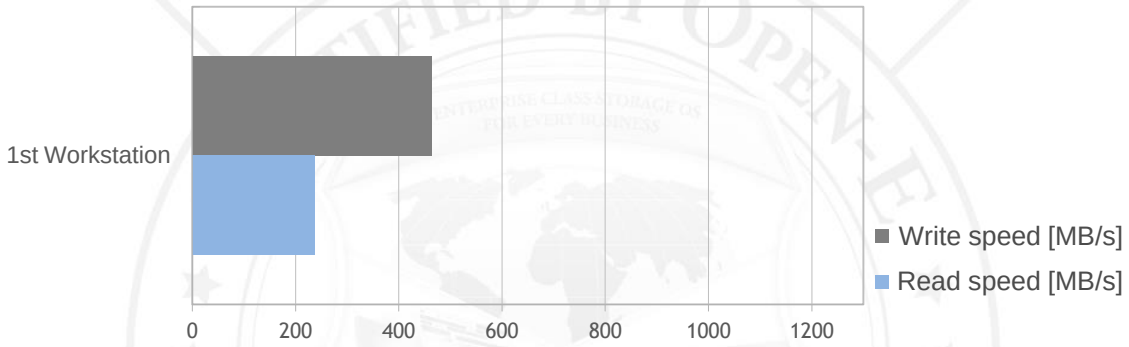

FIGURE 8: Single NIC performance test results chart for Intel® Ethernet Controller X540-AT2

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, 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

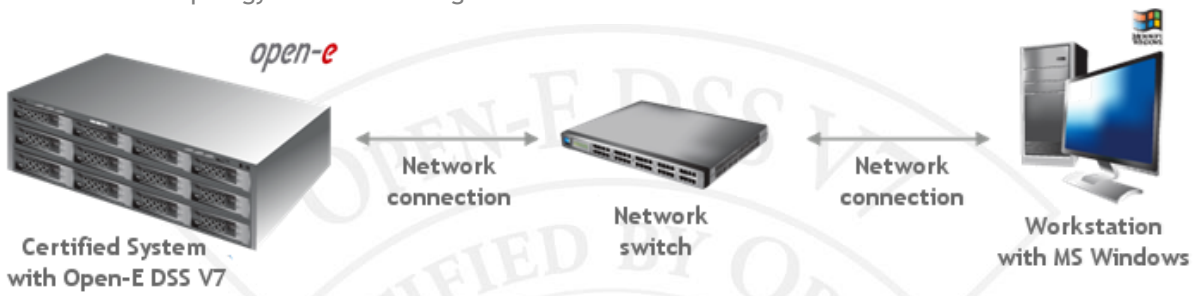

FIGURE 9: Network test topology for RAID testing

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® Ethernet Controller X540-AT2

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	43	62	passed
32	288	470	passed
64	325	517	passed
128	398	753	passed
256	530	879	passed
512	508	842	passed
1024	540	997	passed
4096	541	1101	passed

TABLE 11: RAID0 performance test results table for Intel® Ethernet Controller X540-AT2

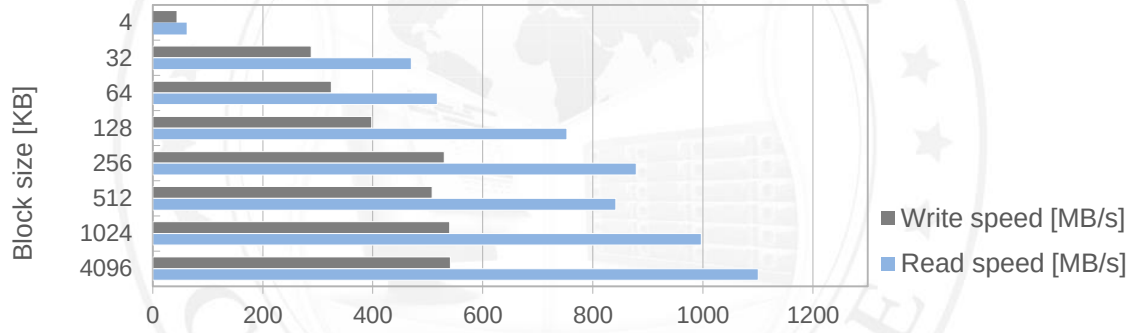

FIGURE 10: RAID0 performance test results chart for Intel® Ethernet Controller X540-AT2

Hardware RAID1 test

3. 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 Iometer testing tool.

4. Test results for RAID1 and Intel® Ethernet Controller X540-AT2

RAID1 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	42	61	passed
32	284	408	passed
64	386	388	passed
128	488	502	passed
256	585	692	passed
512	641	415	passed
1024	647	411	passed
4096	555	416	passed

TABLE 12: RAID1 performance test results table for Intel® Ethernet Controller X540-AT2

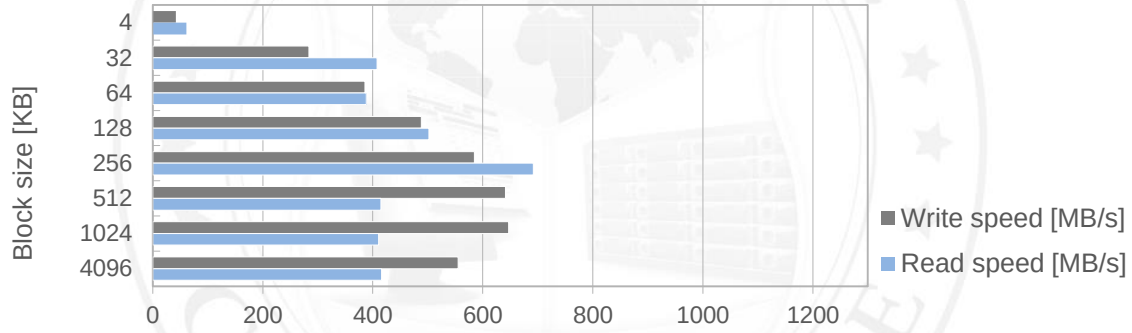

FIGURE 11: RAID1 performance test results chart for Intel® Ethernet Controller X540-AT2

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 Controller X540-AT2

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	40	56	passed
32	265	504	passed
64	365	746	passed
128	471	854	passed
256	592	1101	passed
512	620	1116	passed
1024	623	1104	passed
4096	636	1032	passed

TABLE 13: RAID5 performance test results table for Intel® Ethernet Controller X540-AT2

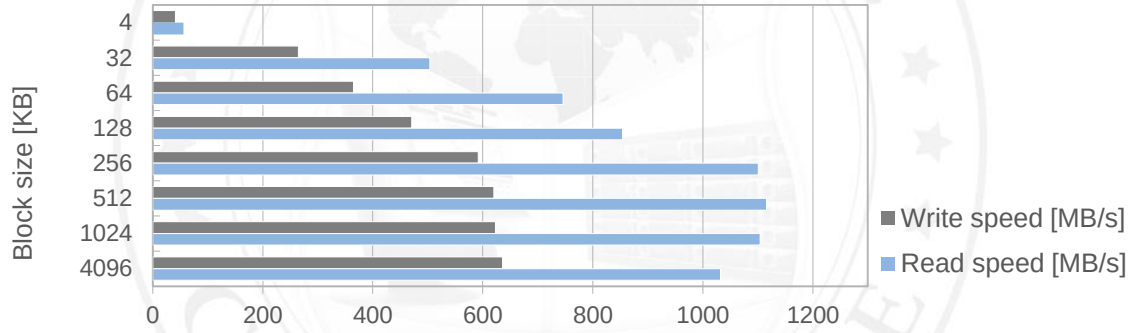

FIGURE 12: RAID5 performance test results chart for Intel® Ethernet Controller X540-AT2

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 Controller X540-AT2

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	43	57	passed
32	284	466	passed
64	381	663	passed
128	469	854	passed
256	669	1050	passed
512	606	1113	passed
1024	604	1109	passed
4096	616	1098	passed

TABLE 14: RAID6 performance test results table for Intel® Ethernet Controller X540-AT2

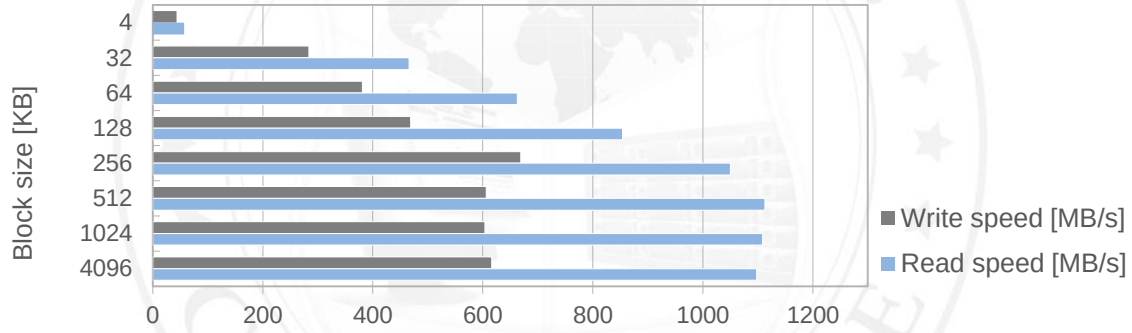

FIGURE 13: RAID6 performance test results chart for Intel® Ethernet Controller X540-AT2

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 X540-AT2

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	44	62	passed
32	289	366	passed
64	378	414	passed
128	478	507	passed
256	550	686	passed
512	601	1057	passed
1024	627	1043	passed
4096	608	1010	passed

TABLE 15: RAID10 performance test results table for Intel® Ethernet Controller X540-AT2

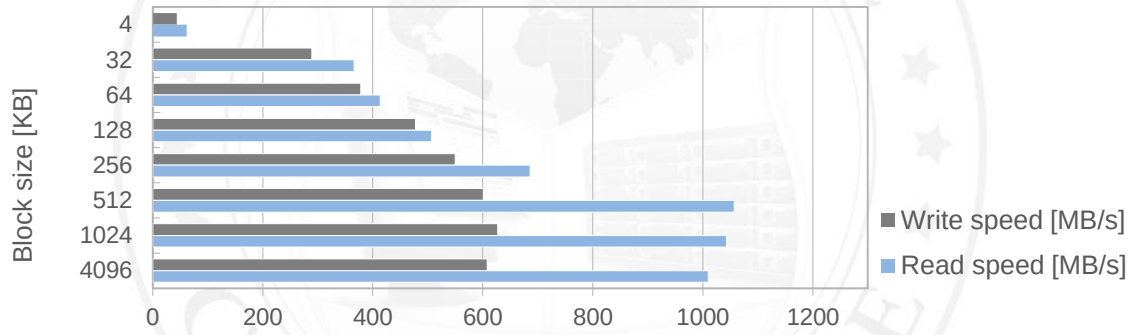

FIGURE 14: RAID10 performance test results chart for Intel® Ethernet Controller X540-AT2

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 Controller X540-AT2

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	41	58	passed
32	281	450	passed
64	377	694	passed
128	486	631	passed
256	562	869	passed
512	593	1058	passed
1024	648	830	passed
4096	601	857	passed

TABLE 16: RAID50 performance test results table for Intel® Ethernet Controller X540-AT2

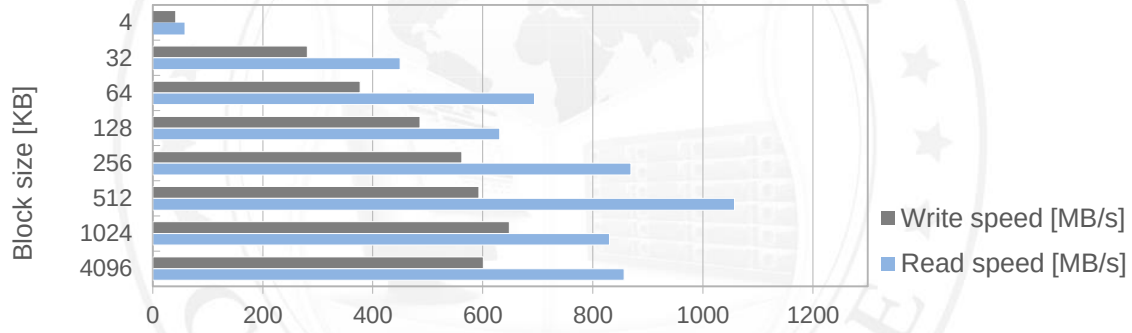

FIGURE 15: RAID50 performance test results chart for Intel® Ethernet Controller X540-AT2

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 Controller X540-AT2

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	42	58	passed
32	280	446	passed
64	374	646	passed
128	466	817	passed
256	593	1012	passed
512	628	1111	passed
1024	571	1104	passed
4096	577	1066	passed

TABLE 17: RAID60 performance test results table for Intel® Ethernet Controller X540-AT2

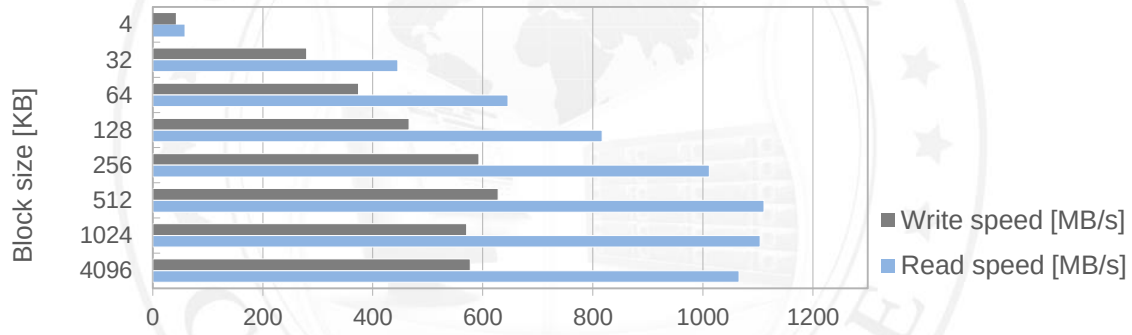

FIGURE 16: RAID60 performance test results chart for Intel® Ethernet Controller X540-AT2

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.

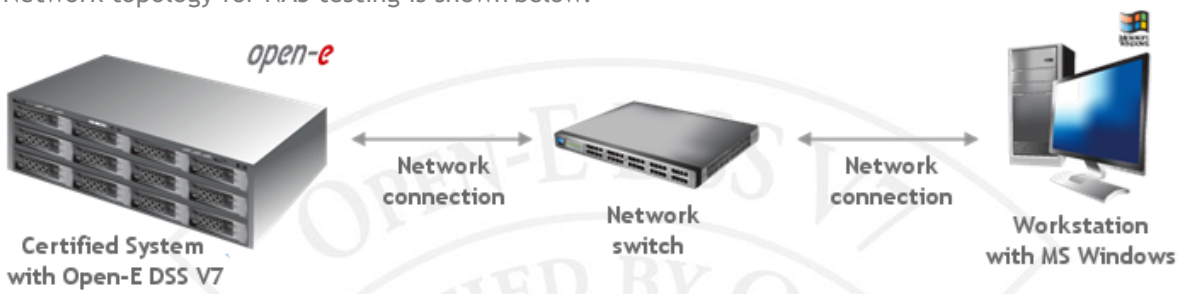

FIGURE 17: Network topology for NAS testing

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 X540-AT2

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	108	100	passed
32	573	571	passed
64	706	472	passed
128	1112	585	passed
256	1018	709	passed
512	1024	645	passed
1024	775	488	passed
4096	946	497	passed

TABLE 18: SMB performance test results table for Intel® Ethernet Controller X540-AT2

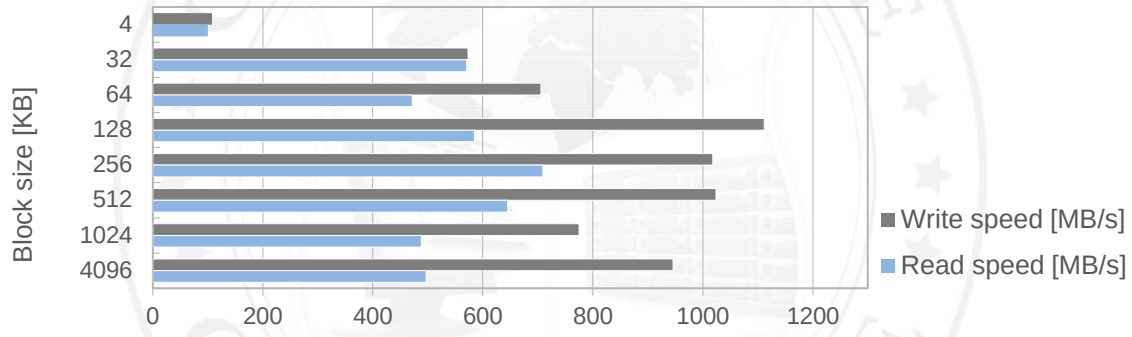

FIGURE 18: SMB performance test results chart for Intel® Ethernet Controller X540-AT2

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.

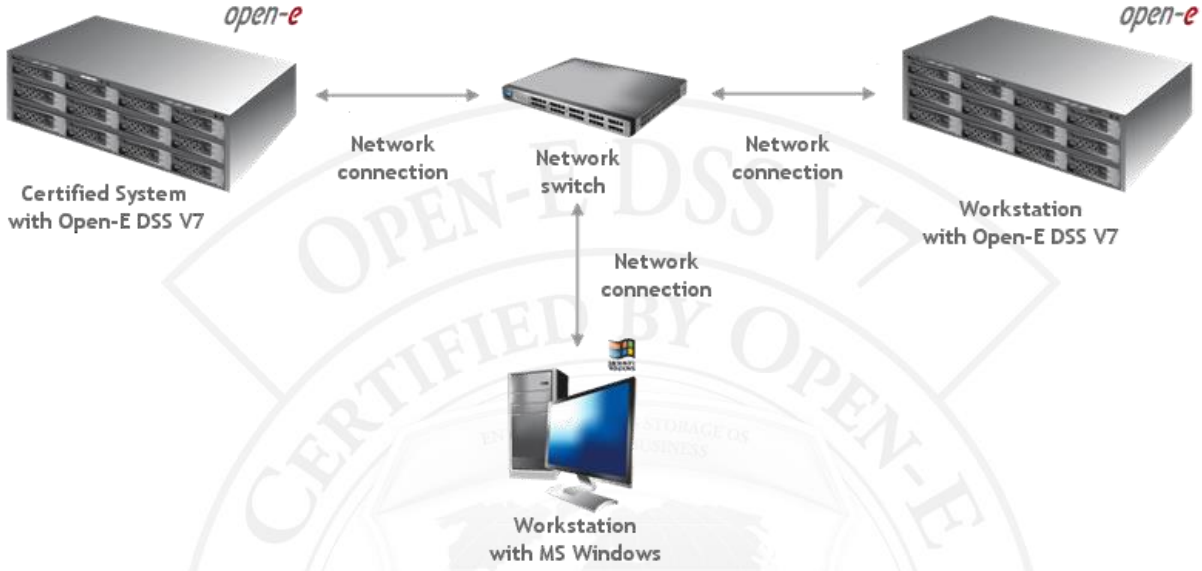

FIGURE 19: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

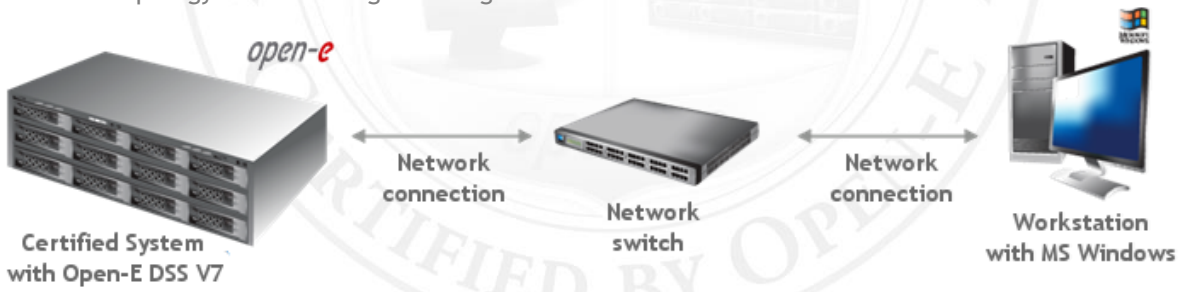

FIGURE 20: Network topology for iSCSI Target testing

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 X540-AT2

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	111	105	passed
32	539	554	passed
64	800	431	passed
128	876	581	passed
256	955	598	passed
512	807	625	passed
1024	970	544	passed
4096	1128	438	passed

TABLE 19: iSCSI Initiator performance test results table for Intel® Ethernet Controller X540-AT2

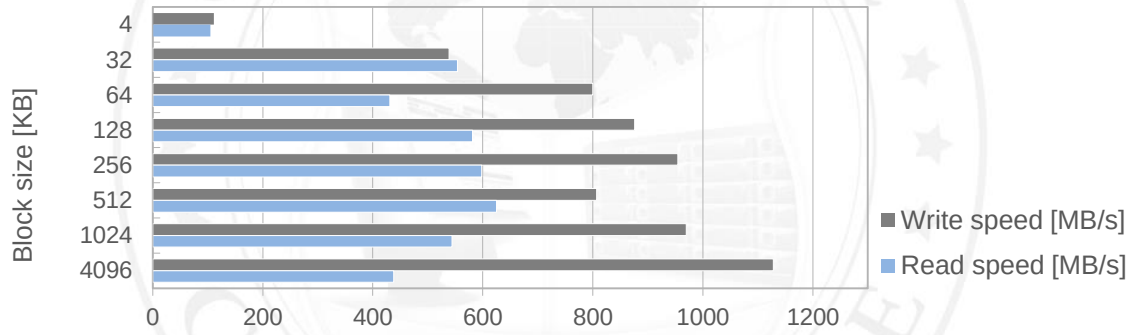

FIGURE 21: iSCSI Initiator performance test results chart for Intel® Ethernet Controller X540-AT2

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 X540-AT2

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	42	60	passed
32	283	488	passed
64	382	706	passed
128	472	489	passed
256	578	640	passed
512	705	1020	passed
1024	675	559	passed
4096	617	817	passed

TABLE 20: iSCSI Target performance test results table for Intel® Ethernet Controller X540-AT2

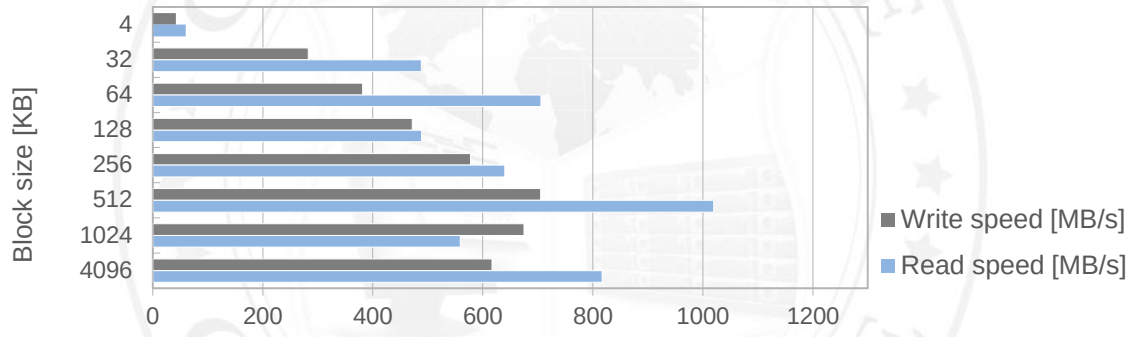

FIGURE 22: iSCSI Target performance test results chart for Intel® Ethernet Controller X540-AT2