

TAROX ParX R208s G5 system



Executive summary

After performing all tests, the TAROX ParX R208s G5 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 TAROX ParX R208s G5 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 TAROX ParX R208s G5 good iSCSI storage:

- HW RAID5, RAID6, RAID50 or RAID60 for high performance and data safety.
- Two 1GbE and two 10GbE 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:

- Eight 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 and two 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.

✓ Storage for backup

The following features make TAROX ParX R208s G5 great storage for a backup:

- Two 1GbE and two 10GbE network interfaces provides enough throughput for demanding backup networks and ensure flexibility in backup network topology.
- Redundant power supply for system reliability.
- Combination of eight 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 balance-alb bonding mode on 1GbE.

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TAROX ParX R208s G5 hardware components

Technical specifications about the certified system are listed below:

Model	TAROX ParX R208s G5
Operating system	Open-E DSS V7 build 10529
Enclosure/chassis	TAROX Servergehäuse Rack SMC SC825TQ-R740LPB
CPU	Intel Xeon E3-1220 v3 3.10GHz
Motherboard	Supermicro X10SLH-F
Memory	2x 8GB Crucial CT102472BD160B DDR3 ECC
Network	2x Intel I210AT (on-board)
Network	Intel Ethernet Converged Network Adapter X540-T2
HW RAID	LSI MegaRAID SAS 9271-8i
Hard disk drives	8x 2TB HGST Ultrastar 7K3000

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



TAROX ParX R208s G5 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 (on-board)
Network	2x Intel Ethernet Converged Network Adapter X540-T2
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 (on-board)
Network	2x Intel Ethernet Converged Network Adapter X540-T2
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
CPU	Intel Xeon Processor E3-1230 3.20 GHz
Motherboard	Asus P8B-E/4L
Memory	3x 4GB DDR3 Kingston KVR1333D3E9S/4G
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Network	2x Intel Ethernet Converged Network Adapter X540-T2
HW RAID	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	Netgear ProSafe Plus XS708E
Description	8 ports 10GbE cooper and 10GbE shared fiber port

TABLE 5: Network switch details for 1GbE and 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.

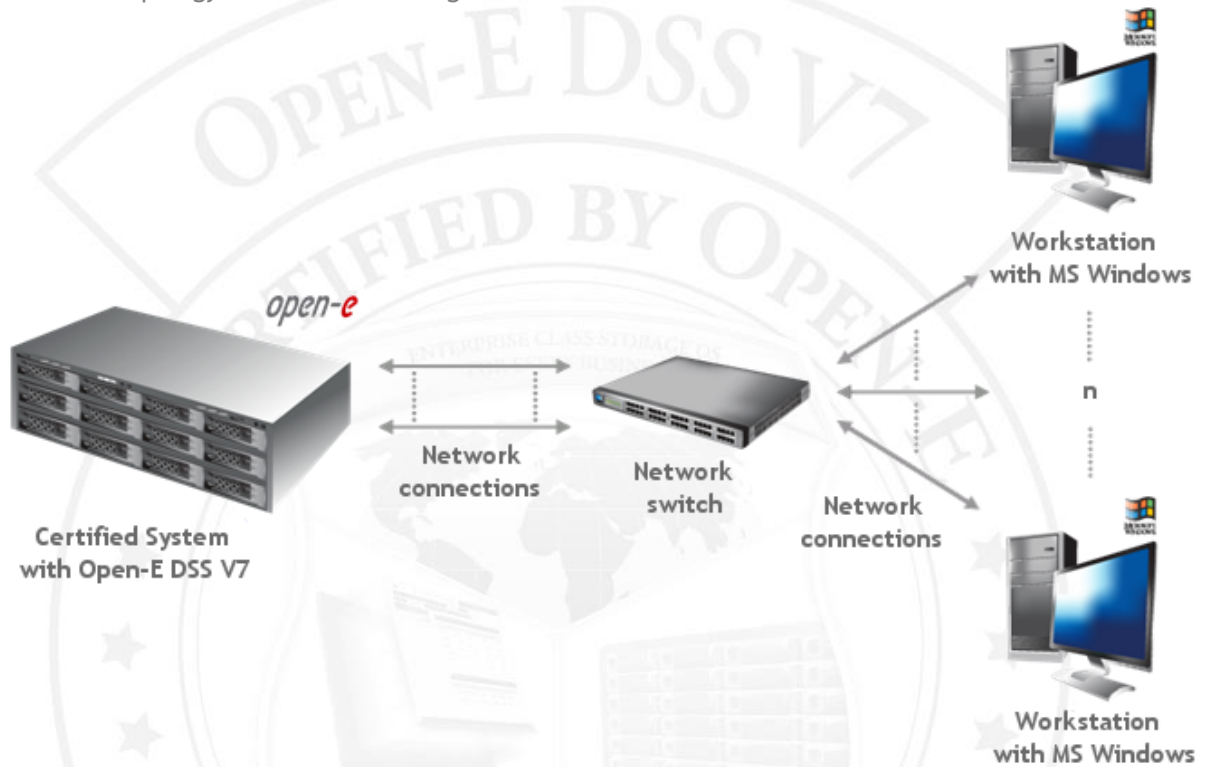


FIGURE 4: Network topology for Network testing

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 I210AT (on-board)

802.3ad bonding mode performance test results			
NIC model	Intel I210AT (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	112.25	51.79	passed
2 nd Workstation	109.27	61.91	passed

TABLE 7: 802.3ad bonding mode performance test results table for Intel I210AT (on-board)

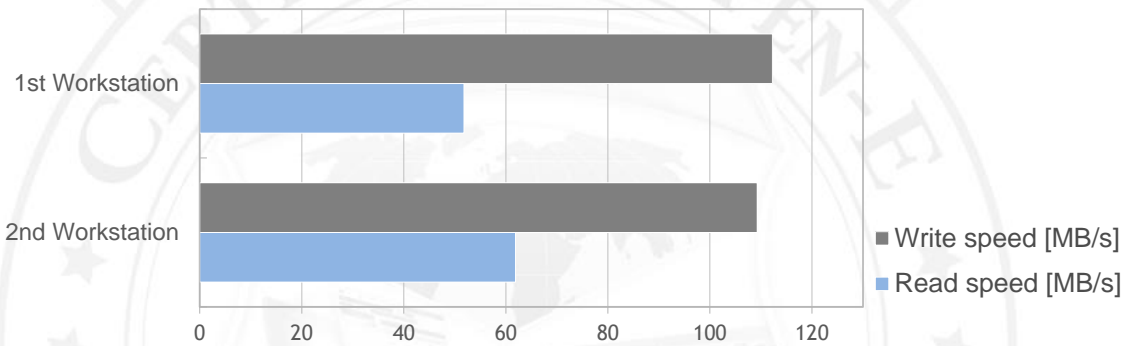


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel I210AT (on-board)

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 I210AT (on-board)

Balance-alb bonding mode performance test results			
NIC model	Intel I210AT (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	111.81	111.62	passed
2 nd Workstation	112.11	111.69	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel I210AT (on-board)

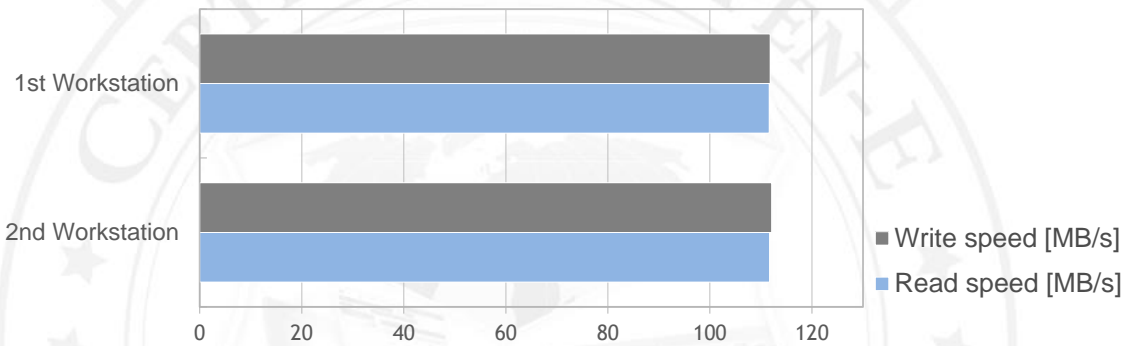


FIGURE 6: Balance-alb bonding mode performance test results chart for Intel I210AT (on-board)

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-T2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	230.11	328.45	passed
2 nd Workstation	249.17	301.71	passed

TABLE 9: Balance-alb bonding mode performance test results table for Intel Ethernet Converged Network Adapter X540-T2

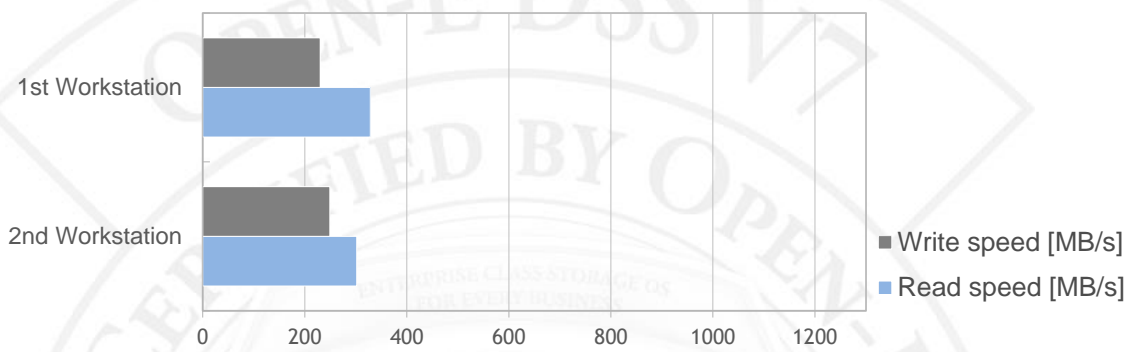


FIGURE 7: Balance-alb bonding mode performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for Balance-rr bonding mode test performed on Intel I210AT (on-board)

Balance-rr bonding mode performance test results			
NIC model	Intel I210AT (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	112.09	63.75	passed
2 nd Workstation	112.11	82.42	passed

TABLE 10: Balance-rr bonding mode performance test results table for Intel I210AT (on-board)

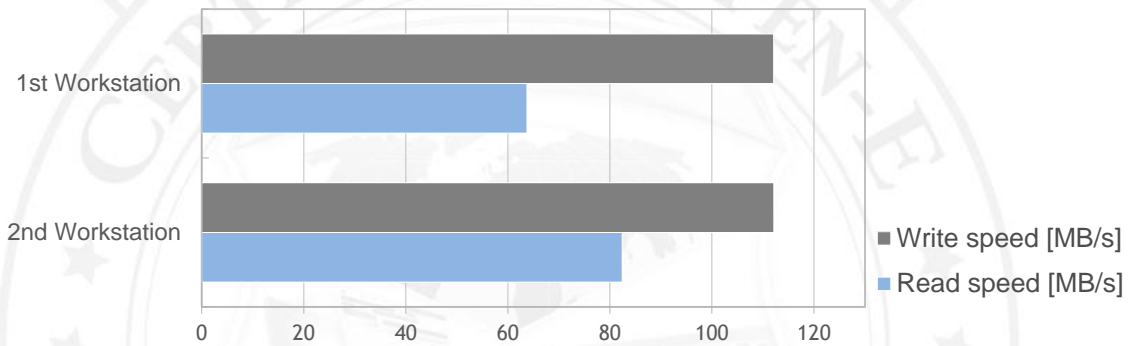


FIGURE 8: Balance-rr bonding mode performance test results chart for Intel I210AT (on-board)

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-T2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	560.15	336.52	passed
2 nd Workstation	575.86	305.83	passed

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

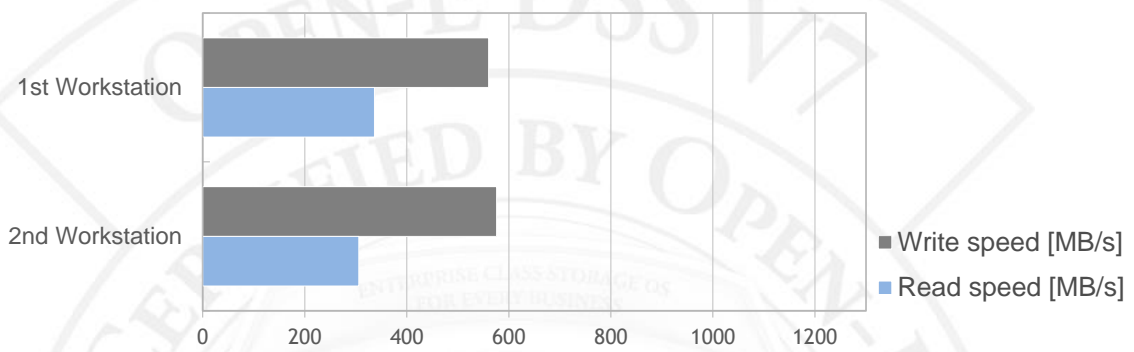


FIGURE 9: Balance-rr bonding mode performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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 I210AT (on-board)

Single NIC performance test results			
NIC model	Intel I210AT (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	112.21	112.02	passed

TABLE 12: Single NIC performance test results table for Intel I210AT (on-board)

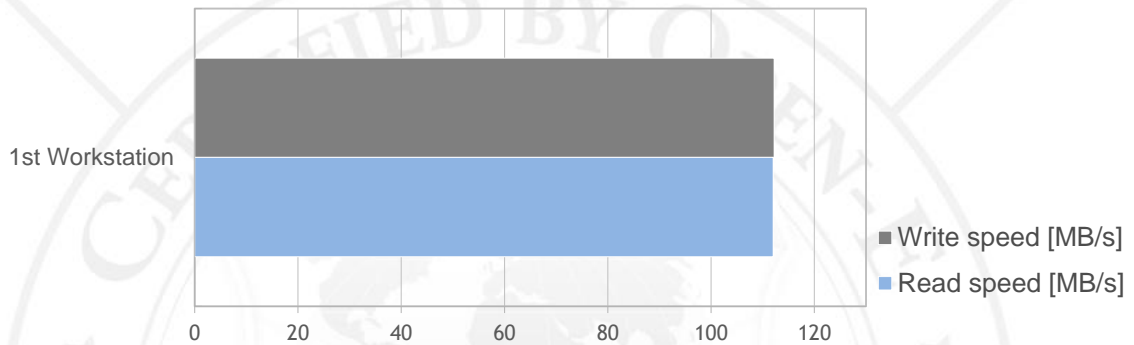


FIGURE 10: Single NIC performance test results chart for Intel I210AT (on-board)

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-T2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	672.06	626.69	passed

TABLE 13: Single NIC performance test results table for Intel Ethernet Converged Network Adapter X540-T2

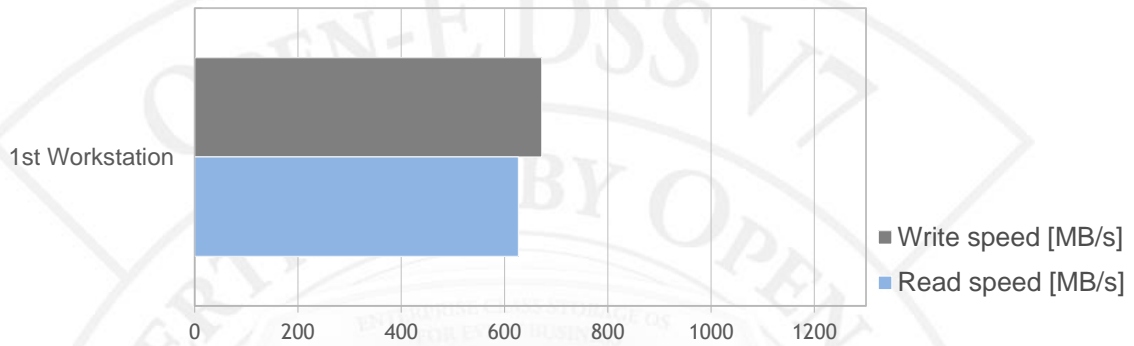


FIGURE 11: Single NIC performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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, 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 lometer testing tool.

RAID test topology

Network test topology for RAID testing is shown below

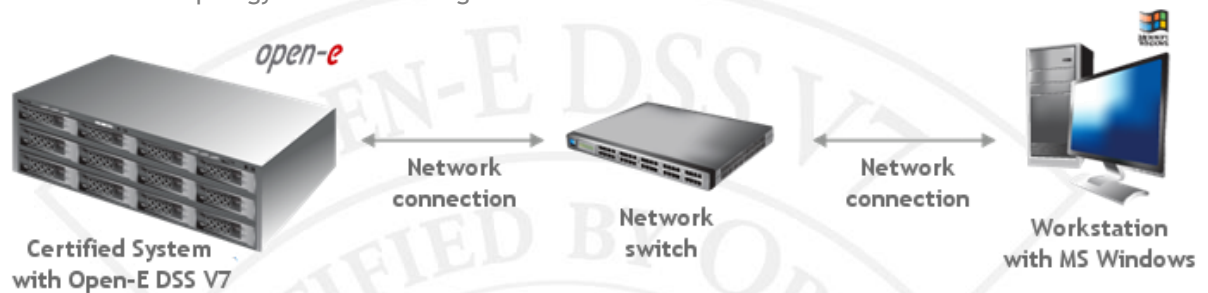


FIGURE 12: Network test topology for RAID testing

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	56.90	65.33	passed
32	332.47	368.12	passed
64	436.09	475.22	passed
128	542.89	549.96	passed
256	769.33	621.56	passed
512	765.01	533.57	passed
1024	778.56	526.88	passed
4096	817.96	540.39	passed

TABLE 14: RAID0 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

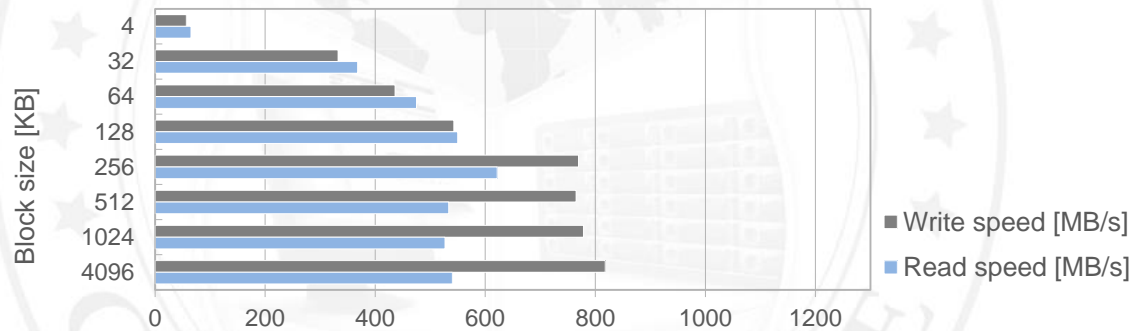


FIGURE 13: RAID0 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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	59.19	67.72	passed
32	344.28	345.29	passed
64	446.88	429.63	passed
128	541.54	500.65	passed
256	785.25	554.30	passed
512	804.58	514.39	passed
1024	803.22	512.65	passed
4096	801.21	514.62	passed

TABLE 15: RAID1 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

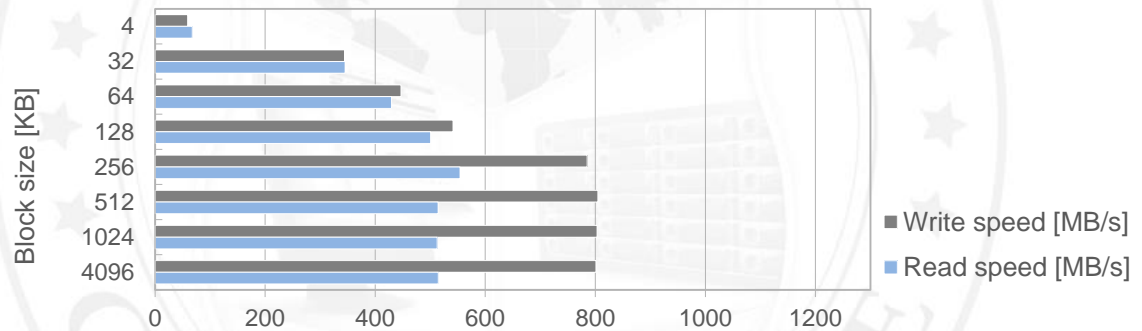


FIGURE 14: RAID1 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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	60.24	69.20	passed
32	343.09	364.05	passed
64	442.39	467.14	passed
128	540.95	524.96	passed
256	788.52	581.97	passed
512	793.20	516.87	passed
1024	789.77	517.59	passed
4096	701.13	534.79	passed

TABLE 16: RAID5 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

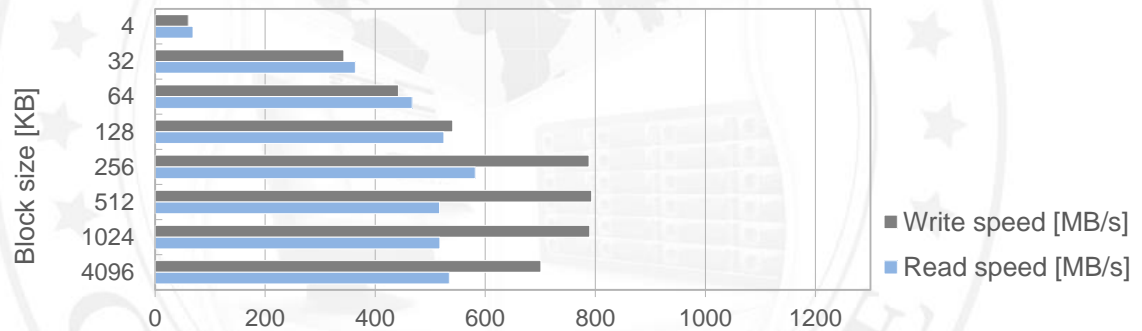


FIGURE 15: RAID5 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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	59.42	69.96	passed
32	342.75	362.04	passed
64	445.43	440.60	passed
128	541.60	500.39	passed
256	796.50	573.71	passed
512	798.94	529.20	passed
1024	797.27	523.03	passed
4096	799.40	526.85	passed

TABLE 17: RAID6 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

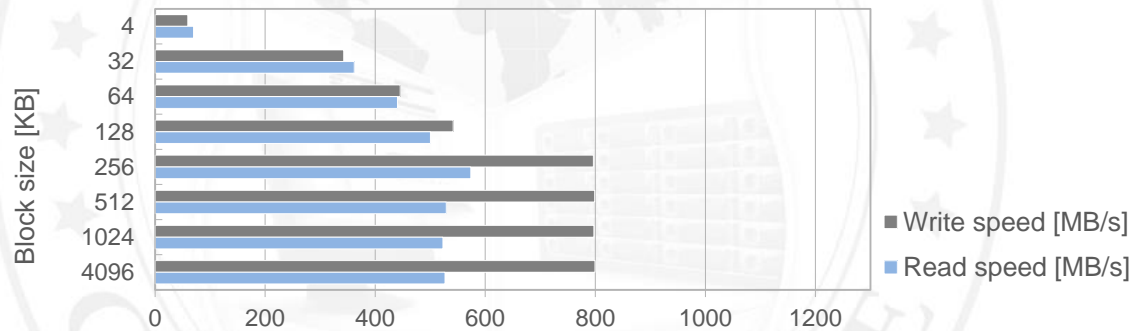


FIGURE 16: RAID6 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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	59.60	66.55	passed
32	343.47	363.57	passed
64	445.32	423.28	passed
128	535.06	514.43	passed
256	787.58	544.05	passed
512	812.88	513.71	passed
1024	826.01	511.18	passed
4096	817.67	512.42	passed

TABLE 18: RAID10 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

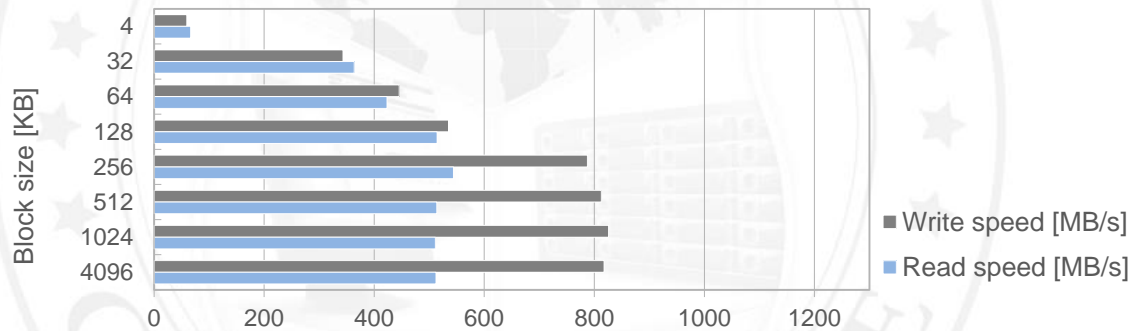


FIGURE 17: RAID10 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for RAID50 and Intel Ethernet Converged Network Adapter X540-T2

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	59.51	69.46	passed
32	342.90	428.63	passed
64	442.51	382.30	passed
128	543.58	463.46	passed
256	780.27	519.38	passed
512	761.30	508.54	passed
1024	797.09	528.56	passed
4096	787.64	501.90	passed

TABLE 19: RAID50 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

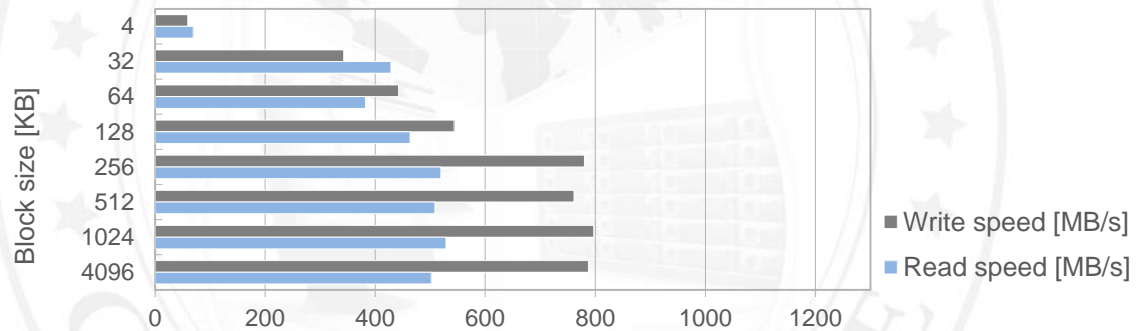


FIGURE 18: RAID50 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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 lometer testing tool.

2. Test results for RAID60 and Intel Ethernet Converged Network Adapter X540-T2

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	59.53	66.94	passed
32	340.92	312.62	passed
64	442.75	306.22	passed
128	536.42	333.28	passed
256	763.15	350.29	passed
512	798.39	411.90	passed
1024	796.14	436.17	passed
4096	748.81	419.19	passed

TABLE 20: RAID60 performance test results table for Intel Ethernet Converged Network Adapter X540-T2

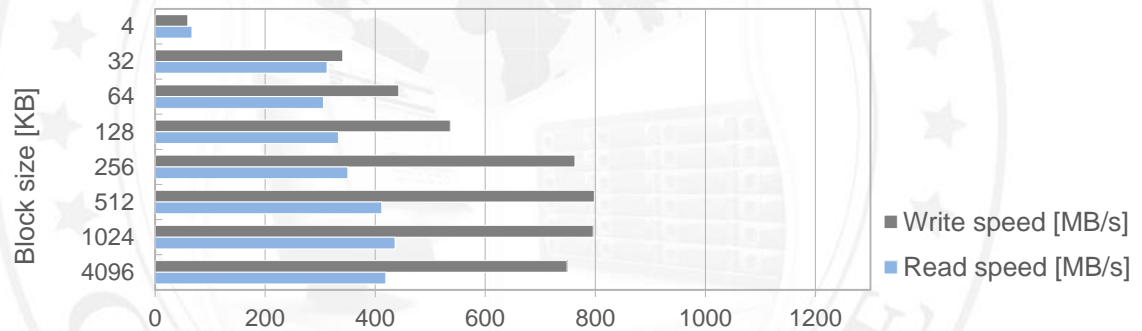


FIGURE 19: RAID60 performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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.

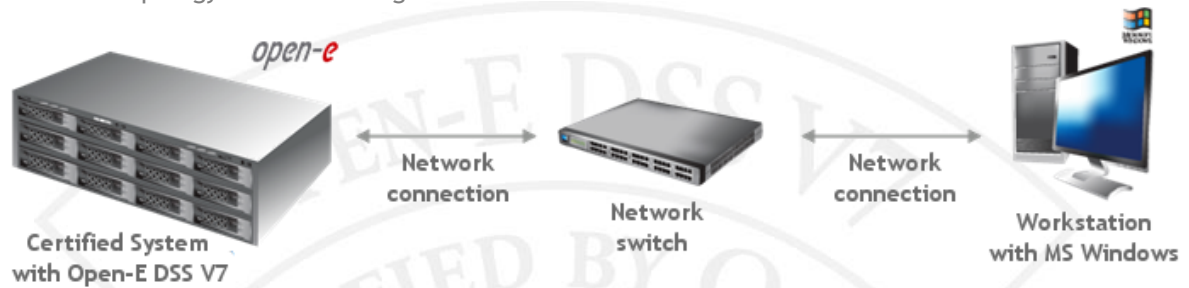


FIGURE 20: Network topology for NAS testing

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 lometer 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	124.40	122.22	passed
32	830.49	732.07	passed
64	1113.77	534.35	passed
128	1127.14	555.57	passed
256	1124.78	532.88	passed
512	1124.72	506.79	passed
1024	1126.07	495.51	passed
4096	1128.54	497.83	passed

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

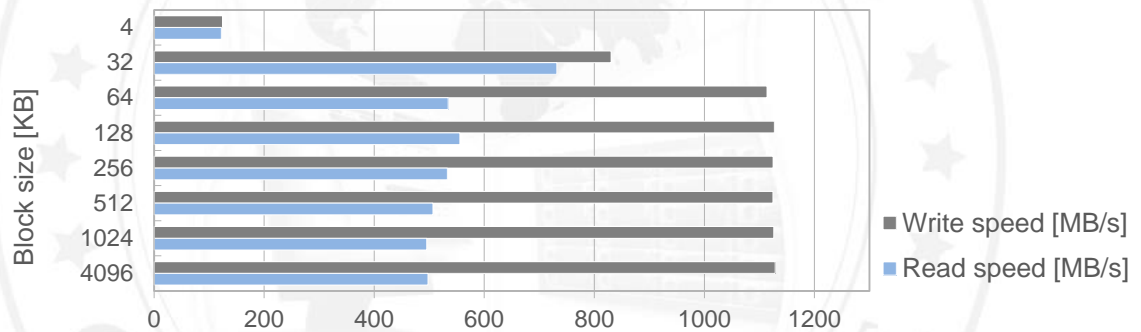


FIGURE 21: SMB performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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.

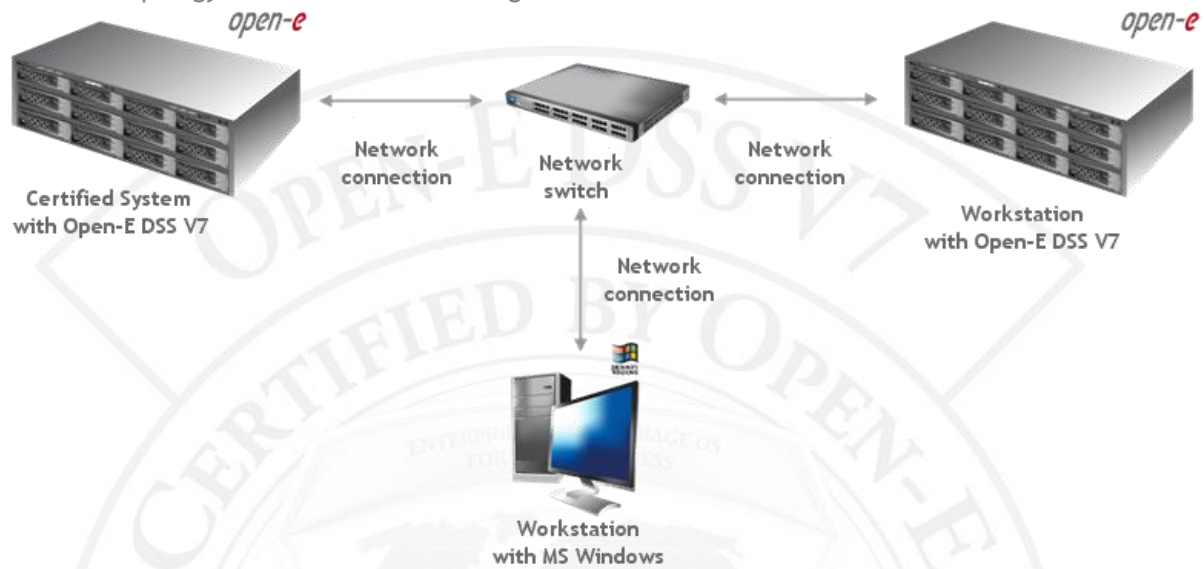


FIGURE 22: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

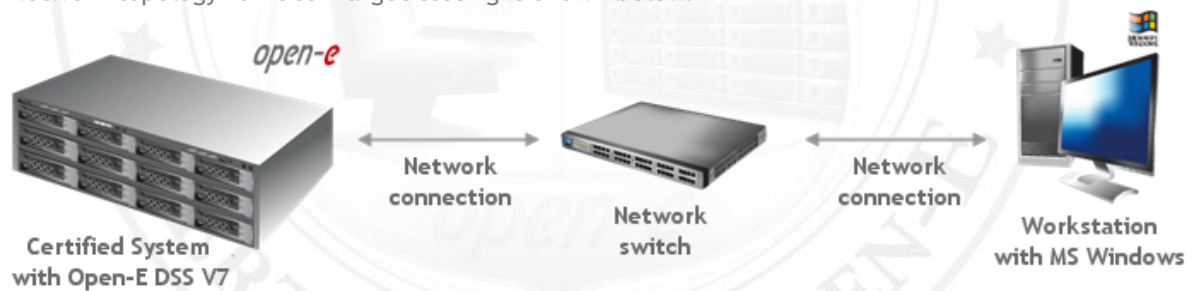


FIGURE 23: Network topology for iSCSI Target testing

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 lometer 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	123.70	119.92	passed
32	816.13	731.78	passed
64	1113.46	545.81	passed
128	1126.37	561.47	passed
256	1125.04	538.27	passed
512	1129.24	509.21	passed
1024	1127.98	497.51	passed
4096	1127.99	503.17	passed

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

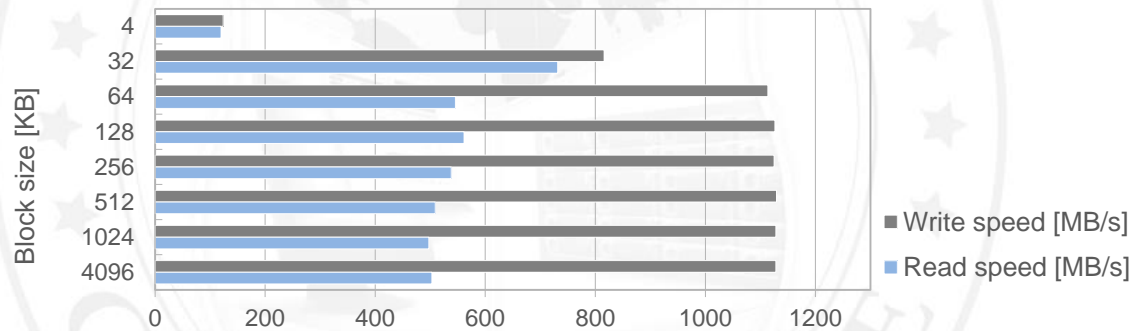


FIGURE 24: iSCSI Initiator performance test results chart for Intel Ethernet Converged Network Adapter X540-T2

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	57.18	69.05	passed
32	336.05	431.16	passed
64	435.64	536.48	passed
128	543.18	554.98	passed
256	781.43	618.63	passed
512	772.17	537.89	passed
1024	753.97	551.60	passed
4096	818.28	572.77	passed

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

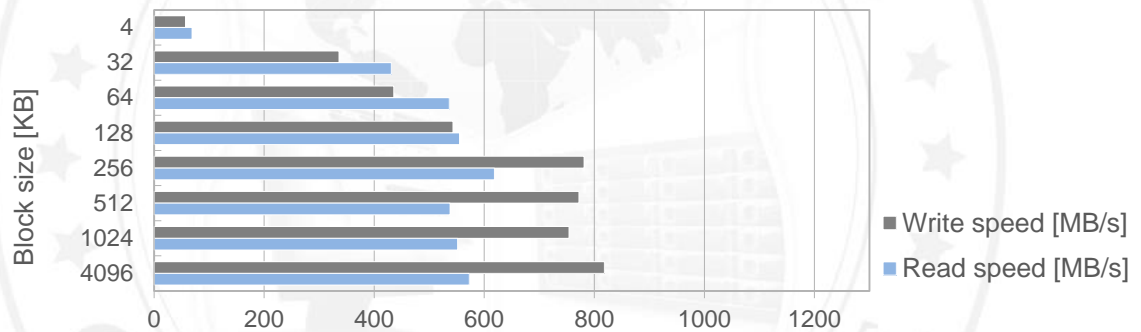


FIGURE 25: iSCSI Target performance test results chart for Intel Ethernet Converged Network Adapter X540-T2