



ComputerCentrum GmbH TERRA NAS 4220 G2 Storage system



Executive summary

After performing all tests, the ComputerCentrum GmbH TERRA NAS 4220 G2 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 ComputerCentrum GmbH TERRA NAS 4220 G2 is stable and performs well.

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

✓ NAS filer

The following features make ComputerCentrum GmbH TERRA NAS 4220 G2 a good NAS filer solution:

- Eight SAS hard drives and high RAID levels ensure a lot of safe storage space.
- Two 1GbE and four 10GbE interfaces for an independent connection to different networks or link aggregation for improved throughput.
- SSD cache for faster access to frequently used files.

✓ Storage for databases

The following features make the ComputerCentrum GmbH TERRA NAS Server 4220 G2 a great Storage for databases:

- Hardware RAID50 for high performance, best I/Ops ratio and data safety.
- Eight high class enterprise SAS drives combined with fast RAID controller and SSD cache, ensure fast random data access and reliability.
- Four 10GbE interfaces which can be aggregated for improved fault tolerance and increased performance for fast database connection.
- Redundant power supply for system reliability.

✓ Storage for Virtualization

For this application the following can be used:

- Hardware RAID5, RAID6, RAID10, RAID50 or RAID60 for high performance and data safety.
- Two 1GbE interfaces for flexible network topology or fast MPIO connection.
- Four 10GbE interfaces for efficient network connections to virtualization platforms.
- SSD cache for I/O bottlenecks elimination and increased virtual machine density.

Certification notes

Five Intel® SSD DC S3500 Series were not only used as SSD Cache but also to perform RAID0, RAID5, RAID6 and RAID10 level tests during certification. The drives passed all tests well.



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ComputerCentrum GmbH TERRA NAS 4220 G2 hardware components

Technical specifications about the certified system are listed below:

Model	ComputerCentrum GmbH TERRA NAS 4220 G2
Operating system	Open-E DSS V7 build 18255
Enclosure/chassis	Chenbro RM23624 2U
CPU	Intel® Xeon® Processor E3-1231 v3 3.40GHz
Motherboard	Intel® Server Board S1200RP
Memory	2x 8GB Hynix HMT41GE7AFR8C DDR3 ECC
Memory	2x 8GB Samsung M391B1G73QH0 DDR3 ECC
Network	2x Intel® Ethernet Controller I210-AT
Network	Intel® Ethernet Converged Network Adapter X540-T2
Network	Intel® Ethernet Converged Network Adapter X520-DA2
HW RAID	Avago MegaRAID SAS 9361-8i
Hard disk drives	5x 240GB Intel® SSD DC S3500 Series SSDSC2BB240G4
Hard disk drives	8x 600GB Seagate Savio® ST600MM0006
Hard disk drives	80GB Intel® SSD DC S3510 Series SSDSC2BB080G6

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



ComputerCentrum GmbH TERRA NAS 4220 G2 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	Intel® R2224GZ4GC4 2U Chassis
Motherboard	Intel® Server Board S2600GZ4
CPU	2x Intel® Xeon® Processor E5-2643 3.30GHz
Memory	8x 16GB Kingston 9965516-421.A00LF DDR3 ECC REG
Network	Intel® Ethernet Controller I350-AM4
Network	Intel® Ethernet Converged Network Adapter X540-T2
Network	Dual Port Intel® 82599EB 10GbE I/O Module (AXX10GBNIAIOM)
Hard disk controller	Intel® Integrated RAID Module RMS25PB080
Hard disk drives	2x 900GB Western Digital XE WD9001BKHG

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2012 R2
Enclosure/chassis	Intel® R2224GZ4GC4 2U Chassis
Motherboard	Intel® Server Board S2600GZ4
CPU	2x Intel® Xeon® Processor E5-2643 3.30GHz
Memory	8x 16GB Kingston 9965516-421.A00LF DDR3 ECC REG
Network	Intel® Ethernet Controller I350-AM4
Network	Intel® Ethernet Converged Network Adapter X540-T2
Network	Dual Port Intel® 82599EB 10GbE I/O Module (AXX10GBNIAIOM)
Hard disk controller	Intel® Integrated RAID Module RMS25PB080
Hard disk drives	2x 900GB Western Digital XE WD9001BKHG

TABLE 3: Hardware components of second Workstation with MS Windows



Model	ComputerCentrum GmbH TERRA NAS 4220 G2
Operating system	Open-E DSS V7 build 18255
Enclosure/chassis	Chenbro RM23624 2U
CPU	Intel® Xeon® Processor E3-1231 v3 3.40GHz
Motherboard	Intel® Server Board S1200RP
Memory	2x 8GB Hynix HMT41GE7AFR8C DDR3 ECC
Memory	2x 8GB Samsung M391B1G73QH0 DDR3 ECC
Network	2x Intel® Ethernet Controller I210-AT
Network	Intel® Ethernet Converged Network Adapter X540-T2
Network	Intel® Ethernet Converged Network Adapter X520-DA2
HW RAID	Avago MegaRAID SAS 9361-8i
Hard disk drives	5x 240GB Intel® SSD DC S3500 Series SSDSC2BB240G4
Hard disk drives	8x 600GB Seagate Savio® ST600MM0006
Hard disk drives	80GB Intel® SSD DC S3510 Series SSDSC2BB080G6

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

Model	Supermicro® SSE-G24-TG4
Description	48-ports 1GbE and 4-ports 10GbE

TABLE 5: Network switch details for connection with 1GbE and 10GbE

Model	Netgear® ProSAFE XS708
Description	8-ports 10GbE

TABLE 6: Network switch details for connection with 10GbE

Administration functionality

The following functionality has been tested.

Drive identifier	N/A
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.

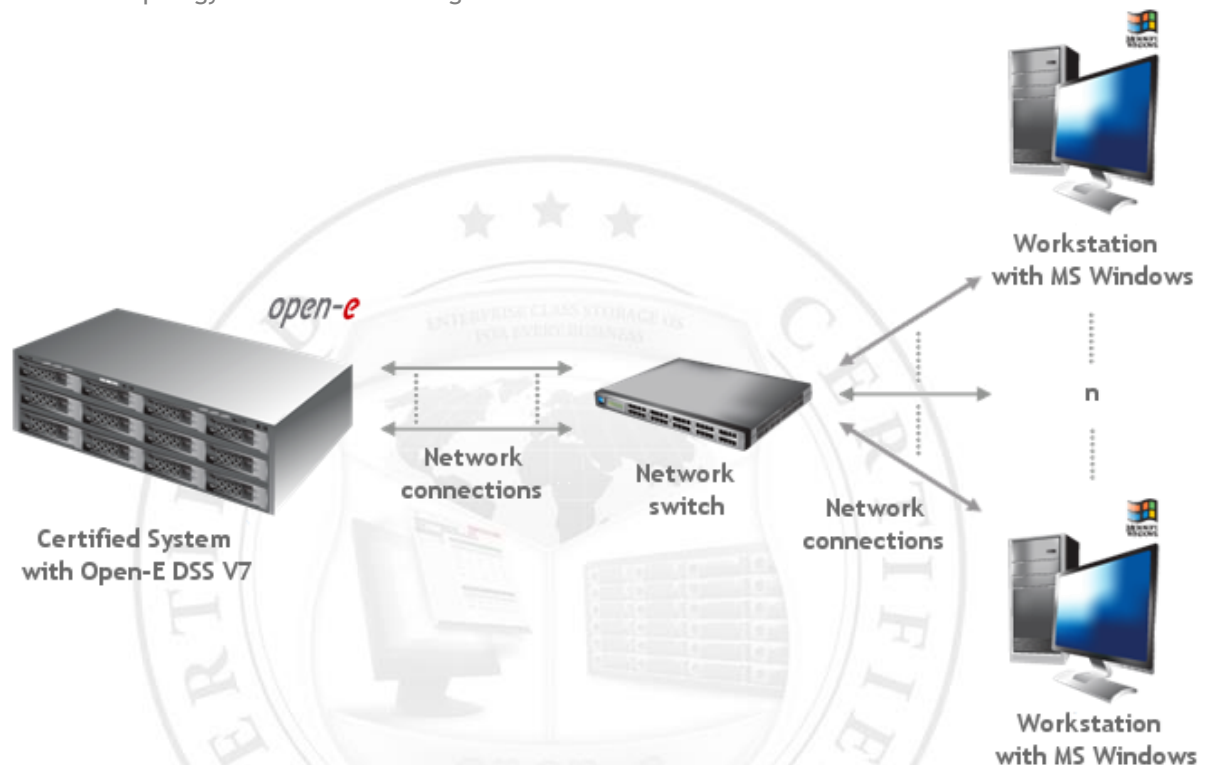


FIGURE 4: Network topology for Network testing

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 Iometer testing tool.

2. Test results for 802.3ad bonding mode test performed on Intel® Ethernet Controller I210-AT

802.3ad bonding mode performance test results			
NIC model	Intel® Ethernet Controller I210-AT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	114.25	57.34	passed
2 nd Workstation	114.20	57.87	passed

TABLE 8: 802.3ad bonding mode performance test results table for Intel® Ethernet Controller I210-AT

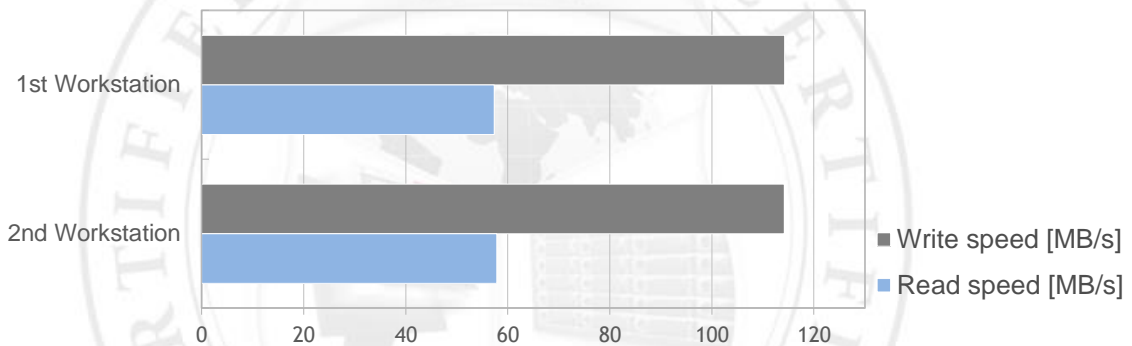


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel® Ethernet Controller I210-AT

3. Test results for 802.3ad bonding mode test performed on Intel® Ethernet Converged Network Adapter X520-DA2

802.3ad bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X520-DA2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	1130.40	517.38	passed
2 nd Workstation	787.12	612.94	passed

TABLE 9: 802.3ad bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

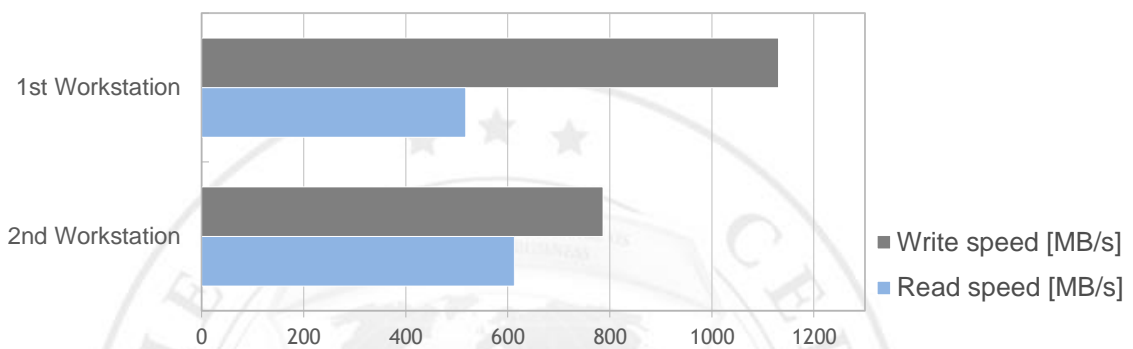


FIGURE 6: 802.3ad bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 I210-AT

Balance-alb bonding mode performance test results			
NIC model	Intel® Ethernet Controller I210-AT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	114.26	114.30	passed
2 nd Workstation	114.20	113.08	passed

TABLE 10: Balance-alb bonding mode performance test results table for Intel® Ethernet Controller I210-AT

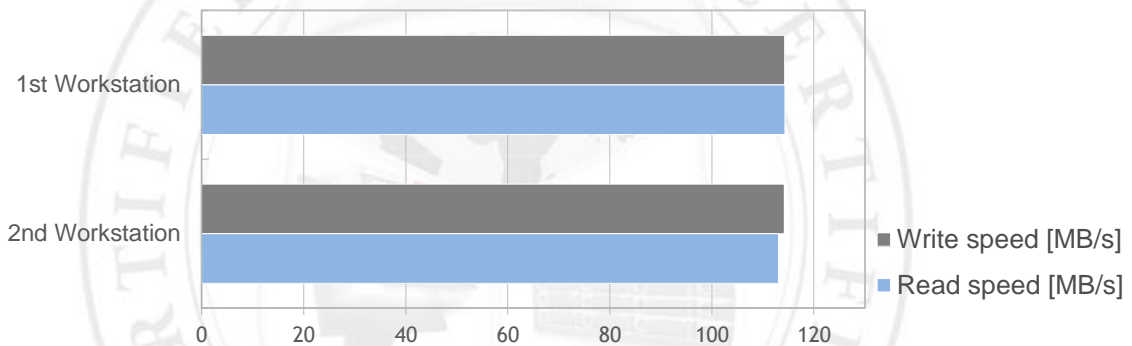


FIGURE 7: Balance-alb bonding mode performance test results chart for Intel® Ethernet Controller I210-AT

3. Test results for Balance-alb bonding mode test performed on Intel® Ethernet Converged Network Adapter X520-DA2

Balance-alb bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X520-DA2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	889.12	981.64	passed
2 nd Workstation	1005.04	963.46	passed

TABLE 11: Balance-alb bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

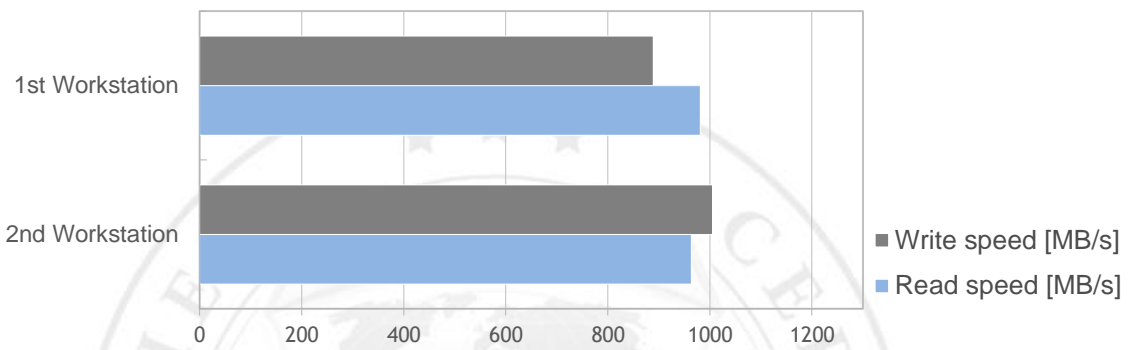
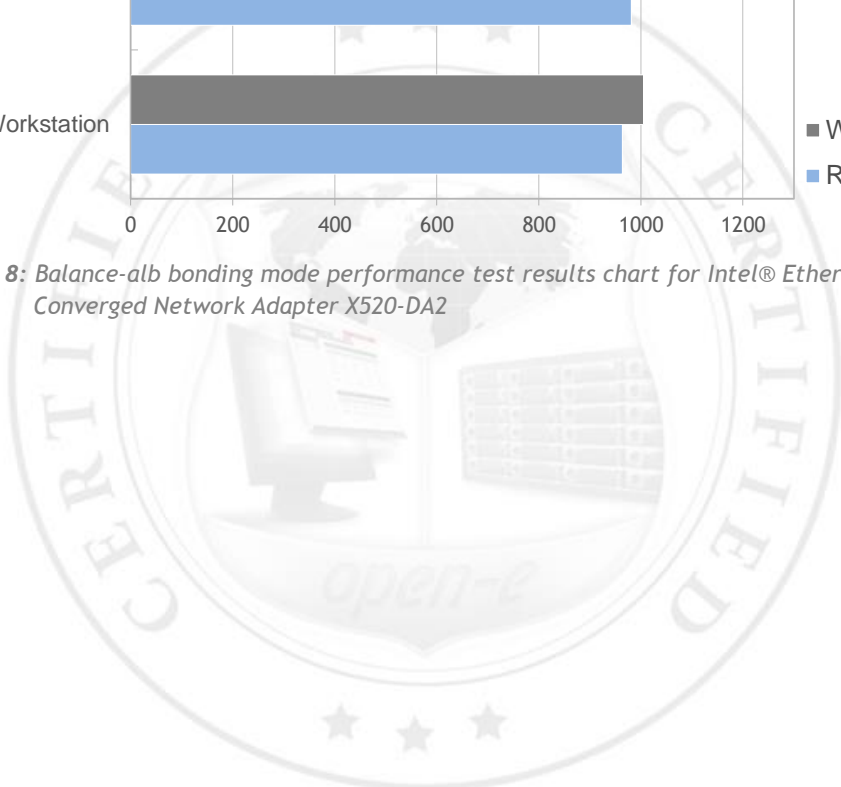


FIGURE 8: Balance-alb bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2



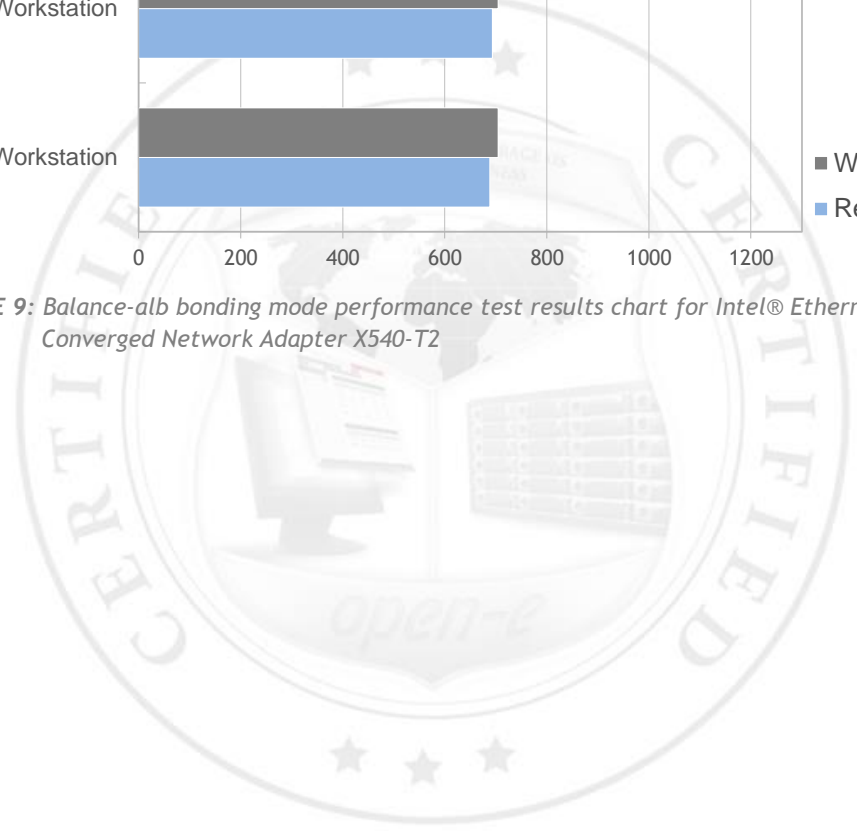
4. Test results for Balance-alb bonding mode test performed on Intel® Ethernet Converged Network Adapter X540-T2

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	704.85	693.56	passed
2 nd Workstation	704.32	688.47	passed

TABLE 12: Balance-alb bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X540-T2



FIGURE 9: 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® Ethernet Controller I210-AT

Balance-rr bonding mode performance test results			
NIC model	Intel® Ethernet Controller I210-AT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	114.27	113.19	passed
2 nd Workstation	114.20	112.62	passed

TABLE 13: Balance-rr bonding mode performance test results table for Intel® Ethernet Controller I210-AT

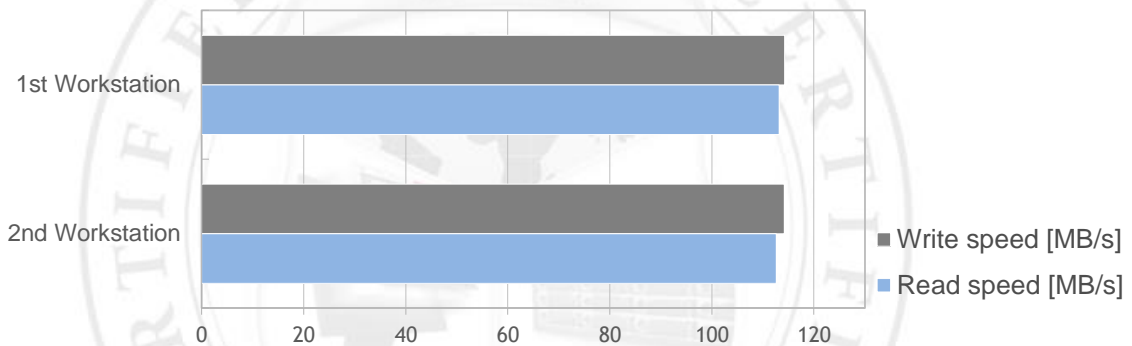


FIGURE 10: Balance-rr bonding mode performance test results chart for Intel® Ethernet Controller I210-AT

3. Test results for Balance-rr bonding mode test performed on Intel® Ethernet Converged Network Adapter X520-DA2

Balance-rr bonding mode performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X520-DA2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	715.88	702.28	passed
2 nd Workstation	891.81	754.78	passed

TABLE 14: Balance-rr bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

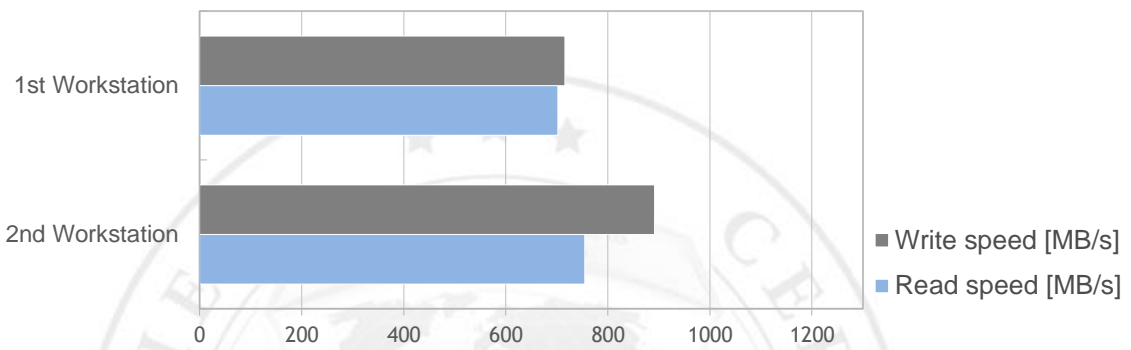
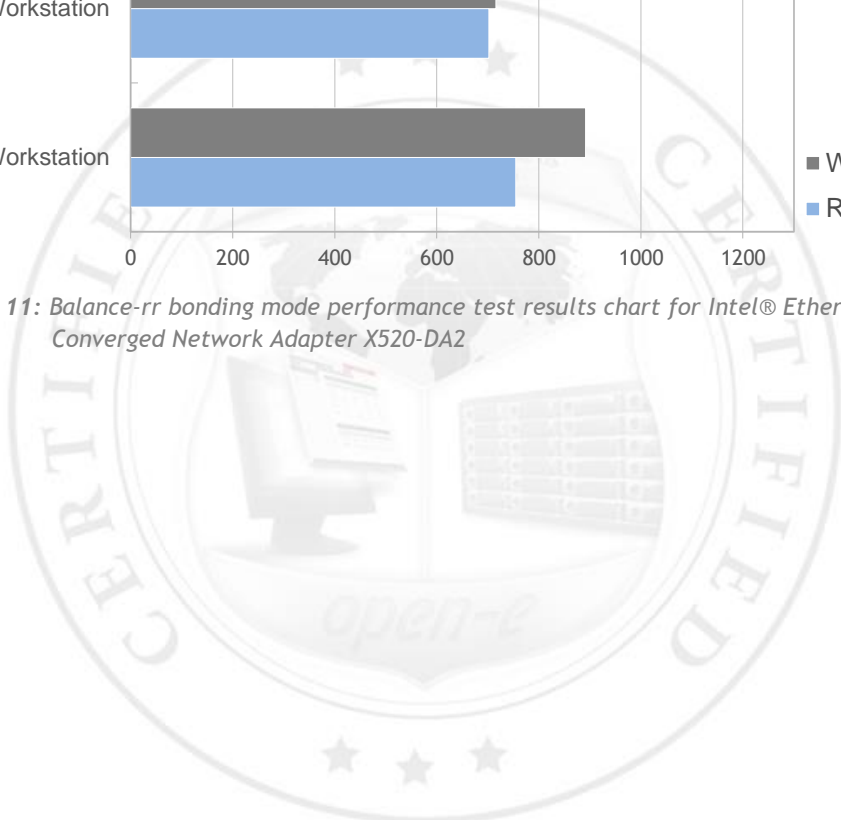


FIGURE 11: Balance-rr bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2



4. 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	566.12	548.94	passed
2 nd Workstation	565.58	692.54	passed

TABLE 15: Balance-rr bonding mode performance test results table for Intel® Ethernet Converged Network Adapter X540-T2

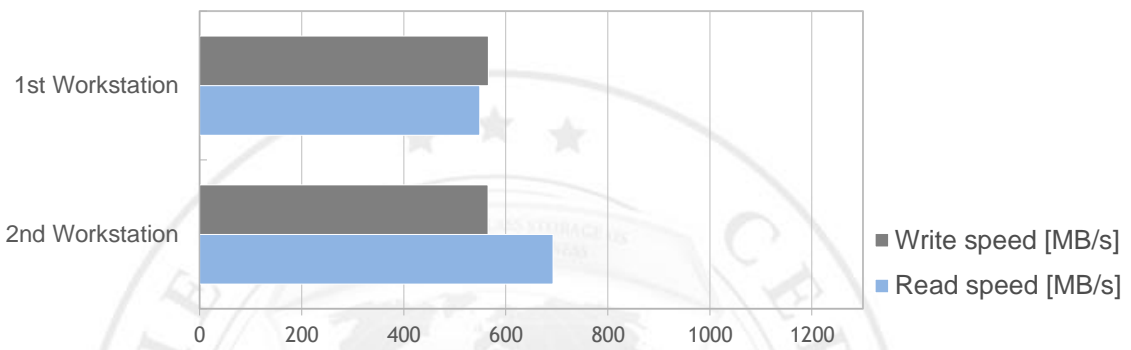
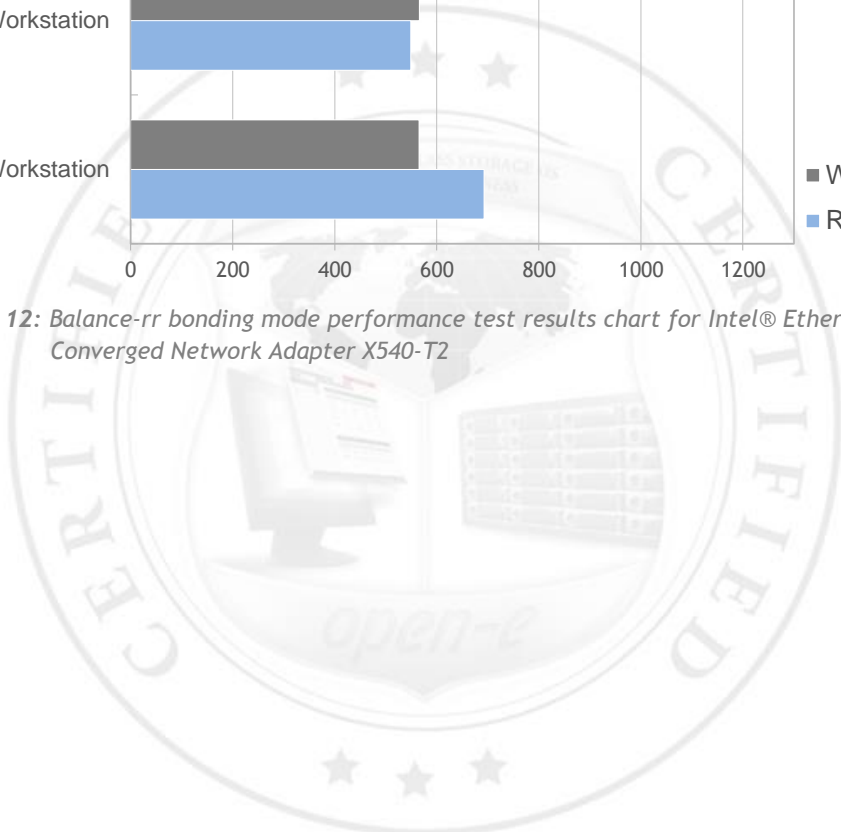


FIGURE 12: Balance-rr bonding mode performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2



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® Ethernet Controller I210-AT

Single NIC performance test results			
NIC model	Intel® Ethernet Controller I210-AT		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	112.83	112.82	passed

TABLE 16: Single NIC performance test results table for Intel® Ethernet Controller I210-AT

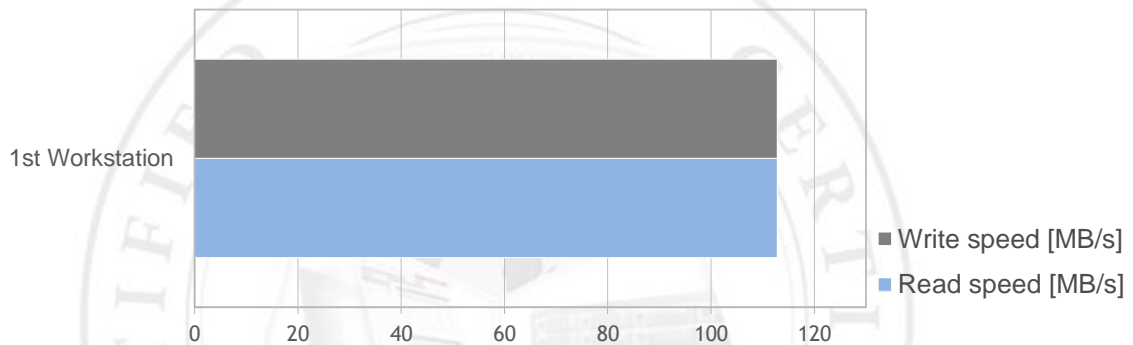


FIGURE 13: Single NIC performance test results chart for Intel® Ethernet Controller I210-AT

3. Test results for single NIC test performed on Intel® Ethernet Converged Network Adapter X520-DA2

Single NIC performance test results			
NIC model	Intel® Ethernet Converged Network Adapter X520-DA2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	1125.44	1128.30	passed

TABLE 17: Single NIC performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

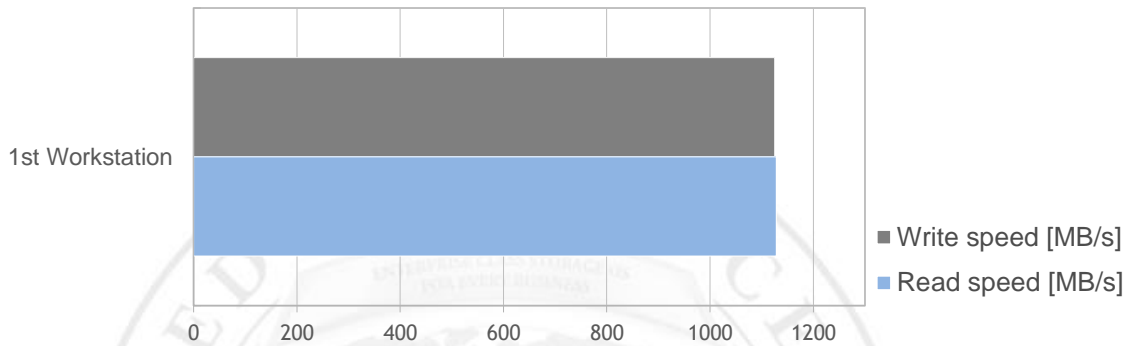
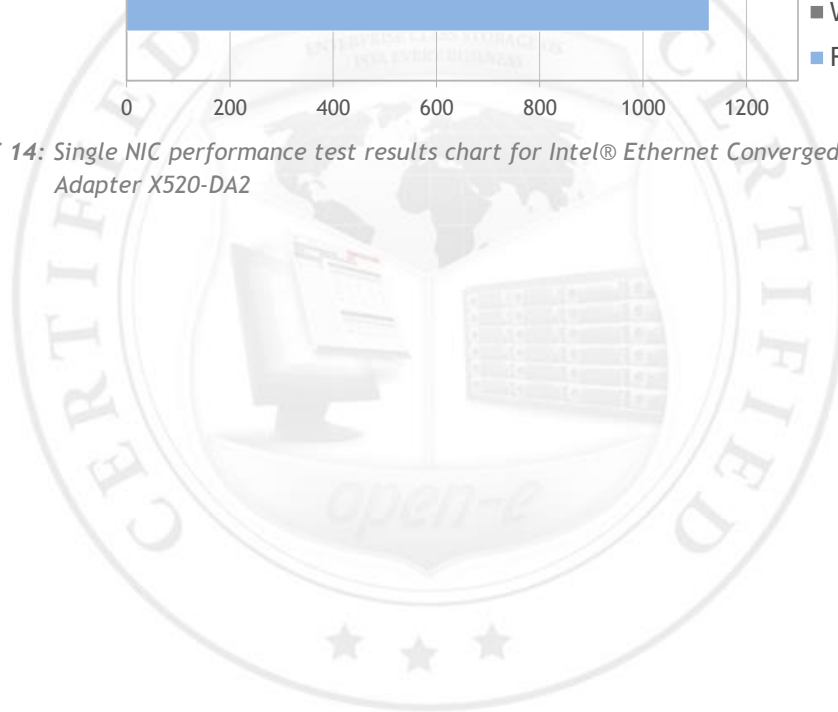


FIGURE 14: Single NIC performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2



4. 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	1128.66	1125.41	passed

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

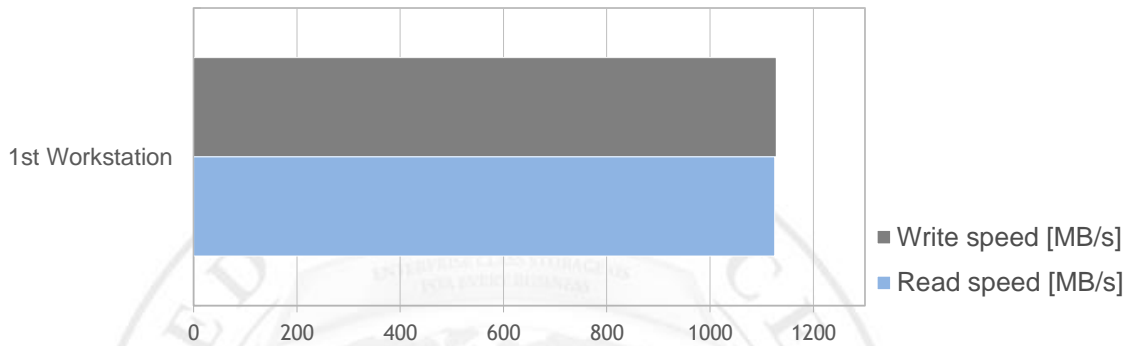
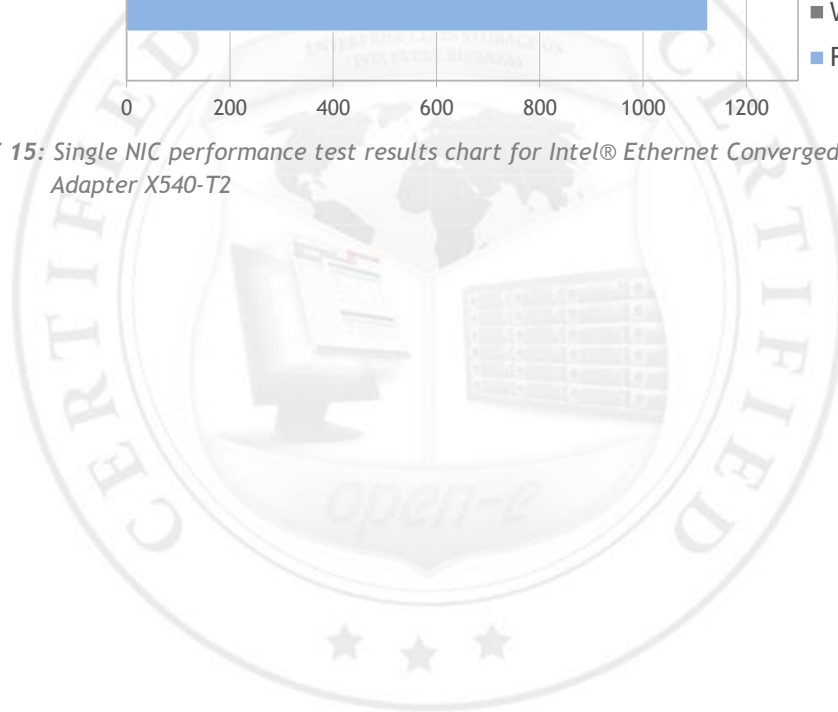


FIGURE 15: Single NIC performance test results chart for Intel® Ethernet Converged Network Adapter X540-T2



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, 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 16: 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 X520-DA2

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	192.25	204.10	passed
32	948.26	1166.27	passed
64	1129.35	1520.84	passed
128	1110.62	1550.14	passed
256	1268.45	1562.26	passed
512	1233.59	1558.15	passed
1024	1260.23	1218.47	passed
4096	1133.24	1387.22	passed

TABLE 19: RAID0 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

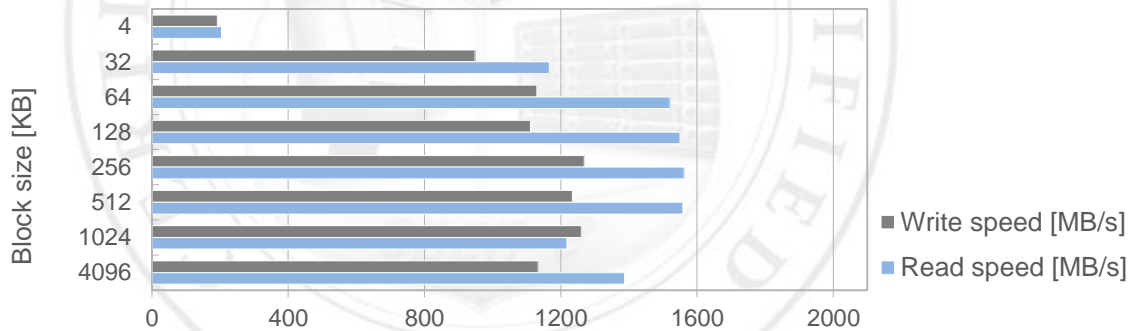


FIGURE 17: RAID0 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 X520-DA2

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	195.22	246.15	passed
32	932.52	1033.25	passed
64	1014.56	1064.25	passed
128	1107.20	1280.09	passed
256	1248.08	1329.55	passed
512	1228.84	1333.29	passed
1024	1213.59	1204.55	passed
4096	842.46	1163.49	passed

TABLE 20: RAID5 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

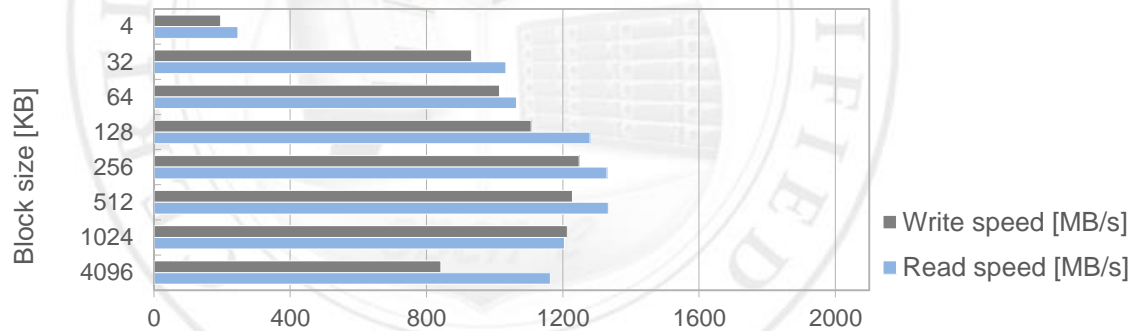


FIGURE 18: RAID5 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 X520-DA2

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	191.00	236.64	passed
32	901.11	1098.24	passed
64	977.72	1114.87	passed
128	959.11	1167.10	passed
256	1090.76	1139.77	passed
512	1092.78	1173.87	passed
1024	1067.91	1215.58	passed
4096	848.91	1214.56	passed

TABLE 21: RAID6 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

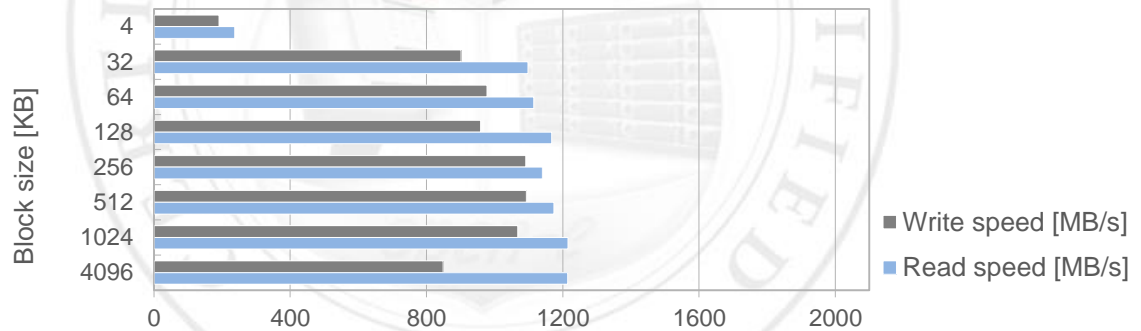


FIGURE 19: RAID6 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 X520-DA2

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	191.94	266.55	passed
32	895.97	835.53	passed
64	989.84	804.97	passed
128	994.17	505.11	passed
256	1146.12	623.12	passed
512	1169.52	680.14	passed
1024	1203.90	759.98	passed
4096	968.20	1090.64	passed

TABLE 22: RAID10 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

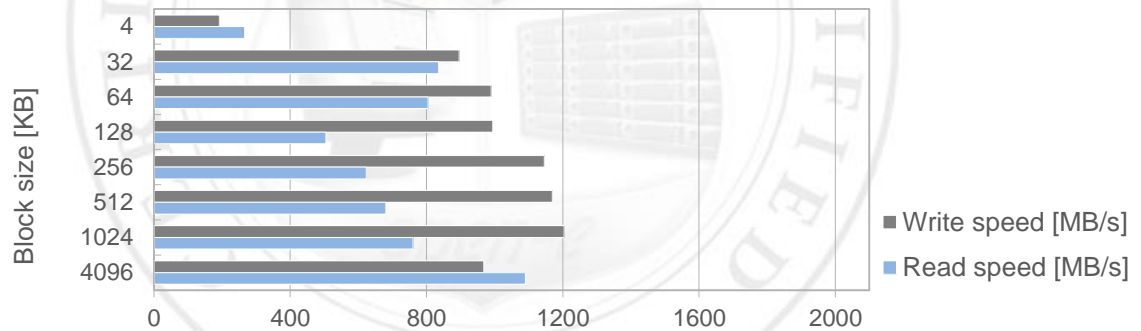


FIGURE 20: RAID10 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 X520-DA2

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	236.52	234.39	passed
32	899.41	922.21	passed
64	1001.99	865.77	passed
128	986.59	986.26	passed
256	1150.67	1052.78	passed
512	1143.61	1074.14	passed
1024	1138.95	1080.78	passed
4096	906.85	1142.76	passed

TABLE 23: RAID50 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

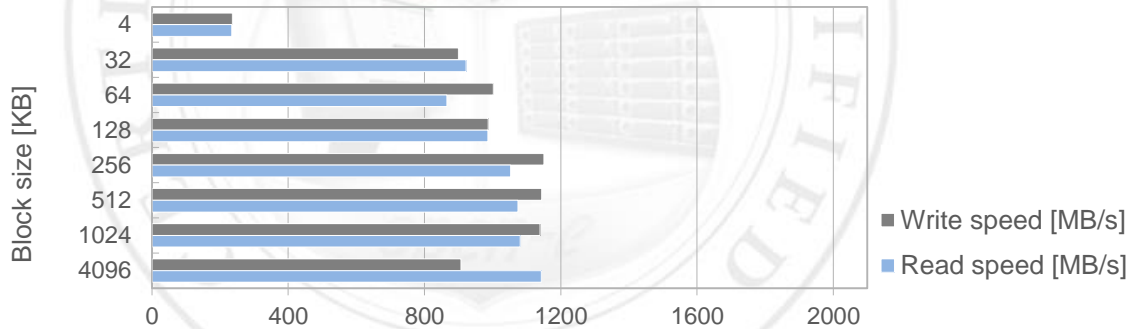


FIGURE 21: RAID50 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 X520-DA2

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	193.39	266.86	passed
32	781.49	637.71	passed
64	961.51	659.68	passed
128	1021.70	663.66	passed
256	1114.21	524.16	passed
512	1141.39	634.58	passed
1024	1052.42	606.93	passed
4096	942.43	756.28	passed

TABLE 24: RAID60 performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

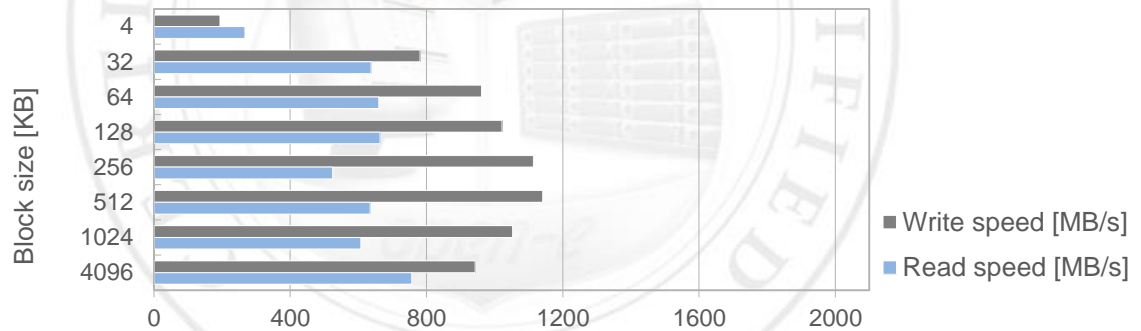


FIGURE 22: RAID60 performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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.

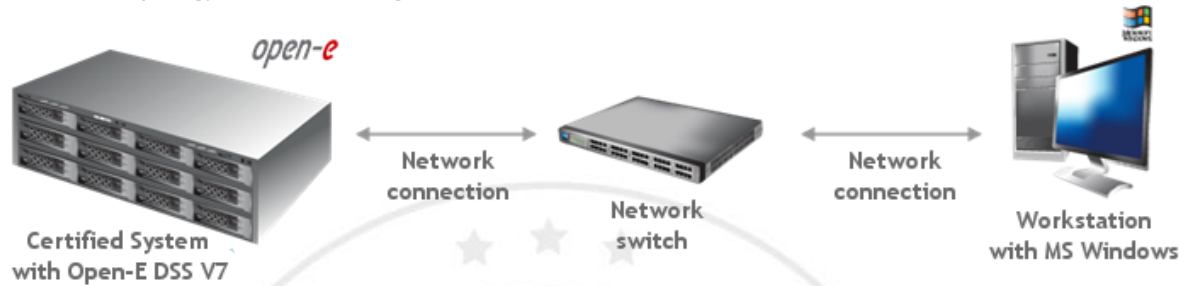
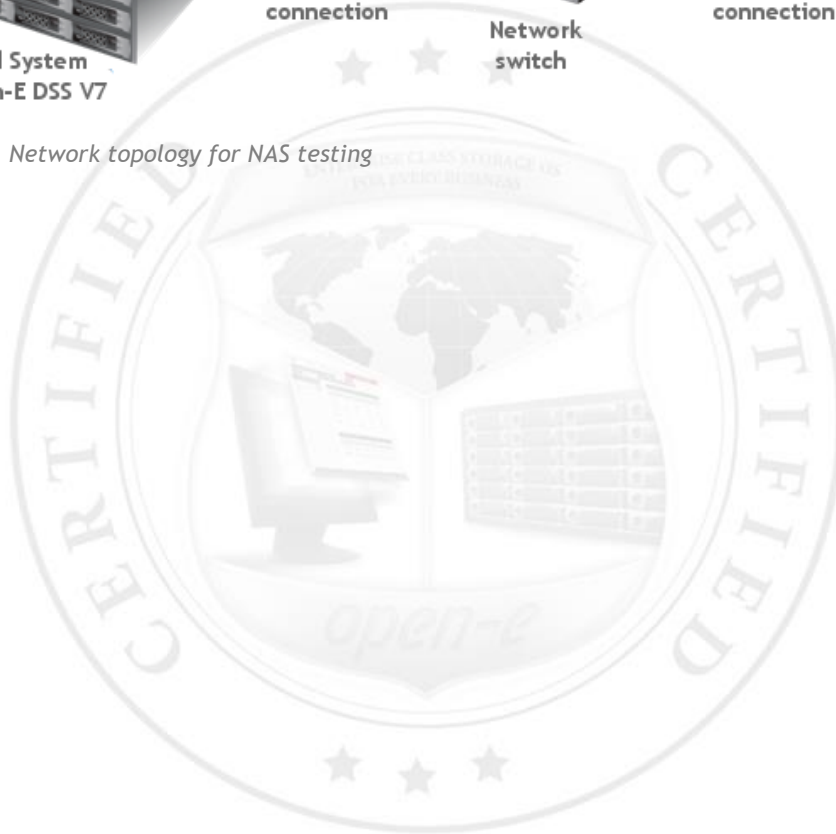


FIGURE 23: Network topology for NAS testing



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 X520-DA2

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	184.23	165.58	passed
32	1281.18	1478.04	passed
64	1690.22	1498.96	passed
128	1518.10	1753.94	passed
256	1376.12	1621.70	passed
512	1740.46	1574.73	passed
1024	1931.80	1503.35	passed
4096	1843.40	1613.00	passed

TABLE 25: SMB performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

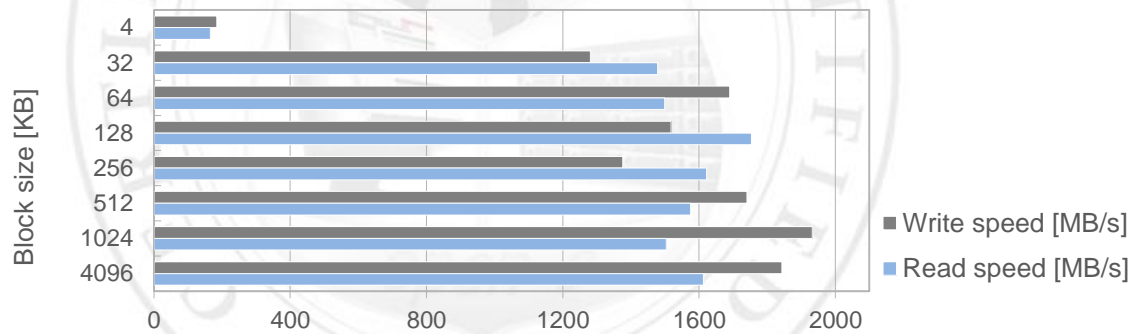


FIGURE 24: SMB performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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.

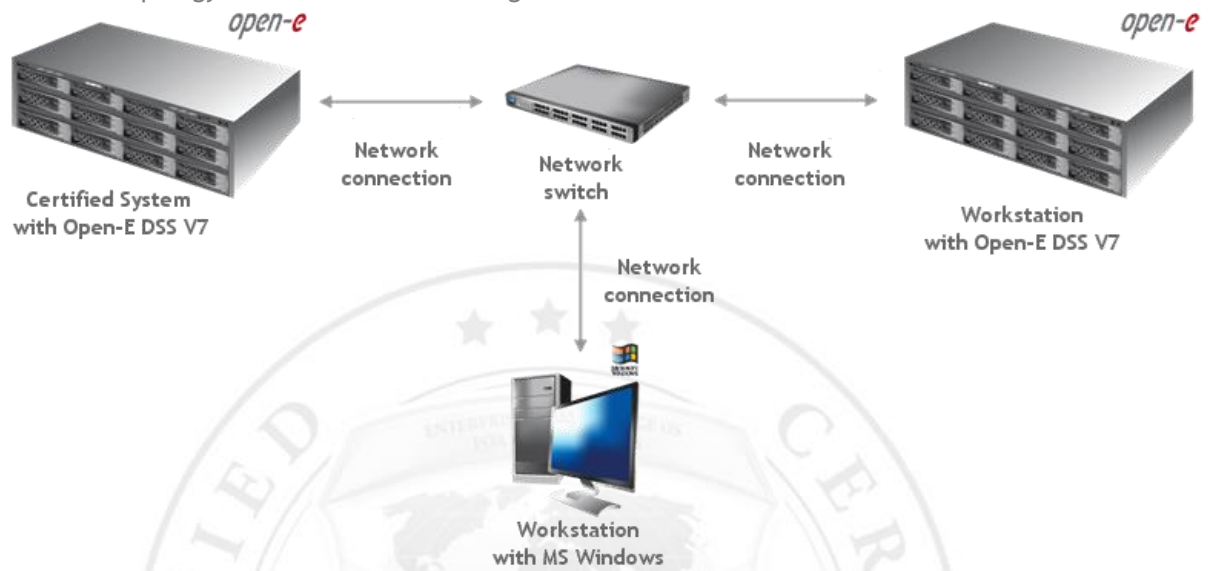


FIGURE 25: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.



FIGURE 26: 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 X520-DA2

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	100.37	90.12	passed
32	763.01	685.54	passed
64	1389.11	931.87	passed
128	1355.44	1328.61	passed
256	1364.74	1397.12	passed
512	1035.73	1346.47	passed
1024	1337.91	1101.83	passed
4096	1469.57	1355.92	passed

TABLE 26: iSCSI Initiator performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

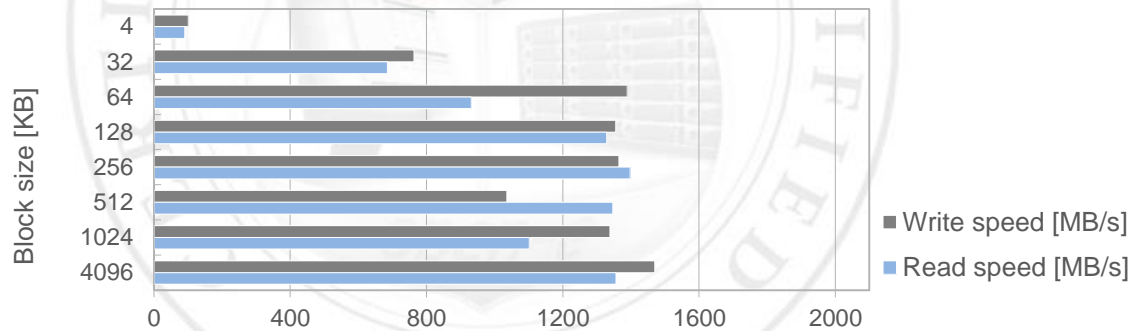


FIGURE 27: iSCSI Initiator performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

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 *lometer* tool.

2. Test results for iSCSI Target and Intel® Ethernet Converged Network Adapter X520-DA2

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	244.99	300.09	passed
32	940.06	1553.90	passed
64	1159.06	1614.44	passed
128	1153.88	1686.64	passed
256	1379.28	1059.68	passed
512	1389.23	1717.38	passed
1024	1359.95	1751.86	passed
4096	1113.76	1365.29	passed

TABLE 27: iSCSI Target performance test results table for Intel® Ethernet Converged Network Adapter X520-DA2

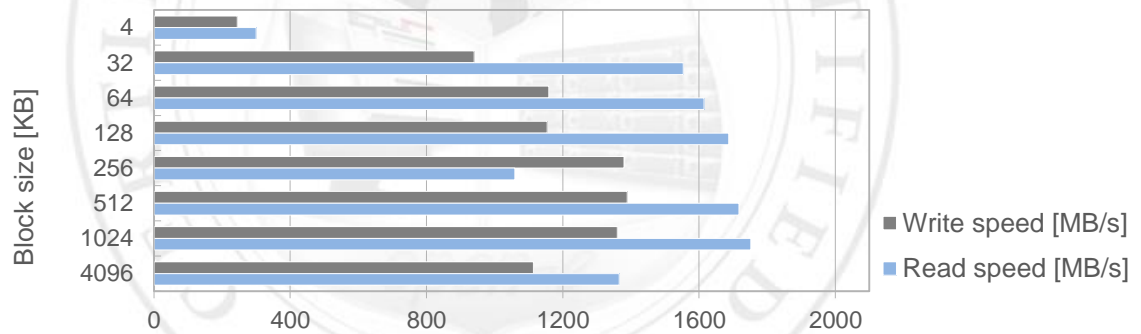


FIGURE 28: iSCSI Target performance test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

SSD Cache performance

Tests performed in this section check the performance of SSD cache in the Open-E DSS V7 product on the certified system.

SSD Cache test topology

Network topology for SSD Cache testing is shown below.

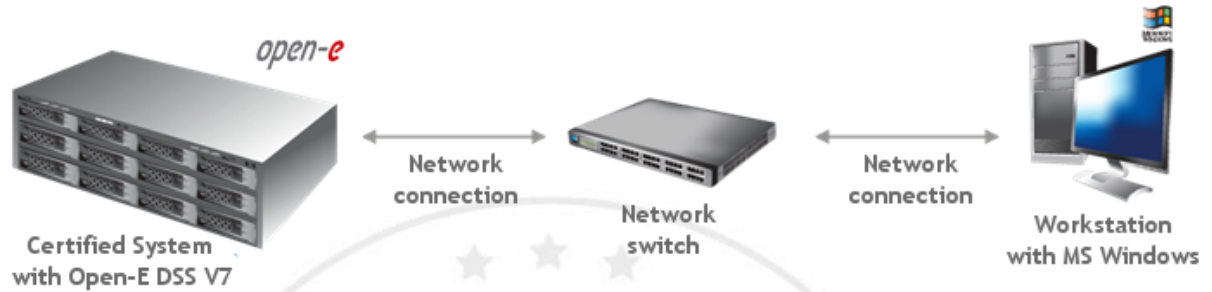


FIGURE 29: Network topology for SSD Cache testing



SSD Cache with real life pattern test

1. Test description

The test relies on creating the iSCSI target on the certified system, writing (35%) and reading (65%) random data from a *Workstation with MS Windows* to it with various block sizes using the lometer tool.

2. Test results for SSD Cache with real life pattern and Intel® Ethernet Converged Network Adapter X520-DA2

SSD Cache with real life pattern test results			
Block size [KB]	Write speed [IOPS]	Read speed [IOPS]	Performance test results
1	23870	99871	passed
2	23523	64464	passed
4	22951	89911	passed

TABLE 28: SSD Cache with real life pattern test results table for Intel® Ethernet Converged Network Adapter X520-DA2

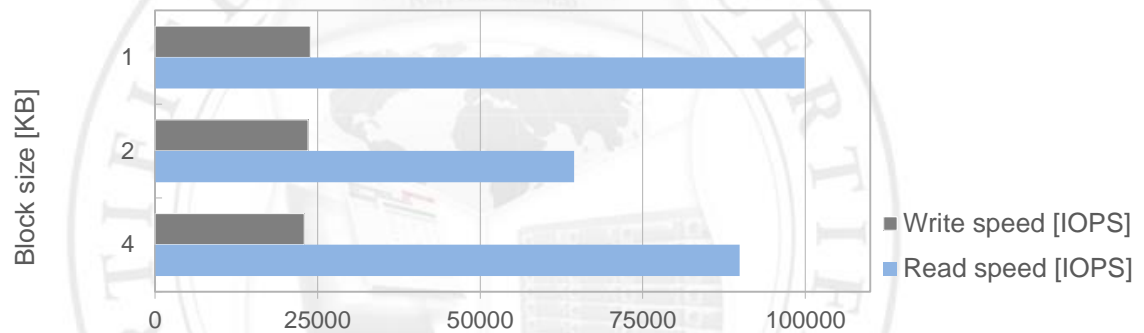


FIGURE 30: SSD Cache with real life pattern test results chart for Intel® Ethernet Converged Network Adapter X520-DA2

SSD Cache with random read/write pattern test

1. Test description

The test relies on creating the iSCSI target on the certified system and copying random data from a *Workstation with MS Windows* to it with various block sizes using the *lometer* tool.

2. Test results for SSD cache with random read/write pattern Intel® Ethernet Converged Network Adapter X520-DA2

SSD cache with random read/write pattern test results			
Block size [KB]	Write speed [IOPS]	Read speed [IOPS]	Performance test results
1	14026	26036	passed
2	14920	27732	passed
4	13503	25121	passed

TABLE 29: SSD cache with random read/write pattern test results table for Intel® Ethernet Converged Network Adapter X520-DA2

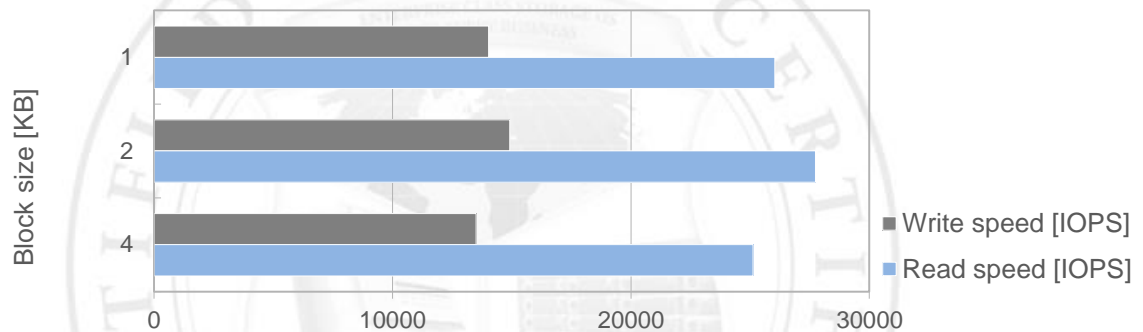


FIGURE 31: SSD cache with random read/write pattern test results chart for Intel® Ethernet Converged Network Adapter X520-DA2