



bluechip STORAGEline R52203s Storage system



Executive summary

After performing all tests, the bluechip STORAGEline R52203s 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 bluechip STORAGEline R52203s is stable and performs well.

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

✓ HA cluster

For this setup, two identical systems are required. The following features make bluechip STORAGEline R52203s suitable for an HA cluster:

- Hardware RAID5, RAID6, RAID10, RAID50, RAID60 for greater node availability and increased performance.
- Two of four 10GbE interfaces for very fast data replication. May be aggregated to ensure extra layer of redundancy and improved throughput.
- Two of four 10GbE and four 1GbE for fast and redundant MPIO connections.
- Redundant power supply for system reliability.

✓ NAS filer

The following features make bluechip STORAGEline R52203s a good NAS filer solution:

- Twenty-four high class SSD drives provide a lot of space for user files and ensure fast random access.
- Hardware RAID5, RAID6, RAID10, RAID50 and RAID60 for fault tolerance and the most efficient use of available disk space.
- Four 10GbE interfaces for independent connection to different networks or link aggregation for improved throughput.
- Four 1GbE interfaces for flexible network topology.

✓ Storage for databases

For this application the following server features are useful:

- Server platform with fast CPU for high transaction rate.
- HW RAID5, RAID6, RAID10, RAID50, RAID60 for high performance and data safety.
- Twenty-four SSD drives for great I/O performance.
- Four 10GbE interfaces, which may be aggregated for fast connection to most demanding databases.

Certification notes

For link aggregation, it is recommended to use balance-alb bonding mode. During tests all 10GbE interfaces were used and MPIO was configured to access iSCSI Targets.



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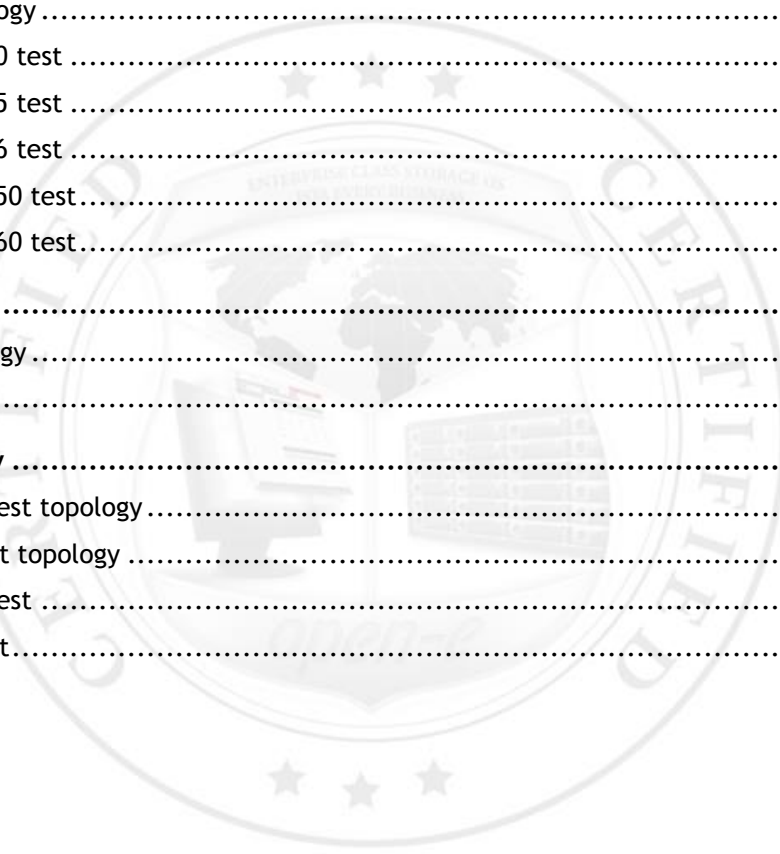
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bluechip STORAGEline R52203s hardware components

Technical specifications about the certified system are listed below:

Model	bluechip STORAGEline R52203s
Operating system	Open-E DSS V7 build 19059
Enclosure/chassis	Supermicro SuperChassis CSE-216BE1C-R920LPB
CPU	2x Intel® Xeon® Processor E5-2620 v3 2.40GHz
Motherboard	Supermicro MBD-X10DRI-B
Memory	4x 8GB Kingston KVR21R15S4/8HA DDR4 ECC REG
Network	2x Emulex OCe14102-NT Ethernet Network Adapter
Network	2x Intel® Ethernet Server Adapter I350-T2V2
HW RAID	Avago MegaRAID SAS 9361-4i
Hard disk drives	24x 480GB Samsung SSD MZ-7KM480E

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



bluechip STORAGEline R52203s photos



FIGURE 1: Front photo



FIGURE 2: Rear photo

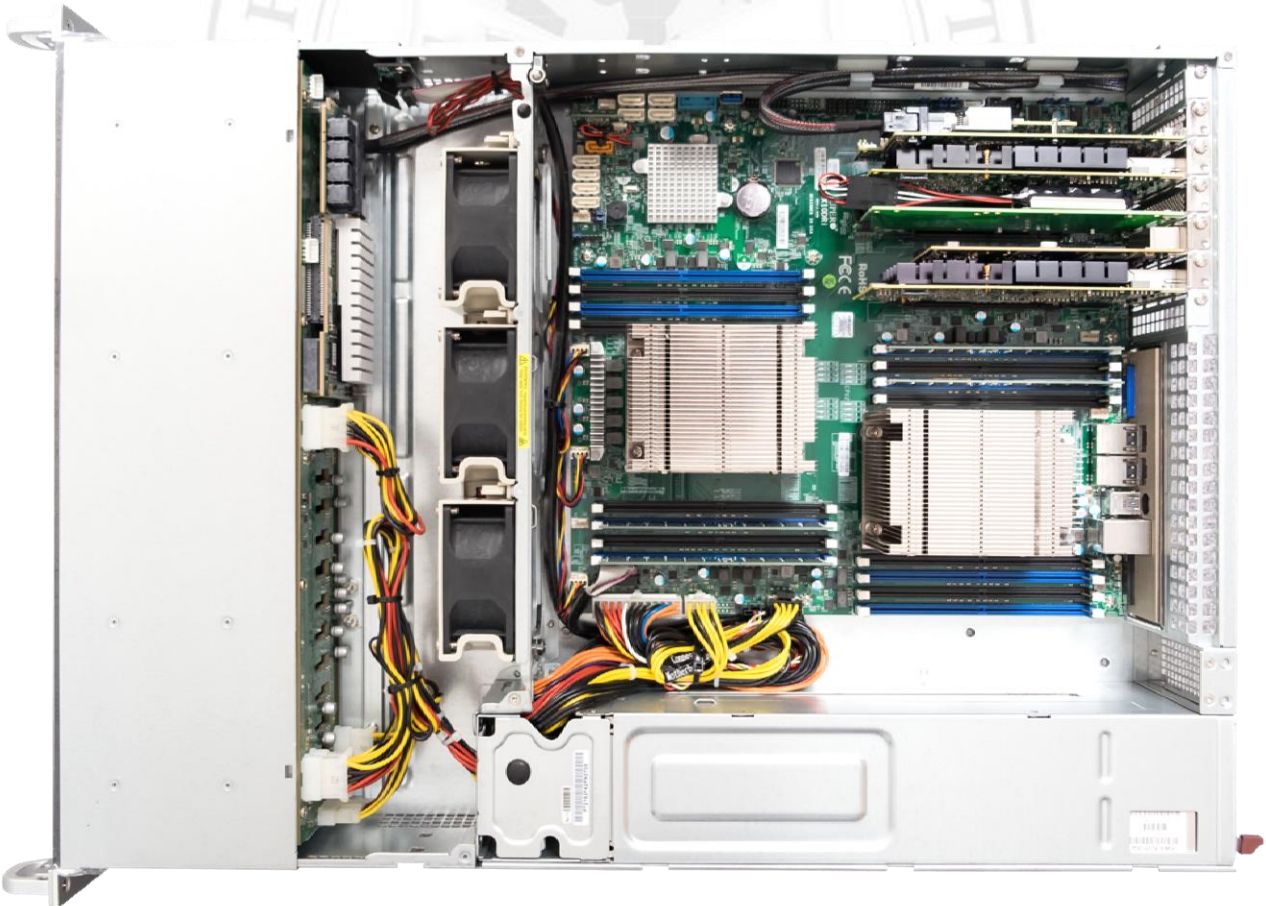


FIGURE 3: Top photo

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	Custom
Motherboard	Supermicro MBD-X10DRW-IT
CPU	2x Intel® Xeon® Processor E5-2660 v3 2.60GHz
Memory	8x 8GB Kingston KVR21R15S4/8HA DDR4 ECC REG
Network	2x Emulex OCE14102-NT Ethernet Network Adapter
Network	Intel® Ethernet Controller X540-AT2
Hard disk controller	Avago MegaRAID SAS 9361-4i
Hard disk drives	480GB Samsung SSD MZ-7KM480E

TABLE 2: Hardware components of first Workstation with MS Windows

Model	bluechip STORAGEline R52203s
Operating system	Open-E DSS V7 build 19059
Enclosure/chassis	Supermicro SuperChassis CSE-216BE1C-R920LPB
CPU	2x Intel® Xeon® Processor E5-2620 v3 2.40GHz
Motherboard	Supermicro MBD-X10DRI-B
Memory	4x 8GB Kingston KVR21R15S4/8HA DDR4 ECC REG
Network	2x Emulex OCE14102-NT Ethernet Network Adapter
Network	2x Intel® Ethernet Server Adapter I350-T2V2
HW RAID	Avago MegaRAID SAS 9361-4i
Hard disk drives	24x 480GB Samsung SSD MZ-7KM480E

TABLE 3: Hardware components of Workstation with Open-E DSS V7

Model	Netgear XS712
Description	12x 10GbE Copper Ethernet Ports

TABLE 4: Network switch details for connection with 1GbE and 10GbE

Administration functionality

The following functionality has been tested.

Drive identifier	N/A
Power button	OK
Front and rear LEDs	OK

TABLE 5: 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 *Workstation 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.

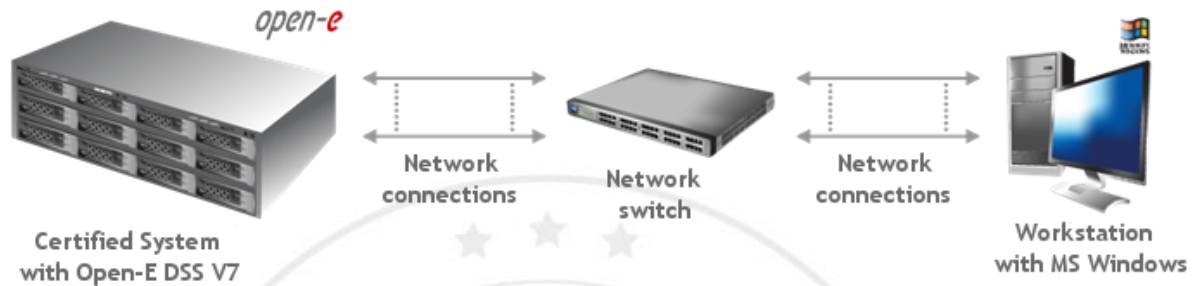


FIGURE 4: Network topology for Network testing

802.3ad bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from Workstation 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® Ethernet Server Adapter I350-T2V2

802.3ad bonding mode performance test results			
NIC model	Intel® Ethernet Server Adapter I350-T2V2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	226.50	113.04	passed

TABLE 6: 802.3ad bonding mode performance test results table for Intel® Ethernet Server Adapter I350-T2V2

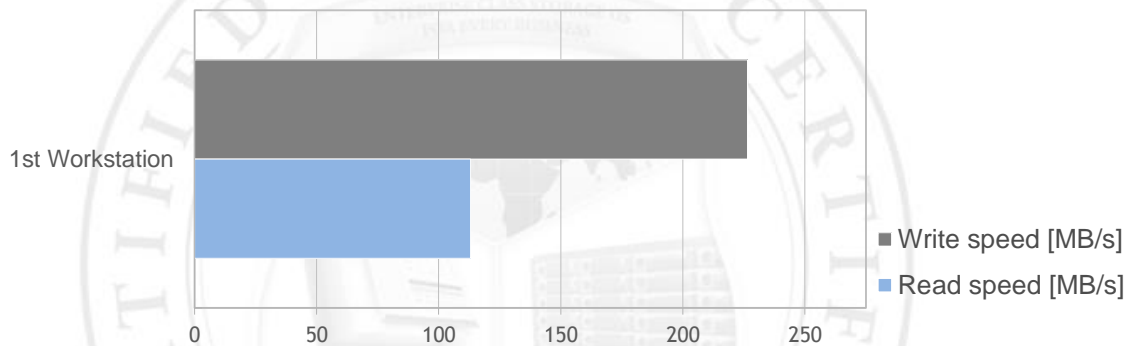


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel® Ethernet Server Adapter I350-T2V2

3. Test results for 802.3ad bonding mode test performed on Emulex OCe14102-NT Ethernet Network Adapter

802.3ad bonding mode performance test results			
NIC model	Emulex OCe14102-NT Ethernet Network Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	2262.03	805.26	passed

TABLE 7: 802.3ad bonding mode performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

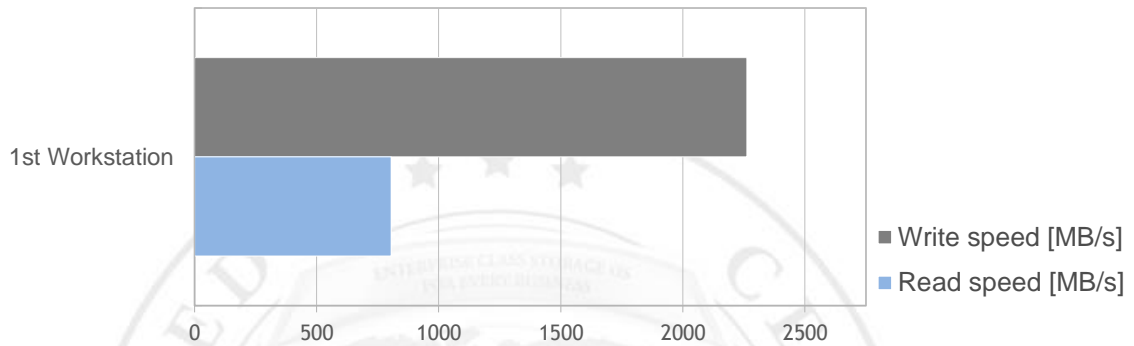


FIGURE 6: 802.3ad bonding mode performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

Balance-alb bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from *Workstation with MS Windows* through a Balance-alb bonding mode network connection with a 4MB block size using the lometer testing tool.

2. Test results for Balance-alb bonding mode test performed on Intel® Ethernet Server Adapter I350-T2V2

Balance-alb bonding mode performance test results			
NIC model	Intel® Ethernet Server Adapter I350-T2V2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	226.24	226.13	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel® Ethernet Server Adapter I350-T2V2

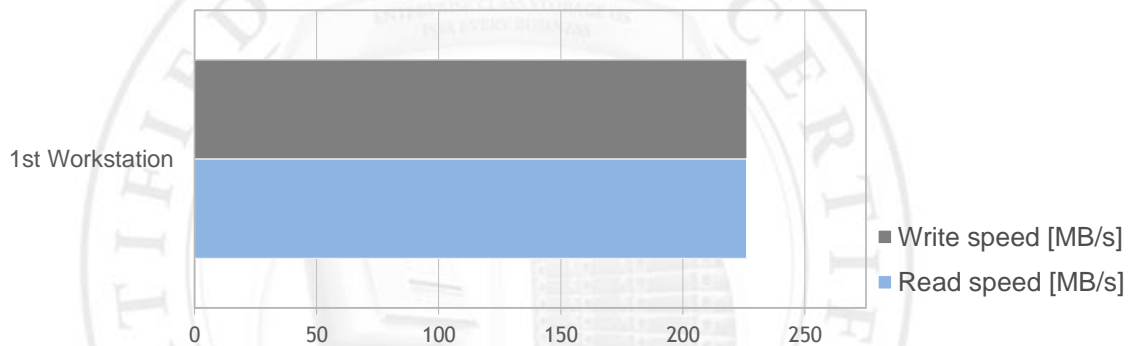


FIGURE 7: Balance-alb bonding mode performance test results chart for Intel® Ethernet Server Adapter I350-T2V2

3. Test results for Balance-alb bonding mode test performed on Emulex OCe14102-NT Ethernet Network Adapter

Balance-alb bonding mode performance test results			
NIC model	Emulex OCe14102-NT Ethernet Network Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	2262.01	1372.12	passed

TABLE 9: Balance-alb bonding mode performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

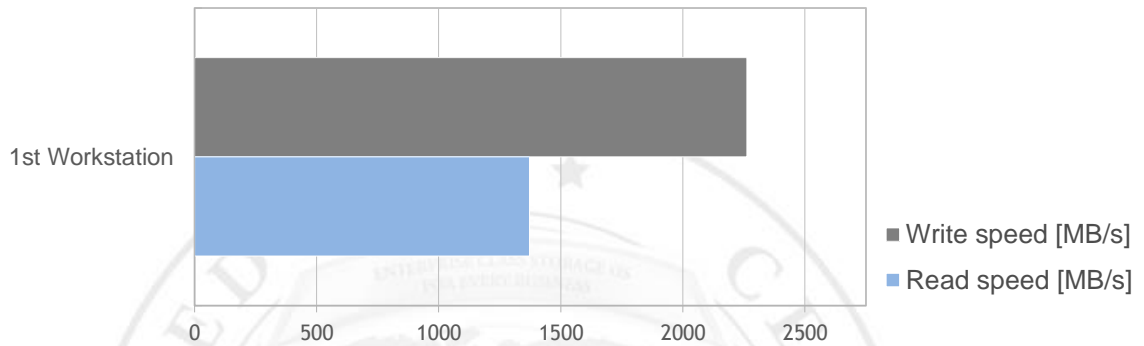
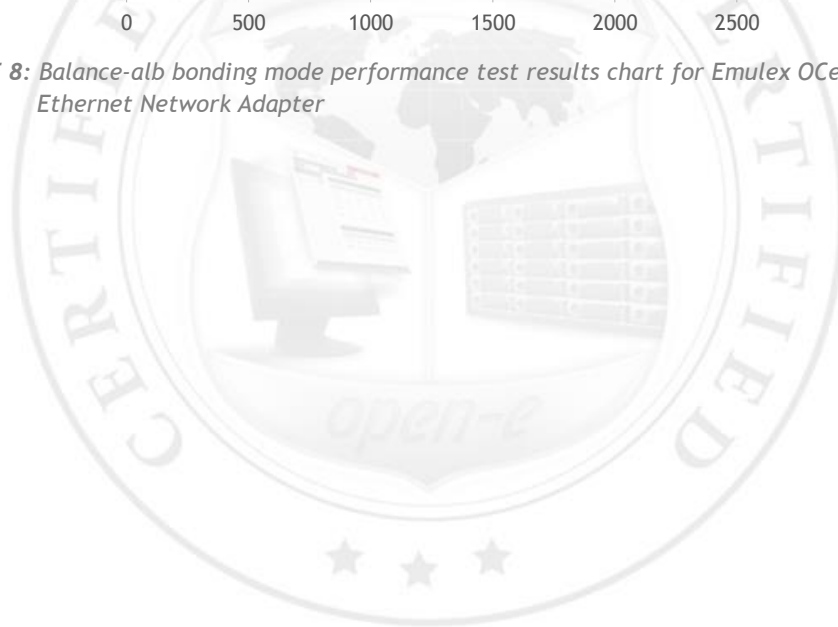


FIGURE 8: Balance-alb bonding mode performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter



Balance-rr bonding mode test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from *Workstation 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® Ethernet Server Adapter I350-T2V2

Balance-rr bonding mode performance test results			
NIC model	Intel® Ethernet Server Adapter I350-T2V2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	226.21	223.72	passed

TABLE 10: Balance-rr bonding mode performance test results table for Intel® Ethernet Server Adapter I350-T2V2

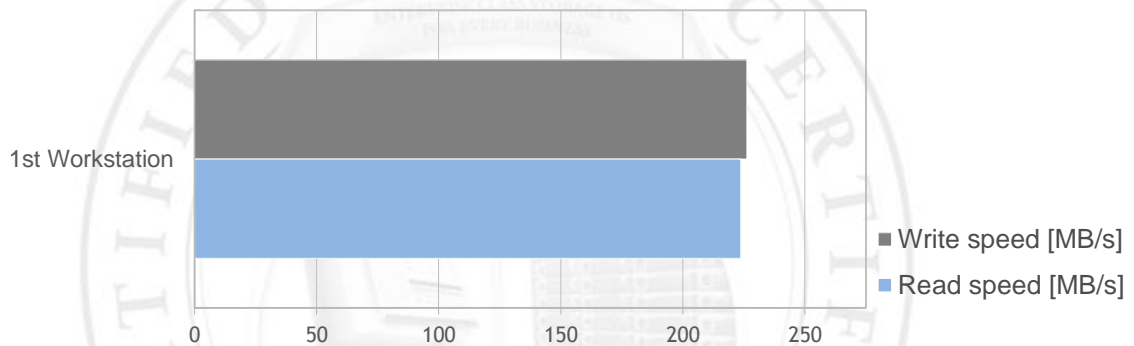


FIGURE 9: Balance-rr bonding mode performance test results chart for Intel® Ethernet Server Adapter I350-T2V2

3. Test results for Balance-rr bonding mode test performed on Emulex OCe14102-NT Ethernet Network Adapter

Balance-rr bonding mode performance test results			
NIC model	Emulex OCe14102-NT Ethernet Network Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	2209.85	1333.65	passed

TABLE 11: Balance-rr bonding mode performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

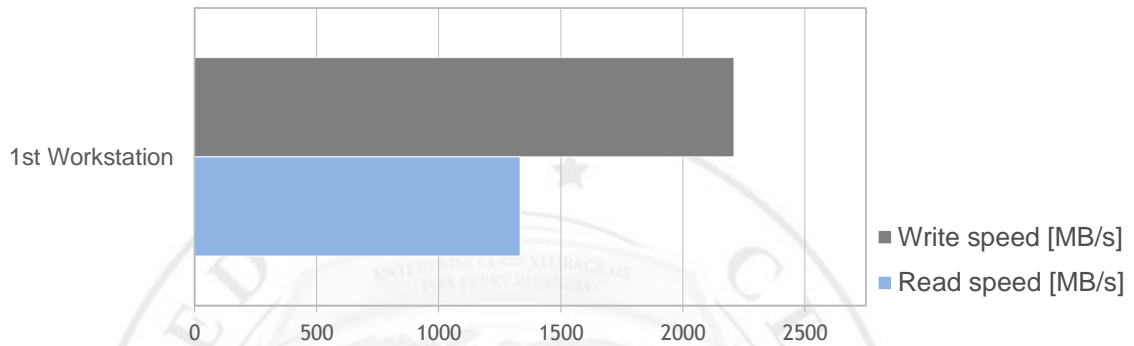
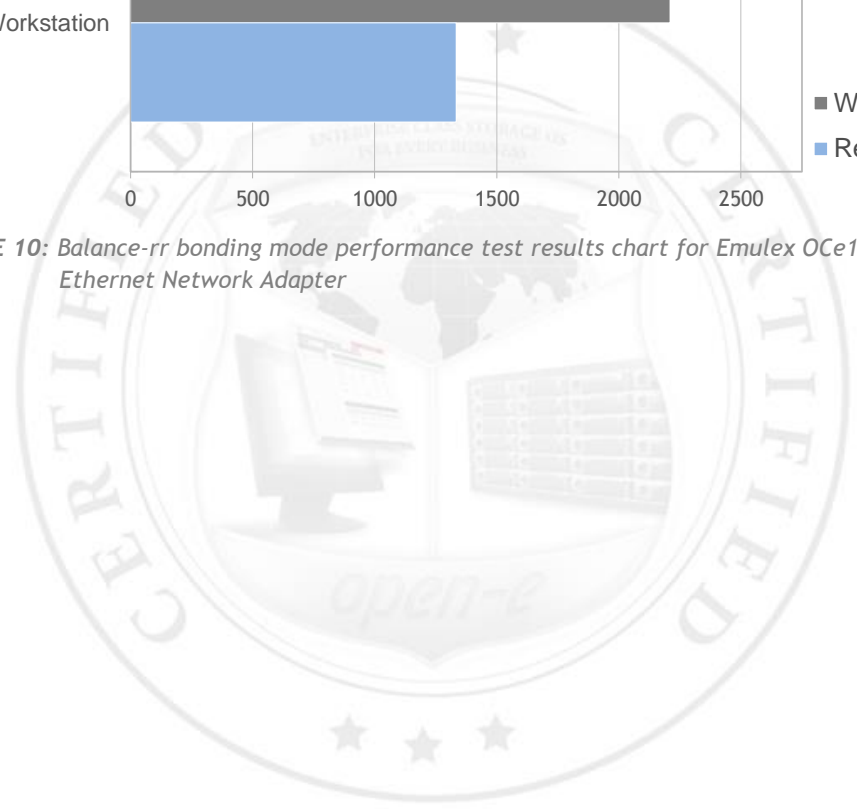


FIGURE 10: Balance-rr bonding mode performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter



Single NIC performance test

1. Test description

The test relies on configuring the iSCSI targets and copying the data from *Workstation 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 Server Adapter I350-T2V2

Single NIC performance test results			
NIC model	Intel® Ethernet Server Adapter I350-T2V2		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	113.05	113.13	passed

TABLE 12: Single NIC performance test results table for Intel® Ethernet Server Adapter I350-T2V2

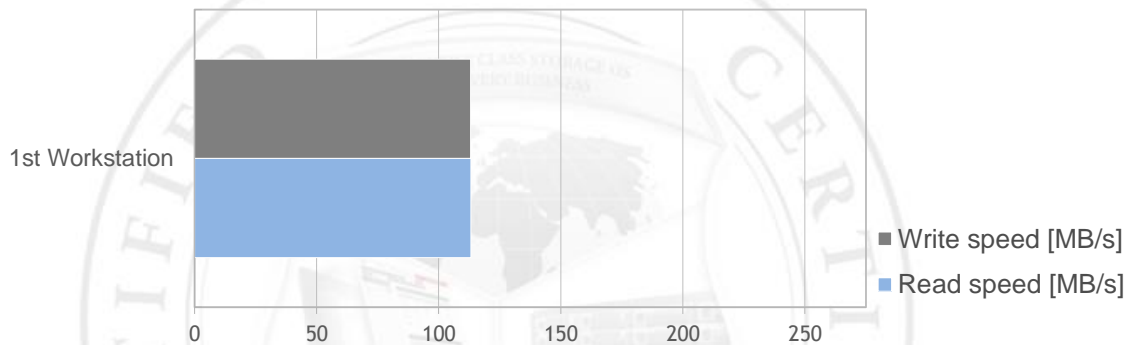


FIGURE 11: Single NIC performance test results chart for Intel® Ethernet Server Adapter I350-T2V2

3. Test results for single NIC test performed on Emulex OCe14102-NT Ethernet Network Adapter

Single NIC performance test results			
NIC model	Emulex OCe14102-NT Ethernet Network Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	1131.12	1130.73	passed

TABLE 13: Single NIC performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

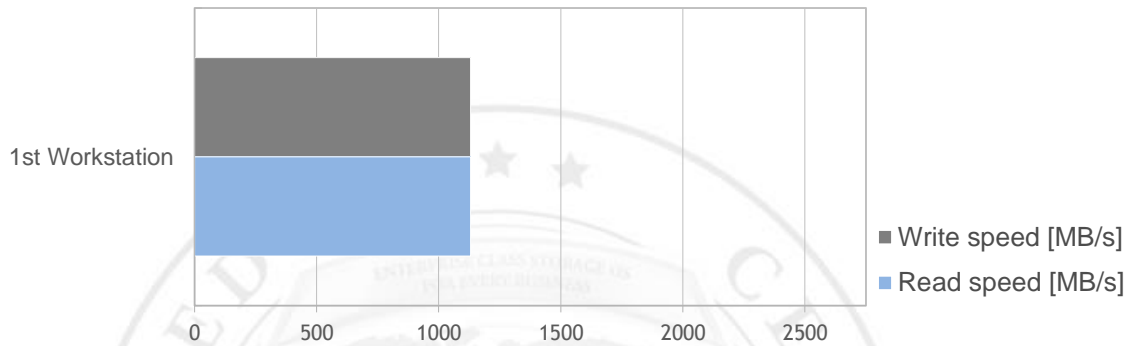


FIGURE 12: Single NIC performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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, 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

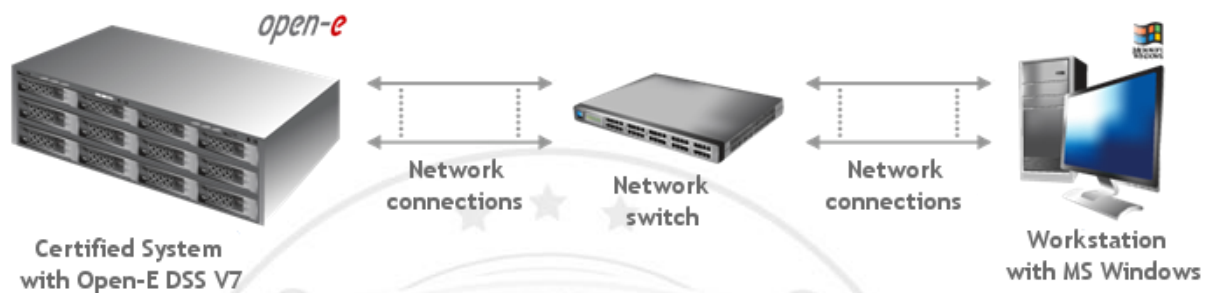


FIGURE 13: Network test topology for RAID testing

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 Emulex OCe14102-NT Ethernet Network Adapter

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	228.08	290.39	passed
32	1332.34	1118.70	passed
64	2246.91	1651.85	passed
128	2657.27	2100.01	passed
256	3608.75	2482.44	passed
512	4241.45	3373.51	passed
1024	4262.53	3504.85	passed
4096	2824.27	2303.71	passed

TABLE 14: RAID0 performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

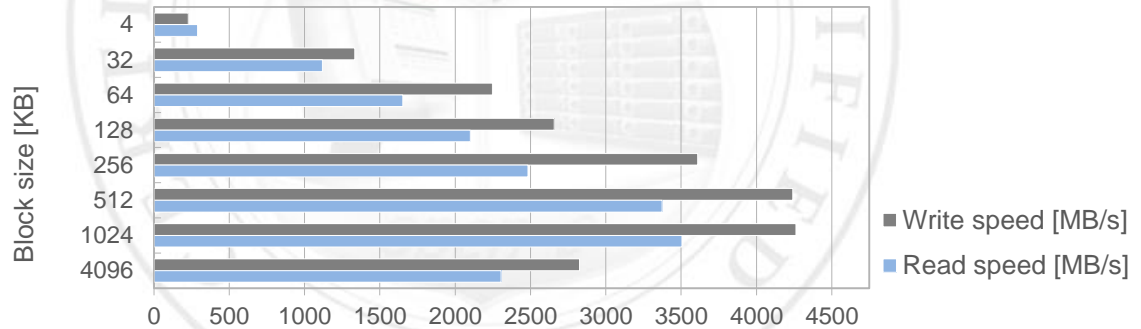


FIGURE 14: RAID0 performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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 Emulex OCe14102-NT Ethernet Network Adapter

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	235.75	293.47	passed
32	1358.75	1132.47	passed
64	2260.51	1667.03	passed
128	2678.30	2120.73	passed
256	3333.01	2661.49	passed
512	3933.39	3240.39	passed
1024	3851.07	3267.31	passed
4096	3006.56	2133.43	passed

TABLE 15: RAID5 performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

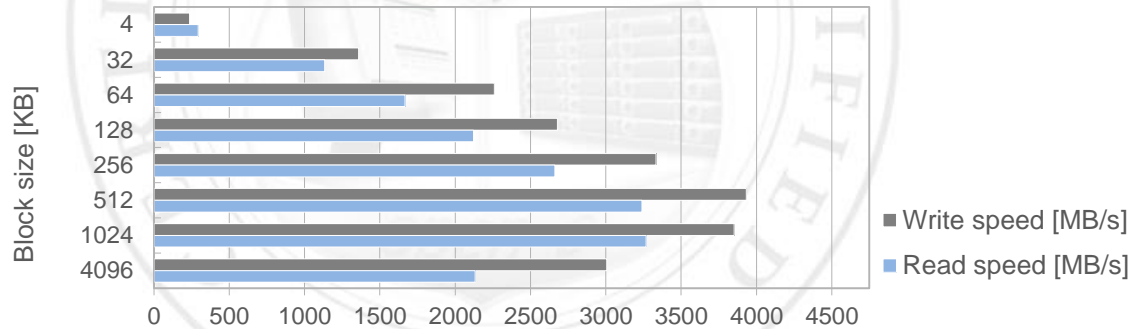


FIGURE 15: RAID5 performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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 Emulex OCe14102-NT Ethernet Network Adapter

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	212.99	283.44	passed
32	1329.56	1101.74	passed
64	2078.32	1606.25	passed
128	2505.15	2039.81	passed
256	3104.39	2548.65	passed
512	3694.75	3254.98	passed
1024	3468.49	3361.01	passed
4096	2869.42	2421.93	passed

TABLE 16: RAID6 performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

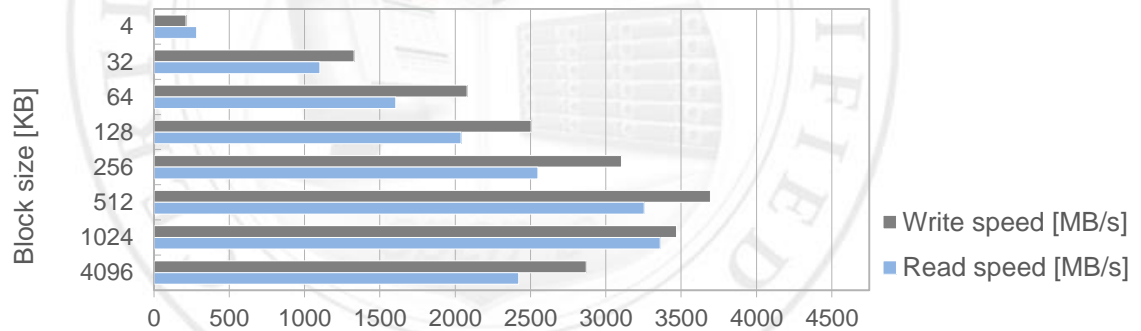


FIGURE 16: RAID6 performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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 Emulex OCe14102-NT Ethernet Network Adapter

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	230.70	289.41	passed
32	1376.92	1141.51	passed
64	2211.96	1684.59	passed
128	2624.73	2171.68	passed
256	2991.41	2766.04	passed
512	3424.71	3438.32	passed
1024	3577.35	3834.13	passed
4096	2488.17	2222.73	passed

TABLE 17: RAID50 performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

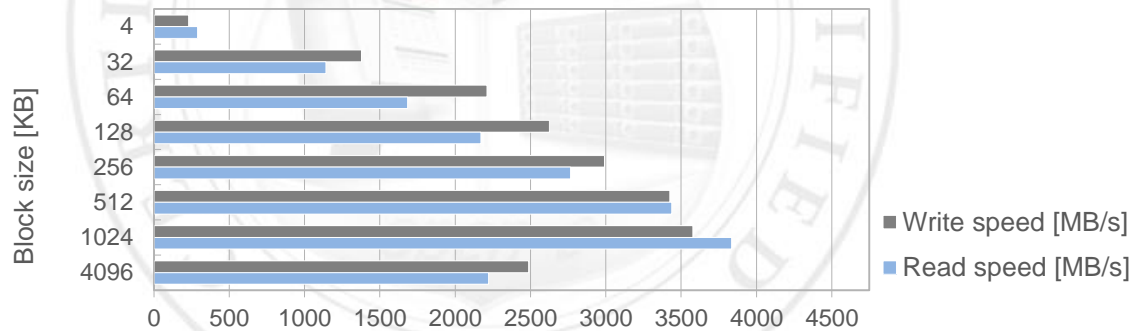


FIGURE 17: RAID50 performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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 Emulex OCe14102-NT Ethernet Network Adapter

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	231.10	297.25	passed
32	1328.25	1150.50	passed
64	2131.07	1698.76	passed
128	2427.15	2198.27	passed
256	2095.24	2851.72	passed
512	2627.85	3562.41	passed
1024	2439.56	3932.45	passed
4096	2140.90	1940.86	passed

TABLE 18: RAID60 performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

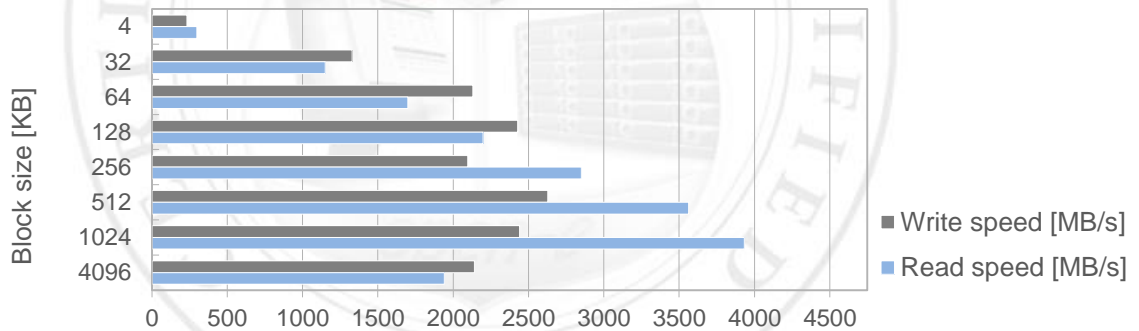


FIGURE 18: RAID60 performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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.

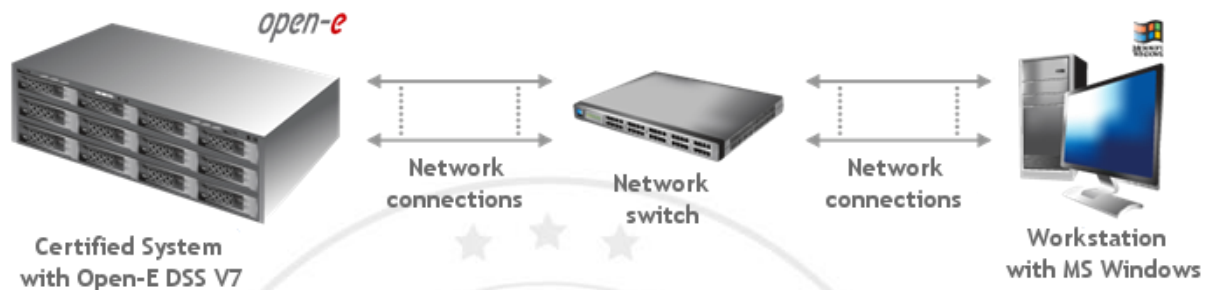


FIGURE 19: Network topology for NAS testing

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 lometer testing tool.

2. Test results for SMB and Emulex OCe14102-NT Ethernet Network Adapter

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	125.30	120.75	passed
32	609.84	1079.11	passed
64	977.54	717.79	passed
128	1126.28	945.28	passed
256	1128.15	1119.22	passed
512	1127.82	1121.72	passed
1024	1127.88	1079.85	passed
4096	1125.16	1122.57	passed

TABLE 19: SMB performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

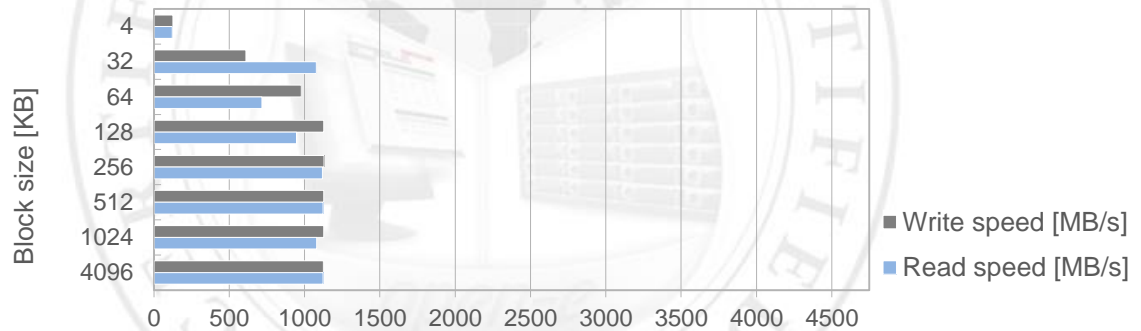


FIGURE 20: SMB performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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.

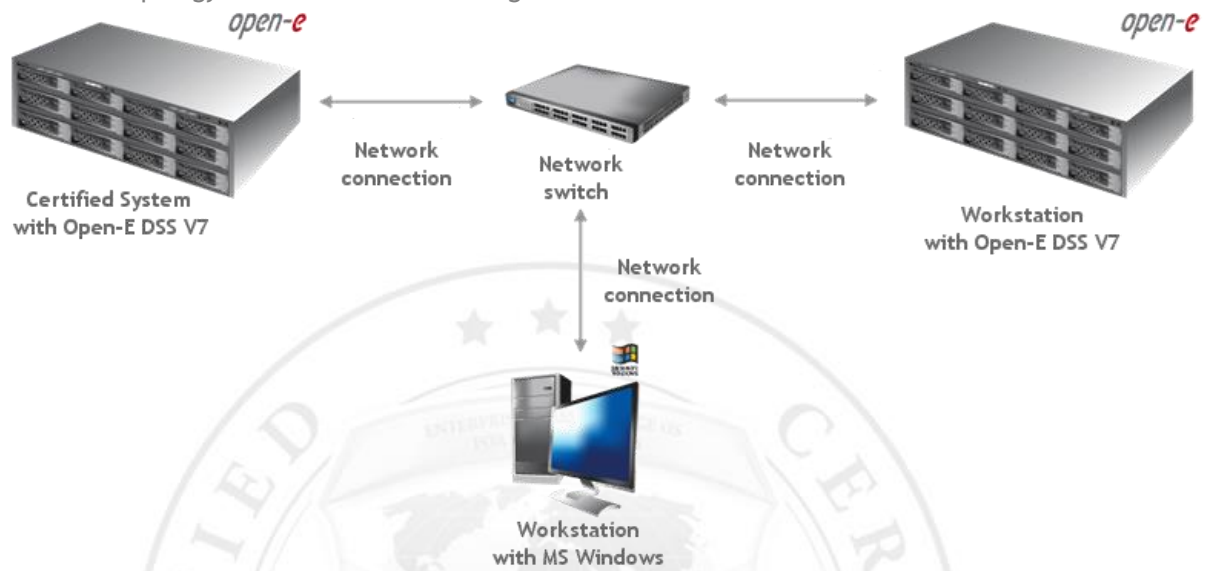


FIGURE 21: Network topology for iSCSI Initiator testing

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 lometer testing tool.

2. Test results for iSCSI Initiator and Emulex OCe14102-NT Ethernet Network Adapter

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	91.03	117.05	passed
32	499.60	790.33	passed
64	765.74	794.41	passed
128	1034.20	925.85	passed
256	1039.09	1069.29	passed
512	1038.19	1110.39	passed
1024	1052.92	1114.01	passed
4096	1016.30	1123.37	passed

TABLE 20: iSCSI Initiator performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

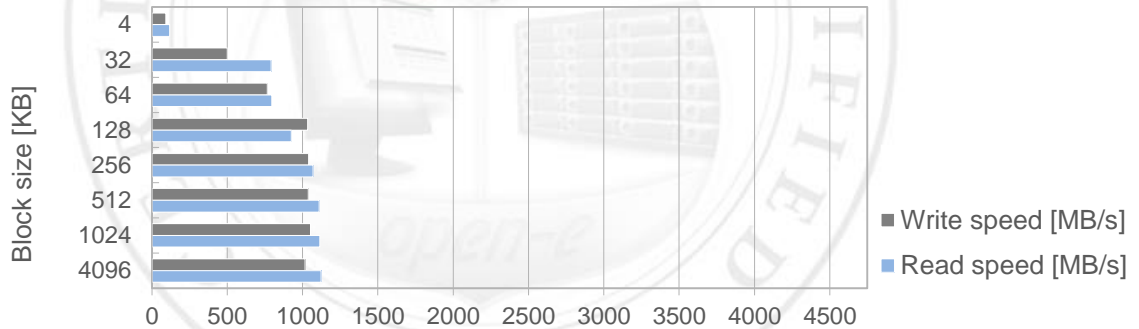


FIGURE 23: iSCSI Initiator performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter

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 Emulex OCe14102-NT Ethernet Network Adapter

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	290.39	290.39	passed
32	1118.70	1118.70	passed
64	1651.85	1651.85	passed
128	2100.01	2100.01	passed
256	2482.44	2482.44	passed
512	3373.51	3373.51	passed
1024	3504.85	3504.85	passed
4096	2303.71	2303.71	passed

TABLE 21: iSCSI Target performance test results table for Emulex OCe14102-NT Ethernet Network Adapter

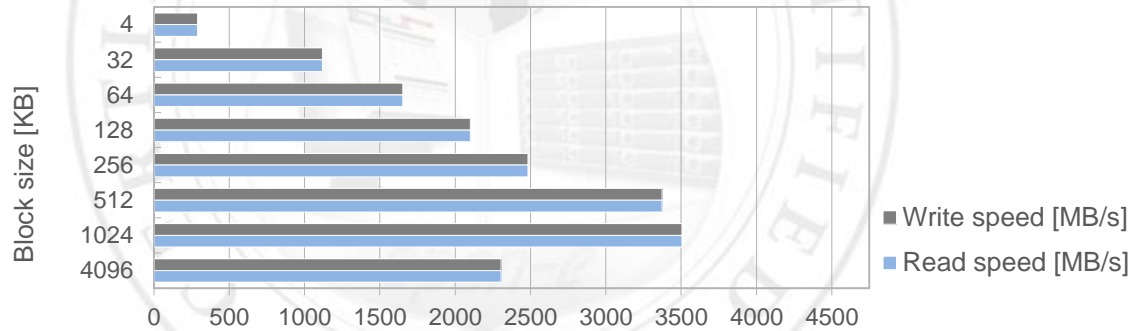


FIGURE 24: iSCSI Target performance test results chart for Emulex OCe14102-NT Ethernet Network Adapter