



HP Proliant DL380 G7 storage system



Executive summary

After performing all tests the HP Proliant DL380 G7 system has been officially certified according to the Open-E Hardware Certification Program.

During the tests it was found that the system is functional and efficient.

With Open-E DSS V6 operating system installed, HP Proliant DL380 G7 is stable and performs well.

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

✓ Storage for database

Following features make HP Proliant DL380 G7 great storage for databases:

- Fast and reliable SAS drives.
- Four 1GbE NICs, which can be aggregated for improved fault tolerance and increased performance.
- Server platform with fast CPUs for high transaction rate.
- Hardware RAID5, RAID10 and RAID50 for high performance and data safety.
- Large amount of RAM for caching.
- Redundant power supply for system reliability.

✓ iSCSI storage

Following features make HP Proliant DL380 G7 great storage for iSCSI target:

- Hardware RAID5, RAID10 and RAID50 for high performance and data safety.
- Four 1GbE interfaces for fast iSCSI MPIO network connection to target.
- Fast and reliable SAS drives.

✓ HA cluster

For this setup two identical systems are required. The following features make HP Proliant DL380 G7 suitable for HA cluster:

- Hardware RAID5, RAID10 and RAID50 for high performance and data safety.
- Four 1GbE NICs. Some of them can be aggregated for increased performance between nodes.
- Fast and reliable SAS drives.
- Redundant power supply for system reliability.

Certification notes

It's not recommended to use Balance-rr nor 802.3ad bonding mode. The Balance-alb bonding mode should be used instead.



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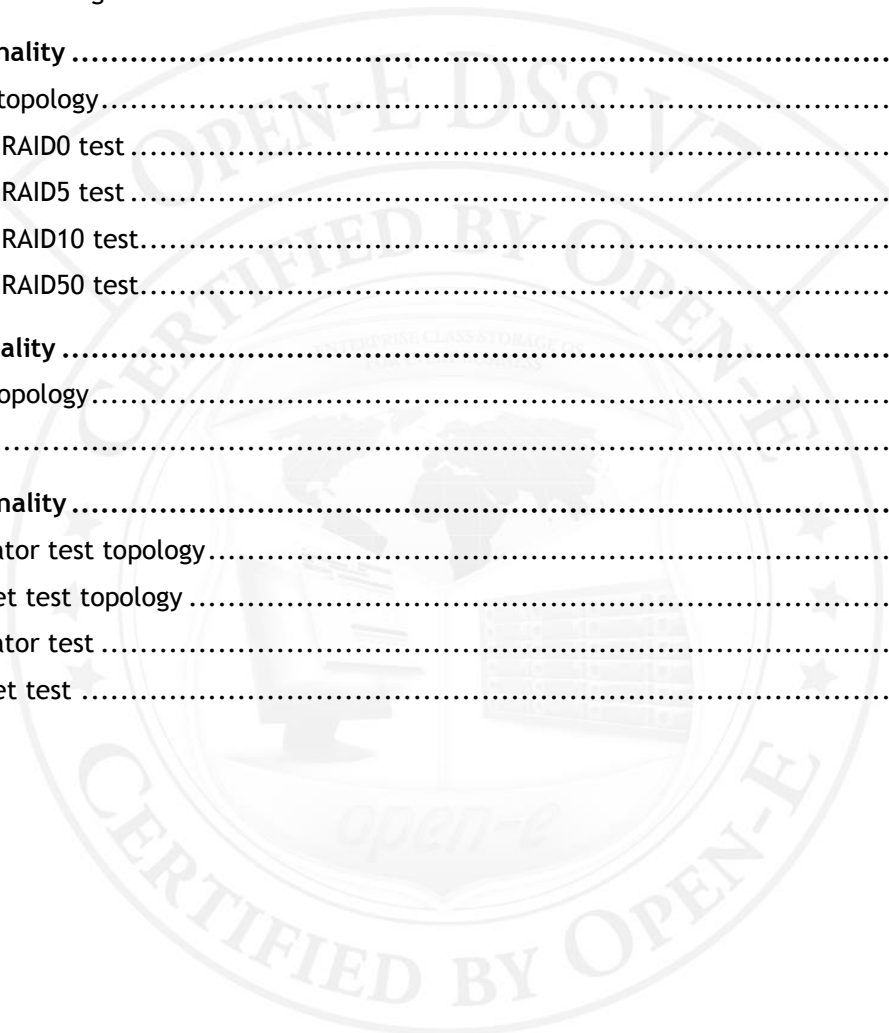
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HP Proliant DL380 G7 hardware components

Below is listed technical information about the certified system.

Model	HP Proliant DL380 G7
Operating system	Open-E DSS V6 build 5845
Enclosure/chassis	HP Proliant DL380 G7
CPU	2x Intel Xeon X5650 (2.66GHz)
Motherboard	Proliant DL380 G7 (Intel i5520 Chipset)
Memory	12x 2GB SAMSUNG ECC REGISTERED DDR3 1333MHz PC3-10600 RDIMM M393B5673FH0-CH9Q5
Network	2x HP NC382i dual port (NetXtreme II BCM5709)
HW RAID	HP Smart Array P410i with 1GB FBWC
Hard disk drives	8x 300GB Seagate Savio ST9300605SS

TABLE 1: Hardware components list of Certified System with Open-E DSS V6

All components were detected and properly recognized.



HP ProLiant DL380 G7 photos



FIGURE 1: Front photo



FIGURE 2: Rear photo

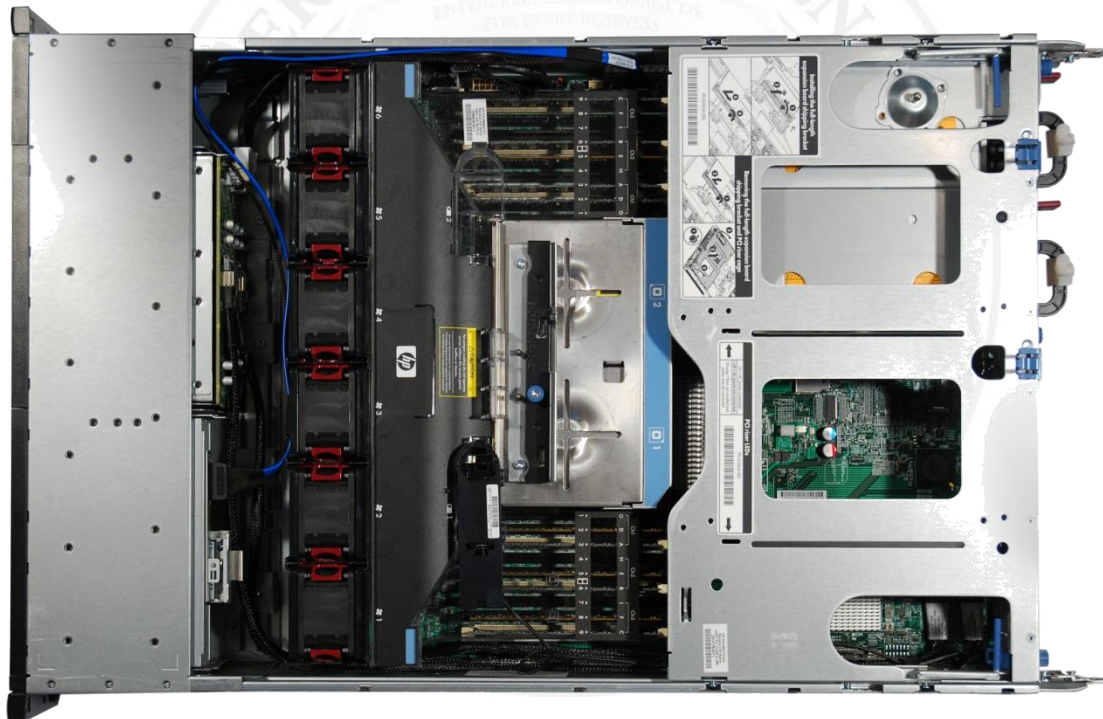


FIGURE 3: Top photo

Auxiliary systems hardware components

Auxiliary system with MS Windows or Open-E DSS V6 installed on it, used in Open-E hardware certification process.

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	lpc-4u-600
Motherboard	Supermicro X7DVL-E
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000PT Dual Port Adapter (i82571EB)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	lpc-4u-600
Motherboard	Tyan Tempest i5400PW (S5397)
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000PT Dual Port Adapter (i82571EB)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	lpc-4u-600
Motherboard	Supermicro X7DVL-E
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000PT Dual Port Adapter (i82571EB)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

TABLE 4: Hardware components of third Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	lpc-4u-600
Motherboard	Tyan Tempest i5400PW (S5397)
CPU	Intel Xeon E5405 2.0GHz
Memory	8x 1GB DDR2 667 ECC FB-DIMM Kingston KVR667D2D8F5K2/2G
Network controller	Intel PRO/1000PT Dual Port Adapter (i82571EB)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

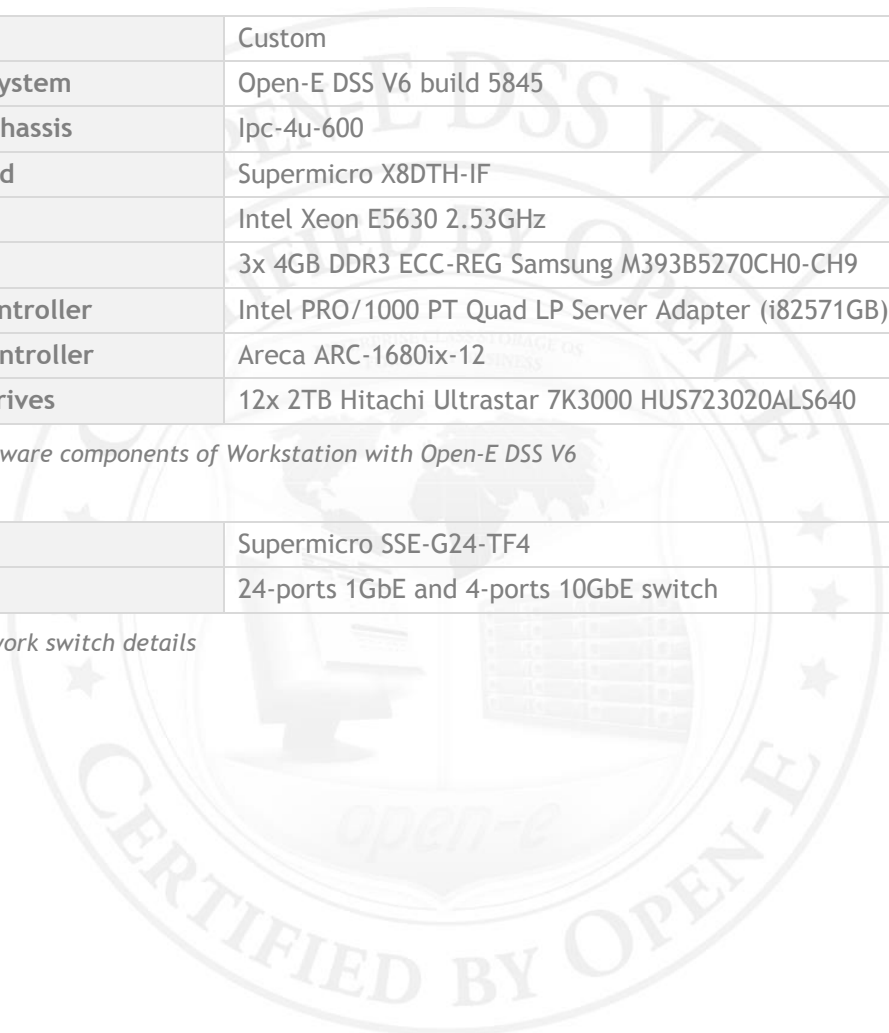
TABLE 5: Hardware components of fourth Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V6 build 5845
Enclosure/chassis	lpc-4u-600
Motherboard	Supermicro X8DTH-IF
CPU	Intel Xeon E5630 2.53GHz
Memory	3x 4GB DDR3 ECC-REG Samsung M393B5270CH0-CH9
Network controller	Intel PRO/1000 PT Quad LP Server Adapter (i82571GB)
HW RAID controller	Areca ARC-1680ix-12
Hard disk drives	12x 2TB Hitachi Ultrastar 7K3000 HUS723020ALS640

TABLE 6: Hardware components of Workstation with Open-E DSS V6

Model	Supermicro SSE-G24-TF4
Description	24-ports 1GbE and 4-ports 10GbE switch

TABLE 7: Network switch details



Administration functionality

The following functionality has been tested.

Drive identifier	OK
Power button	OK
Front and rear LEDs	OK

TABLE 8: Administration functionality test results

In order to monitor the server please use external IPMI client.



Network functionality

Tests performed in this section check the functionality, performance, and stability of the network solutions available in the Open-E DSS V6 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.

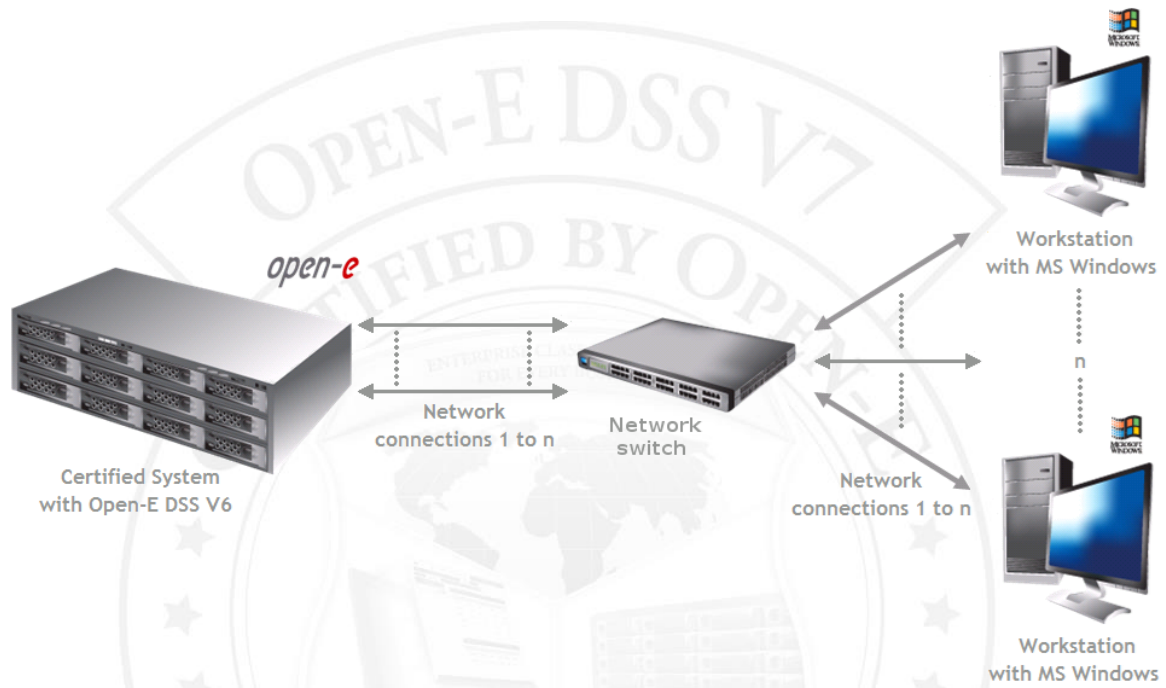


FIGURE 4: Network topology for Network testing

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

802.3ad bonding mode performance test results			
NIC model	HP NC382i dual port (NetXtreme II BCM5709)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1 st Workstation	110.91	47.51	passed
2 nd Workstation	111.06	32.13	passed
3 rd Workstation	109.75	110.94	passed
4 th Workstation	109.78	33.54	passed

TABLE 9: 802.3ad bonding mode performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

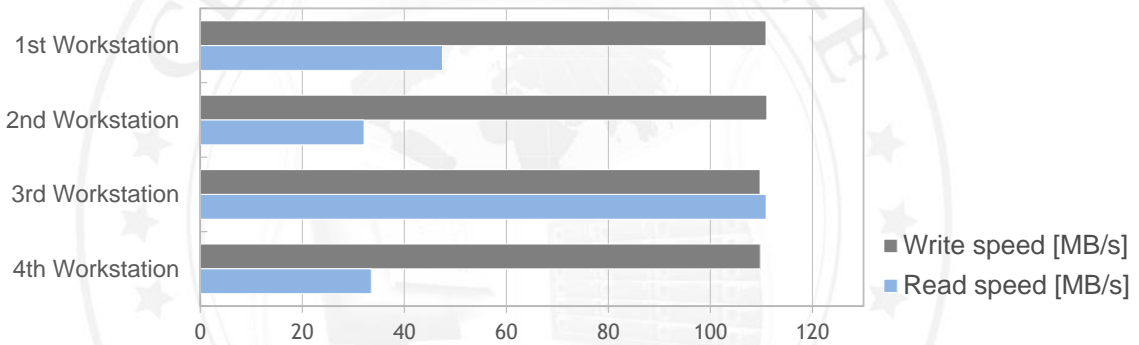


FIGURE 5: 802.3ad bonding mode performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

Balance-alb bonding mode performance test results			
NIC model	HP NC382i dual port (NetXtreme II BCM5709)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1 st Workstation	113.00	110.37	passed
2 nd Workstation	112.94	110.41	passed
3 rd Workstation	112.97	110.74	passed
4 th Workstation	112.36	110.49	passed

TABLE 10: Balance-alb bonding mode performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

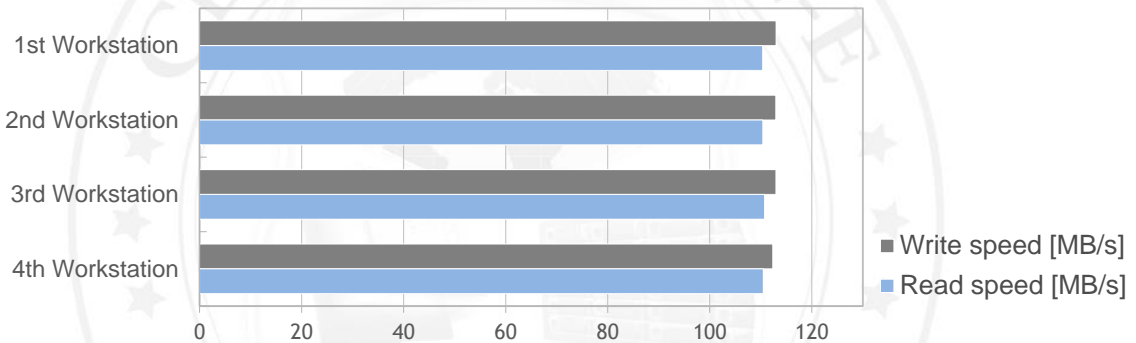


FIGURE 6: Balance-alb bonding mode performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

Balance-rr bonding mode performance test results			
NIC model	HP NC382i dual port (NetXtreme II BCM5709)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1 st Workstation	48.56	86.74	passed
2 nd Workstation	32.19	85.67	passed
3 rd Workstation	46.80	74.07	passed
4 th Workstation	57.18	93.27	passed

TABLE 11: Balance-rr bonding mode performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

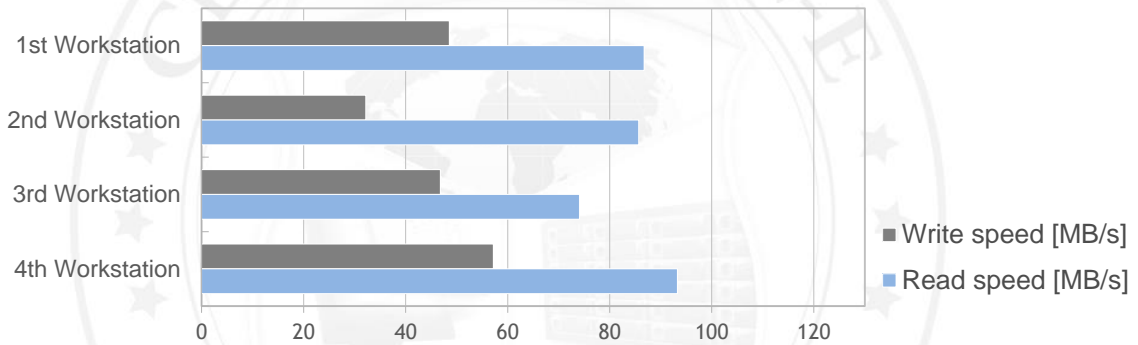


FIGURE 7: Balance-rr bonding mode performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

RAID functionality

Tests performed in this section check the functionality, performance, and stability of Open-E DSS V6 storage devices on the certified system.

Tests in this section rely on the creation of the RAID units on 0, 5, 10 and 50 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

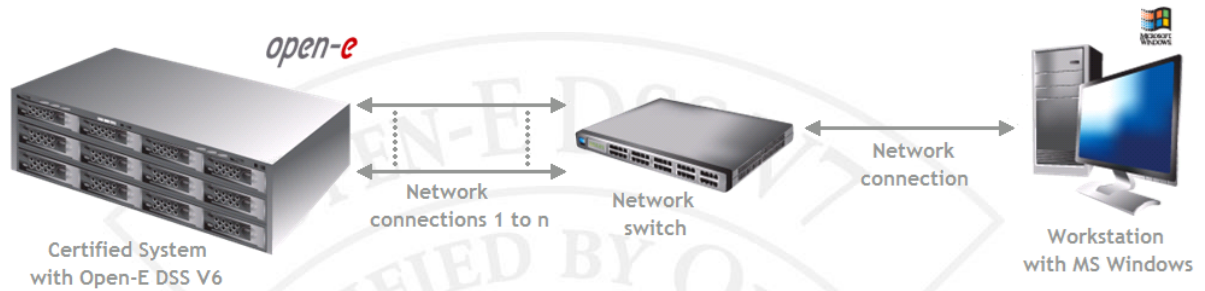
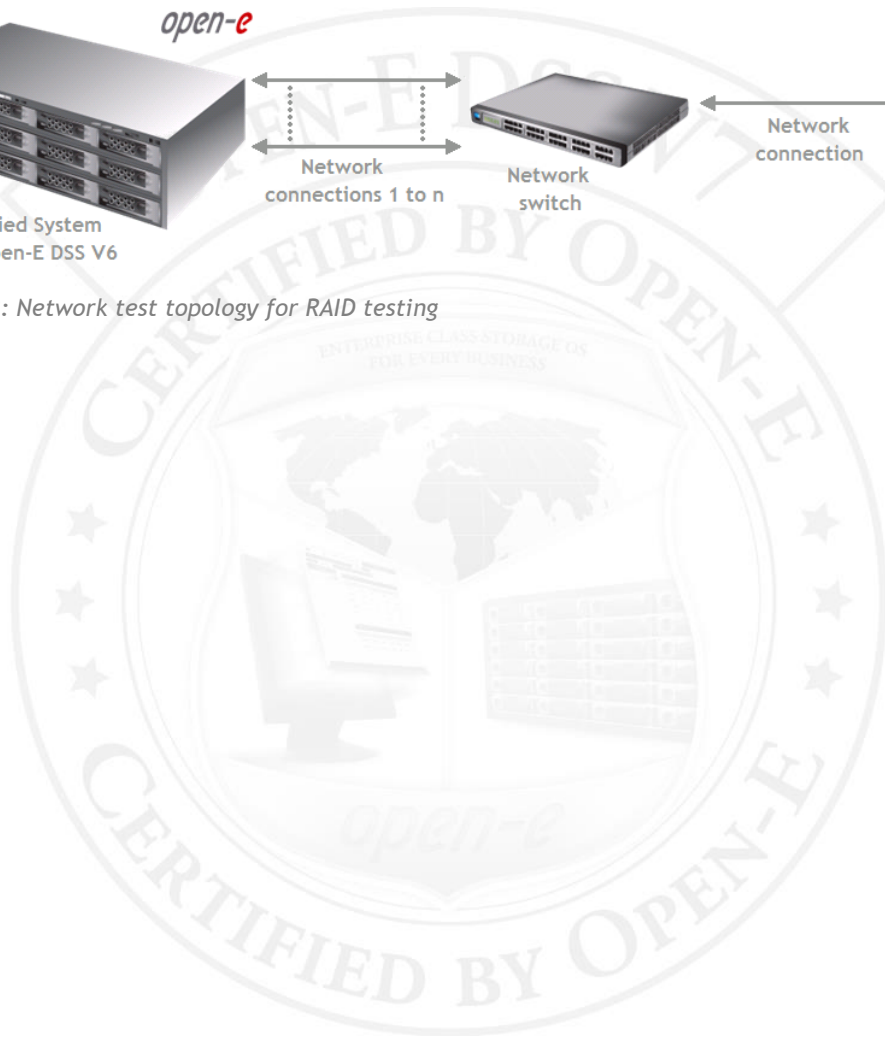


FIGURE 8: Network test topology for RAID testing



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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	46.45	46.53	passed
32	103.42	102.79	passed
64	108.37	108.62	passed
128	110.09	110.64	passed
256	112.73	112.81	passed
512	112.96	112.90	passed
1024	112.97	112.86	passed
4096	112.84	112.77	passed

TABLE 12: RAID0 performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

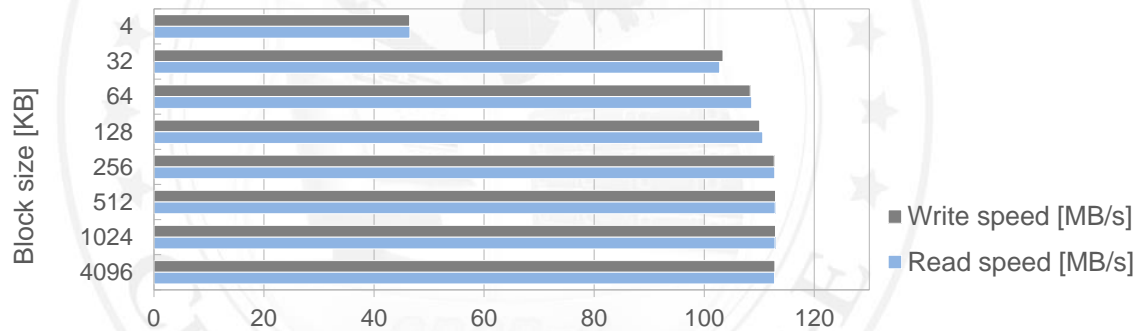


FIGURE 9: RAID0 performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	47.70	51.11	passed
32	103.55	103.45	passed
64	108.67	108.66	passed
128	109.74	110.48	passed
256	112.66	112.88	passed
512	112.90	112.91	passed
1024	112.91	112.87	passed
4096	112.78	112.77	passed

TABLE 13: RAID5 performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

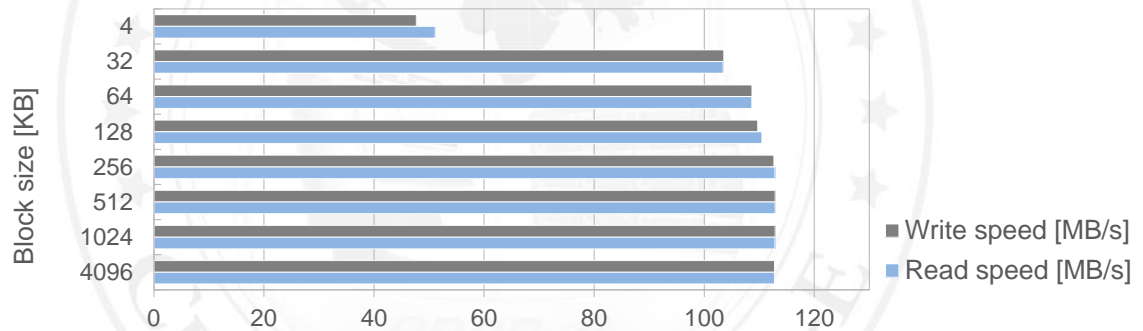


FIGURE 10: RAID5 performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	23.78	46.92	passed
32	100.54	102.81	passed
64	106.86	107.83	passed
128	104.09	110.86	passed
256	109.26	112.07	passed
512	109.24	112.19	passed
1024	97.66	112.05	passed
4096	96.81	111.91	passed

TABLE 14: RAID10 performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

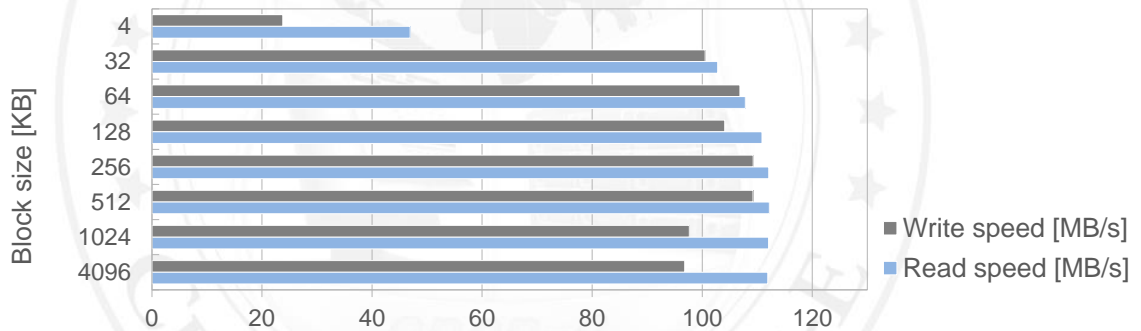


FIGURE 11: RAID10 performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	62.20	85.03	passed
32	111.04	112.71	passed
64	109.00	113.03	passed
128	110.03	113.05	passed
256	112.86	113.06	passed
512	113.08	113.06	passed
1024	113.07	113.04	passed
4096	112.95	112.89	passed

TABLE 15: RAID50 performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

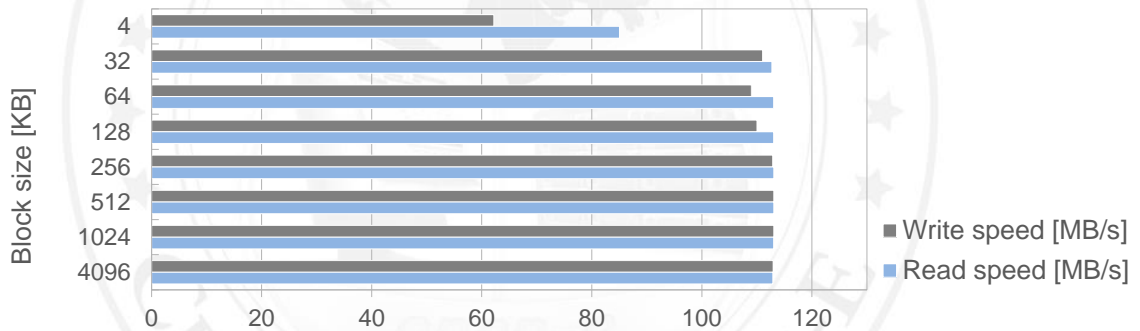


FIGURE 12: RAID50 performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

NAS functionality

Tests performed in this section check the functionality, performance and stability of the NAS protocols in the Open-E DSS V6 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 lometer testing tool.

NAS test topology

Network topology for NAS testing is shown below.

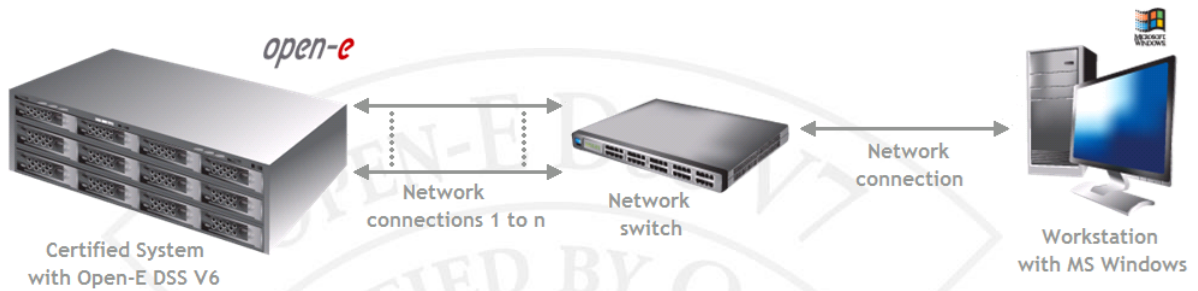
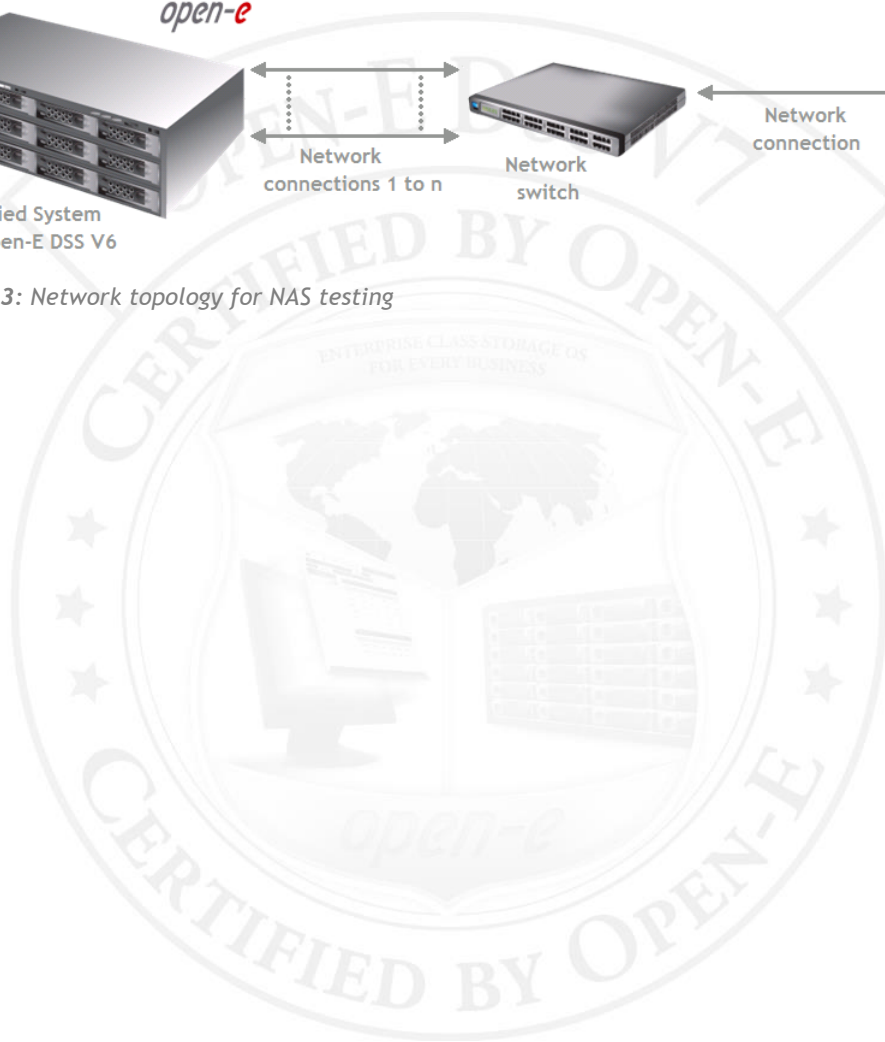


FIGURE 13: Network topology for NAS testing



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 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	81.59	106.07	passed
32	112.59	112.80	passed
64	113.02	112.80	passed
128	112.95	112.85	passed
256	113.01	112.86	passed
512	113.00	112.90	passed
1024	112.98	112.86	passed
4096	112.88	112.67	passed

TABLE 16: SMB performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

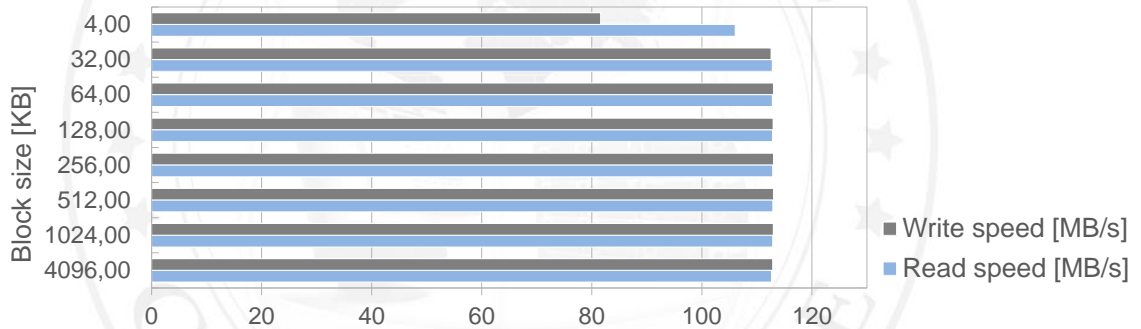


FIGURE 14: SMB performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

iSCSI functionality

Tests performed in this section check the functionality, performance, and stability of the iSCSI protocol in the Open-E DSS V6 product on the certified system.

iSCSI Initiator test topology

Network topology for iSCSI Initiator testing is shown below.

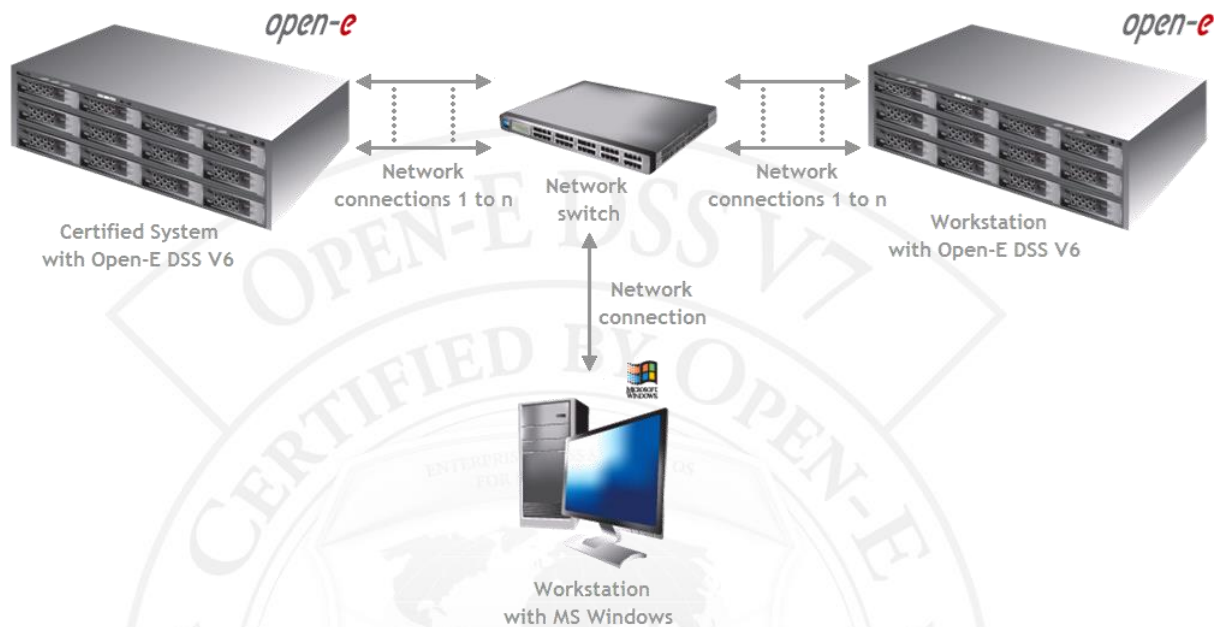


FIGURE 15: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

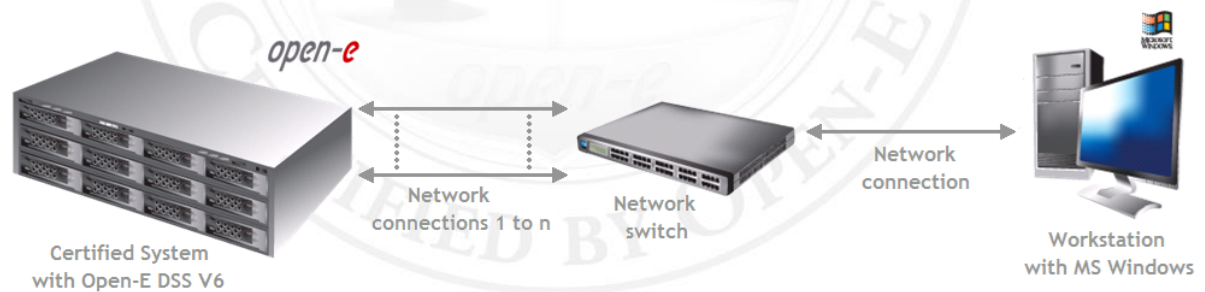


FIGURE 16: Network topology for iSCSI Target testing

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. Tests were performed using network connection.

2. Test results for iSCSI Initiator and 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	74.81	109.63	passed
32	109.23	112.47	passed
64	111.82	110.07	passed
128	111.37	112.52	passed
256	111.60	112.59	passed
512	111.14	112.57	passed
1024	111.41	110.77	passed
4096	111.10	112.45	passed

TABLE 17: iSCSI Initiator performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

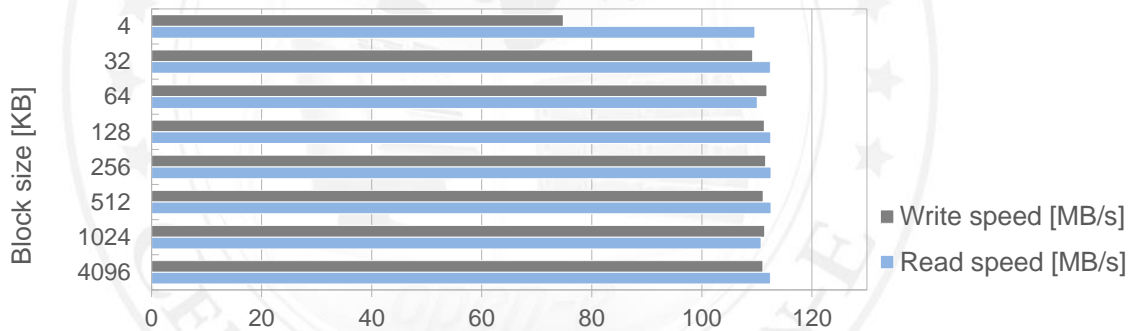


FIGURE 17: iSCSI Initiator performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

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. Tests were performed using network connection.

2. Test results for iSCSI Target and 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
4	46.45	46.53	passed
32	103.42	102.79	passed
64	108.37	108.62	passed
128	110.09	110.64	passed
256	112.73	112.81	passed
512	112.96	112.90	passed
1024	112.97	112.86	passed
4096	112.84	112.77	passed

TABLE 18: iSCSI Target performance test results table for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)

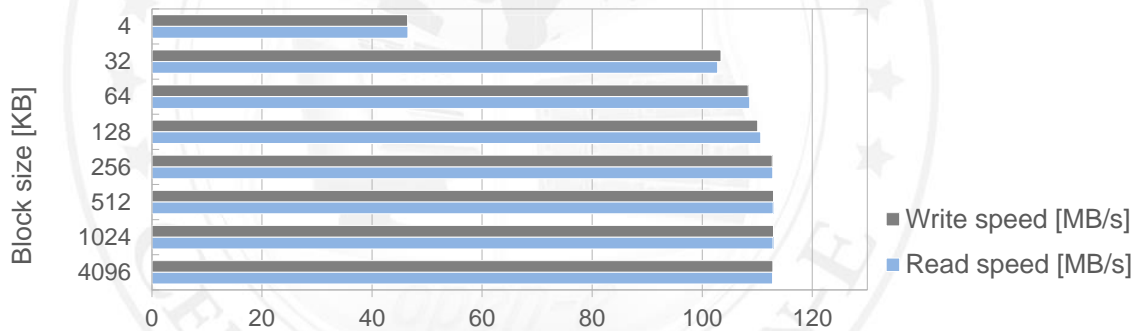


FIGURE 18: iSCSI Target performance test results chart for 1GbE HP NC382i dual port adapter (NetXtreme II BCM5709) (on-board)