

macle GmbH HP Proliant DL380e - Gen8 storage system 687567-DSS



Executive summary

After performing all tests, the macle GmbH HP Proliant DL380e - Gen8 system 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 macle GmbH HP Proliant DL380e - Gen8 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 macle GmbH HP Proliant DL380e - Gen8 good iSCSI storage:

- HW RAID5, or RAID50 for high performance and data safety.
- Four 1GbE and two 10GbE interfaces for fast MPIO connection and flexible network topology
- Redundant power supply for system reliability.

✓ NAS filer

The following features make macle GmbH HP Proliant DL380e - Gen8 a good NAS filer solution:

- Eight high capacity SATA hard drives provide a plenty of space for user files.
- Hardware RAID5, RAID50 for fault tolerance and the most efficient use of available disk space.
- Two 10GbE and four 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.

✓ Storage for Virtualization

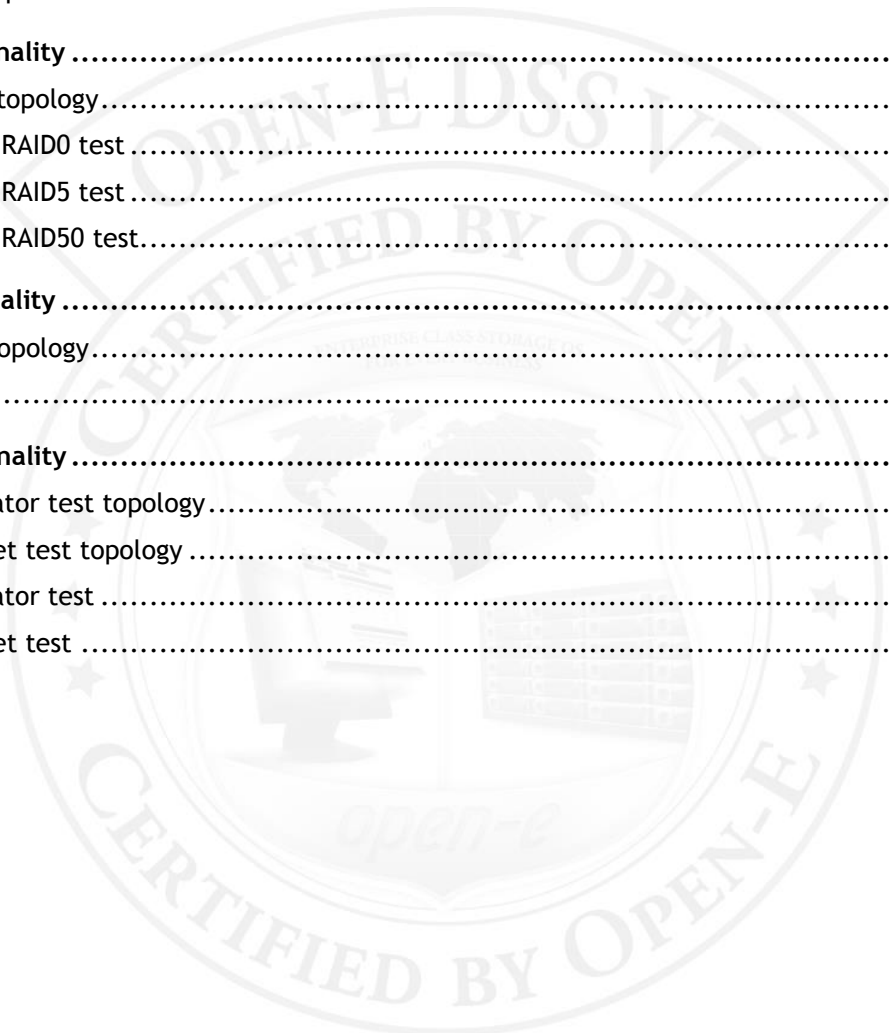
The following features make macle GmbH HP Proliant DL380e - Gen8 great storage for a virtualization:

- Hardware RAID5 and RAID50 ensures failure-free work and great performance, even for demanding virtual environments.
- Two 10GbE and four 1GbE interfaces for efficient network connections to virtualization systems.
- The HP 4GB Enterprise Performance Flash keeps the OS Save

Certification notes

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

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HP Proliant DL380e - Gen8 hardware components

Technical specifications about the certified system are listed below:

Model	HP Proliant DL380e - Gen8
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	HP Proliant DL380e - Gen8
CPU	Intel Xeon E5-2407 2.2 GHz
Motherboard	HP Proliant DL380e - Gen8
Memory	2x 4GB DDR3 ECC-REG Hynix PC3-1600
Network	HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)
Network	Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)
HW RAID	HP Smart Array P420
Hard disk drives	8x 3TB HP MB3000GBKAC (ST33000650NS)
Boot media drive	4GB HP SDHC Flash Media (583039-001)

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



HP Proliant DL380e - Gen8 photos



FIGURE 1: Front photo



FIGURE 2: Rear photo

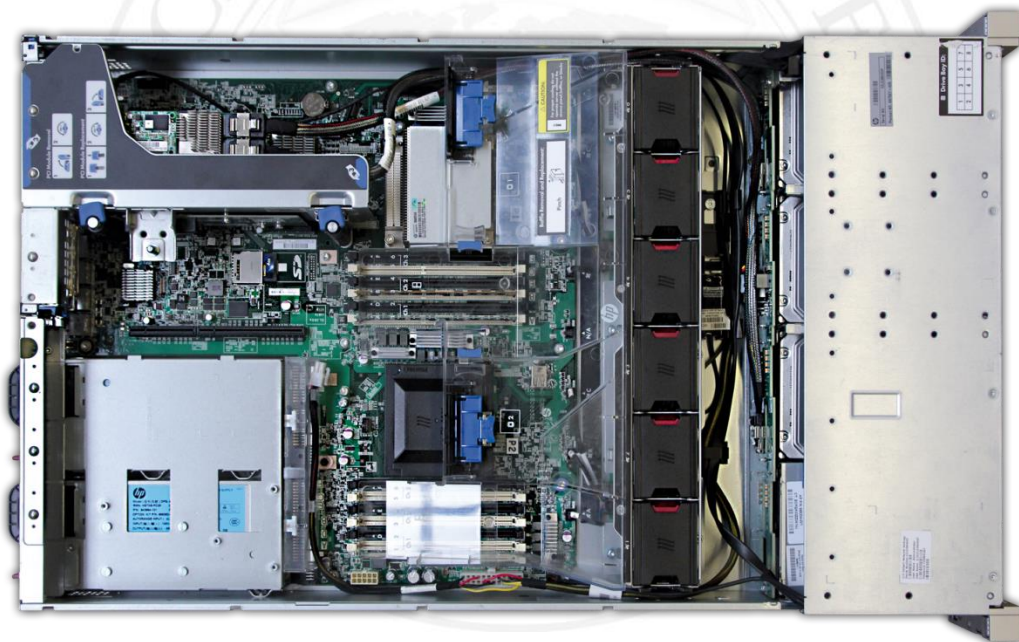


FIGURE 3: Top photo

Auxiliary systems hardware components

Auxiliary systems with MS Windows or Open-E DSS V7 installed, used in Open-E Hardware Certification Process.

Model	HP ProLiant DL360e - Gen8 Server
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	DL360 G5
Motherboard	HP ProLiant DL360 G5
CPU	2x Intel X5460 QC 3.16GHz/12MB cache CPU
Memory	2x Samsung M395T5750GZ4-CE66 DDR2-667 2GB FB-DIMM
Network	NC373i embedded dual gigabit network
Network	Broadcom NetXtreme II BCM57712 10Gigabit Ethernet
Hard disk drives	146GB 10K SAS ST9146803SS

TABLE 2: Hardware components of first Workstation with MS Windows

Model	HP ProLiant DL360e - Gen8 Server
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	DL360 G5
Motherboard	HP ProLiant DL360 G5
CPU	2x Intel X5460 QC 3.16GHz/12MB cache CPU
Memory	2x Samsung M395T5750GZ4-CE66 DDR2-667 2GB FB-DIMM
Network	NC373i embedded dual gigabit network
Network	Broadcom NetXtreme II BCM57712 10Gigabit Ethernet
Hard disk drives	1x Hitachi 1TB SATA

TABLE 3: Hardware components of second Workstation with MS Windows

Model	HP ProLiant DL380e - Gen8
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	HP ProLiant DL380e - Gen8
CPU	Intel Xeon E5-2407 2.2 GHz
Motherboard	HP ProLiant DL380e - Gen8
Memory	2x 4GB DDR3 ECC-REG Hynix PC3-1600
Network	HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)
Network	Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)
HW RAID	HP Smart Array P410
Hard disk drives	8x 3TB HP MB3000GBKAC (ST33000650NS)
Hard disk drives	4GB HP SDHC Flash Media (583039-001) (Boot drive)
Model	HP ProLiant DL380e - Gen8

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

Model	Netgear ProSafe Plus XS708E
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TABLE 5: Network switch details for 10GbE 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.

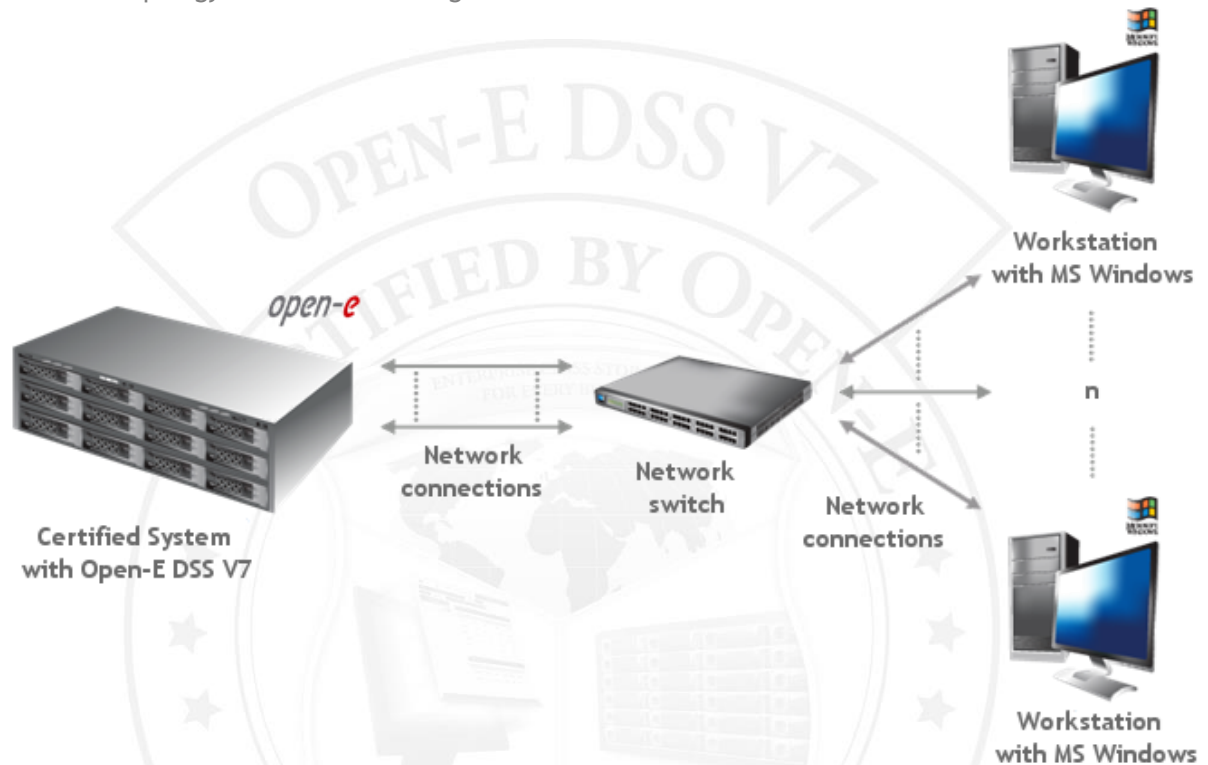


FIGURE 4: Network topology for Network testing

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 HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

802.3ad bonding mode performance test results			
NIC model	HP FlexibleLOM 1Gb 4-port Ethernet Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	111.05	112.21	passed
2 nd Workstation	111.55	112.14	passed
3 rd Workstation	111.52	112.13	passed
4 th Workstation	111.29	112.12	passed

TABLE 7: 802.3ad bonding mode performance test results table for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

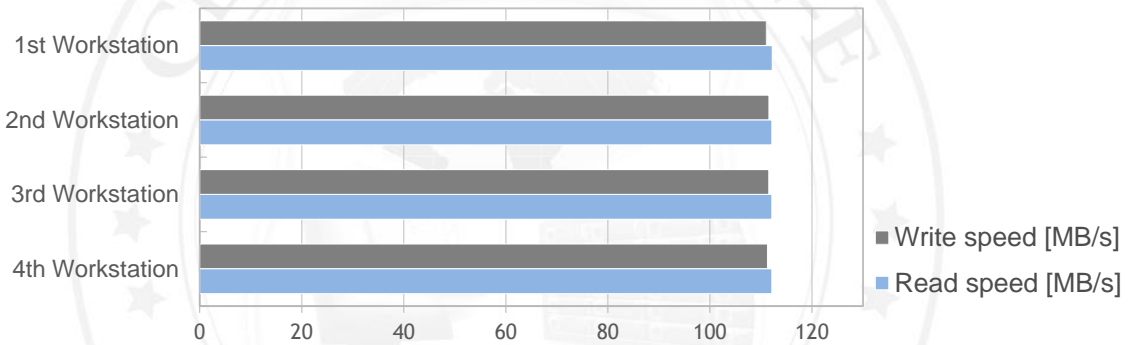


FIGURE 5: 802.3ad bonding mode performance test results chart for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

Balance-alb bonding mode performance test results			
NIC model	Broadcom NetXtreme II 10Gigabit Ethernet		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	524.67	136.34	passed
2 nd Workstation	529.78	200.68	passed
3 rd Workstation	523.91	133.18	passed
4 th Workstation	526.81	277.89	passed

TABLE 8: Balance-alb bonding mode performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

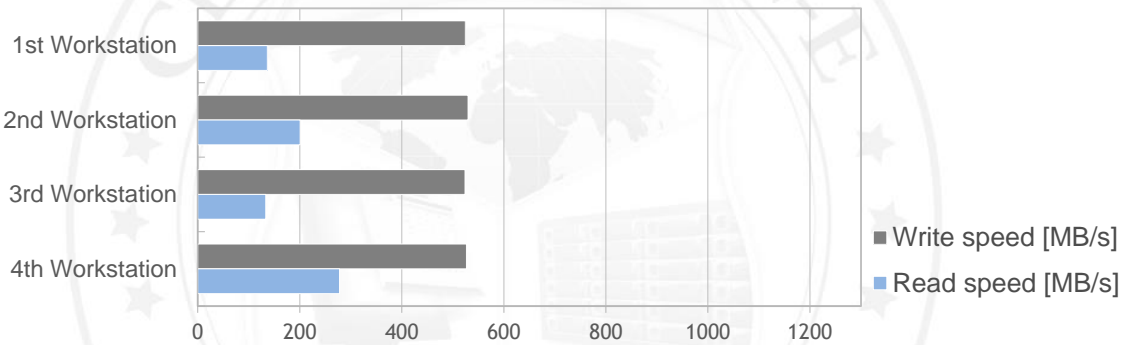


FIGURE 6: Balance-alb bonding mode performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

3. Test results for Balance-alb bonding mode test performed on HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

Balance-alb bonding mode performance test results			
NIC model	HP FlexibleLOM 1Gb 4-port Ethernet Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	111.38	92.49	passed
2 nd Workstation	111.67	110.90	passed
3 rd Workstation	111.25	110.75	passed
4 th Workstation	111.52	110.71	passed

TABLE 9: Balance-alb bonding mode performance test results table for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

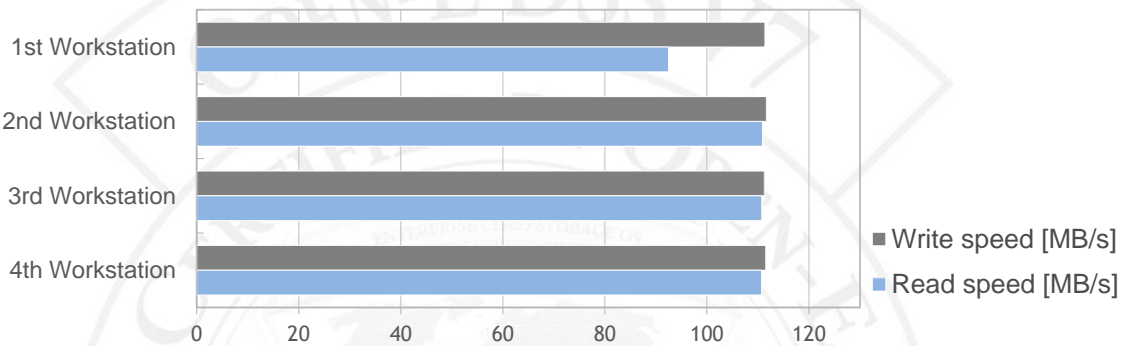
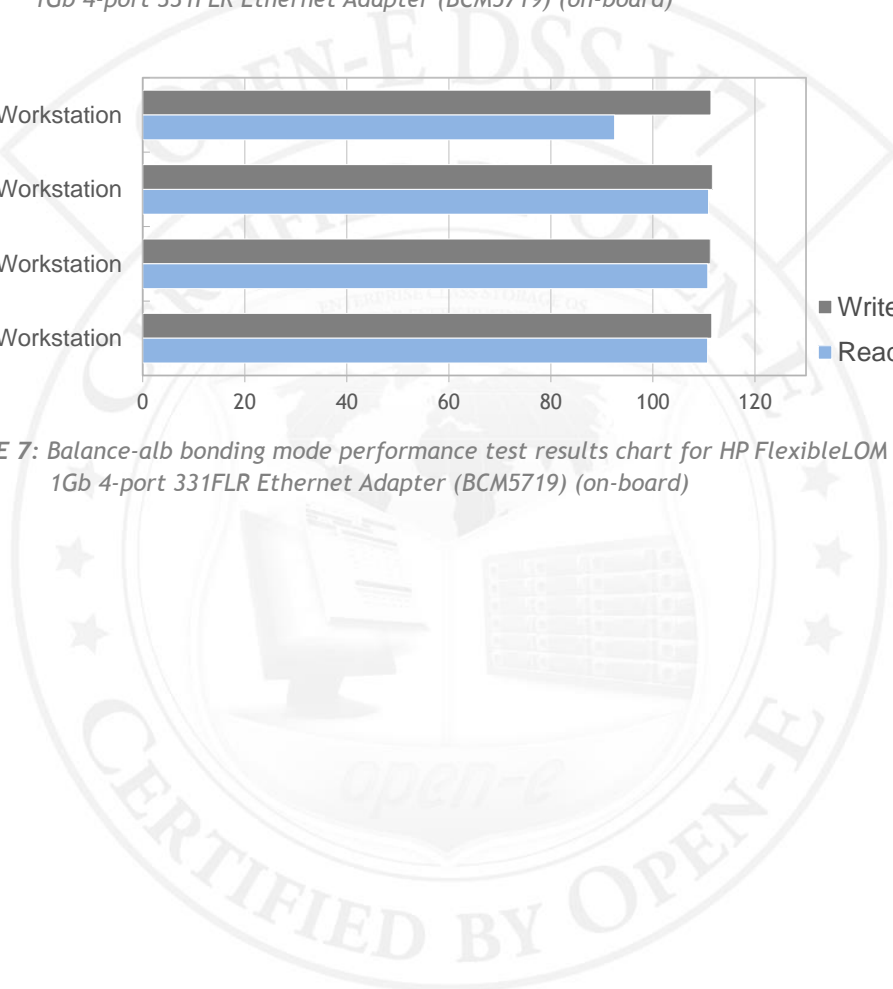


FIGURE 7: Balance-alb bonding mode performance test results chart for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)



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 lometer testing tool.

2. Test results for Balance-rr bonding mode test performed on Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

Balance-rr bonding mode performance test results			
NIC model	Broadcom NetXtreme II 10Gigabit Ethernet		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	283.88	215.12	passed
2 nd Workstation	282.71	352.69	passed
3 rd Workstation	282.78	219.85	passed
4 th Workstation	285.93	279.40	passed

TABLE 10: Balance-rr bonding mode performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

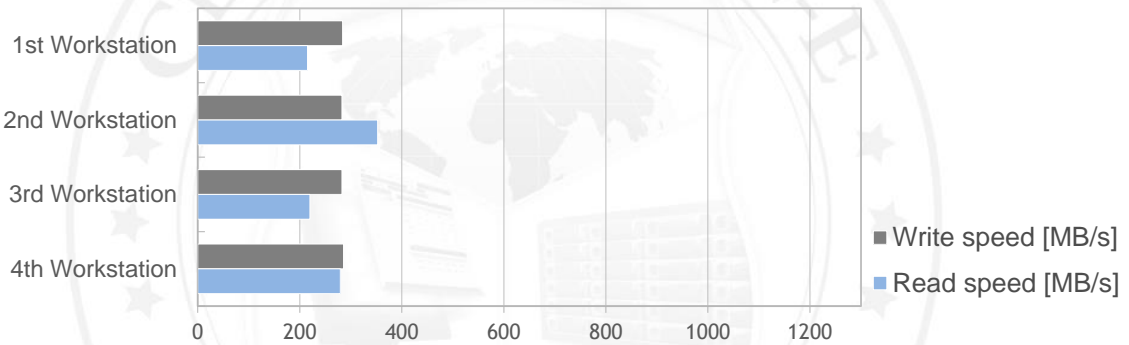


FIGURE 8: Balance-rr bonding mode performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

3. Test results for Balance-rr bonding mode test performed on HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

Balance-rr bonding mode performance test results			
NIC model	HP FlexibleLOM 1Gb 4-port Ethernet Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	90.48	80.35	passed
2 nd Workstation	77.68	64.11	passed
3 rd Workstation	64.19	73.34	passed
4 th Workstation	82.87	78.20	passed

TABLE 11: Balance-rr bonding mode performance test results table for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

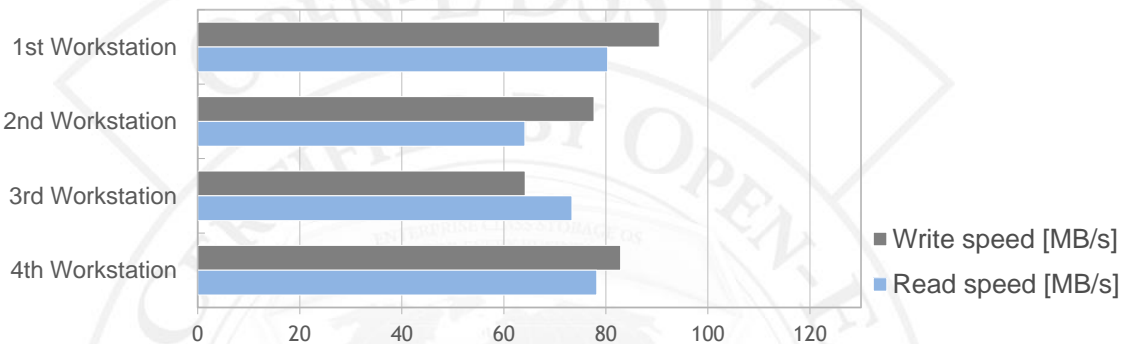
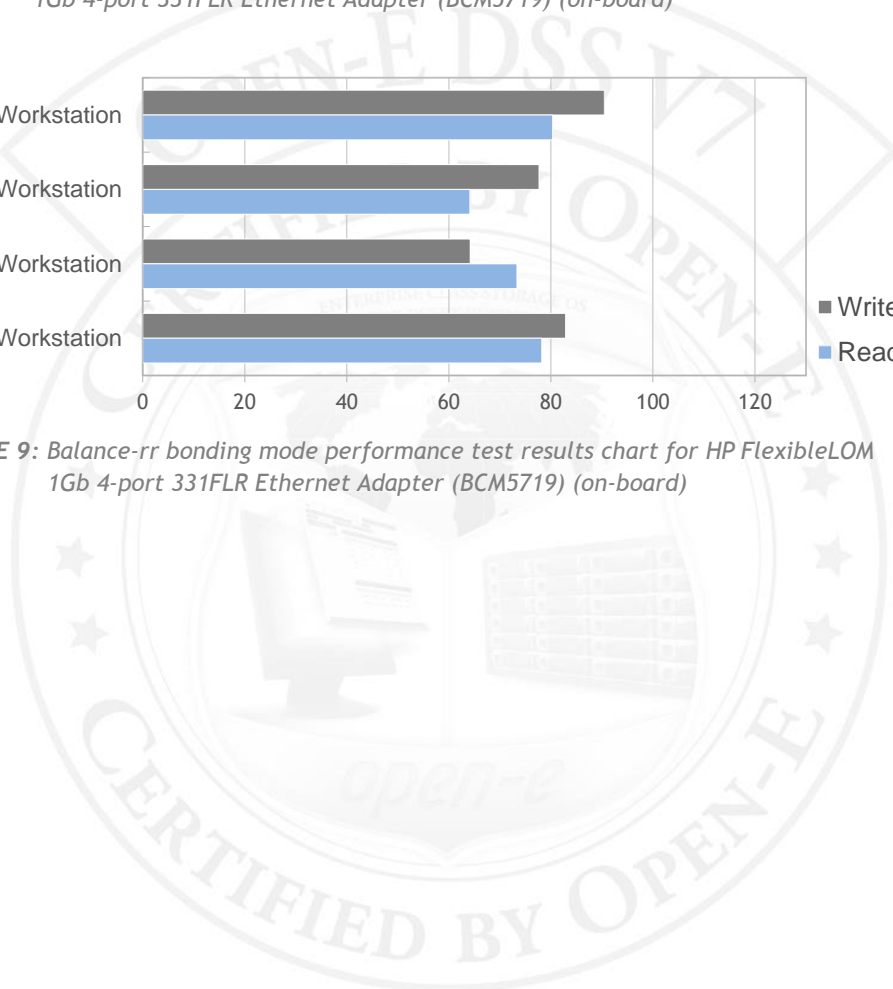


FIGURE 9: Balance-rr bonding mode performance test results chart for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)



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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

Single NIC performance test results			
NIC model	Broadcom NetXtreme II 10Gigabit Ethernet		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	678.9	288.7	passed

TABLE 12: Single NIC performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

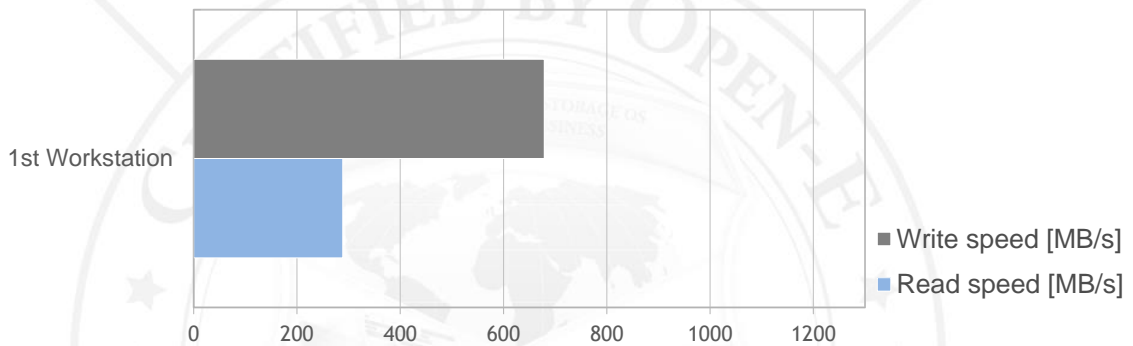


FIGURE 10: Single NIC performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

3. Test results for single NIC test performed on HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

Single NIC performance test results			
NIC model	HP FlexibleLOM 1Gb 4-port Ethernet Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	110.92	112.12	passed

TABLE 13: Single NIC performance test results table for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)

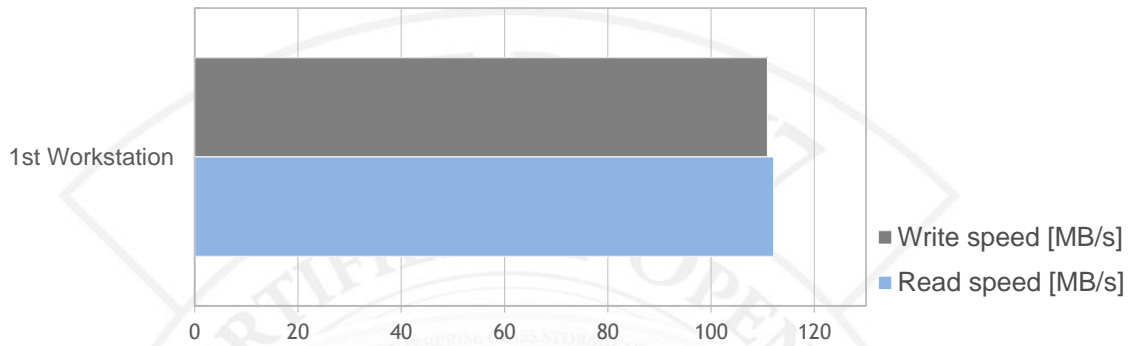
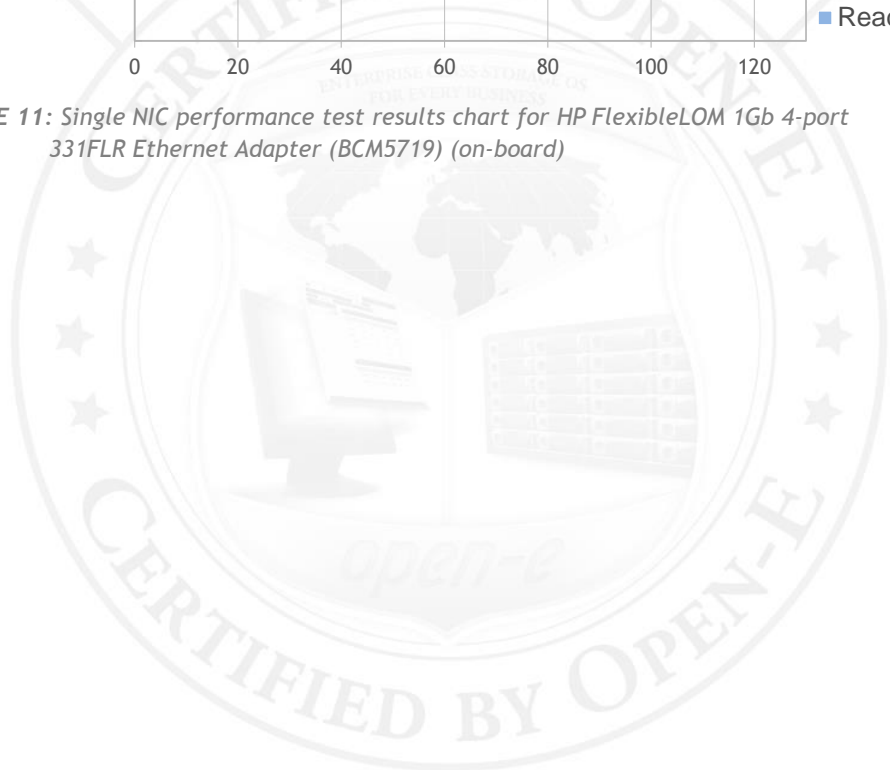


FIGURE 11: Single NIC performance test results chart for HP FlexibleLOM 1Gb 4-port 331FLR Ethernet Adapter (BCM5719) (on-board)



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 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

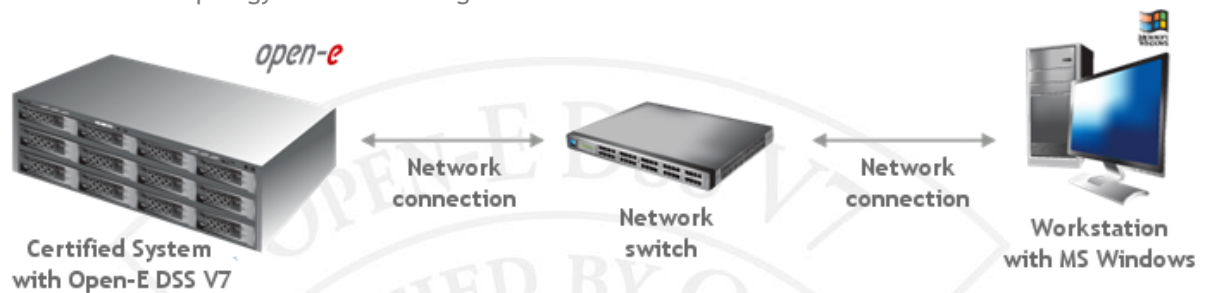


FIGURE 12: Network test topology for RAID testing

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	13.28	51.94	passed
32	96.00	222.43	passed
64	203.66	277.44	passed
128	340.17	354.53	passed
256	490.39	440.54	passed
512	529.59	460.23	passed
1024	555.51	468.46	passed
4096	552.93	482.93	passed

TABLE 14: RAID0 performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

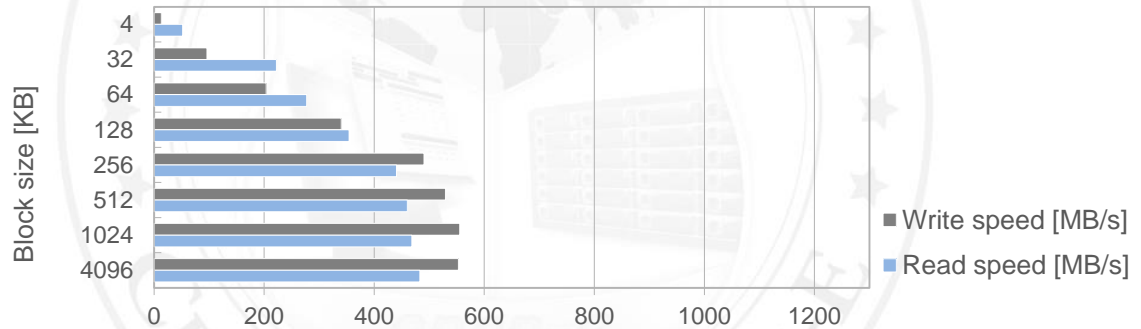


FIGURE 13: RAID0 performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	14.72	49.78	passed
32	99.34	229.72	passed
64	208.73	298.26	passed
128	342.32	355.69	passed
256	490.46	447.34	passed
512	524.85	472.69	passed
1024	552.20	479.76	passed
4096	554.71	500.92	passed

TABLE 15: RAID5 performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

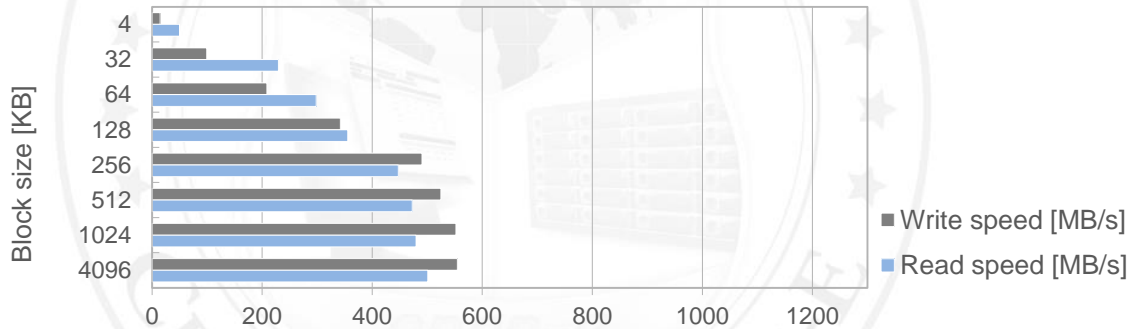


FIGURE 14: RAID5 performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	17.11	46.75	passed
32	104.28	226.56	passed
64	204.25	303.83	passed
128	300.30	359.40	passed
256	435.94	462.47	passed
512	485.06	482.42	passed
1024	499.75	493.92	passed
4096	506.42	508.51	passed

TABLE 16: RAID50 performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

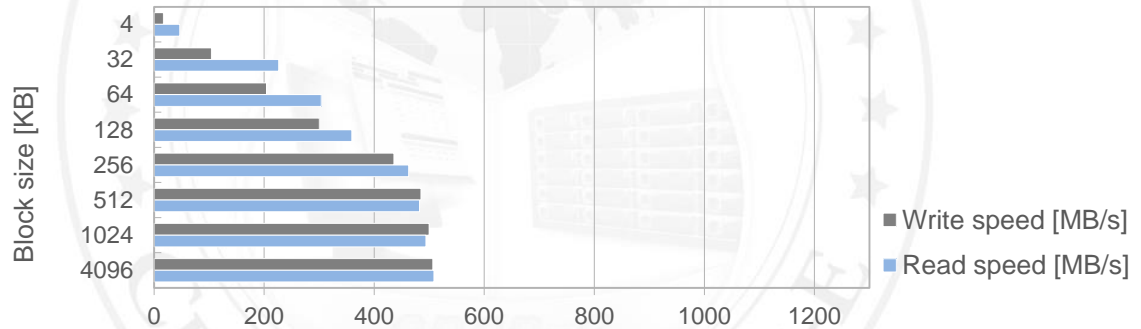


FIGURE 15: RAID50 performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

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.

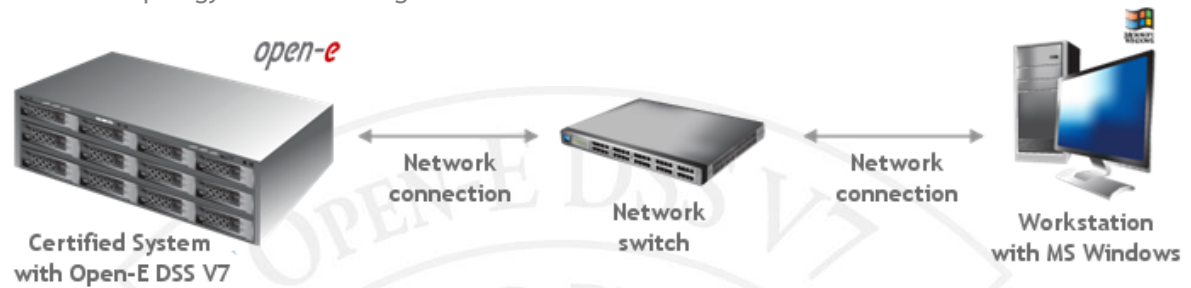
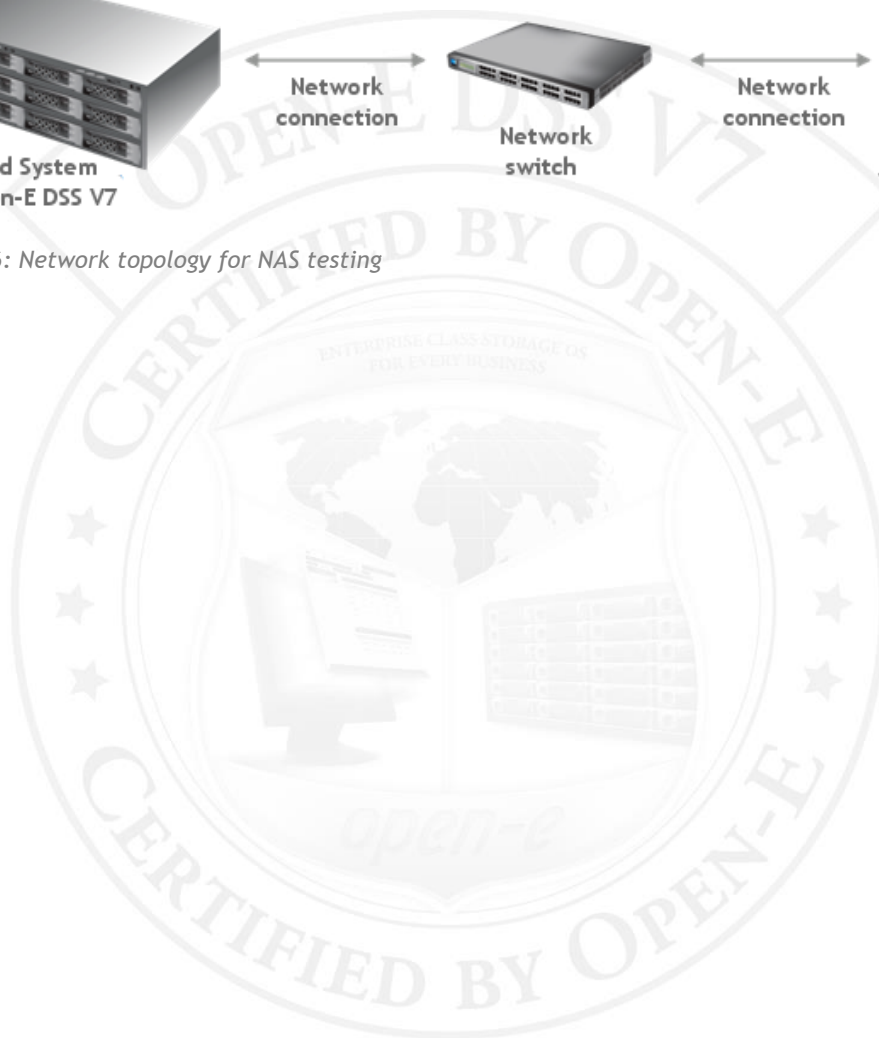


FIGURE 16: Network topology for NAS testing



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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	71.24	54.86	passed
32	423.95	271.45	passed
64	777.08	251.00	passed
128	873.41	336.94	passed
256	873.89	396.07	passed
512	858.08	423.86	passed
1024	847.66	428.39	passed
4096	861.41	461.06	passed

TABLE 17: SMB performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

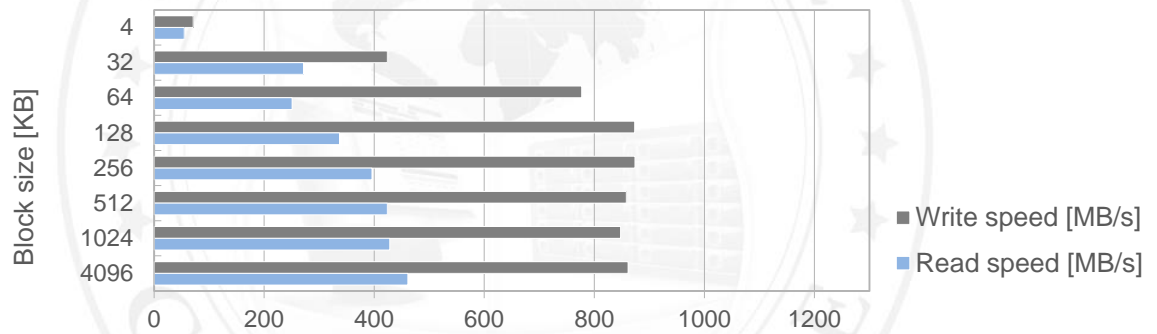


FIGURE 17: SMB performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

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.

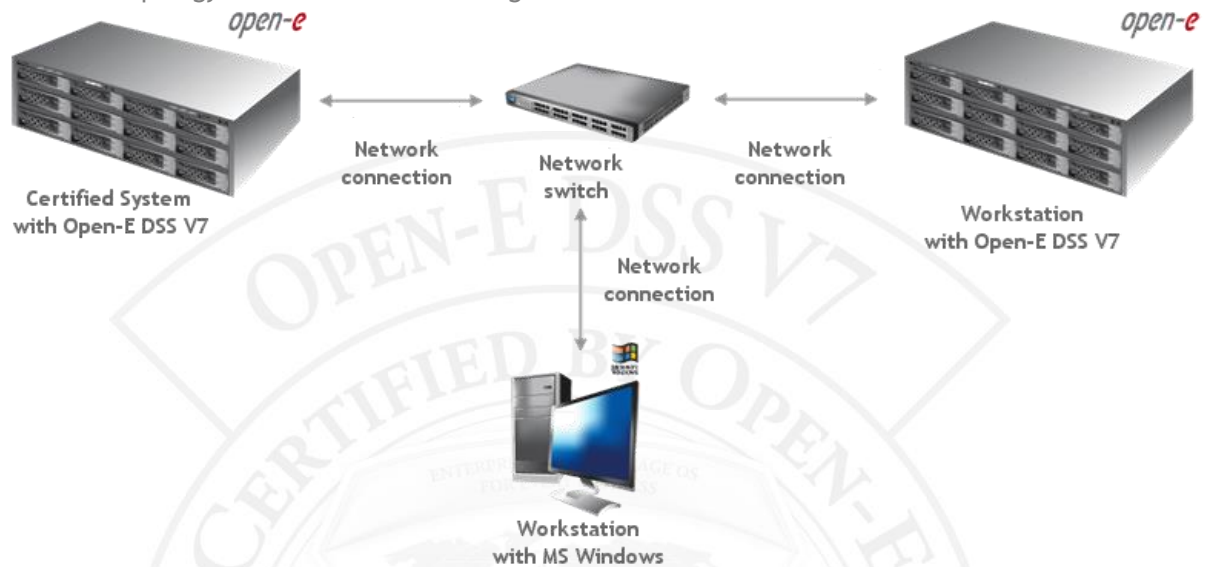


FIGURE 18: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

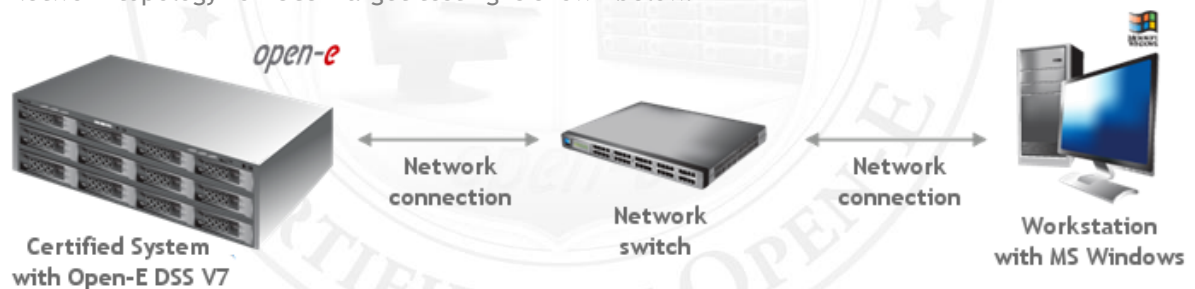


FIGURE 19: Network topology for iSCSI Target testing

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	52.58	67.74	passed
32	260.32	239.25	passed
64	461.33	342.16	passed
128	632.26	406.65	passed
256	812.87	256.55	passed
512	897.03	275.21	passed
1024	912.30	373.95	passed
4096	1017.53	389.78	passed

TABLE 18: iSCSI Initiator performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

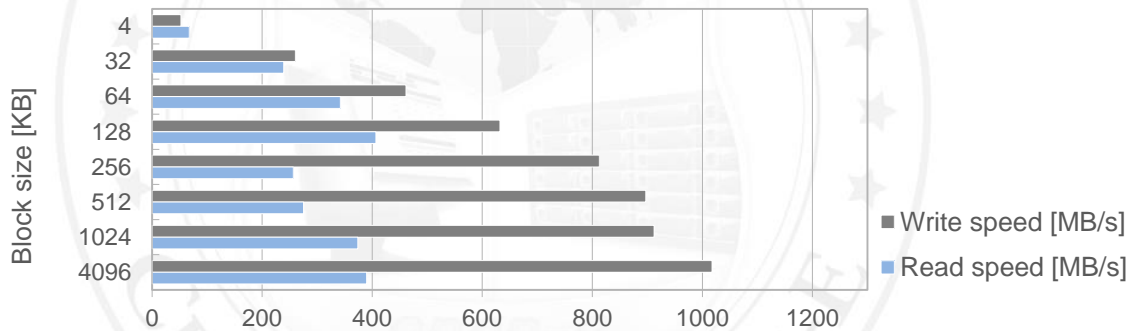


FIGURE 20: iSCSI Initiator performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

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 Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	13.48	48.74	passed
32	96.32	221.86	passed
64	204.05	285.71	passed
128	336.43	361.80	passed
256	484.87	442.87	passed
512	510.65	487.38	passed
1024	526.80	488.52	passed
4096	539.71	503.21	passed

TABLE 19: iSCSI Target performance test results table for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)

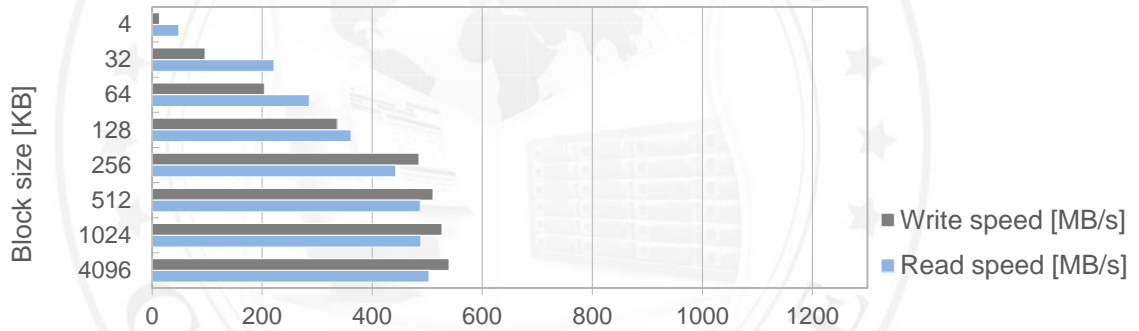


FIGURE 21: iSCSI Target performance test results chart for Broadcom NetXtreme II 10Gigabit Ethernet (BCM57712)