

AIC PSG-SB-3URGEDP02 storage system



Executive summary

After performing all tests, the AIC PSG-SB-3URGEDP02 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 the Open-E DSS V6 operating system installed, the AIC PSG-SB-3URGEDP02 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 AIC PSG-SB-3URGEDP02 suitable for an HA cluster:

- Hardware RAID5, RAID6, RAID10, RAID50, RAID60 for greater node availability and increased performance.
- Six 1GbE interfaces allow node replication and data access simultaneously. Some of them may be aggregated for improved throughput and additional layer of redundancy.
- Redundant power supply for system reliability.

✓ iSCSI Storage

The following features make AIC PSG-SB-3URGEDP02 good iSCSI storage:

- Six 1GbE interfaces allow flexibility in network topology. MPIO may be used for improved throughput and reliability.
- Hardware RAID5, RAID50, RAID6, RAID60 and RAID10 for high performance and data safety.

✓ Storage for backup

The following features make AIC PSG-SB-3URGEDP02 good storage for a backup:

- Hardware RAID5, RAID50, RAID6 and RAID60 for data safety and the best use of available storage space.
- Six 1GbE interfaces provides enough throughput for demanding backup networks and allows flexibility in backup network topology.
- Redundant power supply for uninterrupted backup process.

Certification notes

It's recommended to use Balance-alb instead of 802.3ad or Balance-rr bonding mode.

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AIC PSG-SB-3URGEDP02 hardware components

Technical specifications about the certified system are listed below:

Model	AIC PSG-SB-3URGEDP02
Operating system	Open-E DSS V6 build 5845
Enclosure/chassis	PSG-CHS-GE3USSR110
CPU	2x Intel Xeon E5603 1.60GHz
Motherboard	AIC GEMINI PSG-M-GEDP036D-110
Memory	2GB DDR3 1333 ECC-REG Kingston KVR1333D3D8R9S/2G
Network	1GbE Intel Single Port Adapter (i82567LM-4) (on-board)
Network	1GbE Intel CT Desktop Adapter (i82574L) (on-board)
Network	2x 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)
HW RAID	LSI MegaRAID SAS 9265-8i
Hard disk drives	16x 1TB Seagate Barracuda ST31000524AS

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

All components were detected and properly recognized.



AIC PSG-SB-3URGEDP02 photos



FIGURE 1: Front photo

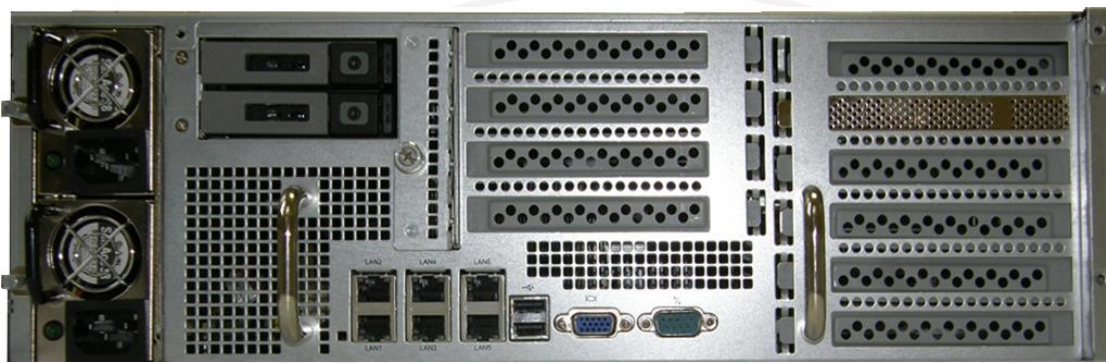


FIGURE 2: Rear photo

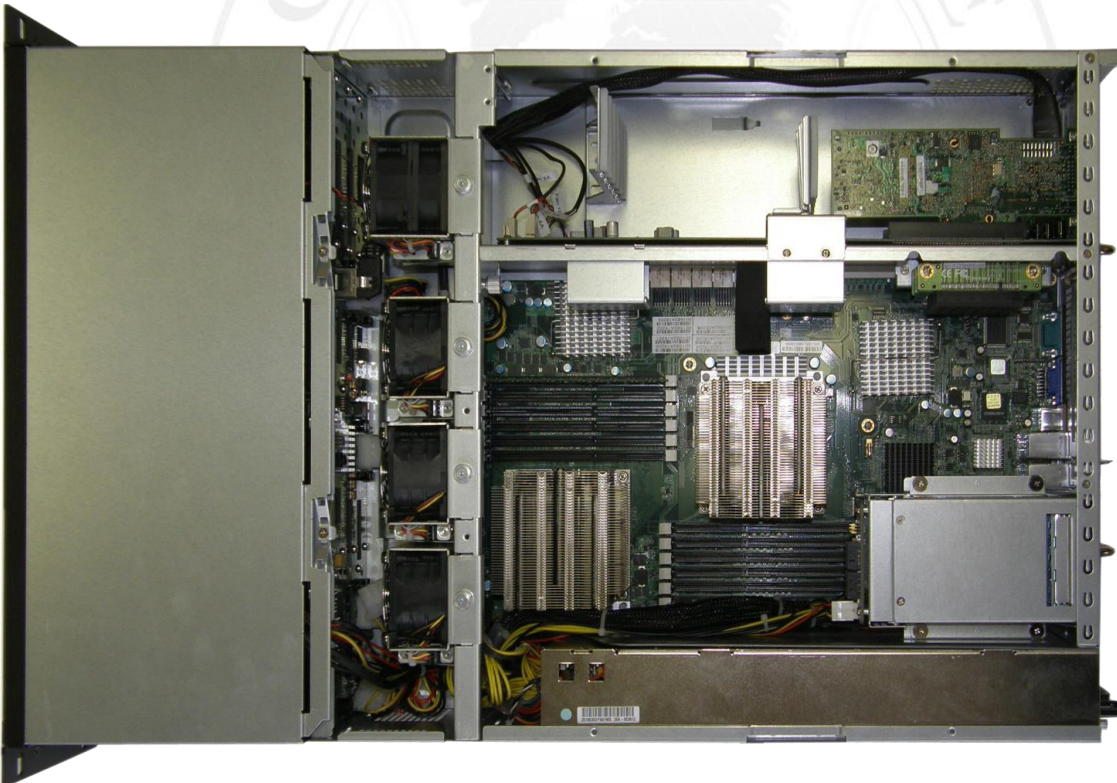


FIGURE 3: Top photo

Auxiliary systems hardware components

Auxiliary system with MS Windows or Open-E DSS V6 installed, 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	1GbE 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	1GbE 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	1GbE 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	1GbE Intel PRO/1000PT Dual Port Adapter (i82571EB)
Hard disk drives	1x 2TB Samsung SpinPoint F4EG HD204UI

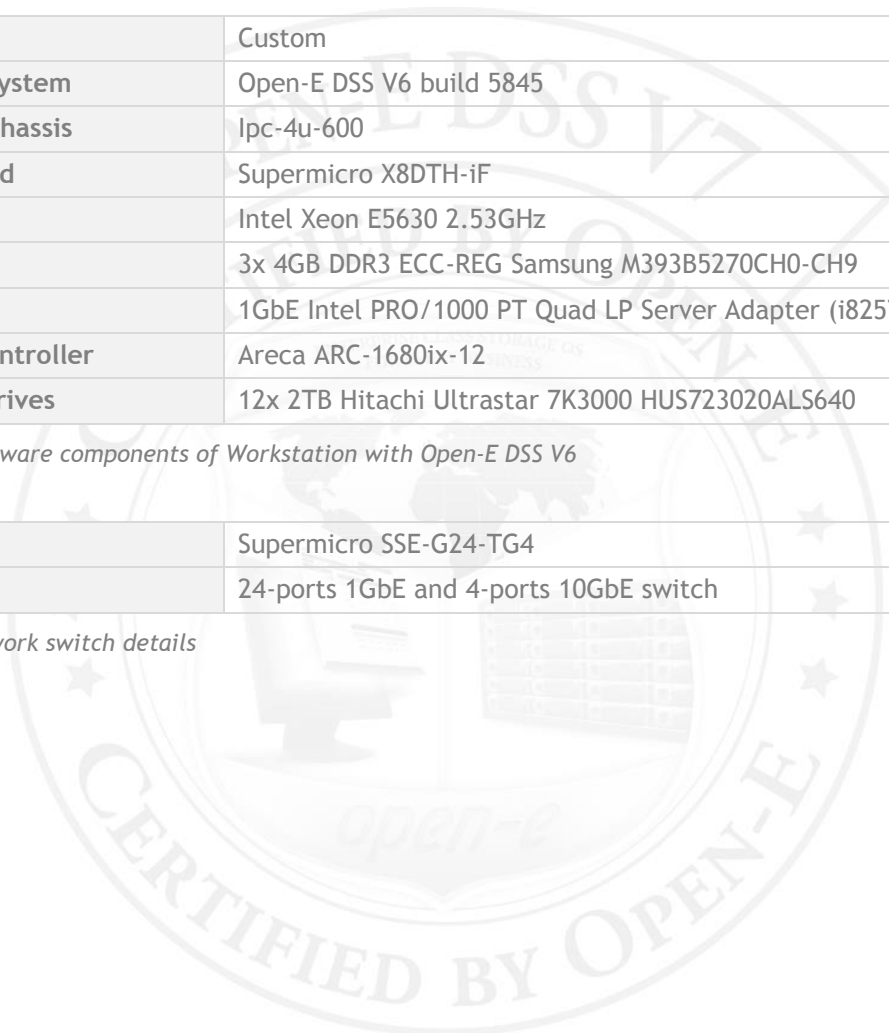
TABLE 5: Hardware components of fourth Workstation with MS Windows

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	1GbE 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-TG4
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.

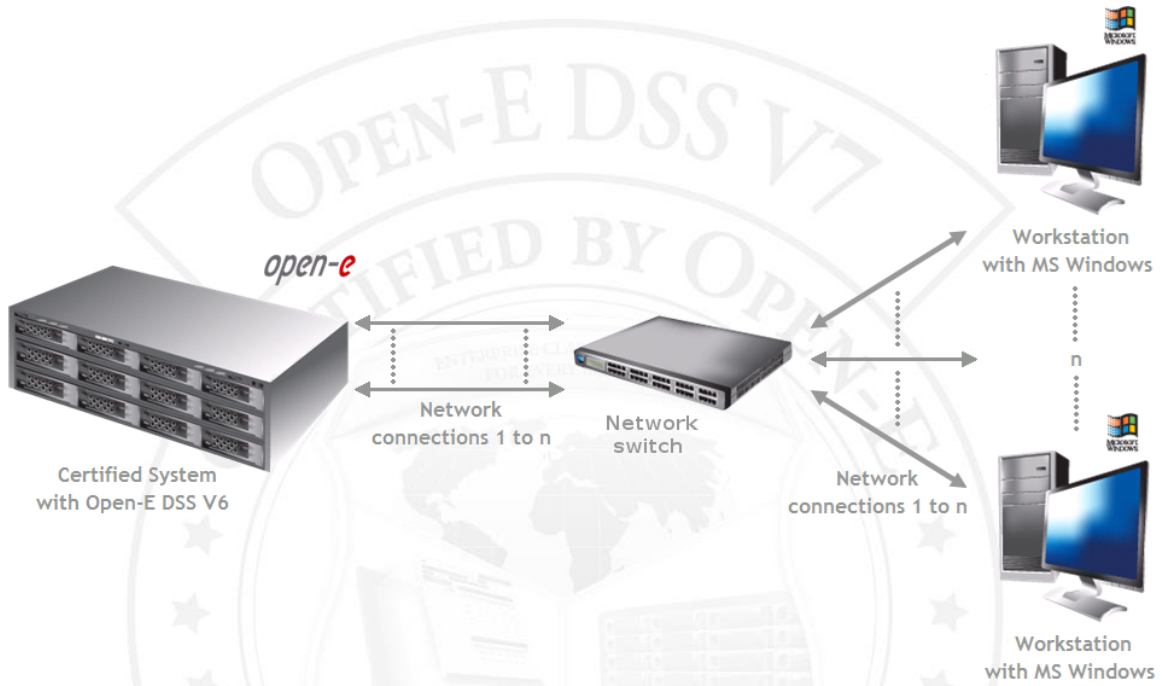


FIGURE 4: Network topology for Network testing

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 Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

802.3ad bonding mode performance test results			
NIC model	1GbE Intel PRO/1000 PF Dual Port Server Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	54.66	55.84	passed
2 nd Workstation	56.52	57.71	passed
3 rd Workstation	57.65	55.69	passed
4 th Workstation	55.31	57.70	passed

TABLE 9: 802.3ad bonding mode performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

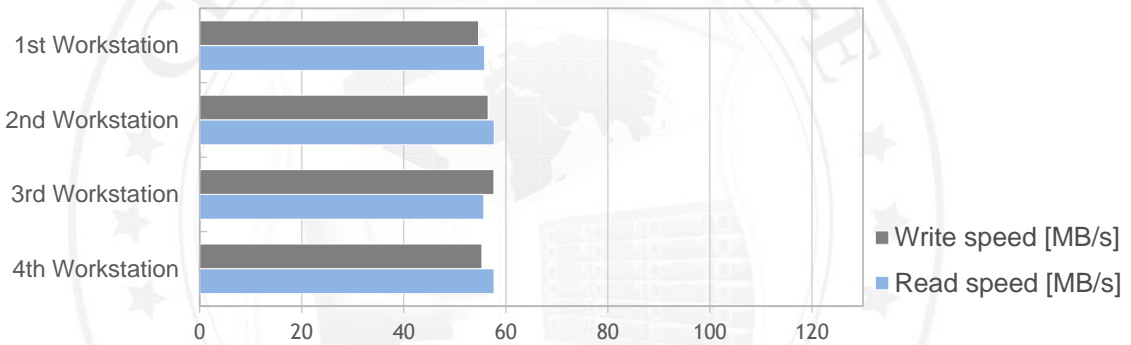


FIGURE 5: 802.3ad bonding mode performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

Balance-alb bonding mode performance test results			
NIC model	1GbE Intel PRO/1000 PF Dual Port Server Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	109.26	112.50	passed
2 nd Workstation	90.03	112.89	passed
3 rd Workstation	49.64	112.82	passed
4 th Workstation	51.07	113.13	passed

TABLE 10: Balance-alb bonding mode performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

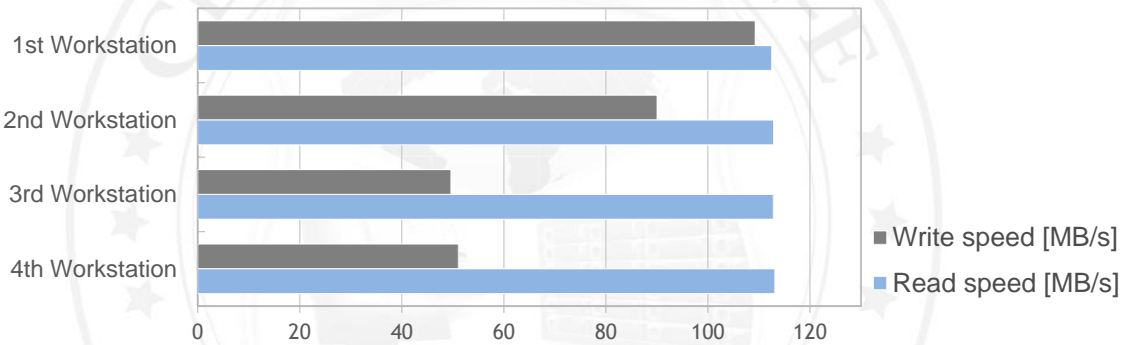


FIGURE 6: Balance-alb bonding mode performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

Balance-rr bonding mode performance test results			
NIC model	1GbE Intel PRO/1000 PF Dual Port Server Adapter		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	55.10	99.16	passed
2 nd Workstation	55.46	99.64	passed
3 rd Workstation	55.68	97.48	passed
4 th Workstation	55.62	98.17	passed

TABLE 11: Balance-rr bonding mode performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

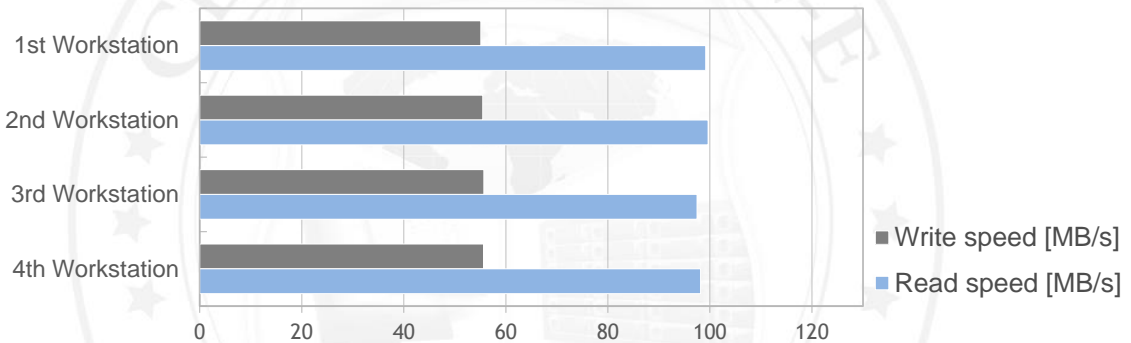


FIGURE 7: Balance-rr bonding mode performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE Intel CT Desktop Adapter (i82574L) (on-board)

Single NIC performance test results			
NIC model	1GbE Intel CT Desktop Adapter (i82574L)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1 st Workstation	112.43	81.07	passed

TABLE 12: Single NIC test results table for 1GbE Intel CT Desktop Adapter (i82574L) (on-board)

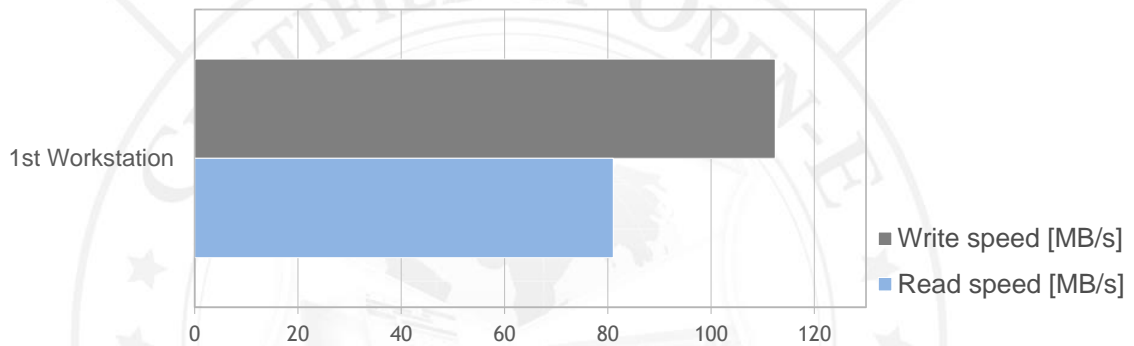


FIGURE 8: Single NIC performance test results chart for 1GbE Intel CT Desktop Adapter (i82574L) (on-board)

3. Test results for single NIC test performed on 1GbE Intel Single Port Adapter (i82567LM-4) (on-board)

Single NIC performance test results			
NIC model	1GbE Intel Single Port Adapter (i82567LM-4)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance [passed/failed]
1 st Workstation	110.98	109.99	passed

TABLE 13: Single NIC test results table for 1GbE Intel Single Port Adapter (i82567LM-4) (on-board)

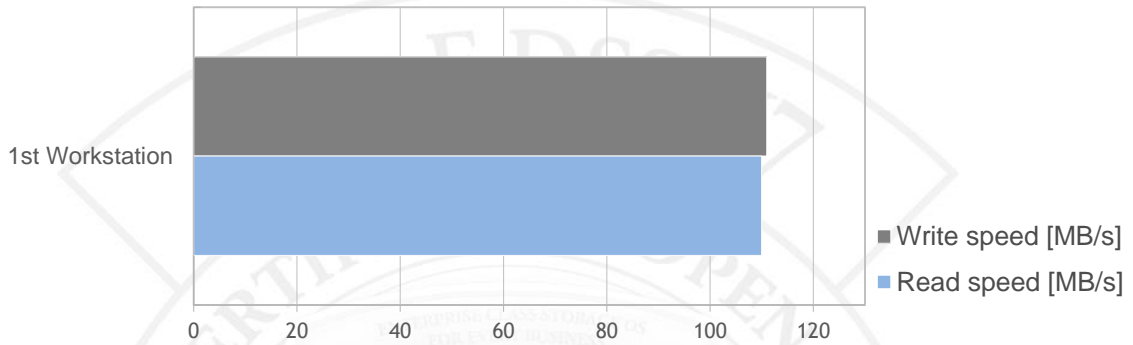
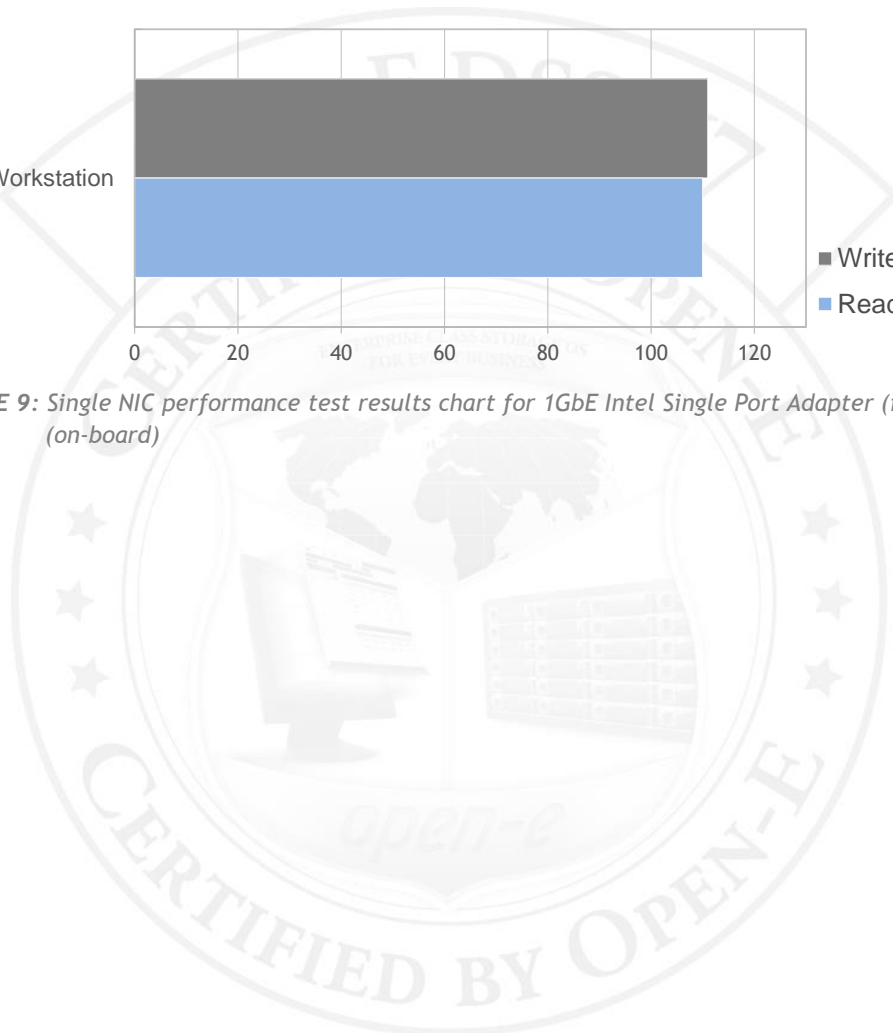


FIGURE 9: Single NIC performance test results chart for 1GbE Intel Single Port Adapter (i82567LM-4) (on-board)



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, 6, 10, 50 and 60 levels, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via 1GbE network connection with various block sizes using the lometer testing tool.

RAID test topology

Network test topology for RAID testing is shown below

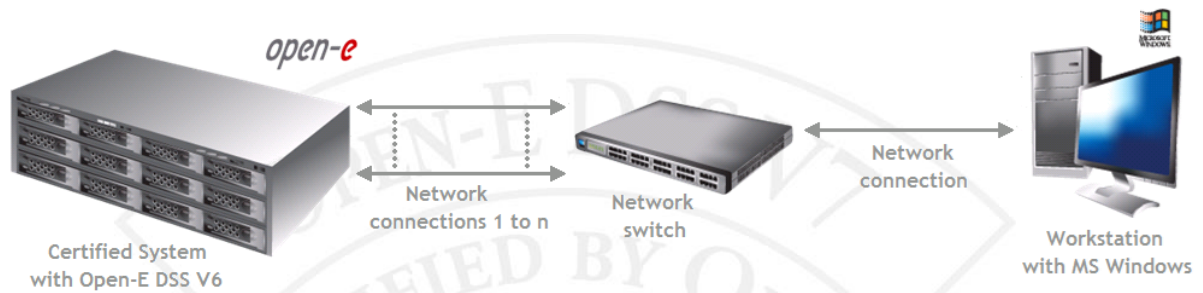


FIGURE 10: Network test topology for RAID testing

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID0 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	52.32	51.64	passed
32	102.85	103.60	passed
64	108.01	108.75	passed
128	109.25	110.32	passed
256	112.89	111.94	passed
512	112.20	112.90	passed
1024	112.24	112.90	passed
4096	112.12	112.75	passed

TABLE 14: RAID0 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

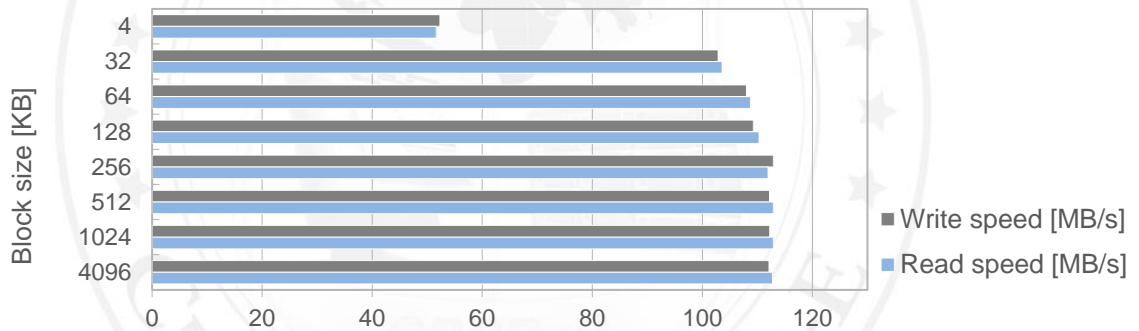


FIGURE 11: RAID0 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID5 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49.08	54.29	passed
32	111.65	111.68	passed
64	111.77	112.34	passed
128	111.74	112.79	passed
256	112.28	112.94	passed
512	112.18	112.92	passed
1024	112.33	112.91	passed
4096	112.11	112.66	passed

TABLE 15: RAID5 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

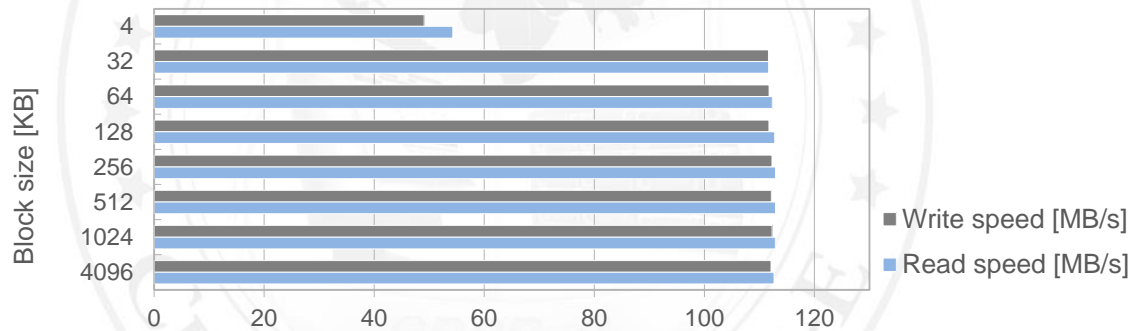


FIGURE 12: RAID5 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID6 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49.52	53.72	passed
32	111.58	111.84	passed
64	112.01	112.14	passed
128	112.08	112.22	passed
256	112.32	111.80	passed
512	112.38	111.89	passed
1024	112.30	112.71	passed
4096	112.25	112.78	passed

TABLE 16: RAID6 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

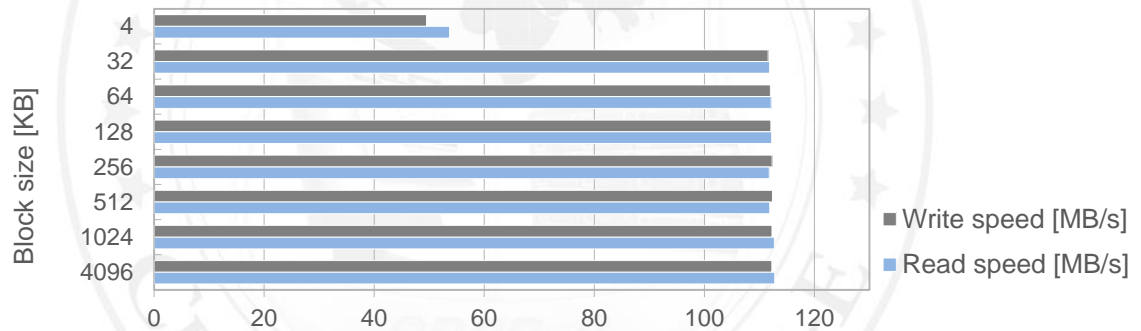


FIGURE 13: RAID6 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID10 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	51.47	54.16	passed
32	111.73	111.36	passed
64	111.98	111.66	passed
128	112.23	111.97	passed
256	112.36	112.13	passed
512	112.33	112.25	passed
1024	112.34	112.10	passed
4096	112.17	111.91	passed

TABLE 17: RAID10 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

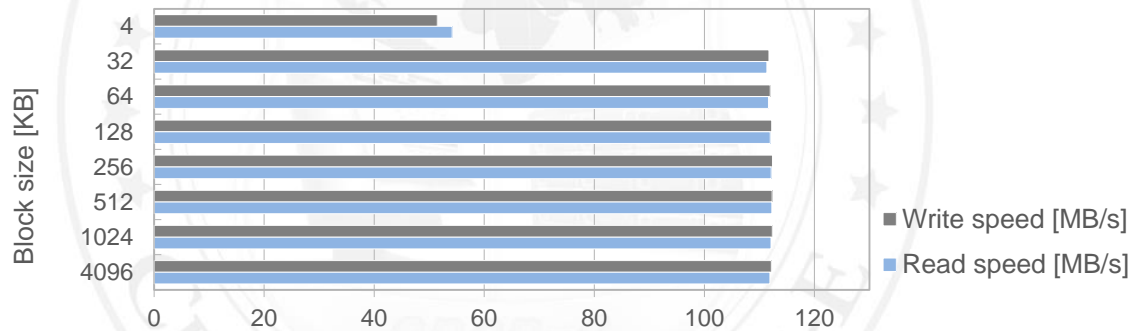


FIGURE 14: RAID10 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID50 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49.89	53.73	passed
32	111.66	111.61	passed
64	112.12	112.26	passed
128	112.13	112.07	passed
256	112.39	112.07	passed
512	112.30	111.87	passed
1024	112.34	112.36	passed
4096	112.24	112.00	passed

TABLE 18: RAID50 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

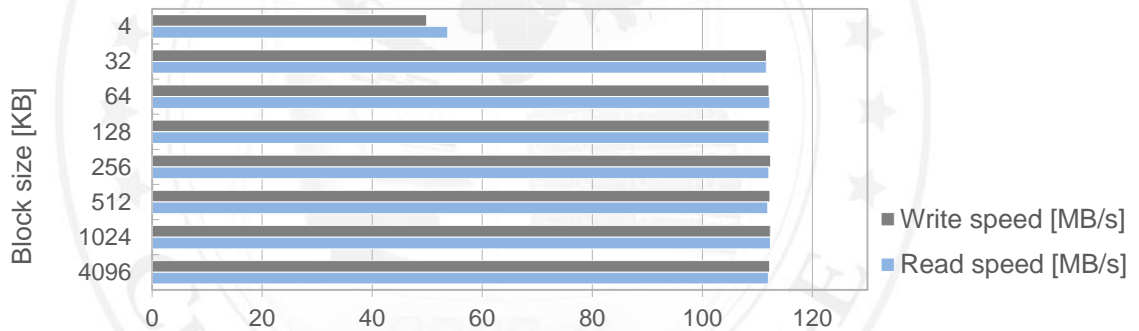


FIGURE 15: RAID50 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

2. Test results for RAID60 and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	49.90	53.99	passed
32	111.79	112.01	passed
64	112.14	112.14	passed
128	112.24	112.37	passed
256	112.39	112.90	passed
512	112.39	112.92	passed
1024	112.90	112.37	passed
4096	112.17	112.74	passed

TABLE 19: RAID60 performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

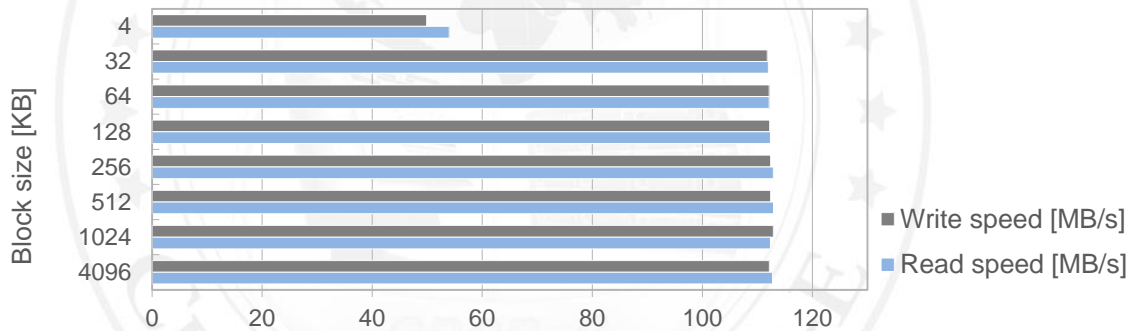


FIGURE 16: RAID60 performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection with various block sizes using the lometer testing tool.

NAS test topology

Network topology for NAS testing is shown below.

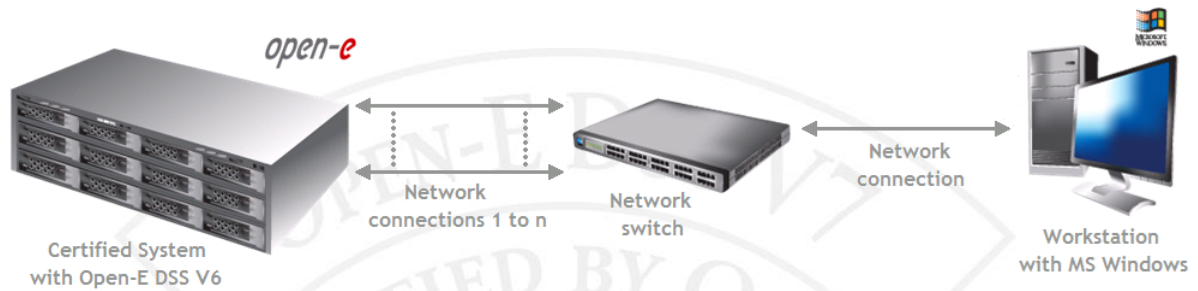


FIGURE 17: Network topology for NAS testing



SMB test

1. Test description

The tests rely on creating NAS shares and copying the data from a *Workstation with MS Windows* via 1GbE network connection with various block sizes using the iometer testing tool.

2. Test results for SMB and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	63.28	60.98	passed
32	111.99	111.71	passed
64	112.12	108.99	passed
128	111.59	110.20	passed
256	112.07	111.77	passed
512	112.33	111.60	passed
1024	112.32	111.78	passed
4096	112.08	111.25	passed

TABLE 20: SMB performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

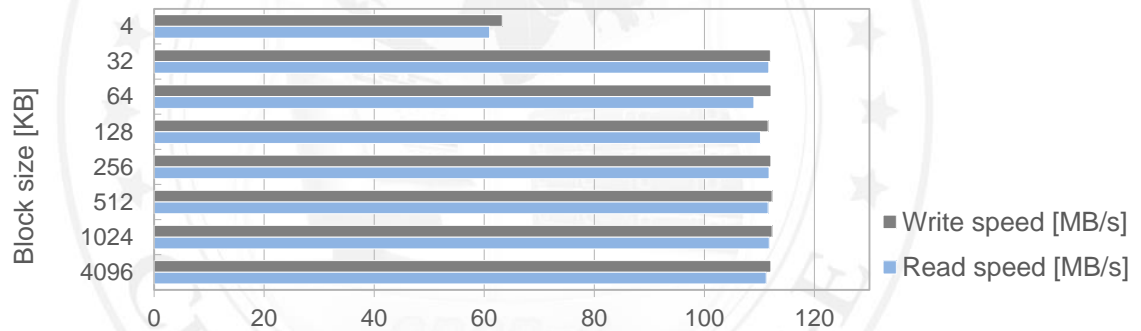


FIGURE 18: SMB performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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.

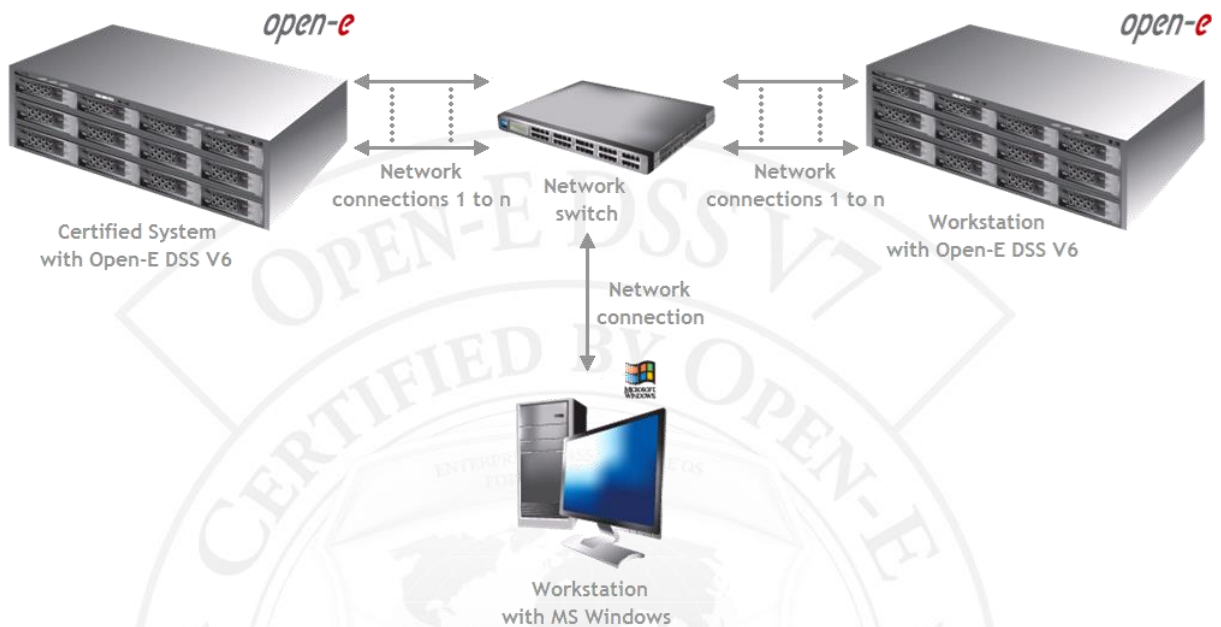


FIGURE 19: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

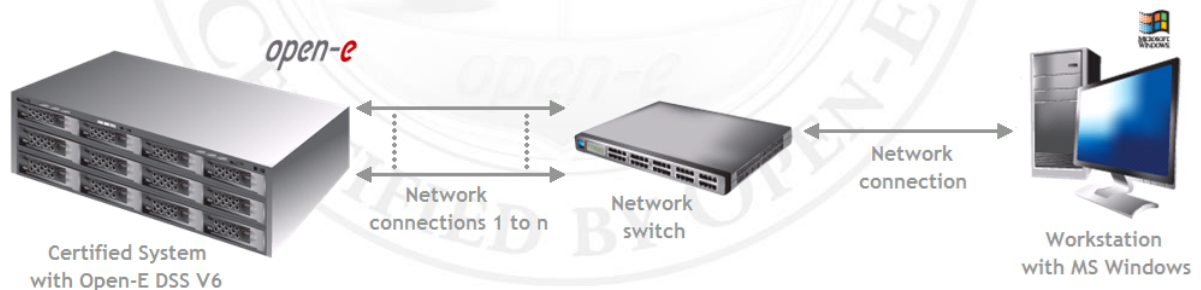


FIGURE 20: Network topology for iSCSI Target testing

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 1GbE network connection.

2. Test results for iSCSI Initiator and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	59.25	60.07	passed
32	106.57	110.52	passed
64	111.76	109.11	passed
128	109.22	111.72	passed
256	108.91	110.88	passed
512	107.85	110.55	passed
1024	107.27	110.46	passed
4096	107.38	111.54	passed

TABLE 21: iSCSI Initiator performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

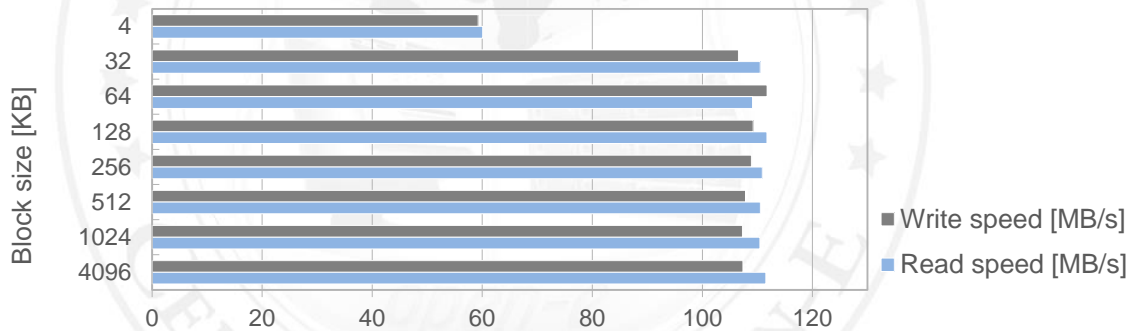


FIGURE 21: iSCSI Initiator performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

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 1GbE network connection.

2. Test results for iSCSI Target and 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	53.24	52.12	passed
32	102.66	104.02	passed
64	108.07	108.90	passed
128	109.20	110.77	passed
256	112.48	112.07	passed
512	112.30	112.91	passed
1024	112.29	112.95	passed
4096	112.11	112.69	passed

TABLE 22: iSCSI Target performance test results table for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)

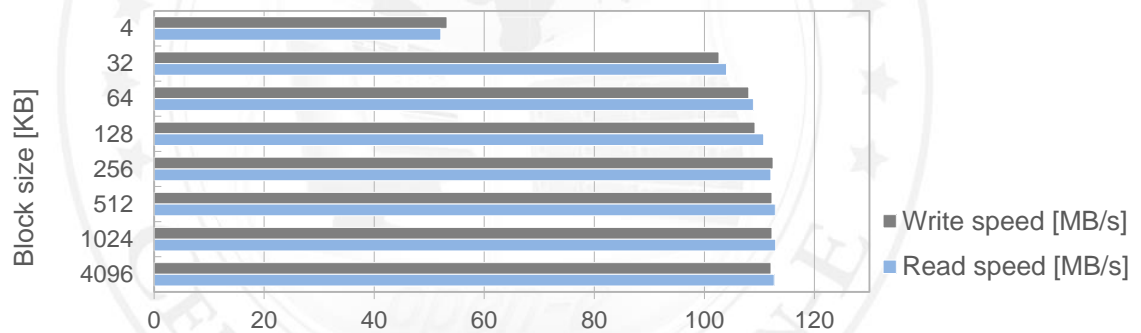


FIGURE 22: iSCSI Target performance test results chart for 1GbE Intel PRO/1000 PF Dual Port Server Adapter (i82571EB) (on-board)