

N-TEC rapidNAS DSS316-G6 storage system



Executive summary

After performing all tests, the N-TEC rapidNAS DSS316-G6 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 V7](#) operating system installed, the N-TEC rapidNAS DSS316-G6 is stable and performs well.

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

✓ Storage for CCTV

For this application the following can be used:

- Sixteen enterprise class SATA hard drives provide a lot of space for CCTV records.
- Two 1GbE interfaces for independent connection to different networks or link aggregation for improved throughput.
- Redundant power supply for system reliability.

✓ iSCSI storage

The following features make N-TEC rapidNAS DSS316-G6 good iSCSI storage:

- Hardware RAID5, RAID6, RAID10, RAID50 or RAID60 for high performance and data safety.
- Two 1GbE interfaces for fast MPIO connection.
- Redundant power supply for system reliability.

✓ Storage for backup

The following features make N-TEC rapidNAS DSS316-G6 great storage for a backup:

- Combination of sixteen high class SATA hard drives and controller providing high RAID levels, ensures a lot of secure storage space for backups.
- Redundant power supply for system reliability.

Certification notes:

We recommend using 802.3ad or Balance-alb bonding modes for link aggregation.

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N-TEC rapidNAS DSS316-G6 hardware components

Technical specifications about the certified system are listed below:

Model	N-TEC rapidNAS DSS316-G6
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	N-TEC rapidNAS DSS316-G6 3U
CPU	Intel Xeon E5-2603 1.8GHz
Motherboard	Supermicro X9SRI-F
Memory	4x 4GB DDR3 1600 ECC Mustang M651272161108NDT
Network	Intel i350 Dual Port Gigabit Ethernet (on-board)
HW RAID	Areca ARC-1882IX-16
Hard disk drives	16x 1TB Seagate Constellation ES ST31000524NS

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



N-TEC rapidNAS DSS316-G6 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 2008 R2
Enclosure/chassis	Inter-Tech IPC 4088 4HE
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon Processor E3-1230 3.20 GHz
Memory	3x Kingston KVR1333D3E9S/4G DDR3 4GB
Network	Intel 82574L Gigabit Ethernet Controller (on-board)
Hard disk drives	Hitachi Deskstar 7K1000.C HDS721050CLA362 500GB

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter-Tech IPC 4088 4HE
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon Processor E3-1230 3.20 GHz
Memory	3x Kingston KVR1333D3E9S/4G DDR3 4GB
Network	Intel 82574L Gigabit Ethernet Controller (on-board)
Hard disk drives	Hitachi Deskstar 7K1000.C HDS721050CLA362 500GB

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	Inter-Tech IPC 4088 4HE
CPU	Intel Xeon Processor E3-1230 3.20 GHz
Motherboard	Asus P8B-E / 4L
Memory	3x Kingston KVR1333D3E9S/4G DDR3 4GB
Network	Intel 82574L Gigabit Ethernet Controller (on-board)
HW RAID	3ware SAS 9750-8i
Hard disk drives	8x Hitachi Deskstar 7K1000.C HDS721050CLA362 500GB

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

Model	Supermicro SSE-G24-TG4
Description	24-ports 1GbE and 4-ports 10GbE switch

TABLE 5: Network switch details for 1GbE 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.

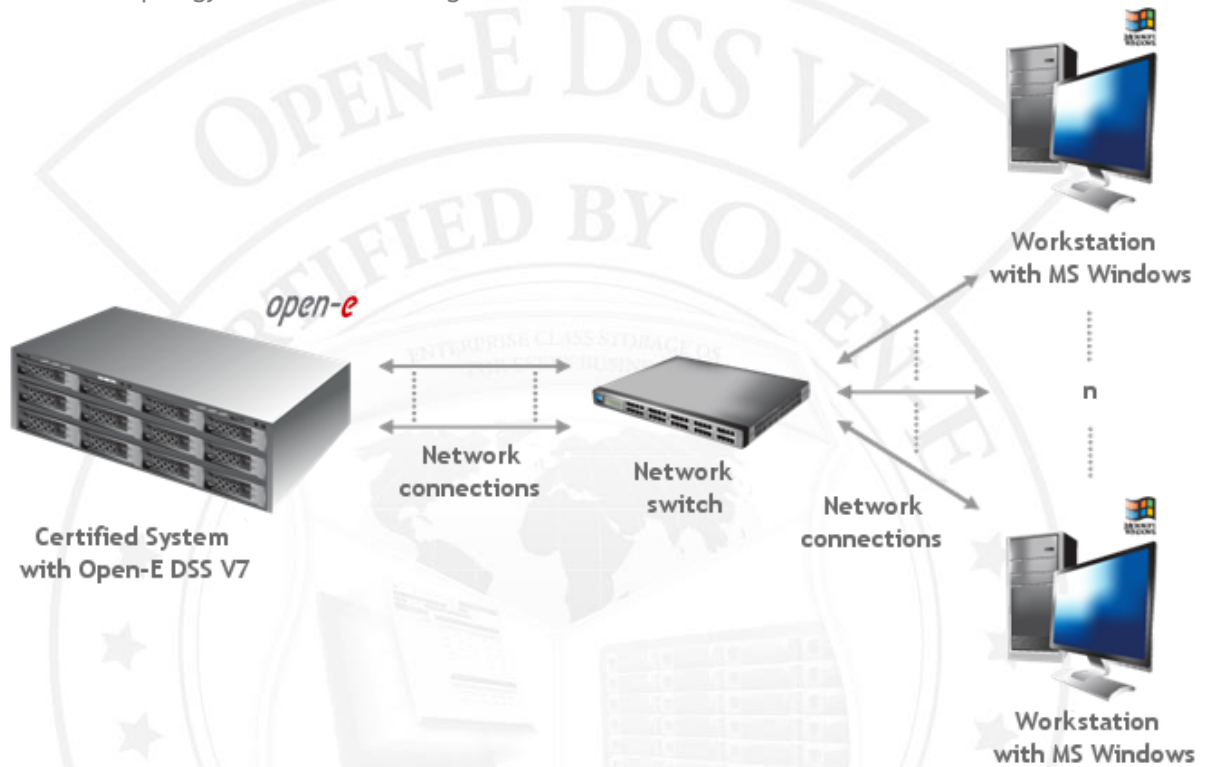


FIGURE 4: Network topology for Network testing

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 Intel Gigabit Server Adapter I350 (on-board)

802.3ad bonding mode performance test results			
NIC model	Intel Gigabit Server Adapter I350 (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	109.26	112.03	passed
2 nd Workstation	111.72	112.04	passed

TABLE 7: 802.3ad bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

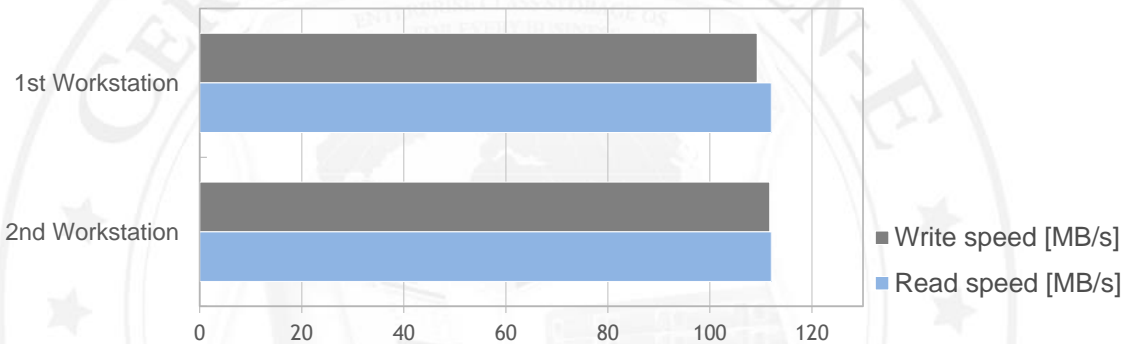


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

Balance-alb bonding mode performance test results			
NIC model	Intel Gigabit Server Adapter I350 (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	111.68	111.85	passed
2 nd Workstation	111.10	111.94	passed

TABLE 8: Balance-alb bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

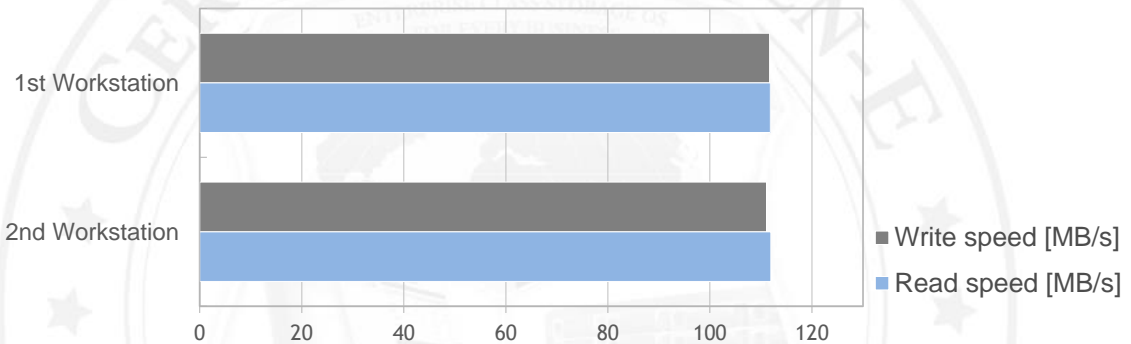


FIGURE 6: Balance-alb bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

Balance-rr bonding mode performance test results			
NIC model	Intel Gigabit Server Adapter I350 (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	111.85	66.14	passed
2 nd Workstation	110.37	102.89	passed

TABLE 9: Balance-rr bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

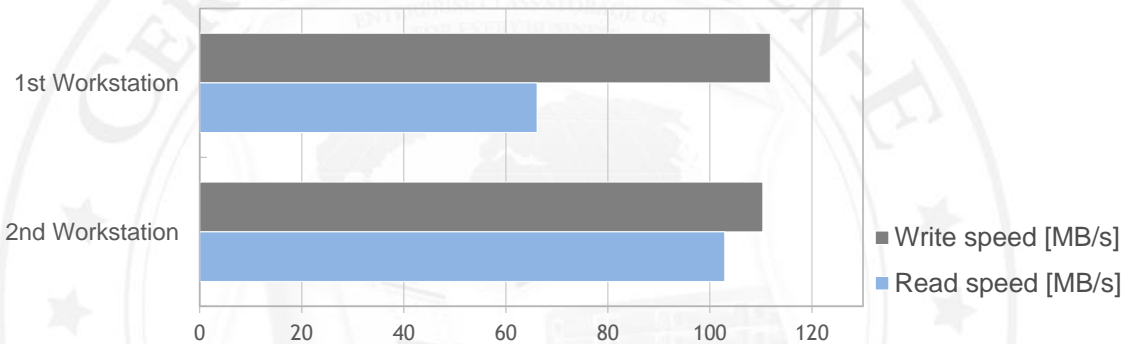


FIGURE 7: Balance-rr bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

Single NIC performance test results			
NIC model	Intel Gigabit Server Adapter I350 (on-board)		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	108.67	112.04	passed

TABLE 10: Single NIC performance test results table for Intel Gigabit Server Adapter I350 (on-board)

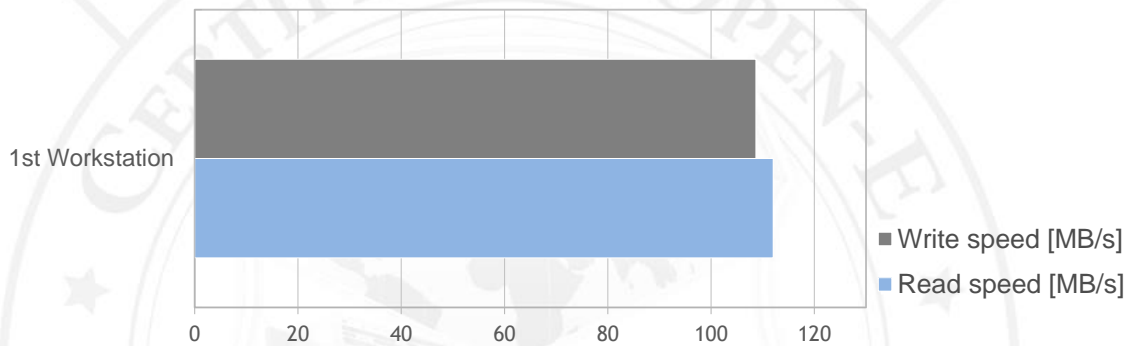


FIGURE 8: Single NIC performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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

RAID test topology

Network test topology for RAID testing is shown below

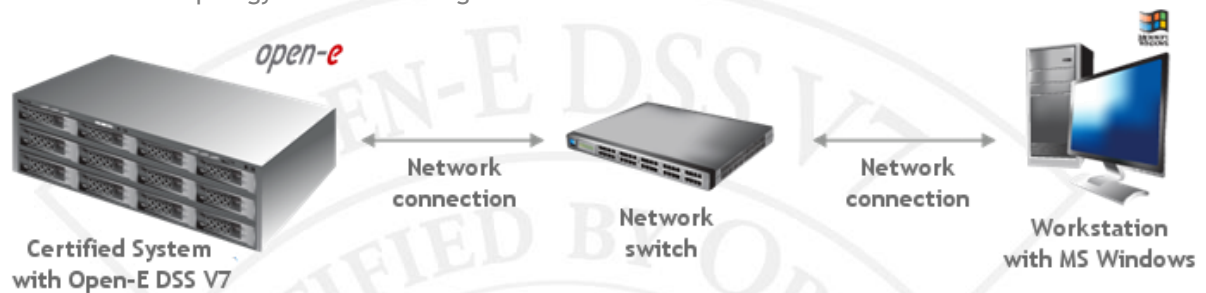


FIGURE 9: Network test topology for RAID testing

Hardware RAID0 test

1. Test description

The test relies on creation of the RAID0 unit on all hard disk drives, configuring the iSCSI target and copying the data from a *Workstation with MS Windows* via network connection with various block sizes using the lometer testing tool.

2. Test results for RAID0 and Intel Gigabit Server Adapter I350 (on-board)

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	22.69	39.65	passed
32	68.27	71.54	passed
64	77.72	79.70	passed
128	86.58	95.25	passed
256	106.98	111.85	passed
512	111.06	112.03	passed
1024	110.50	112.01	passed
4096	110.72	111.89	passed

TABLE 11: RAID0 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

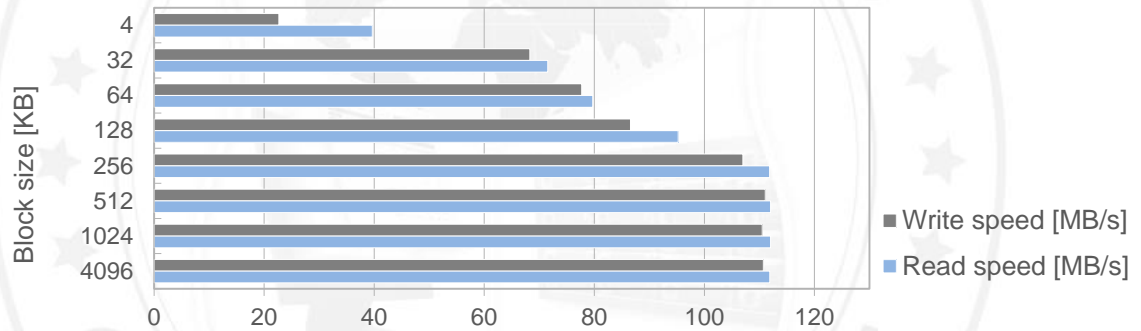


FIGURE 10: RAID0 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	22.62	36.12	passed
32	65.30	74.01	passed
64	81.33	80.17	passed
128	87.87	93.94	passed
256	107.15	111.87	passed
512	109.28	112.03	passed
1024	110.34	112.01	passed
4096	109.63	111.89	passed

TABLE 12: RAID5 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

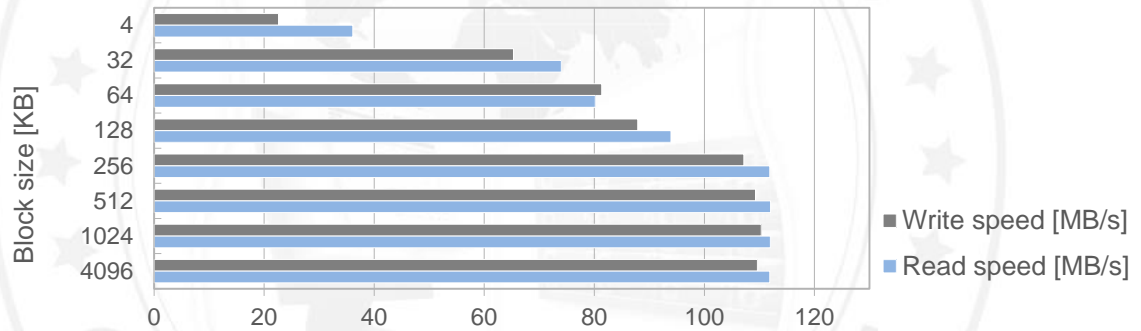


FIGURE 11: RAID5 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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

2. Test results for RAID6 and Intel Gigabit Server Adapter I350 (on-board)

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	18.02	34.21	passed
32	55.21	60.47	passed
64	69.99	74.57	passed
128	86.20	91.30	passed
256	107.59	111.88	passed
512	108.14	112.03	passed
1024	109.36	112.01	passed
4096	110.44	111.91	passed

TABLE 13: RAID6 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

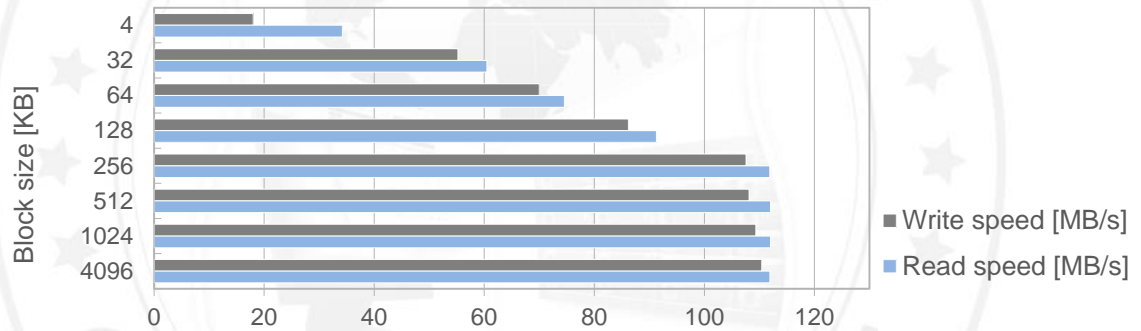


FIGURE 12: RAID6 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	23.57	41.85	passed
32	68.49	68.05	passed
64	79.04	68.54	passed
128	89.45	87.57	passed
256	107.19	111.89	passed
512	107.97	112.00	passed
1024	107.91	111.98	passed
4096	107.76	111.86	passed

TABLE 14: RAID10 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

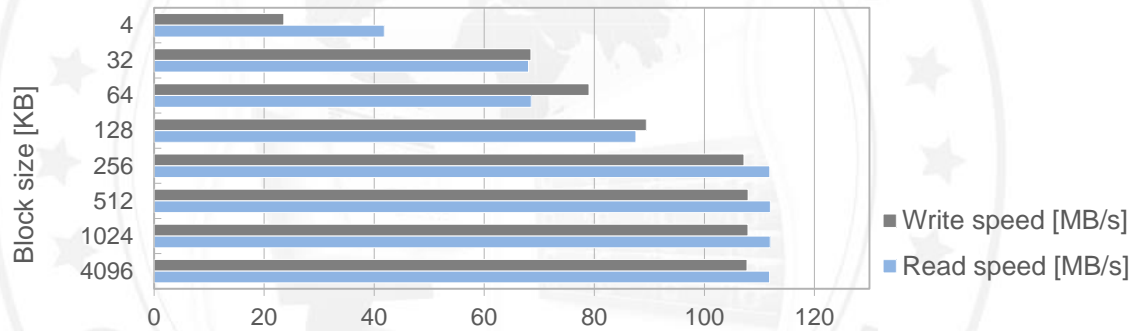


FIGURE 13: RAID10 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Intel Gigabit Server Adapter I350 (on-board)

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	20.23	36.94	passed
32	56.60	68.01	passed
64	67.03	76.31	passed
128	84.18	93.09	passed
256	107.65	111.82	passed
512	107.93	112.04	passed
1024	110.89	112.01	passed
4096	109.41	111.89	passed

TABLE 15: RAID50 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

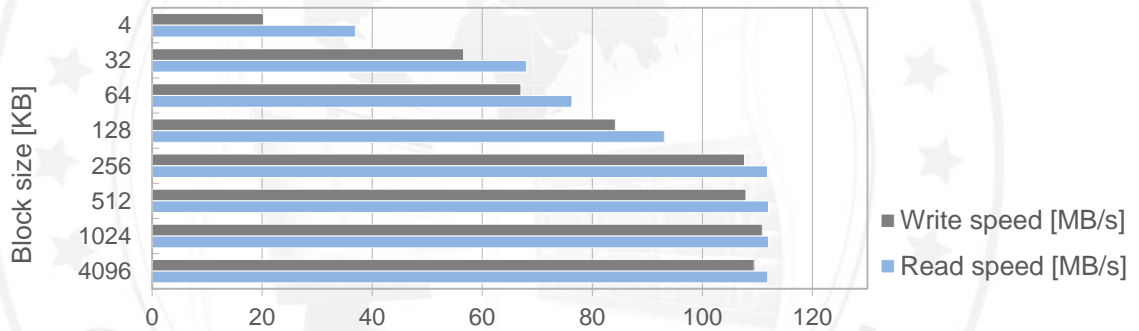


FIGURE 14: RAID50 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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

2. Test results for RAID60 Intel Gigabit Server Adapter I350 (on-board)

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	20.55	38.26	passed
32	59.27	67.93	passed
64	74.21	79.89	passed
128	87.26	94.47	passed
256	107.94	111.94	passed
512	108.00	112.04	passed
1024	108.69	112.02	passed
4096	107.77	111.89	passed

TABLE 16: RAID60 performance test results table for Intel Gigabit Server Adapter I350 (on-board)

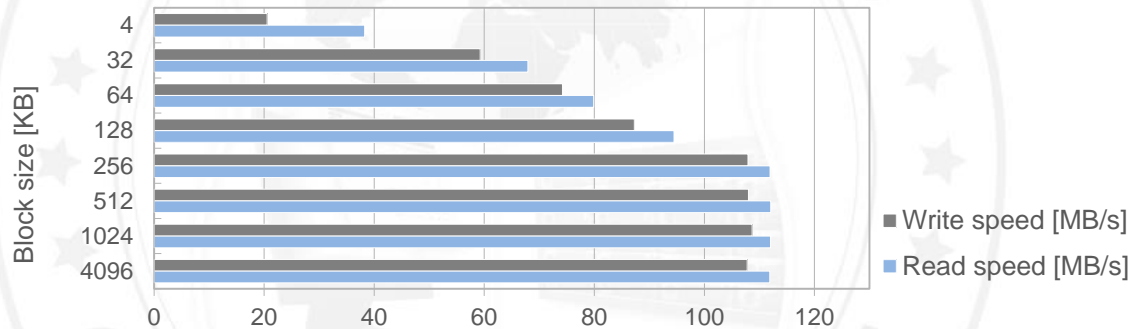


FIGURE 15: RAID60 performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 lometer testing tool.

NAS test topology

Network topology for NAS testing is shown below.

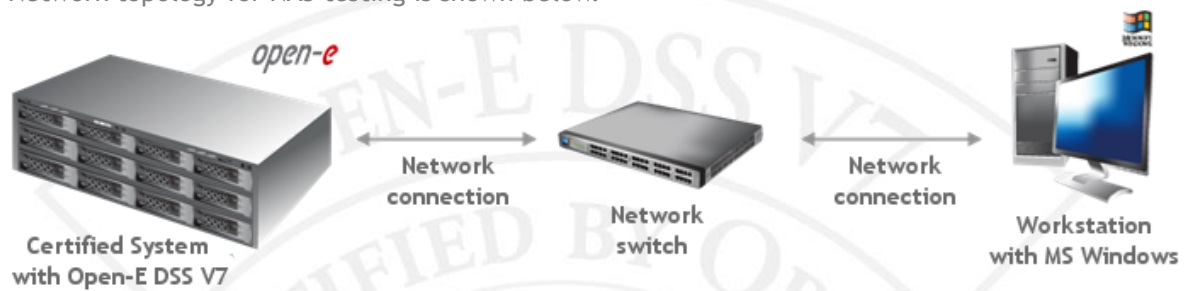


FIGURE 16: Network topology for NAS testing

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 Intel Gigabit Server Adapter I350 (on-board)

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	68.19	63.77	passed
32	112.58	112.69	passed
64	111.97	111.26	passed
128	112.36	111.83	passed
256	112.86	111.65	passed
512	112.92	111.97	passed
1024	112.90	111.90	passed
4096	112.77	111.88	passed

TABLE 17: SMB performance test results table for Intel Gigabit Server Adapter I350 (on-board)

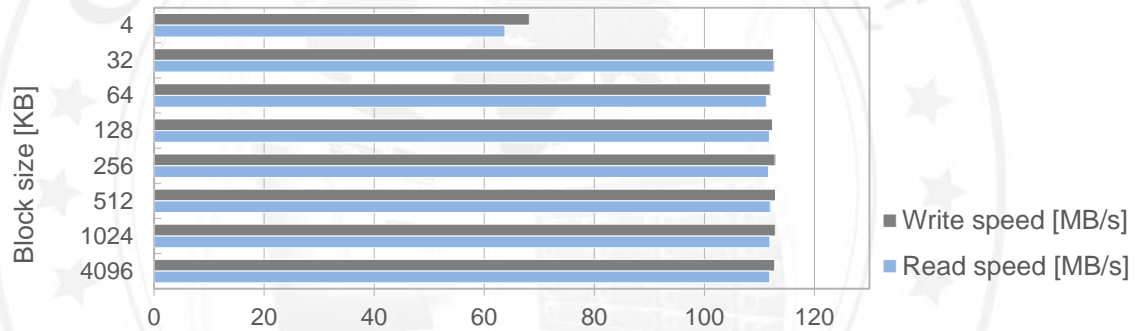


FIGURE 17: SMB performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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.

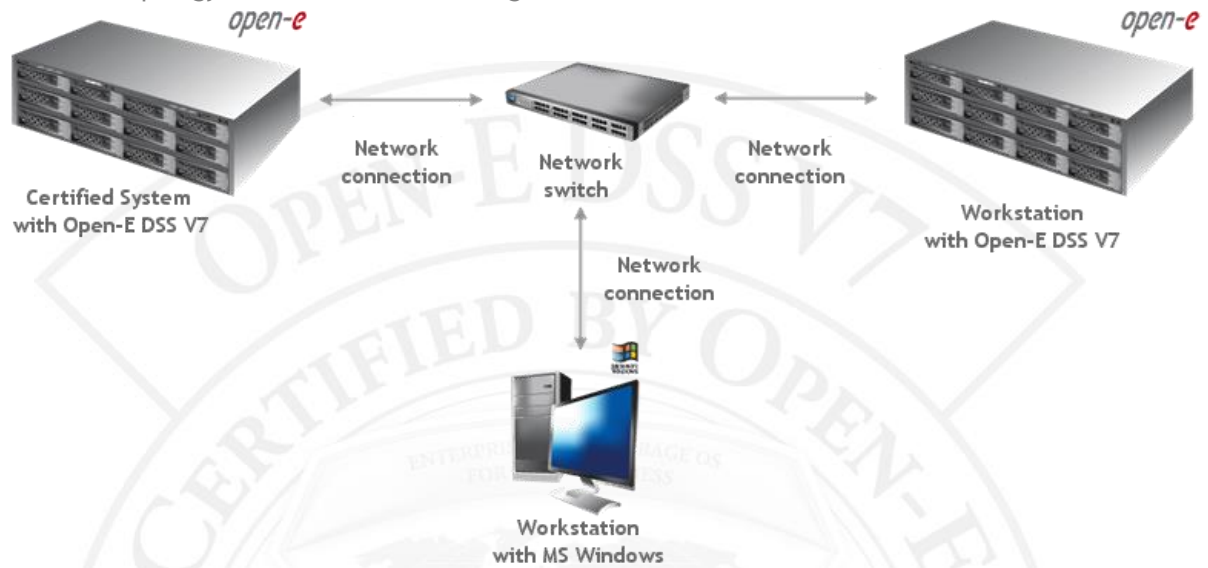


FIGURE 18: Network topology for iSCSI Initiator testing

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 Intel Gigabit Server Adapter I350 (on-board)

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	64.43	61.80	passed
32	110.45	112.65	passed
64	111.56	111.93	passed
128	112.37	111.96	passed
256	112.77	111.93	passed
512	112.63	111.93	passed
1024	112.68	111.97	passed
4096	112.60	111.90	passed

TABLE 18: iSCSI Initiator performance test results table for Intel Gigabit Server Adapter I350 (on-board)

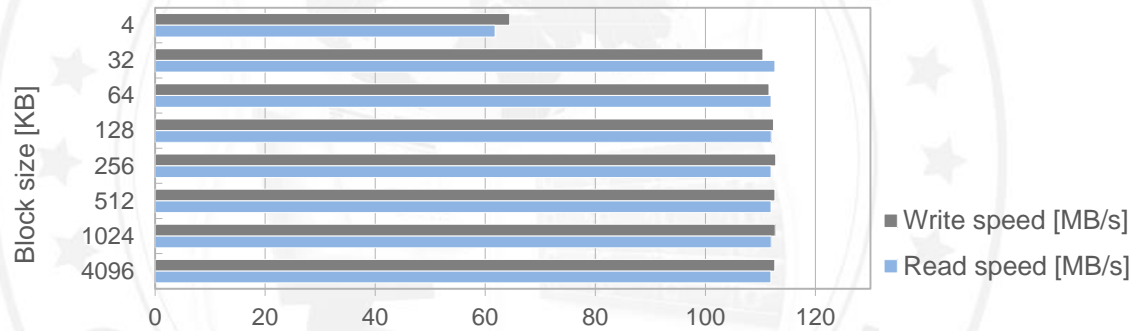


FIGURE 20: iSCSI Initiator performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 *lometer* tool.

2. Test results for iSCSI Target Intel Gigabit Server Adapter I350 (on-board)

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	28.23	39.19	passed
32	79.11	68.30	passed
64	70.64	74.56	passed
128	83.86	95.74	passed
256	107.83	111.97	passed
512	107.83	112.04	passed
1024	109.00	112.01	passed
4096	107.65	111.90	passed

TABLE 19: iSCSI Target performance test results table for Intel Gigabit Server Adapter I350 (on-board)

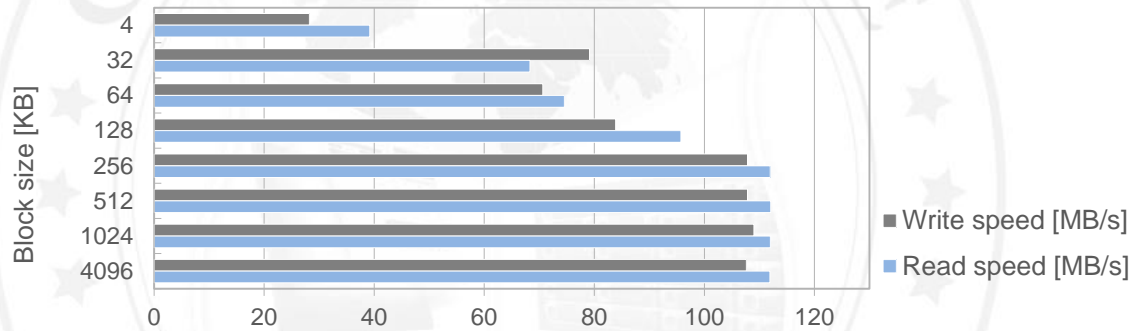


FIGURE 21: iSCSI Target performance test results chart for Intel Gigabit Server Adapter I350 (on-board)