



Mactronics StorWay 2247 Unified Open Storage system



Executive summary

After performing all tests, the Mactronics StorWay 2247 Unified Open Storage 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 Mactronics StorWay 2247 Unified Open Storage 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 Mactronics StorWay 2247 Unified Open Storage good iSCSI storage solution:

- HW RAID5, RAID6, RAID50 or RAID60 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

For this application the following can be used:

- Twelve high capacity SATA hard drives provide a plenty of space for user files.
- Hardware RAID5, RAID50, RAID10, RAID6 and RAID60 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 backup

The following features make Mactronics StorWay 2247 Unified Open Storage great storage for a backup:

- Four 1GbE and two 10GbE network interfaces provides enough throughput for demanding backup networks and ensures flexibility in backup network topology.
- Redundant power supply for system reliability.
- Combination of twelve high capacity SATA hard drives and controller providing high RAID levels, ensures a lot of secure storage space for backups.

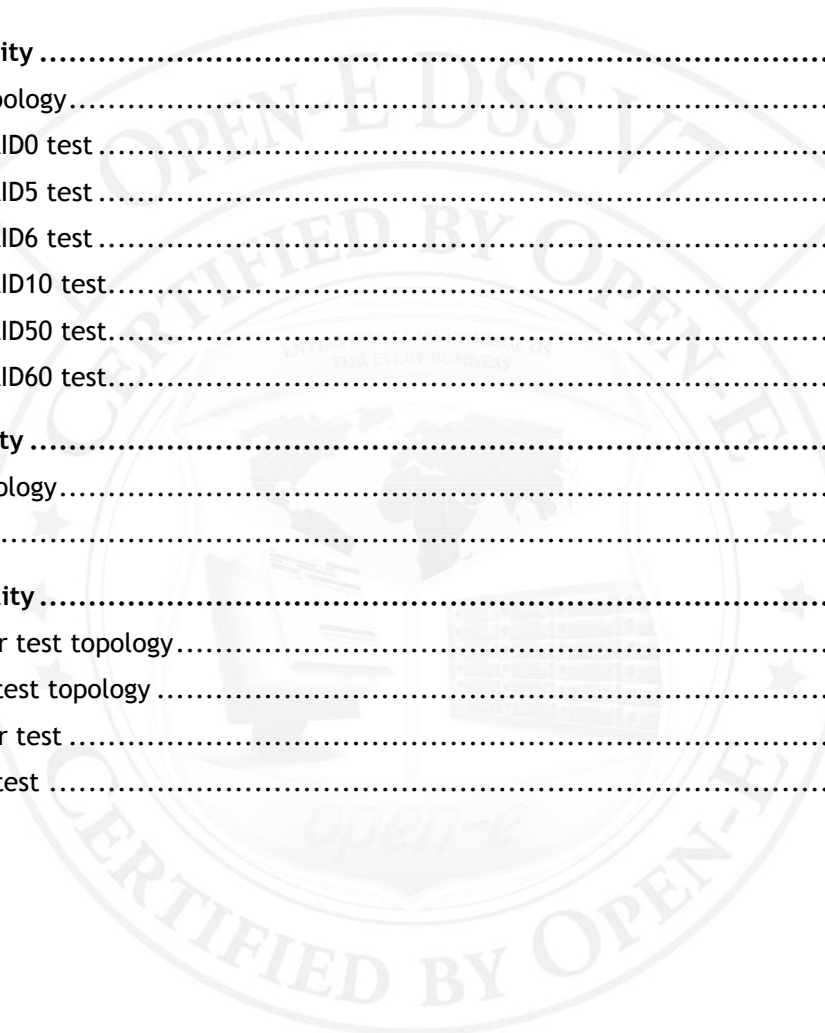
Certification notes

Certification was performed according to the Open-E Hardware Certification Program Guide 2.1.

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



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Mactronics StorWay 2247 Unified Open Storage hardware components

Technical specifications about the certified system are listed below:

Model	Mactronics StorWay 2247 Unified Open Storage
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	Supermicro SuperChassis 826BE16-R920LPB
CPU	2x Intel Xeon E5-2620 2.00GHz
Motherboard	Supermicro X9DRi-LN4F+
Memory	4x 4GB DDR3 ECC-REG Hynix HMT351R7CFR8C-PBT3
Network	4x Intel Gigabit Server Adapter I350 (on-board)
Network	Supermicro AOC-STG-i2T
HW RAID	Supermicro AOC-SAS2LP-H8IR
Hard disk drives	12x 2TB Hitachi Ultrastar 7K3000 HUS723020ALS640
Boot media drive	Logical volume exported by HW RAID controller

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



Mactronics StorWay 2247 Unified Open Storage photos



FIGURE 1: Front photo

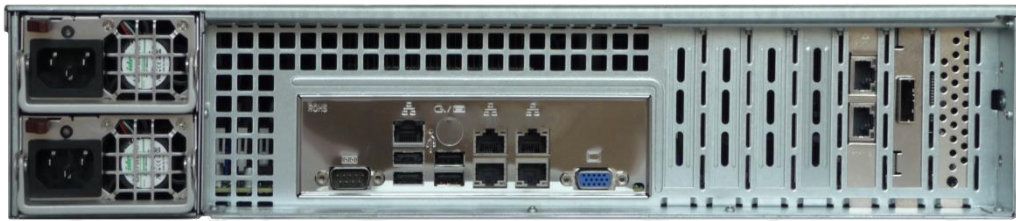


FIGURE 2: Rear photo

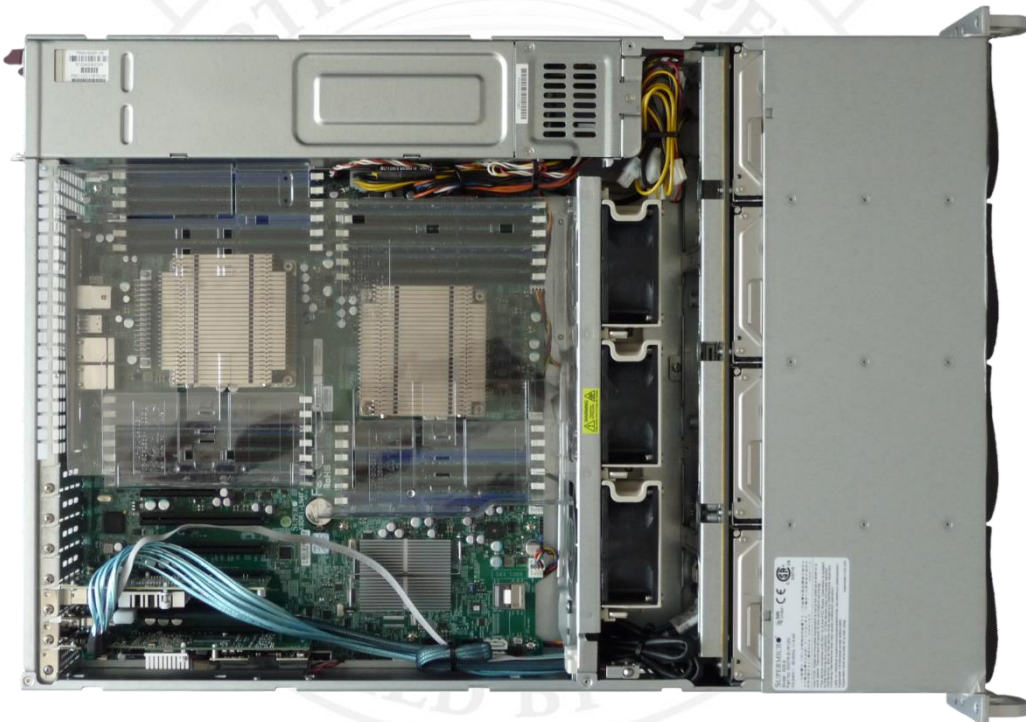


FIGURE 3: Top photo

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 19" IPC - 4088 4U
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	4x 4GB ECC Kingston KVR1333D3E9S/4G
Network	4x Intel Gigabit Server Adapter (i82574L) (on-board)
Network	Intel Ethernet Server Adapter X540-T2
HW RAID	LSI MegaRAID SAS 9280-16i4e
Hard disk drives	8x 1TB Hitachi Ultrastar A7K2000 HUA722010CLA330

TABLE 2: Hardware components of first Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter Tech 19" IPC - 4088 4U
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	4x 4GB ECC Kingston KVR1333D3E9S/4G
Network	4x Intel Gigabit Server Adapter (i82574L) (on-board)
Network	Intel Ethernet Server Adapter X540-T2
HW RAID	LSI MegaRAID SAS 9280-4i4e
Hard disk drives	4x 750GB Seagate Barracuda ST3750330NS

TABLE 3: Hardware components of second Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter Tech 19" IPC - 4088 4U
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	4x 4GB ECC Kingston KVR1333D3E9S/4G
Network	4x Intel Gigabit Server Adapter (i82574L) (on-board)
Network	Intel PRO/1000 PT Dual Port Server Adapter (i82561EB)
HW RAID	LSI MegaRAID SAS 9280-4i4e
Hard disk drives	4x 750GB Seagate Barracuda ST3750330NS

TABLE 4: Hardware components of third Workstation with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter Tech 19" IPC - 4088 4U
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	4x 4GB ECC Kingston KVR1333D3E9S/4G
Network	4x Intel Gigabit Server Adapter (i82574L) (on-board)
Network	Intel PRO/1000 PT Dual Port Server Adapter (i82561EB)
HW RAID	LSI MegaRAID SAS 9280-4i4e
Hard disk drives	4x 750GB Seagate Barracuda ST3750330NS

TABLE 5: Hardware components of fourth Workstation with MS Windows

Model	Custom
Operating system	Open-E DSS V7 build 7637
Enclosure/chassis	Inter Tech 19" IPC - 4088 4U
Motherboard	Asus P8B-E / 4L
CPU	Intel Xeon E3-1230 3.20 GHz
Memory	4x 4GB ECC Kingston KVR1333D3E9S/4G
Network	4x Intel Gigabit Server Adapter (i82574L) (on-board)
Network	Intel Ethernet Server Adapter X540-T2
HW RAID	LSI MegaRAID SAS 9280-16i4e
Hard disk drives	8x 1TB Hitachi Ultrastar A7K2000 HUA722010CLA330

TABLE 6: Hardware components of Workstation with Open-E DSS V7

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

TABLE 7: Network switch details for 1GbE connections

Model	NETGEAR XS708E
Description	8-ports 10GbE switch

TABLE 8: 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 9: 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.

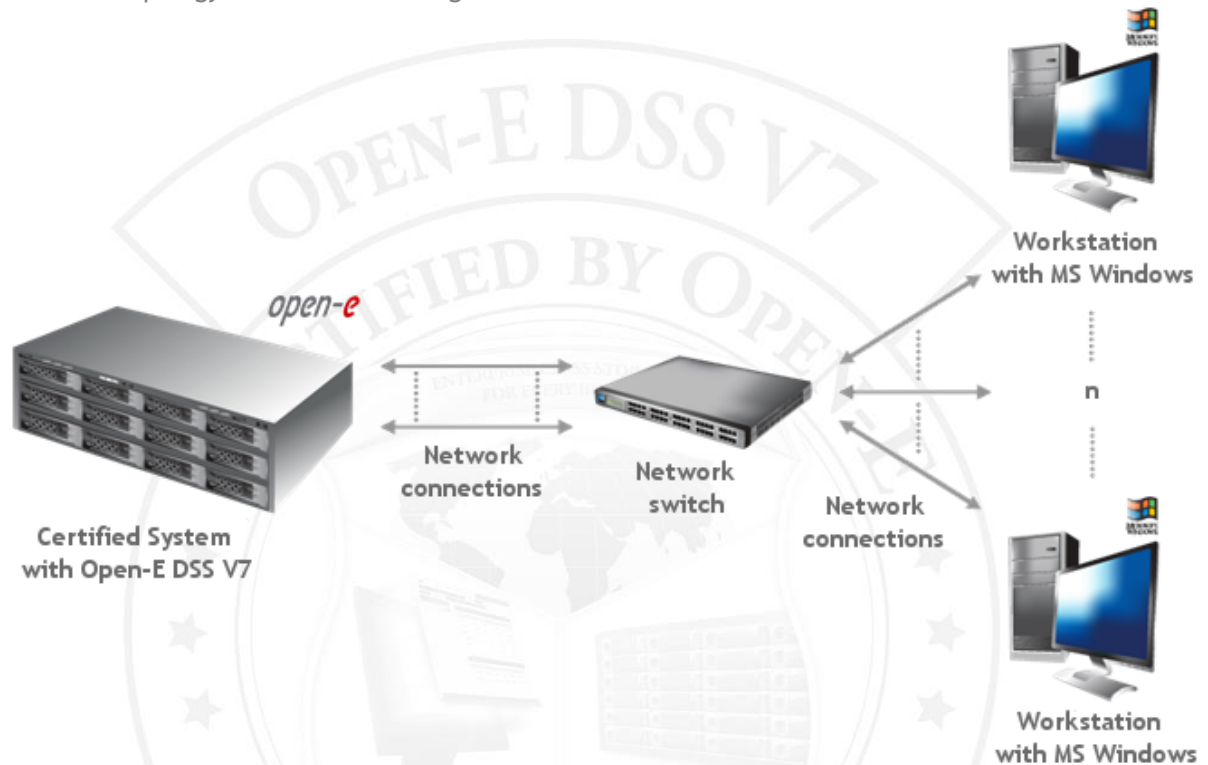


FIGURE 4: Network topology for Network testing

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	108.83	112.03	passed
2 nd Workstation	109.78	112.03	passed
3 rd Workstation	109.31	57.28	passed
4 th Workstation	109.44	56.39	passed

TABLE 10: 802.3ad bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

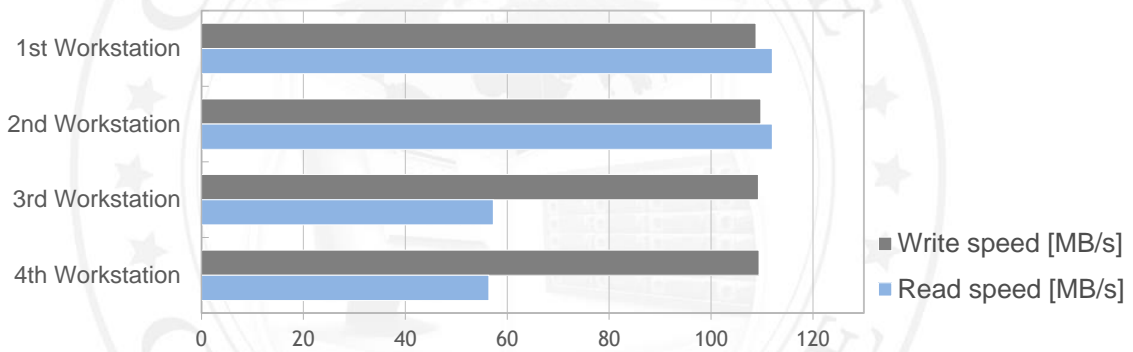


FIGURE 5: 802.3ad bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)

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 Supermicro AOC-STG-i2T

Balance-alb bonding mode performance test results			
NIC model	Supermicro AOC-STG-i2T		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	540.67	469.33	passed
2 nd Workstation	526.43	411.38	passed

TABLE 11: Balance-alb bonding mode performance test results table for Supermicro AOC-STG-i2T

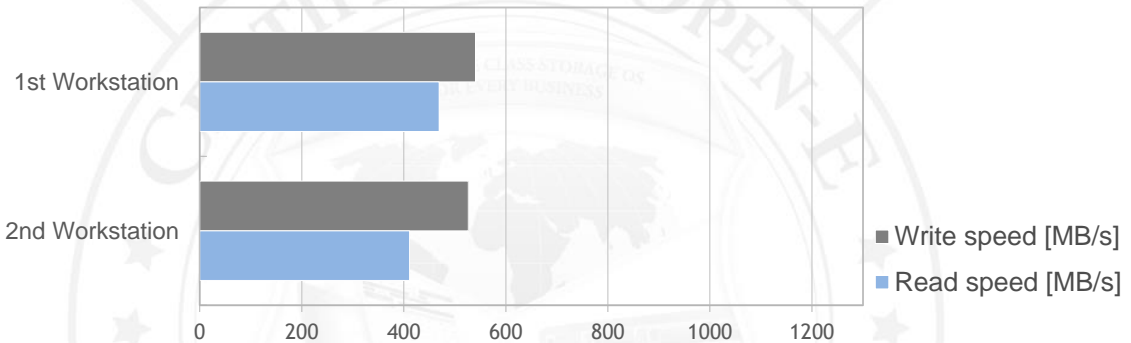


FIGURE 6: Balance-alb bonding mode performance test results chart for Supermicro AOC-STG-i2T

3. 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	110.11	111.67	passed
2 nd Workstation	109.68	111.63	passed
3 rd Workstation	109.73	111.77	passed
4 th Workstation	109.77	111.83	passed

TABLE 12: Balance-alb bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

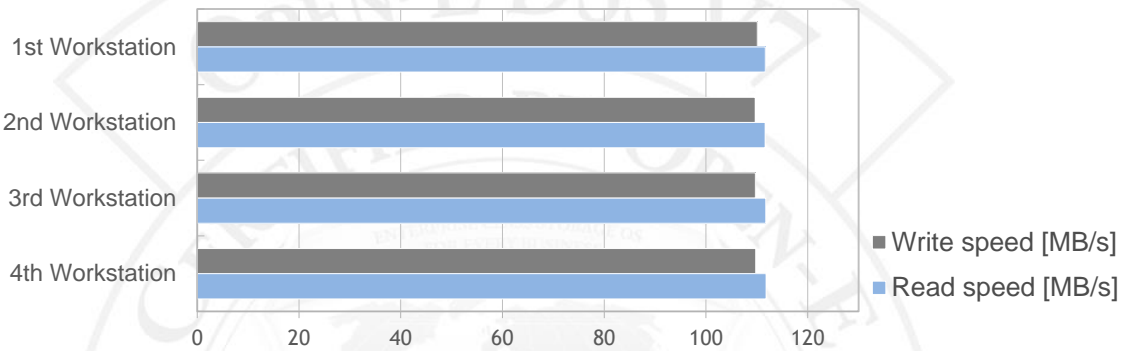
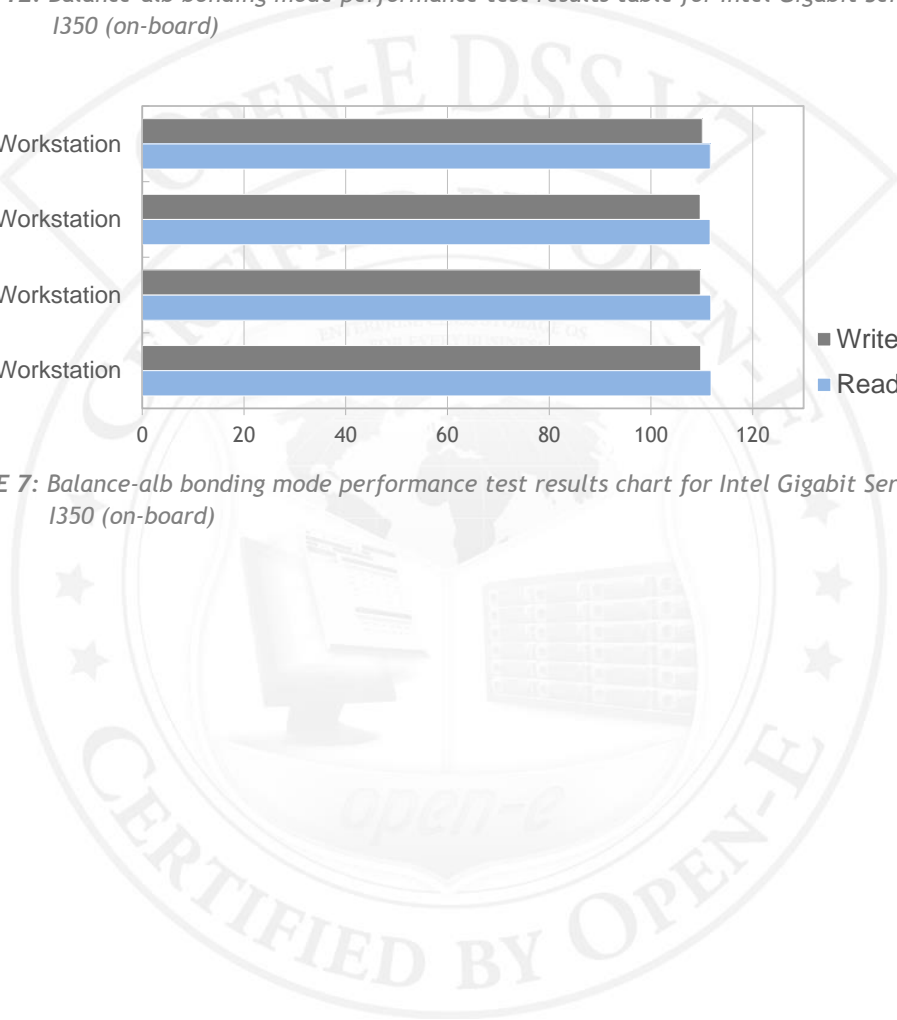


FIGURE 7: Balance-alb bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)



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 Iometer testing tool.

2. Test results for Balance-rr bonding mode test performed on Supermicro AOC-STG-i2T

Balance-rr bonding mode performance test results			
NIC model	Supermicro AOC-STG-i2T		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	403.51	179.73	passed
2 nd Workstation	456.69	255.90	passed

TABLE 13: Balance-rr bonding mode performance test results table for Supermicro AOC-STG-i2T

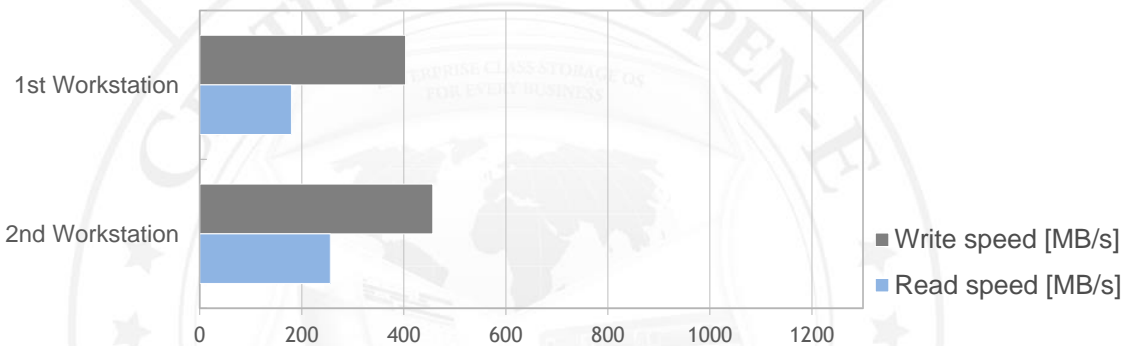


FIGURE 8: Balance-rr bonding mode performance test results chart for Supermicro AOC-STG-i2T

3. 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	110.32	57.56	passed
2 nd Workstation	109.81	58.09	passed
3 rd Workstation	110.06	83.53	passed
4 th Workstation	110.03	82.22	passed

TABLE 14: Balance-rr bonding mode performance test results table for Intel Gigabit Server Adapter I350 (on-board)

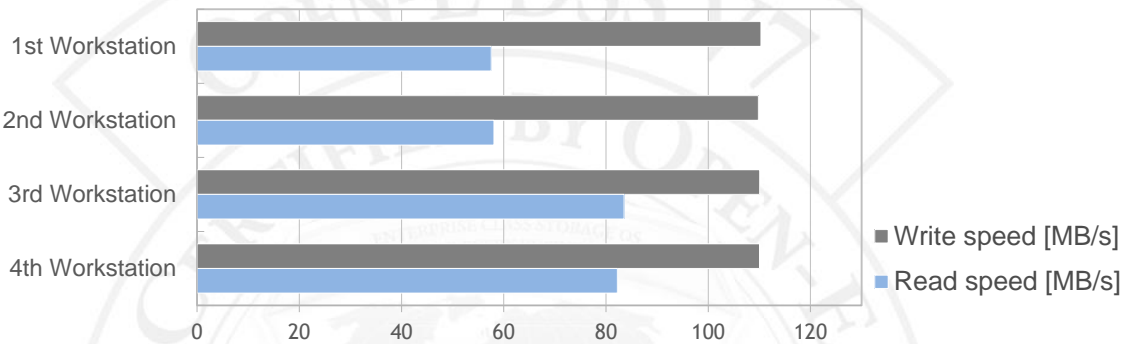
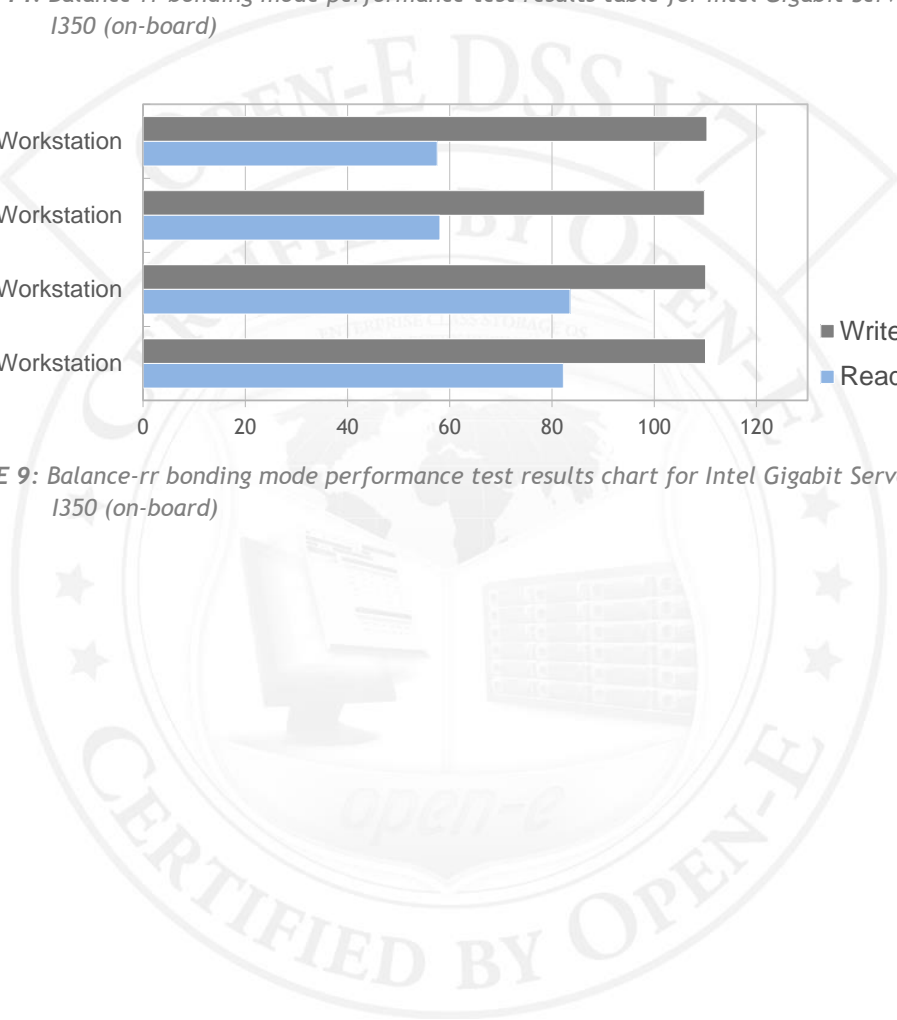


FIGURE 9: Balance-rr bonding mode performance test results chart for Intel Gigabit Server Adapter I350 (on-board)



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 Supermicro AOC-STG-i2T

Single NIC performance test results			
NIC model	Supermicro AOC-STG-i2T		
Workstations with MS Windows	Write speed [MB/s]	Read speed [MB/s]	Performance test results
1 st Workstation	554.05	495.29	passed

TABLE 15: Single NIC performance test results table for Supermicro AOC-STG-i2T

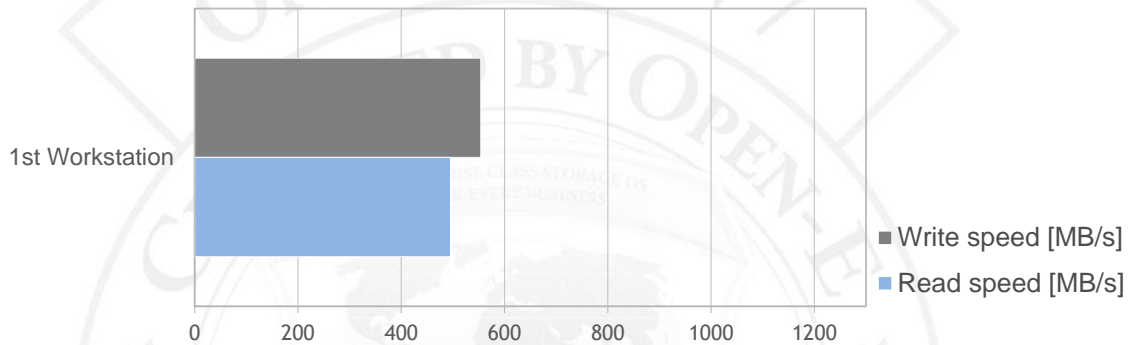


FIGURE 10: Single NIC performance test results chart for Supermicro AOC-STG-i2T

3. 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	110.24	112.06	passed

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

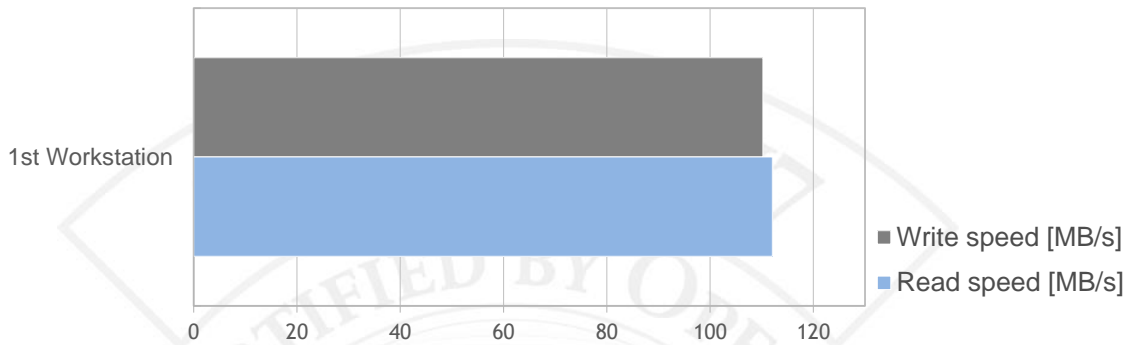


FIGURE 11: Single NIC performance test results chart for Intel Gigabit Server Adapter I350 (on-board)



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

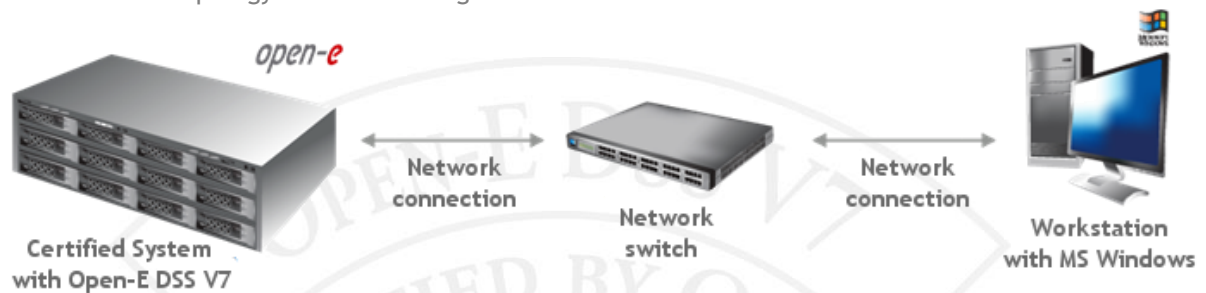


FIGURE 12: Network test topology for RAID testing

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 Supermicro AOC-STG-i2T

RAID0 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	47.11	67.40	passed
32	310.81	312.98	passed
64	415.60	402.28	passed
128	477.59	439.06	passed
256	534.81	494.34	passed
512	528.37	474.65	passed
1024	533.63	482.42	passed
4096	521.09	495.41	passed

TABLE 17: RAID0 performance test results table for Supermicro AOC-STG-i2T

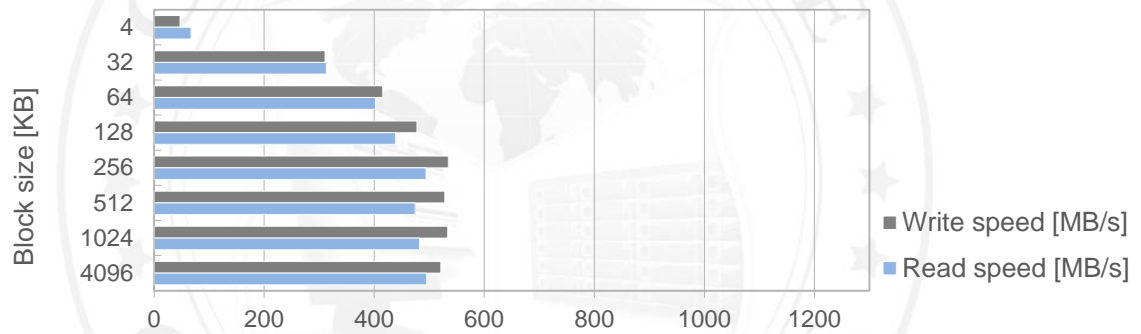


FIGURE 13: RAID0 performance test results chart for Supermicro AOC-STG-i2T

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 Supermicro AOC-STG-i2T

RAID5 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	44.79	64.66	passed
32	293.32	331.65	passed
64	377.89	458.73	passed
128	465.75	551.04	passed
256	561.26	617.06	passed
512	566.85	511.34	passed
1024	583.15	535.39	passed
4096	565.26	512.94	passed

TABLE 18: RAID5 performance test results table for Supermicro AOC-STG-i2T

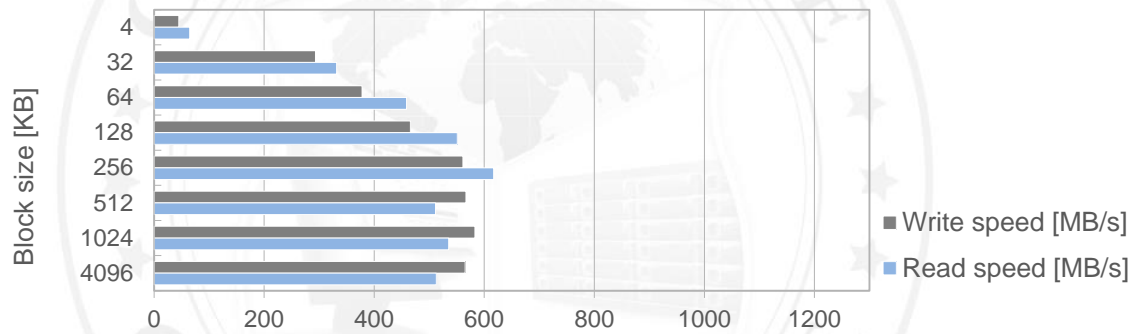


FIGURE 14: RAID5 performance test results chart for Supermicro AOC-STG-i2T

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 Supermicro AOC-STG-i2T

RAID6 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	42.15	67.42	passed
32	263.34	301.50	passed
64	344.64	372.51	passed
128	376.59	472.23	passed
256	443.91	585.87	passed
512	493.32	474.28	passed
1024	516.84	479.21	passed
4096	512.46	481.95	passed

TABLE 19: RAID6 performance test results table for Supermicro AOC-STG-i2T

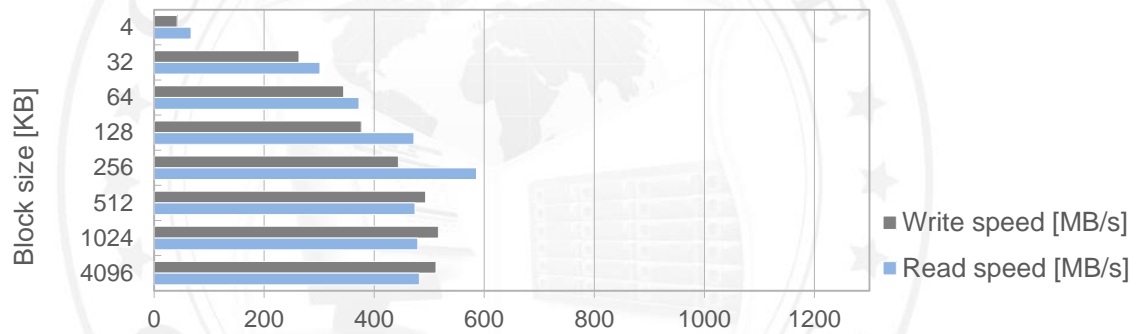


FIGURE 15: RAID6 performance test results chart for Supermicro AOC-STG-i2T

Hardware RAID10 test

3. 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.

4. Test results for RAID10 and Supermicro AOC-STG-i2T

RAID10 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	47.46	68.67	passed
32	308.67	318.78	passed
64	407.91	357.83	passed
128	464.10	405.00	passed
256	520.68	436.32	passed
512	516.44	459.93	passed
1024	523.47	465.00	passed
4096	532.05	459.69	passed

TABLE 20: RAID10 performance test results table for Supermicro AOC-STG-i2T

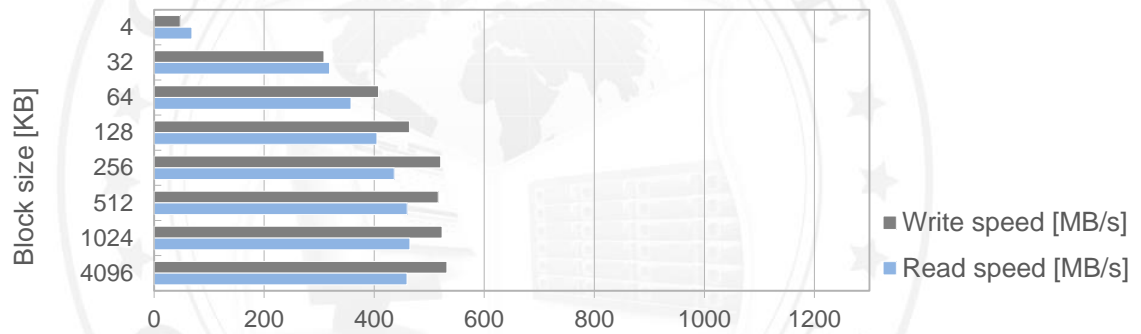


FIGURE 16: RAID10 performance test results chart for Supermicro AOC-STG-i2T

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 Supermicro AOC-STG-i2T

RAID50 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	46.77	66.17	passed
32	299.85	312.86	passed
64	410.84	394.49	passed
128	478.69	494.78	passed
256	501.57	590.19	passed
512	512.42	483.70	passed
1024	545.03	498.42	passed
4096	510.79	493.17	passed

TABLE 21: RAID50 performance test results table for Supermicro AOC-STG-i2T

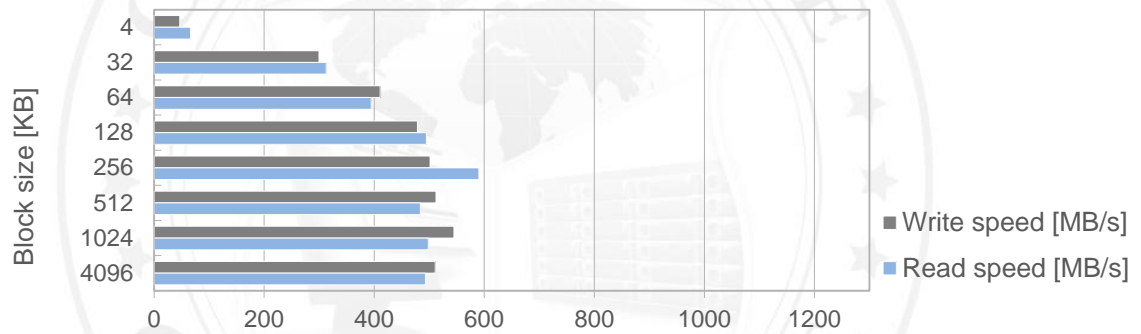


FIGURE 17: RAID50 performance test results chart for Supermicro AOC-STG-i2T

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 Supermicro AOC-STG-i2T

RAID60 performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	45.12	68.30	passed
32	290.44	315.56	passed
64	391.17	392.47	passed
128	447.71	550.29	passed
256	495.99	533.09	passed
512	494.43	468.88	passed
1024	501.24	464.53	passed
4096	502.65	494.04	passed

TABLE 22: RAID60 performance test results table for Supermicro AOC-STG-i2T

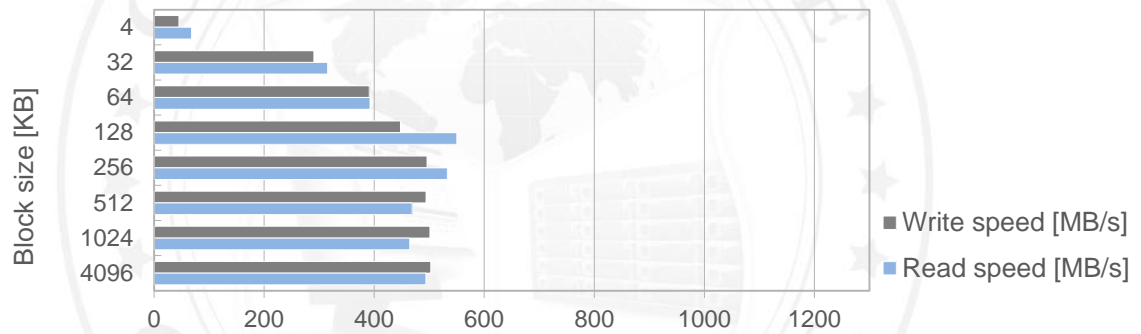


FIGURE 18: RAID60 performance test results chart for Supermicro AOC-STG-i2T

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.

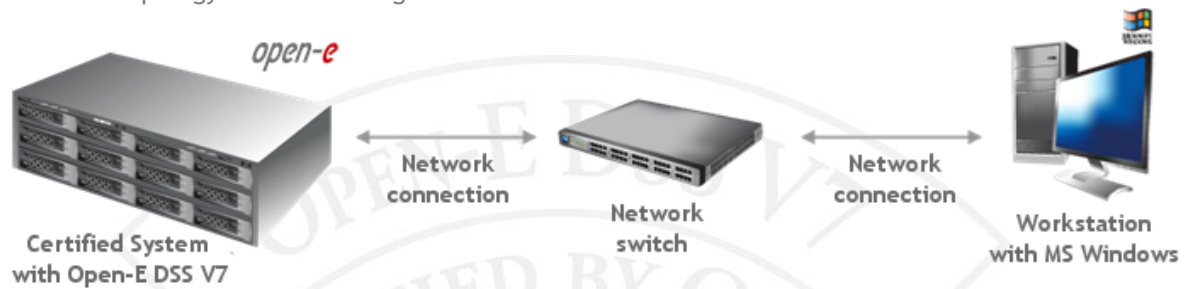
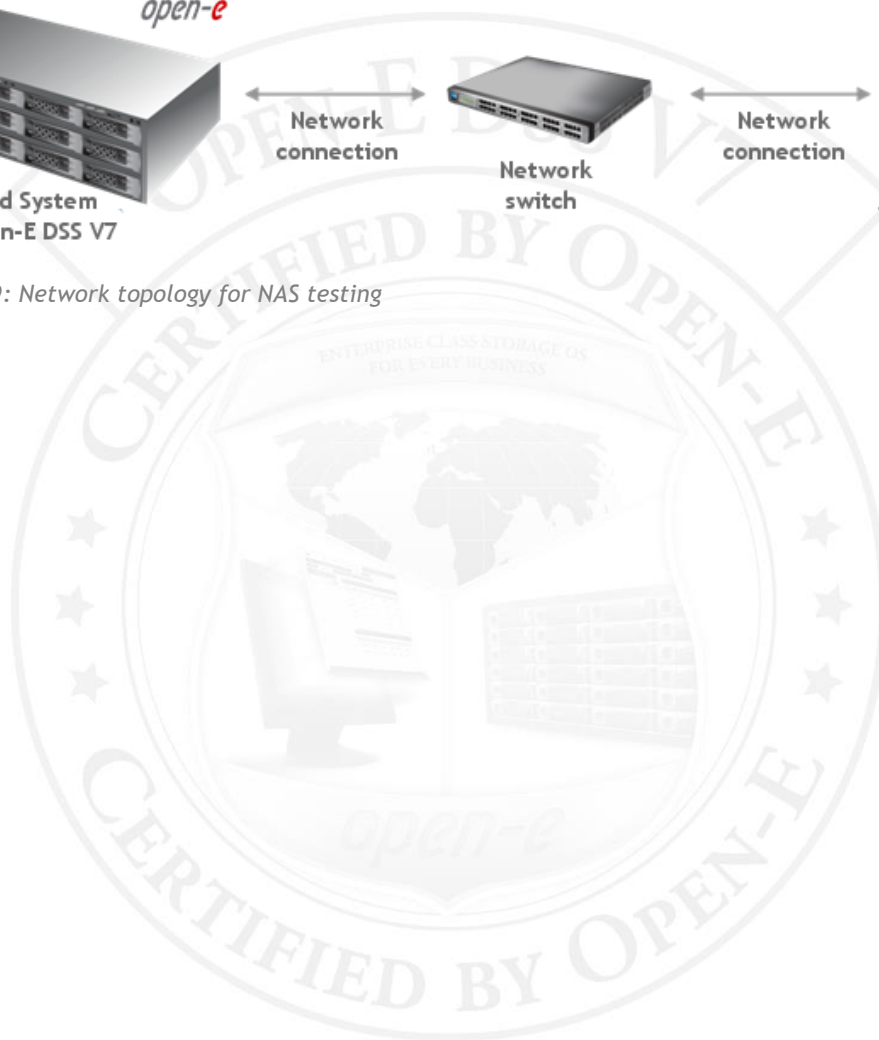


FIGURE 19: Network topology for NAS testing



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 Supermicro AOC-STG-i2T

SMB performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	105.99	96.09	passed
32	435.03	640.87	passed
64	485.61	449.62	passed
128	475.30	441.11	passed
256	484.79	435.51	passed
512	489.02	429.76	passed
1024	484.22	431.43	passed
4096	483.65	451.51	passed

TABLE 23: SMB performance test results table for Supermicro AOC-STG-i2T

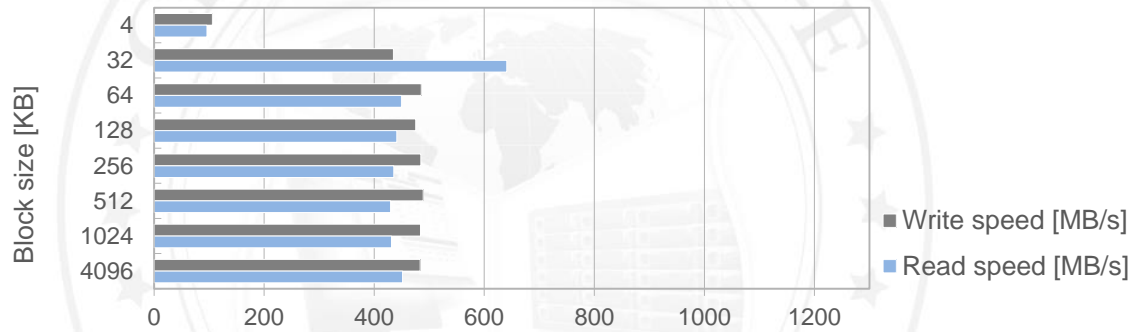


FIGURE 20: SMB performance test results chart for Supermicro AOC-STG-i2T

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.

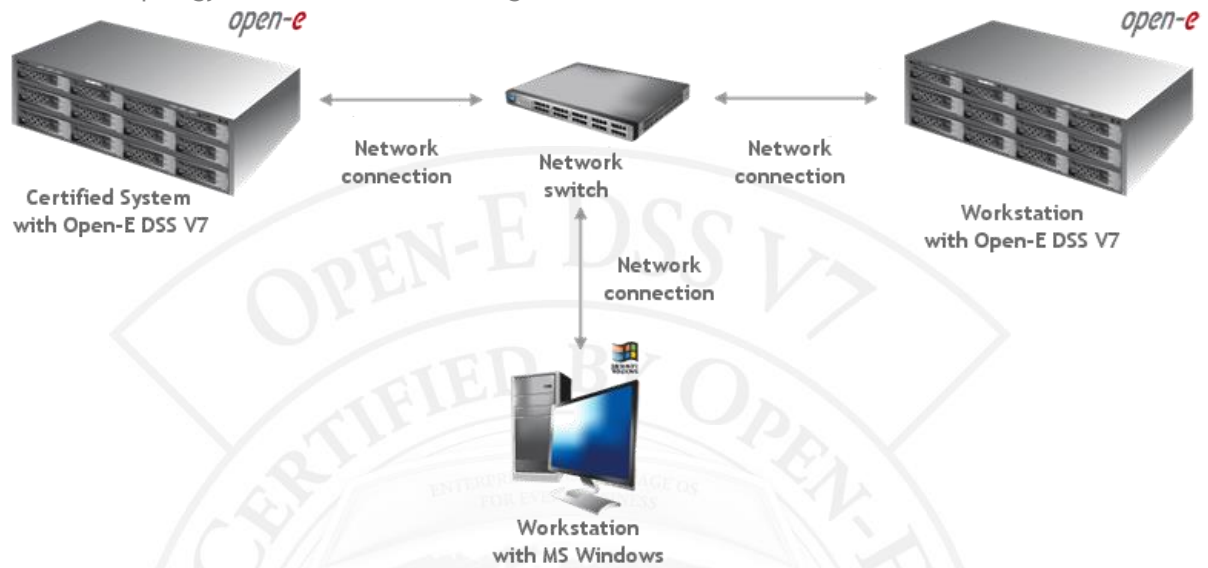


FIGURE 21: Network topology for iSCSI Initiator testing

iSCSI Target test topology

Network topology for iSCSI Target testing is shown below.

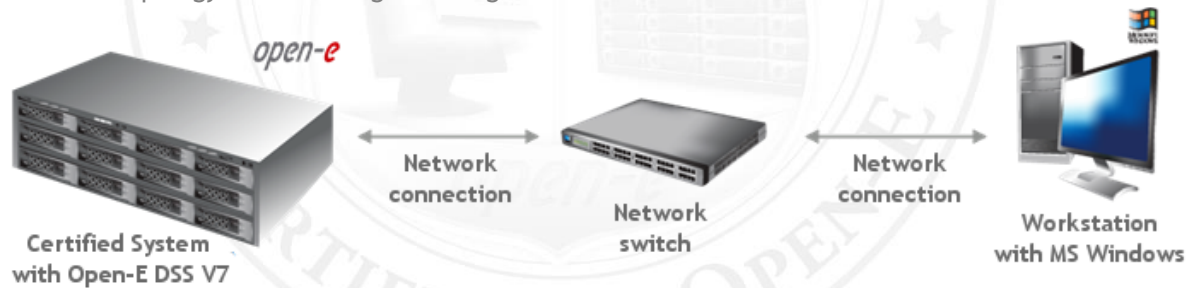


FIGURE 22: Network topology for iSCSI Target testing

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 Supermicro AOC-STG-i2T

iSCSI Initiator performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	106.29	105.79	passed
32	677.98	662.18	passed
64	937.95	480.11	passed
128	1018.37	499.55	passed
256	989.80	459.92	passed
512	880.38	482.36	passed
1024	970.67	482.43	passed
4096	969.71	484.34	passed

TABLE 24: iSCSI Initiator performance test results table for Supermicro AOC-STG-i2T

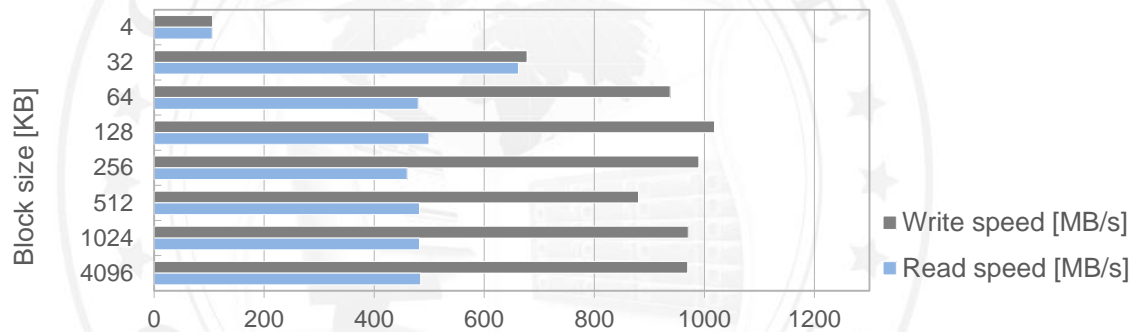


FIGURE 23: iSCSI Initiator performance test results chart for Supermicro AOC-STG-i2T

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 and Supermicro AOC-STG-i2T

iSCSI Target performance test results			
Block size [KB]	Write speed [MB/s]	Read speed [MB/s]	Performance test results
4	47.23	66.77	passed
32	308.89	320.61	passed
64	424.86	406.63	passed
128	461.58	437.36	passed
256	532.47	486.00	passed
512	542.24	472.41	passed
1024	553.25	485.55	passed
4096	548.92	494.39	passed

TABLE 25: iSCSI Target performance test results table for Supermicro AOC-STG-i2T

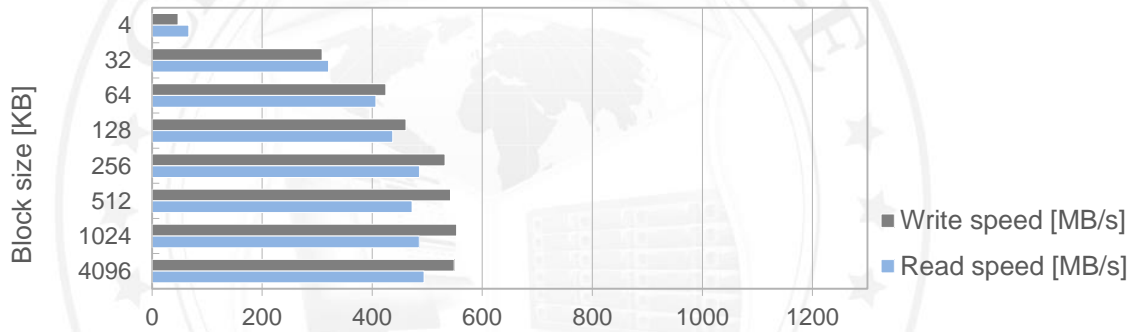


FIGURE 24: iSCSI Target performance test results chart for Supermicro AOC-STG-i2T