



# Open-E High Availability Certification report for Intel R2312IP4LHPC



## Executive summary

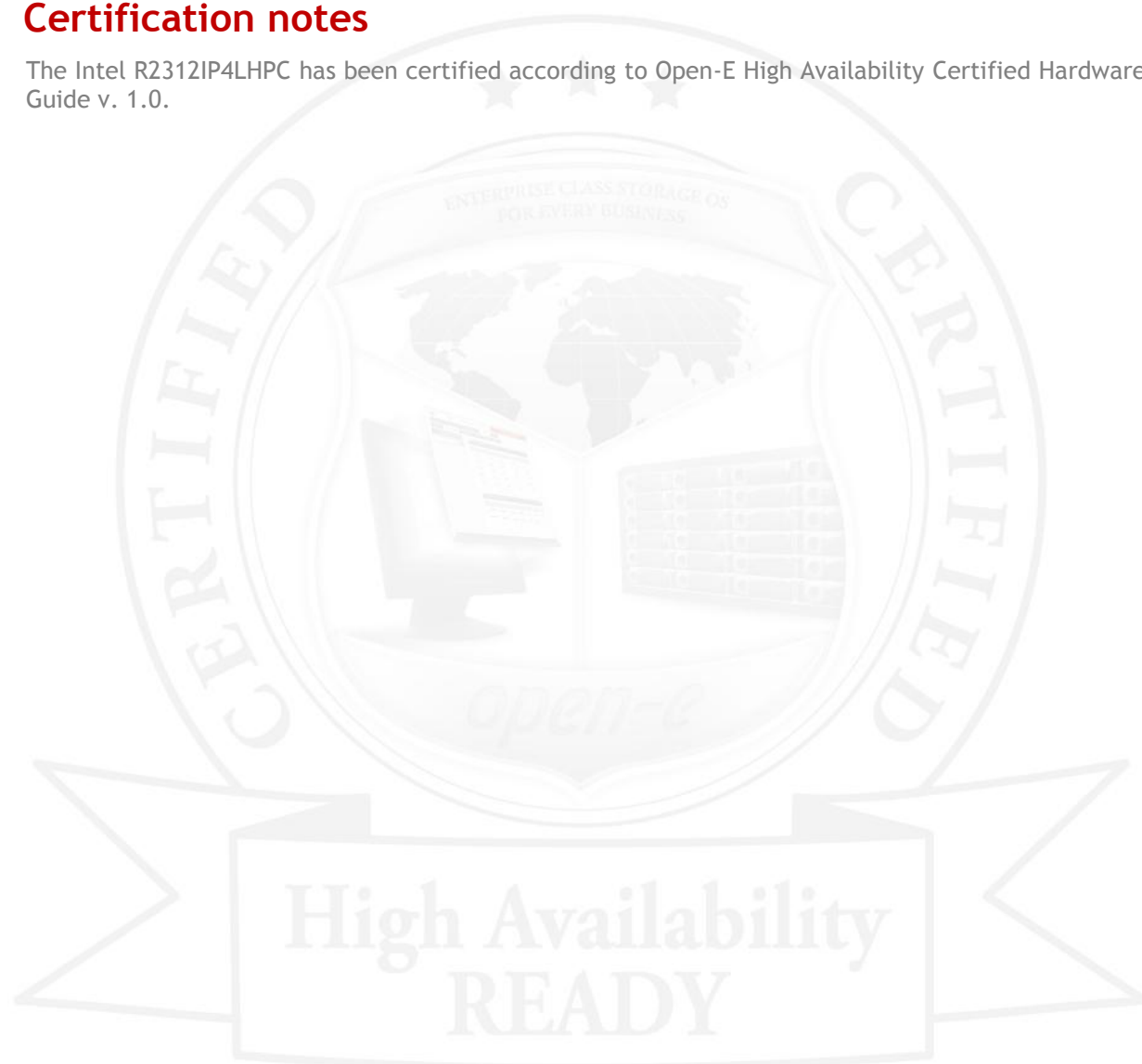
After successfully passing all the required tests, the Intel R2312IP4LHPC is now officially declared as [Open-E](#) High Availability Certified Storage Server.

The tests, conducted by Open-E's Quality Assurance team, prove that Open-E High Availability solution works effectively and efficiently on the certified system. The certification also signifies to customers that the Intel R2312IP4LHPC has met specific Open-E integration and interoperability standards.

The Open-E High Availability solution, based on the Intel R2312IP4LHPC, is considered to be stable and secure with superb performance.

## Certification notes

The Intel R2312IP4LHPC has been certified according to Open-E High Availability Certified Hardware Guide v. 1.0.





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## High Availability solution hardware components

Technical specification of iSCSI Failover nodes is listed below:

Model	Intel R2312IP4LHPC
Operating system	Open-E DSS V7 build 8826
Enclosure/chassis	Intel R2312IP4LHPC 2U Chassis
CPU	2x Intel Xeon E5-2643 3.3GHz
Motherboard	Intel Server Board S2600IP
Memory	8x 8GB Kingston DDR3 1600 ECC KVR1600D3D4R11S/8G
Network	4x 1GbE Intel I350 Quad Port Ethernet Controller (on-board)
Network	2x 10GbE Intel Ethernet Converged Network Adapter X520-SR2
HW RAID	Intel Integrated RAID Module RMS25CB080
Hard disk drives	10x 4TB Seagate Constellation ES.3 ST4000NM0023
Hard disk drives	2x 100GB Intel Solid-State Drive DC S3700 Series

TABLE 1: Hardware components list of iSCSI Failover nodes

Both iSCSI Failover nodes have the same hardware configuration as listed above.



## Auxiliary systems hardware components

Auxiliary systems with MS Windows installed, used in Open-E High Available solution 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 E5-2640 2.50 GHz
Memory	3x Intel Xeon Processor E3-1230 3.20 GHz
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Hard disk drives	Hitachi Ultrastar A7K2000 HUA722010CLA330 1TB

TABLE 2: Hardware components of first Workstations 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 E5-2640 2.50 GHz
Memory	3x Intel Xeon Processor E3-1230 3.20 GHz
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Hard disk drives	Hitachi Ultrastar A7K2000 HUA722010CLA330 1TB

TABLE 3: Hardware components of second Workstations with MS Windows

Model	Custom
Operating system	MS Windows Server 2008 R2
Enclosure/chassis	Inter-Tech IPC 4088 4HE
CPU	Asus P8B-E / 4L
Motherboard	Intel Xeon E5-2640 2.50 GHz
Memory	3x Intel Xeon Processor E3-1230 3.20 GHz
Network	4x Intel 82574L Gigabit Ethernet Controller (on-board)
Hard disk drives	Hitachi Ultrastar A7K2000 HUA722010CLA330 1TB

TABLE 4: Hardware components of third Workstations with MS Windows

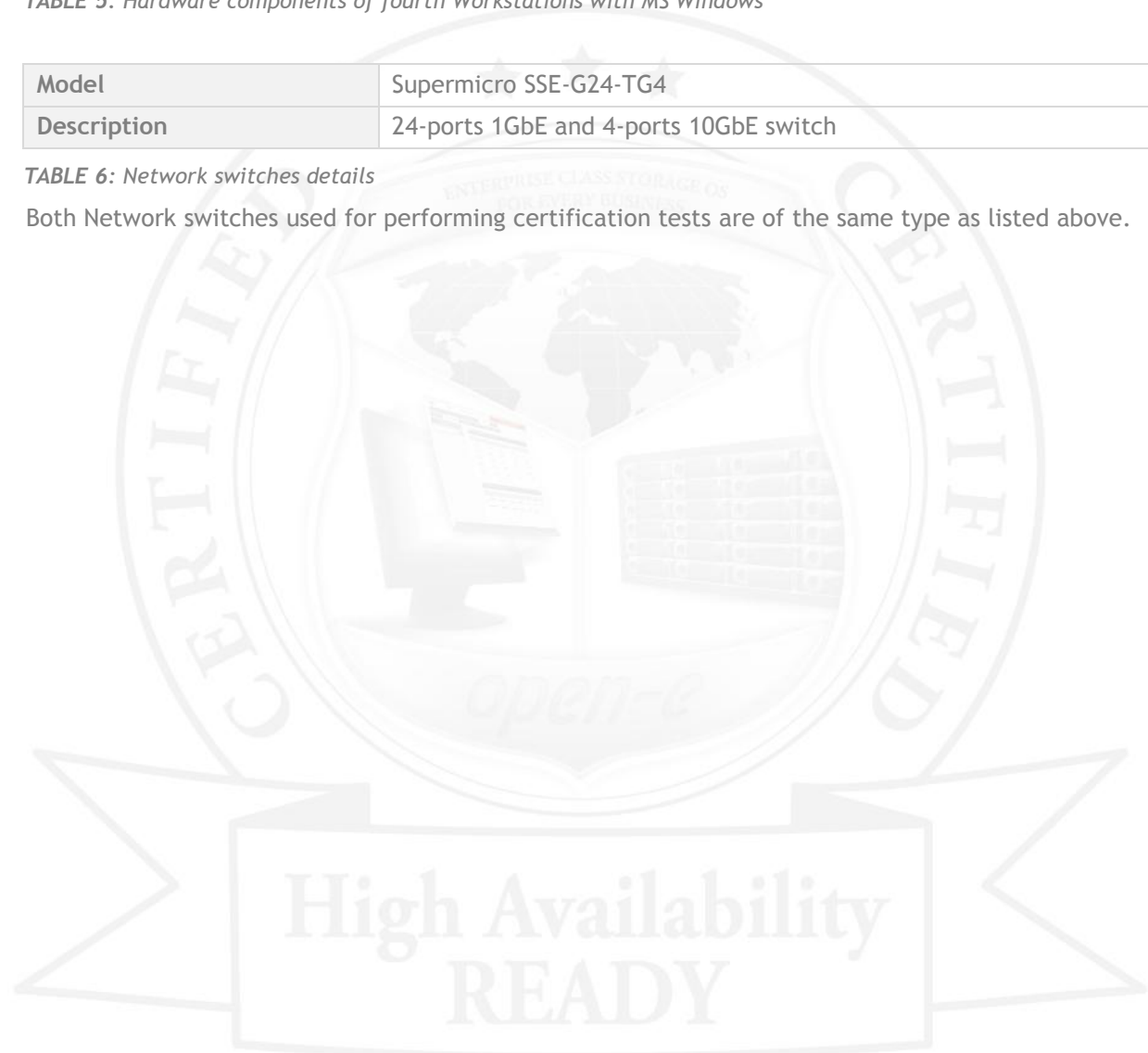
<b>Model</b>	Custom
<b>Operating system</b>	MS Windows Server 2008 R2
<b>Enclosure/chassis</b>	Inter-Tech IPC 4088 4HE
<b>CPU</b>	Asus P8B-E / 4L
<b>Motherboard</b>	Intel Xeon E5-2640 2.50 GHz
<b>Memory</b>	3x Intel Xeon Processor E3-1230 3.20 GHz
<b>Network</b>	4x Intel 82574L Gigabit Ethernet Controller (on-board)
<b>Hard disk drives</b>	Hitachi Ultrastar A7K2000 HUA722010CLA330 1TB

**TABLE 5:** Hardware components of fourth Workstations with MS Windows

<b>Model</b>	Supermicro SSE-G24-TG4
<b>Description</b>	24-ports 1GbE and 4-ports 10GbE switch

**TABLE 6:** Network switches details

Both Network switches used for performing certification tests are of the same type as listed above.



## High Availability solution performance

Tests performed in this section compare the performance of Active-Passive iSCSI Failover with Active-Active iSCSI Failover available in the Open-E DSS V7 software running on the certified systems.

### High Availability solution performance test topology

Network topology for High Availability solution performance testing is shown below.

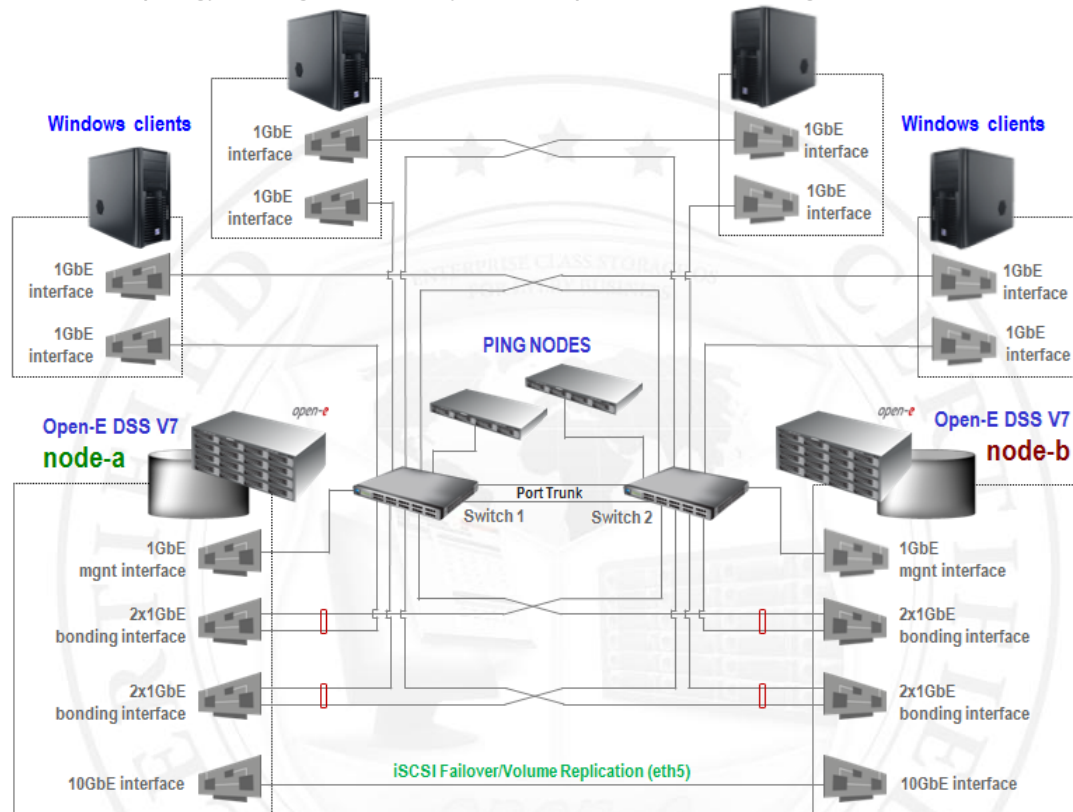


FIGURE 1: Network topology for High Availability performance testing

## Active-Passive iSCSI Failover data throughput performance test

### 1. Test description

The test relies on using the iSCSI targets exported by Active-Passive iSCSI Failover running on certified systems. The data are copied from four *Workstations with MS Windows* equipped with two 1GbE interfaces each to iSCSI targets located on one active node using the Iometer tool. One 10GbE interface is used on each node for Volume replication.

### 2. Test results for Active-Passive iSCSI Failover data throughput performance using 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on one active node

Active-Passive iSCSI Failover data throughput performance test results			
Block size [KB]	Total write throughput [MB/s]	Total read throughput [MB/s]	Performance test results
4	75.67	92.84	passed
32	210.60	199.92	passed
64	221.41	220.92	passed
128	154.07	219.85	passed
256	148.15	222.97	passed
512	211.98	221.90	passed
1024	215.78	224.02	passed
4096	219.84	225.05	passed

TABLE 7: Active-Passive iSCSI Failover data throughput performance test results table for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on one active node

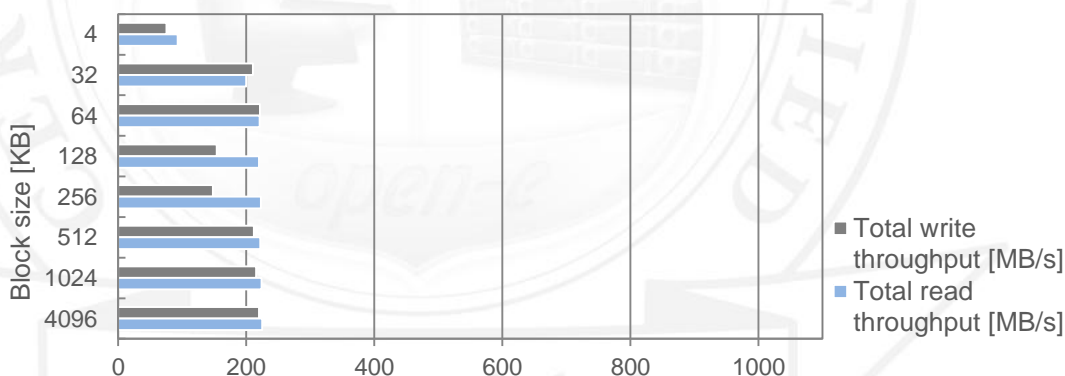


FIGURE 2: Active-Passive iSCSI Failover data throughput performance test results chart for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on one active node



## Active-Active iSCSI Failover data throughput performance test

### 1. Test description

The test relies on using the iSCSI targets exported by Active-Active iSCSI Failover running on certified systems. The data are copied from four *Workstations with MS Windows* equipped with two 1GbE interfaces each to iSCSI targets located on two active nodes using the iometer tool. One 10GbE interface is used on each node for Volume replication.

### 2. Test results for Active-Active iSCSI Failover data throughput performance using 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

Active-Active iSCSI Failover data throughput performance test results			
Block size [KB]	Total write throughput [MB/s]	Total read throughput [MB/s]	Performance test results
4	81.51	101.00	passed
32	278.27	434.38	passed
64	351.94	444.91	passed
128	395.38	444.67	passed
256	421.77	438.61	passed
512	430.27	447.77	passed
1024	429.95	447.47	passed
4096	430.27	443.09	passed

TABLE 8: Active-Active iSCSI Failover data throughput performance test results table for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

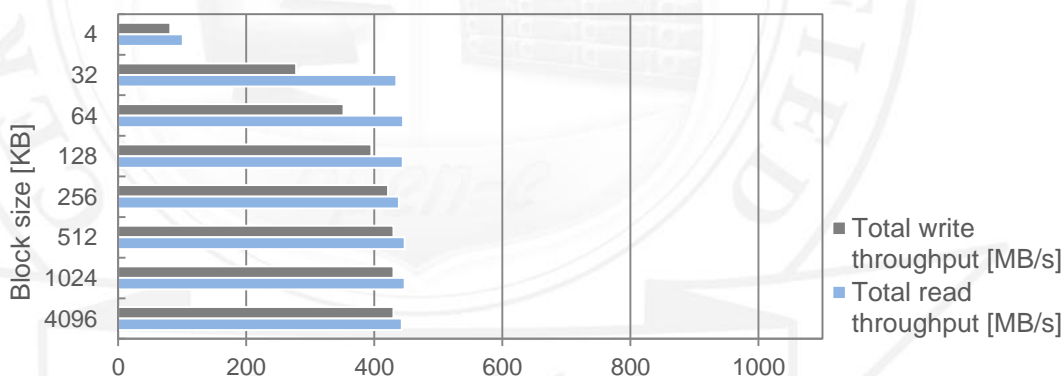


FIGURE 3: Active-Active iSCSI Failover data throughput performance test results chart for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

## Active-Passive iSCSI Failover resource group switching time test

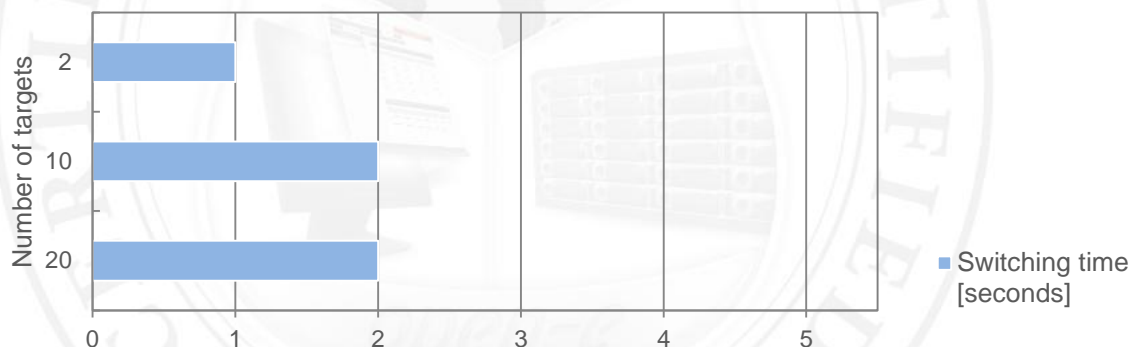
### 1. Test description

The test relies on copying data of 4MB block size using the lometer tool from four *Workstations with MS Windows* equipped with two 1GbE interfaces each to iSCSI targets located on one active node. The Resource group switching time is measured under high load for 2, 10 and 20 iSCSI targets located on one active node. One 10GbE interface is used on each node for Volume replication.

### 2. Test results for Active-Passive iSCSI Failover resource group switching time using 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

Active-Passive iSCSI Failover resource switching time test results		
Total number of targets	Switching time [seconds]	Performance test results
2	1	passed
10	2	passed
20	2	passed

**TABLE 9:** Active-Passive iSCSI Failover resource group switching time test results table for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on one active node



**FIGURE 4:** Active-Passive iSCSI Failover resource group switching time test chart for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on one active node

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## Active-Active iSCSI Failover resource group switching time test

### 1. Test description

The test relies on copying data of 4MB block size using the lometer tool from four *Workstations with MS Windows* equipped with two 1GbE interfaces each to iSCSI targets located on two active nodes. The Resource group switching time is measured under high load for 2, 10 and 20 iSCSI targets located on two active nodes. One 10GbE interface is used on each node for Volume replication.

### 2. Test results for Active-Active iSCSI Failover resource groups switching time using 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

Active-Active iSCSI Failover resource switching time test results		
Total number of targets	Switching time [seconds]	Performance test results
2	1	passed
10	1	passed
20	2	passed

**TABLE 10:** Active-Active iSCSI Failover resource groups switching time test results table for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes



**FIGURE 5:** Active-Active iSCSI Failover resource groups switching time test chart for 10GbE Intel Ethernet Converged Network Adapter X520-SR2 on both active nodes

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## High Availability solution functionality

Tests performed in this section analyze the functionality of [High Availability solution](#) configured as Active-Active iSCSI Failover. available in the Open-E DSS V7 product on the certified systems.

### High Availability solution functionality test topology

Network topology for High Availability solution functionality testing is presented below.

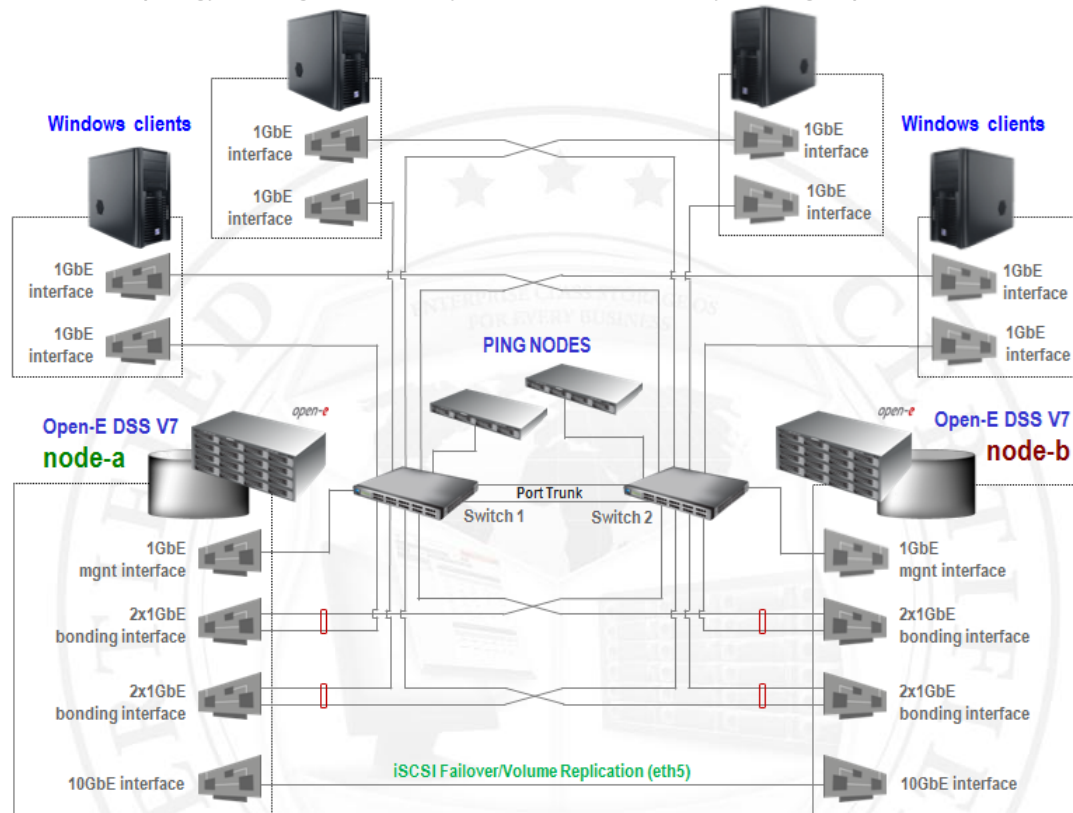


FIGURE 6: Network topology for High Availability solution functionality testing

## High Availability solution functionality test

### 1. Test description

The test relies on performing various actions which should cause Resource group switching during copying data from four *Workstations with MS Windows* equipped with two 1GbE interfaces each to iSCSI targets exported by Active-Active iSCSI Failover. It tests whether failover occurs and if all resources are still reachable for 20 iSCSI targets located on two active nodes. One 10GbE interface is used on each node for Volume replication.

### 2. Test results for High Availability solution functionality

High Availability solution functionality test		
Total number of targets	Test case	Test results
20	Manual resources transfer test	passed
20	Network malfunction test	passed
20	Reboot test	passed
20	Shutdown test	passed
20	I/O error test	passed

TABLE 11: High Availability solution functionality test results table

