

## Interoperability Report With Isilon IQ Cluster Storage (Revision 1.1)

The following test report demonstrates interoperability with Isilon IQ and Force10 S-Series family storage switches.



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## Objectives

The testing described in this document demonstrates interoperability between Isilon Systems cluster storage system and Force10 Networks S-Series storage switches.

## Isilon IQ Series

Isilon IQ clustered storage systems deliver the industry's first and only storage system to scale up to 3.5 petabytes of capacity and provide performance of 30 GB/second in a single file system and single volume. Powered by OneFS, the Isilon IQ family of products creates a single pool of expandable storage that is easy to install and grow – once racked, a 10, 50 or 100+ terabyte cluster takes less than 10 minutes to configure and set up, and capacity can be added on the fly in less than 60 seconds with no downtime.

## Summary of the Tests

Table.1 shows the summary of the testing.

	Description	Pass	Fail
1	Interoperability With 1 GbE	✓	
3	Interoperability With VirtualScale Scenario 2 – Failover	✓	
3	Interoperability With 10 GbE (Demonstration With InterBEE2008)	✓	

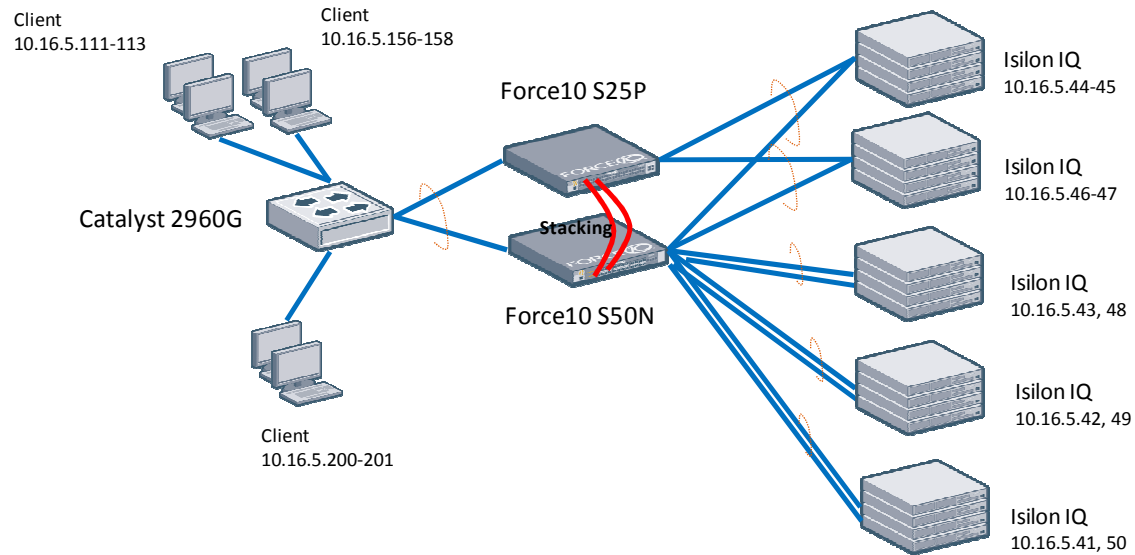
## Introduction

The interoperability testing has been successfully achieved between an Isilon IQ system and the Force10 S-Series family which includes the S25P, S50N and S2410 switches. The testing proved end-to-end connectivity and redundancy over Gigabit Ethernet including copper and fiber (1000BASE-SX) and 10 Gigabit Ethernet including 10GBASE-SR.

### Test Bed Setup (Network Diagram)

Figure.1 shows the test bed for tests 1, 3 and 4. Clients were connected to the Isilon IQ through Force10 S-Series switches connected together with stacking. The Force10 S-Series were connected to a Catalyst 2960G and the Isilon IQ through a port-channel. The Isilon IQ is connected to each stacked S-Series switch for redundancy.

Figure. 1 Test Bed for Test 1, 3 and 4



## Test Items

In test 1, clients mount the Isilon IQ storage using NFS and then read and write a 4 GByte file over the network. In test 2, clients mount the Isilon IQ storage using NFS and modify a 4K digital cinema file.

### ● Interoperability and Throughput With 1 GbE

Evaluate the interoperability of Isilon IQ with the S-Series S25P and S50N switches. The S25P and S50N are running FTOS 7.7.1.1.

6 clients (Solaris 10 5/08 s10x\_u5wos\_10 X86) mount the Isilon IQ through NFS. For the test, each client mounts the same directory from all nodes.

```
mount -F nfs 10.16.5.41:/ifs/test /iq41
```

```
...
```

```
mount -F nfs 10.16.5.45:/ifs/test /iq45
```

Each IP address refers to an Isilon IQ node; to access the /ifs/test directory, the Isilon IQ has 5 paths (10.16.5.41-45).

[Benchmark tool : IOzone <http://www.iozone.org/> ]

IOzone is a filesystem benchmark tool. The benchmark generates and measures a variety of file operations.

The throughput of a 4 GB file write, rewrite, read, reread from one or multiple client(s) was tested using IOzone.

### ● Interoperability with VirtualScale™ Scenario 2 – Failover

Evaluate the failover under VirtualScale™ scenario. Failover the stacking using the CLI “redundancy force failover” command and confirm that the clients maintain TCP communication with Isilon IQ.

### ● Interoperability and Throughput With 10GbE (Jumbo Frames)

Evaluate the interoperability with the Isilon IQ Accelerator X and the S2410 switch. The S2410 is running SFTOS 2.3.1.11. We provided an interoperability and 10 GbE performance demonstration at InterBEE2008.

Reading 3 uncompressed movie files (bit rate: 782.4 Mbps) from Isilon IQ concurrently with FinalCut Pro was possible without any dropping frames.

## Configuration

The Isilon cluster storage has dual connections connected to the Force10 S-Series family. Each interface is configured with jumbo frames and NIC teaming. The Force10 S-Series family is stacked and provides redundant connections to the Isilon cluster storage.

### ● Isilon

Figure.2 shows the Isilon IQ storage configuration.

Isilon IQ has two Gigabit Ethernet interfaces on each node. The interfaces can be used as independent interfaces on the same subnet, teamed interfaces on the same subnet (802.3ad), or as independent interfaces on different subnets. Isilon IQ Accelerator has two Gigabit Ethernet and two 10 Gigabit Ethernet interfaces. Isilon IQ supports 802.3ad (called NIC teaming in this document), and NIC-teamed Isilon IQ nodes are connected to the 2 ports on the stacked Force10 S-Series (described above). The 10 Gigabit interfaces on the Accelerator are not teamed.

6 clients (Solaris 10 5/08 s10x\_u5wos\_10 X86) mount the Isilon IQ through NFS. For the test, each client mounts the same directory from all nodes.

```
mount -F nfs 10.16.5.41:/ifs/test /iq41
...
mount -F nfs 10.16.5.45:/ifs/test /iq45
```

Each IP address refers to an Isilon IQ node; to access the /ifs/test directory, the Isilon IQ has 5 paths (10.16.5.41-45).

[Benchmark tool : IOzone <http://www.iozone.org/> ]

IOzone is a filesystem benchmark tool. The benchmark generates and measures a variety of file operations. The throughput of a 4GB file write, rewrite, read, reread from one or multiple client(s) are tested by using IOzone.

Figure. 2 Isilon IQ Configuration

```
iq41-1# isi stat
Cluster Name:  iq41
Cluster Health: [ OK ]
Available:     6.9T (> 99%)
```

ID	IP Address	Health  D-A--S-R	Throughput (bits/s)			Used / Capacity
			In	Out	Total	
1	10.16.5.41	[OK]	0	0	0	3.2G / 1.7T (<1%)
2	10.16.5.42	[OK]	0	0	0	3.2G / 1.7T (<1%)
3	10.16.5.43	[OK]	0	0	0	3.2G / 1.7T (<1%)
4	10.16.5.44	[OK]	0	0	0	3.2G / 1.7T (<1%)
6	10.16.5.45	[OK]	0	0	0	(Diskless)
Cluster Totals:			0	0	0	13G / 6.9T (<1%)

Health Fields: D = Down, A = Attention, S = Smart-Failed, R = Read-Only

## ● Force10

Figure.3 shows the Force10 S-Series configuration.

Figure. 3 S-Series Family Configuration

```
!  
interface GigabitEthernet 0/1  
description ### connection with Isilon ###  
no ip address  
no shutdown  
!  
interface GigabitEthernet 0/2  
description ### connection with Isilon ###  
no ip address  
no shutdown  
!  
interface GigabitEthernet 0/3  
description ### cross stack lag with Isilon ###  
no ip address  
no shutdown  
!  
---(omit)---  
!  
interface GigabitEthernet 1/3  
description ### cross stack lag with Isilon ###  
no ip address  
no shutdown  
!  
---(omit)---  
!  
interface Port-channel 1  
description ### connection with Isilon ###  
no ip address  
switchport  
channel-member GigabitEthernet 0/1-2  
rate-interval 30  
no shutdown  
!  
interface Port-channel 2  
description ### cross stack lag with Isilon ###  
no ip address  
switchport  
channel-member GigabitEthernet 0/3, 1/3  
rate-interval 30  
no shutdown  
!
```

## Test Results

### ● Interoperability and Throughput With 1GbE

Evaluate the interoperability of Isilon IQ with the S-Series S25P and S50N switches. The S25P and S50N are running FTOS 7.7.1.1. Results are from IOZone.

#### Single Port Configuration

1 thread from 1 client to a single node (KB/s)

Record size = 32 Kbytes

Output is in Kbytes/sec

Initial write 83015.99

Rewrite 103626.6

Read 112503

Re-read 112755.4

3 threads from 1 client to a single node(KB/s)

Record size = 32 Kbytes

Output is in Kbytes/sec

Initial write 102219

Rewrite 102036.6

Read 113201.4

Re-read 113259.5

#### NIC Teaming Configuration

12 threads from 4 clients to a single node (KB/s)

Record size = 32 Kbytes

Output is in Kbytes/sec

Initial write 239277.9

Rewrite 228216.9

Read 395967.3

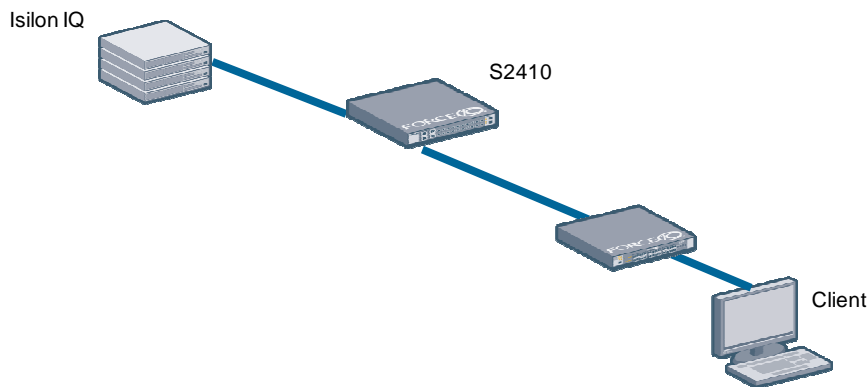
Re-read 396571.2

## InterBEE – Interoperability and Throughput With 10 GbE (Jumbo Frames)

The interoperability was successfully demonstrated at InterBEE. The client modified an uncompressed 4K digital file stored in Isilon directly.

Figure.4 shows the test bed for test 2. This was demonstrated at InterBEE2008 which is a major annual media event in Japan. Clients with FinalCut Pro were connected to the Isilon IQ through Force10 S-Series S2410 and S25P switches. Isilon IQ is connected to the S2410 with 10 GbE. The clients mount Isilon IQ using NFS and modify a 4K digital cinema file, which requires a 10 GbE high bandwidth connection.

Figure. 4 InterBEE2008 Demonstration



### Test with 10 GbE interfaces

Reading 3 uncompressed movie files (bit rate: 782.4 Mbps) from Isilon concurrently with FinalCut Pro was possible without any dropping frames (2347.2 Mbps).

Application: FinalCut Pro

OS: MacOS X 10.5.5

Protocol: NFS

IQ: 5 \* 1920x + 1 \* Accelerator, jumbo frames