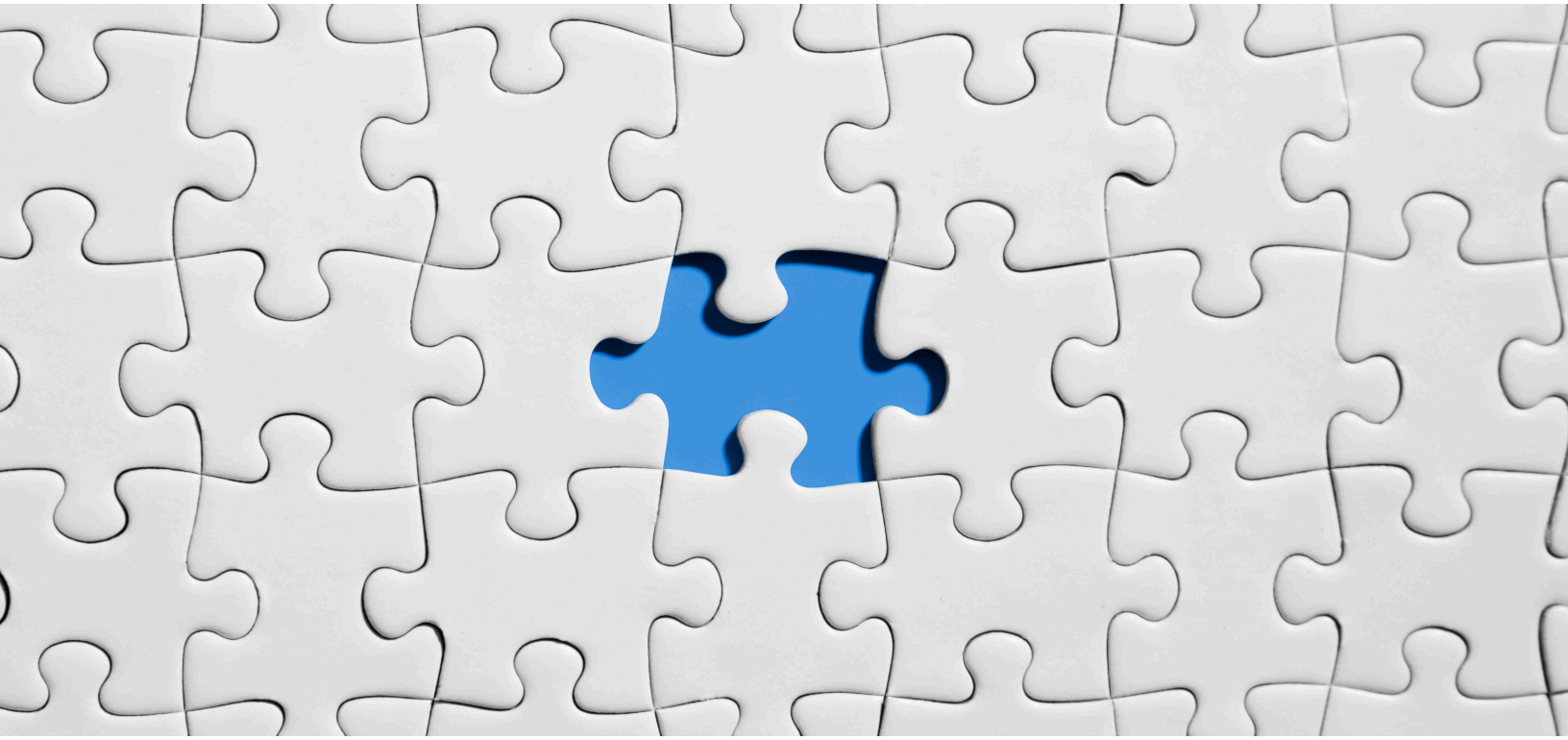
DELL EMC

ISILON GEN 6 VS GEN 5 COMPARISON FOR NEWBIES



Akshay Kumar

Principal Engineer, Solutions Architect

Dell EMC

Akshay.kumar2@dell.com

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Knowledge Sharing Article

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Isilon Gen 6 Overview

New Isilon Gen 6 hardware is far more advanced and robust than previous Isilon generations. It's an entiely new architecture with denser nodes and many hardware and software improvements. Isilon Gen 6 drastically reduces physical footprint and offers improved scalability, compute power, software optimization and protection against hardware failures.

OneFS 8.1 is a major upgrade to the OneFS operating system and includes support for revolutionary new Gen 6 hardware platforms with new levels of performance, efficiency and flexibility that deliver great performance and large capacity.

Isilon Gen 4/Gen 5 S, X, NL, HD Series & A100 Performance accelerator is being replaced by Isilon's Gen 6 platforms, including:

- All-Flash (F800)
- Hybrid (H400, H500, H600)
- Archive storage (A200, A2000)

*A100 Backup accelerator will still exist as there is no Gen6 Node with FC adapters.

Dell EMC Isilon Gen 5 vs Gen 6

<table>
<tr><th>Changes</th><th>Gen 4 & Gen 5</th><th>Gen 6</th></tr>
<tr><td>Model</td><td>S, X, NL & HD Series discontinued
A100 Performance accelerator discontinued
A100 Backup accelerator NOT discontinued
(as there’s no Gen6 No de yet with FC adapters)</td><td>F800, H600, H500, H400, A200, A2000</td></tr>
<tr><td>Node Size</td><td>Node size differs per Node model :

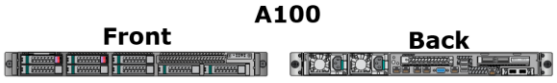
S Series: 2U Chassis
 

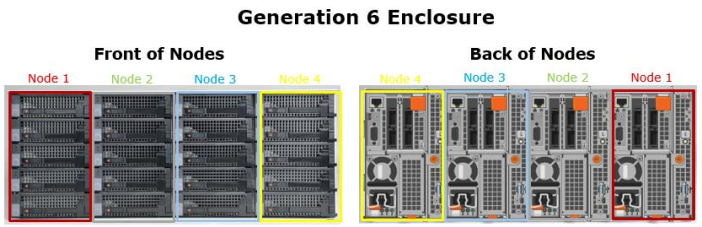
X Series : 2U/4U Chassis
 

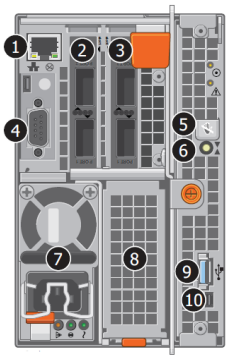
 

NL Series : 4U Chassis
 

HD Series : 4U Chassis
 

A100 Series : 1U Chassis
 
</td><td>Unlike Gen 4/Gen 5, Gen 6 nodes of all models are of same size.
1 Node: ¼ x 4U Chassis
4 Nodes: 1 x 4U Chassis (vertical mount)

<table><tr><th>Item Number</th><th>Item</th><th>Item Number</th><th>Item</th></tr><tr><td>1</td><td>1Gb management port</td><td>6</td><td>Multi-function button</td></tr><tr><td>2</td><td>Internal network ports</td><td>7</td><td>Power supply</td></tr><tr><td>3</td><td>External network ports</td><td>8</td><td>Cache SSD</td></tr><tr><td>4</td><td>Console connector</td><td>9</td><td>USB connector</td></tr><tr><td>5</td><td>Do Not Remove LED</td><td>10</td><td>HDMI debugging port</td></tr></table></td></tr>
<tr><td>Rack Requirement</td><td>S, X, NL & A Series: Standard Rack (Depth 35.50 inch)
HD Series: Deep Rack (Depth 39.80 inch)

Note: H400 can be installed in standard racks, but
• Not additional space for cable management arms
• Rear doors cannot be closed on most standard cabinets</td><td>F800, H600, H500, H400, A200 : Standard Rack (Depth 35.50 inch)
A2000: Deep Rack (Depth 39.80 inch)</td></tr>
</table>

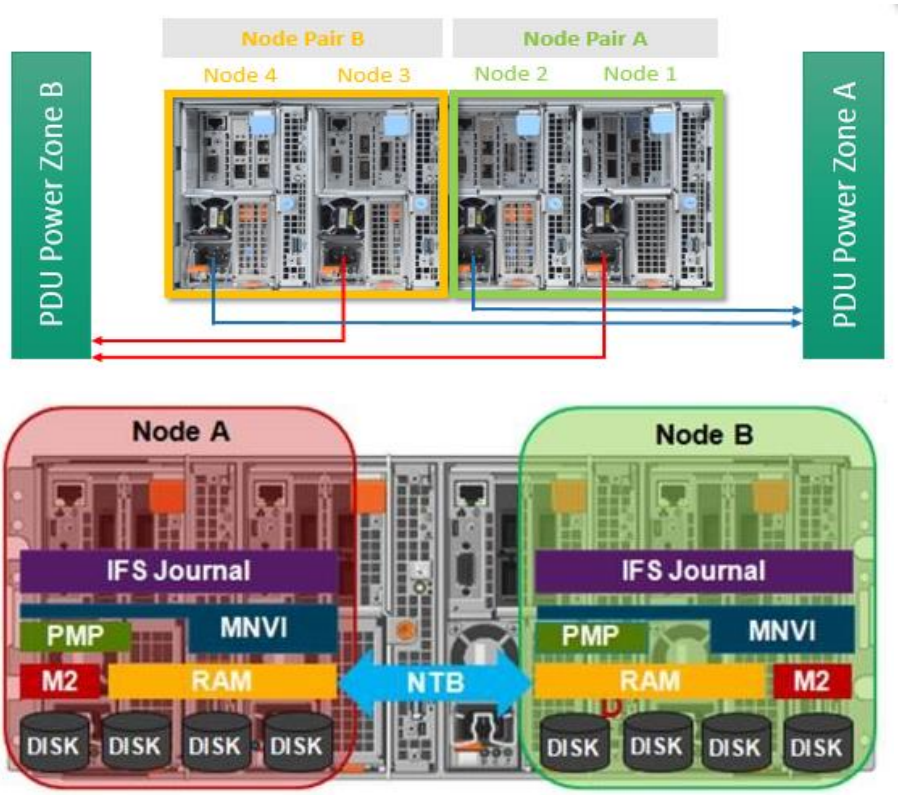
Back-End connectivity options	Infiniband	Infiniband or Ethernet
On-board Front-End connectivity	2 x 1 Gb Ethernet	1 x 1 Gb Ethernet
PCIe Front-End connectivity options	**Either one of below depending on Model :** • 2 x 1 Gb Ethernet • 2 x 10 Gb Ethernet	**Either one of below depending on Model :** • 2 x 10 Gb Ethernet • 2 x 40 Gb Ethernet
Min. Number of Nodes of same model	3	4
Incremental with Nodes of same model	1	2 (Couplet or Node-Pair)

For more details:

- https://www.emc.com/collateral/TechnicalDocument/docu52911.pdf
- https://community.emc.com/community/products/isilon/blog/2017/05/25/next-gen-nodes

Isilon Gen 6 – Expansion Requirements

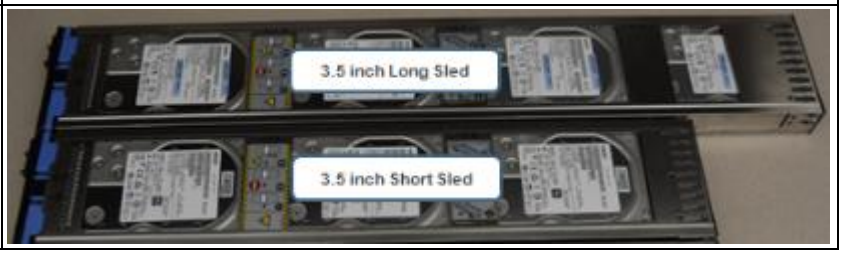
Isilon Gen 5 needed a minimum 3 nodes to build a cluster which can be expanded with a minimum of 1 Node. In Gen 6, a minimum of 4 nodes are needed to build a cluster and at least 2 Nodes for cluster expansion. This is because in Gen 6 resiliency and availability is increased with the introduction of "couplet" or “node-pair” design which pairs 2 identical nodes within each chassis for use as mirrored journaling and as a failover power supply.



Isilon Gen 6 – Drive layout

Isilon Gen 6 hardware uses the concept of a drive SLED that contains the physical drives.

- Each Node supports up to 5 SLEDs
- There are three different SLED types depending on the chassis type.

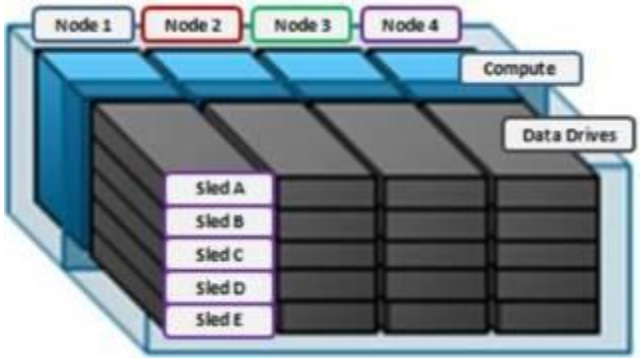
Drive Type	SLED	SLED Drive Placement	SLED Drive Layout
2.5 inch SAS drives	**Short SLED** : Up to 6 Drives F800 - 3 Drives H600 - 6 Drives	Transverse	
3.5 inch SATA drives	**Short SLED** : Up to 3 Drives H500 - 3 Drives H400 - 3 Drives A200 - 3 Drives **Long SLED** : Up to 4 Drives A2000 - 4 Drives	Longitudinal	

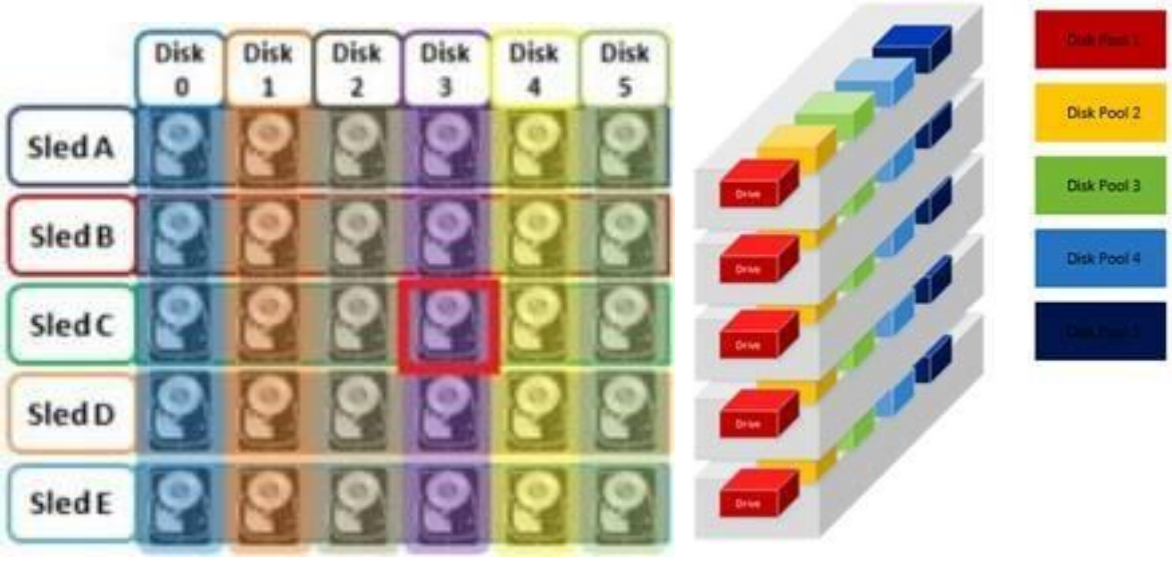
Replacing a drive that fails requires removing the respective drives' SLED and then replacing the drive. Thus, to replace one faulted drive, we are removing more than one drive from a node. So how will data be protected?

Isilon Gen 6 – Cluster and Data Protection

In Gen 6, Cluster and Data Protection is introduced in 3 areas:

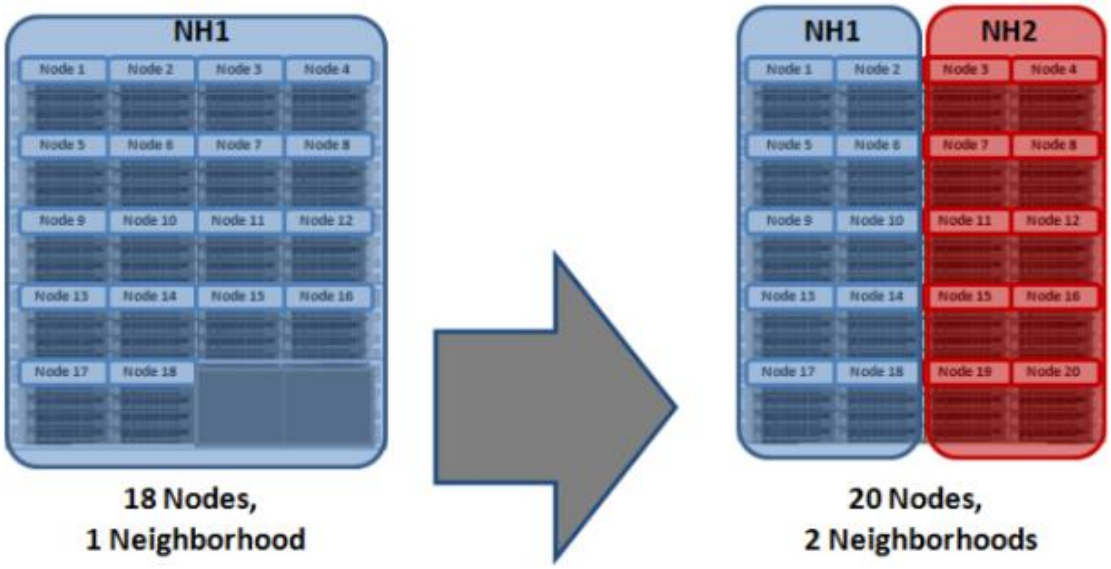
- **SLED protection:** Each drive in SLED is automatically located in a different disk pool. If a SLED is removed, a disk loses only one drive and not all drives in SLED.





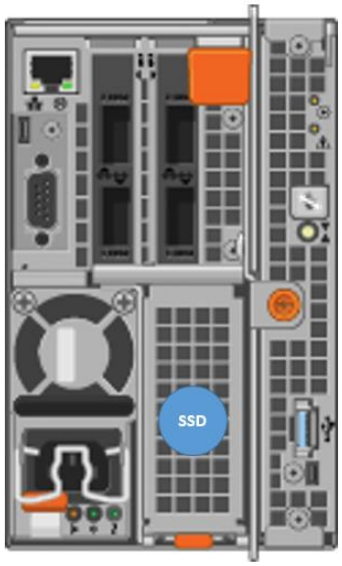
- **Partner Node Protection:** "couplet" or “node-pair” design (explained above)

- **Chassis Protection:** Each of the four nodes within a chassis is placed in a separate neighborhood. Neighborhoods split at 20 nodes.


NH1
Node 1
Node 2
Node 3
Node 4
Node 5
Node 6
Node 7
Node 8
Node 9
Node 10
Node 11
Node 12
Node 13
Node 14
Node 15
Node 16
Node 17
Node 18
18 Nodes,
1 Neighborhood
NH1
NH2
Node 1
Node 2
Node 3
Node 4
Node 5
Node 6
Node 7
Node 8
Node 9
Node 10
Node 11
Node 12
Node 13
Node 14
Node 15
Node 16
Node 17
Node 18
Node 19
Node 20
20 Nodes,
2 Neighborhoods

Isilon Gen 6 – SSD Cache

- SSD Drives for Cache are not part of SLEDs. A separate slot is provided in each node for SSD Cache, with up to 2 x SSD Cache Drives per node.
- The cache SSD is found in the back panel of a node and can be replaced/upgraded without removing the node from the chassis. One or two cache SSDs are installed depending on your node configuration.



Isilon Gen 6 – Available Configurations in all models

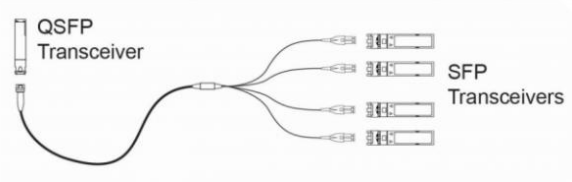
Model	Compute (Per Node)	Front-End I/O Options (Per Node)	Back-End I/O Options (Per Node)	SSD Cache Supported (Per Node)	Chassis HDD Capacity Options	HDD Supported (Per Node)	HDD Capacities (Per Node)	HDD Capacities (Per Chassis)
Isilon F800	Ultra	1 x 1 Gb Ethernet	2 x QSFP Infiniband	NONE	Fully Populated		15 Drives	60 Drives
	CPU : 16 Core 2.6Ghz BDW-EP	2 x 40Gb Ethernet	2 x QSFP 40Gb Ethernet		(5 SLEDs x 3 - 2.5" inch Drives)	1.6TB SAS SSD	24 TB	96 TB
	Memory : 256GB DDR4	1 x 1 Gb Ethernet				3.2TB SAS SSD	48 TB	192 TB
		2 x 10Gb Ethernet				15.4TB SAS SSD	231 TB	924 TB
Isilon H600	Turbo	1 x 1 Gb Ethernet	2 x QSFP Infiniband	1 or 2 Drives	Fully Populated		30 Drives	120 Drives
	CPU : 14 Core 2.2Ghz BDW-EP	2 x 40Gb Ethernet	2 x QSFP 40Gb Ethernet	1.6TB SSD	(5 SLEDs x 6 - 2.5" inch Drives)	600GB SAS	18 TB	72 TB
	Memory : 256GB DDR4	1 x 1 Gb Ethernet		3.2TB SSD		1.2TB SAS	36 TB	144 TB
		2 x 10Gb Ethernet						
Isilon H500	High	1 x 1 Gb Ethernet	2 x QSFP Infiniband	1 or 2 Drives	Fully Populated		15 Drives	60 Drives
	CPU : 10 Core 2.2Ghz BDW-EP	2 x 40Gb Ethernet	2 x QSFP 40Gb Ethernet	1.6TB SSD	(5 SLEDs x 3 - 3.5" inch Drives)	2TB SATA	30 TB	120 TB
	Memory : 128GB DDR4	1 x 1 Gb Ethernet		3.2TB SSD		4TB SATA	60 TB	240 TB
		2 x 10Gb Ethernet				8TB SATA	120 TB	480 TB
Isilon H400	Medium	1 x 1 Gb Ethernet	2 x QSFP Infiniband	1 or 2 Drives	Fully Populated		15 Drives	60 Drives
	CPU : 4 Core 2.2Ghz BDX-DE	2 x 10Gb Ethernet	2 x QSFP 10Gb Ethernet	800GB SSD	(5 SLEDs x 3 - 3.5" inch Drives)	2TB SATA	30 TB	120 TB
	Memory : 64GB			1.6TB SSD		4TB SATA	60 TB	240 TB
				3.2TB SSD		8TB SATA	120 TB	480 TB
					Partially Populated		6 Drives	24 Drives
					(2 SLEDs x 3 - 3.5" inch Drives)	2TB SATA	12 TB	48 TB
Isilon A200	Low	1 x 1 Gb Ethernet	2 x QSFP Infiniband	1 or 2 Drives	Fully Populated		15 Drives	60 Drives
	CPU : 2 Core 2.2Ghz BDX-DE	2 x 10Gb Ethernet	2 x QSFP 10Gb Ethernet	400GB SSD	(5 SLEDs x 3 - 3.5" inch Drives)	2TB SATA	30 TB	120 TB
	Memory : 16GB					4TB SATA	60 TB	240 TB
						8TB SATA	120 TB	480 TB
					Partially Populated		6 Drives	24 Drives
					(2 SLEDs x 3 - 3.5" inch Drives)	2TB SATA	12 TB	48 TB
Isilon	Low	1 x 1 Gb Ethernet	2 x QSFP Infiniband	1 or 2 Drives	Fully Populated		20 Drives	80 Drives
	CPU : 2 Core 2.2Ghz BDX-DE	2 x 10Gb Ethernet	2 x QSFP 10Gb Ethernet	400GB SSD	(5 SLEDs x 4 - 3.5" inch Drives)	10TB SATA	200 TB	800 TB
	Memory : 16GB							

Note:

- 1 x 1Gb Ethernet interface is recommended for management use only, but can be used for data.
- Unlike Gen 4/Gen 5, only one Memory (RAM) option is available for each model
- Backend Ethernet Connectivity:
  - F800, H600 & H500 support 40Gb Ethernet
  - H400, A200 & A2000 support 10Gb Ethernet

Isilon Gen 6 – How to build a cluster with different types of backend Ethernet ports

Using break-out cables

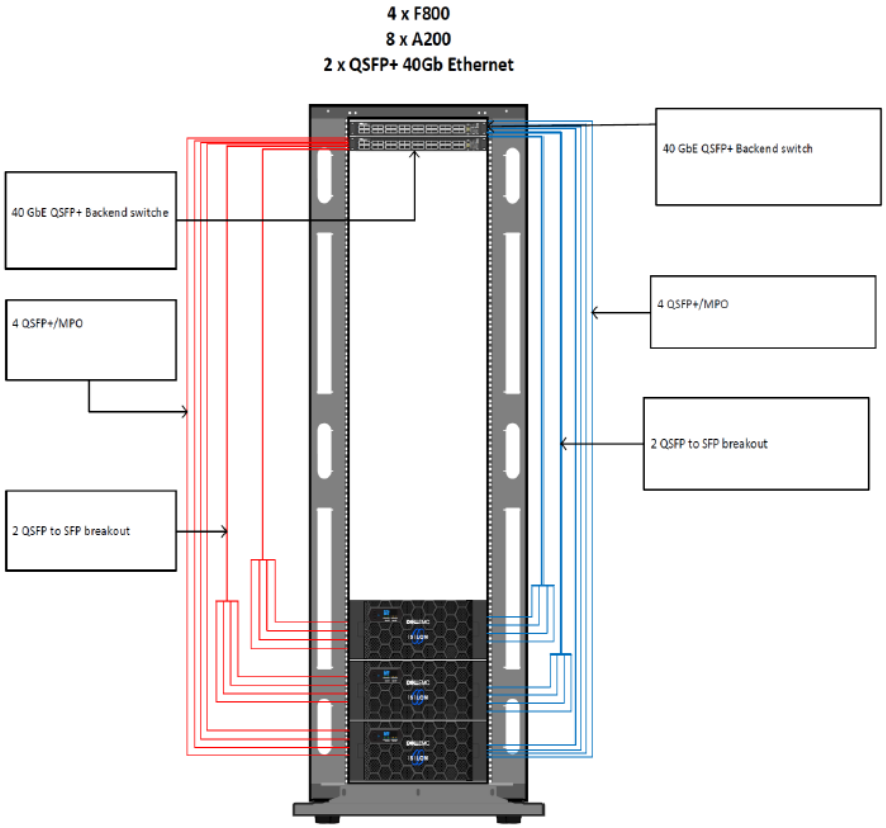


Breakout cables are introduced to enable combining F800, H600 & H500 and H400, A200 & A2000 in the same cluster [1 x 40G à 4x10G ports]. Breakout cable is a type of optical fiber cable that contains several fibers, each with their own jacket, and then encased by a single common jacket. Breakout cables are often referred to as "fanout-style" cables.

- Breakout cables for Back-End network is supported for H400, A200 & A2000
- Breakout cables for Front-End is not supported for any Gen 6 node model
- Only Celestica D4040 Ethernet backend switch supports Breakout cable
- Celestica D4040 (Smallstone) Ethernet switch has 32 QSFP ports numbered 1-32.

  Breakout cables can only use 24 switch ports. (To connect 4 x 24 = 96 Nodes at 10G). Ports numbers 1 - 12 and 17 - 28.

  This is a Celestica design limitation. Celestica D4040 has a Trident2 chip which can only handle 52 logical ports per pipeline. The X pipeline covers QSFP ports 1 through 16 and the Y pipeline covers QSFP ports 17 through 32. Thirty-two ports are configurable as 40G or split into 4x10G ports. The maximum number of 40G ports that can be un-ganged per pipeline is 12. The 12 40G ports become 48 un-ganged 10G ports, plus the remaining 4 40G ports totals 52 logical ports for that pipeline.



Isilon Gen 5 vs Gen 6 – How to compare

DO NOT COMPARE. Both are different designs.

There are many design differences between Gen 5 and Gen 6, i.e. Mirror Journal, Power Zones, Neighborhoods, etc. There is no direct correlation between the models of Gen 5 nodes and Gen 6 nodes. While vague equivalences can be drawn, this is dangerous because it risks specifying the incorrect configuration for a desired workload.

However, if you run into a situation where you need to give an answer:

Never compare Gen 5 vs Gen 6 per Node basis. All comparisons should be done per Chassis basis.

Metric	Gen 5 (“*sorta-kinda*”)	Gen 6	Gen 6 configs
High Perf, low latency		Extreme Performance	F800
$/IOP	S210	Performance	H600
$/MB/s	X410	Balanced	H500 H400
$/TB	NL410 HD400	Archive	A200 A2000
$$	X210	Entry	N/A