A Solution for Adding NVM-express storage to generic computers

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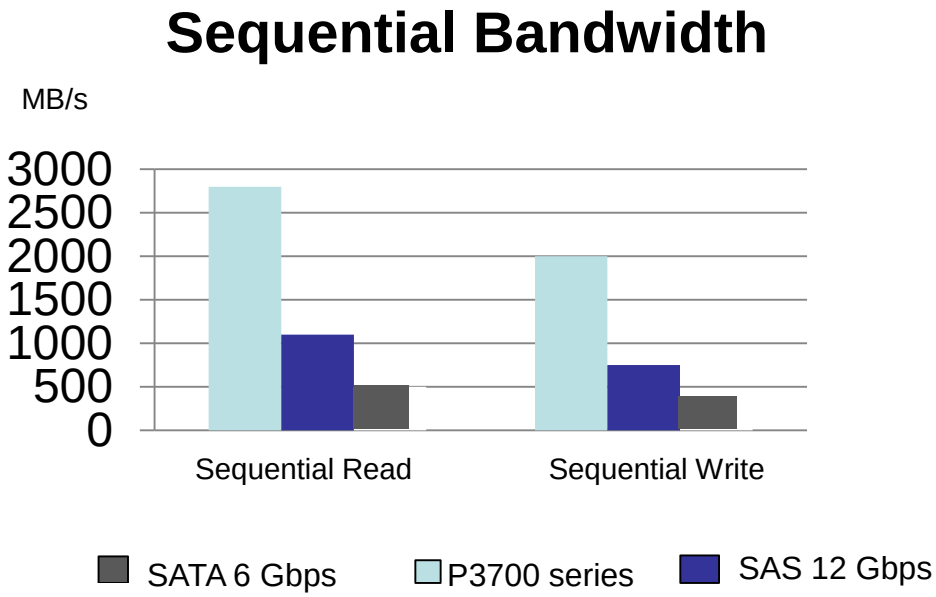
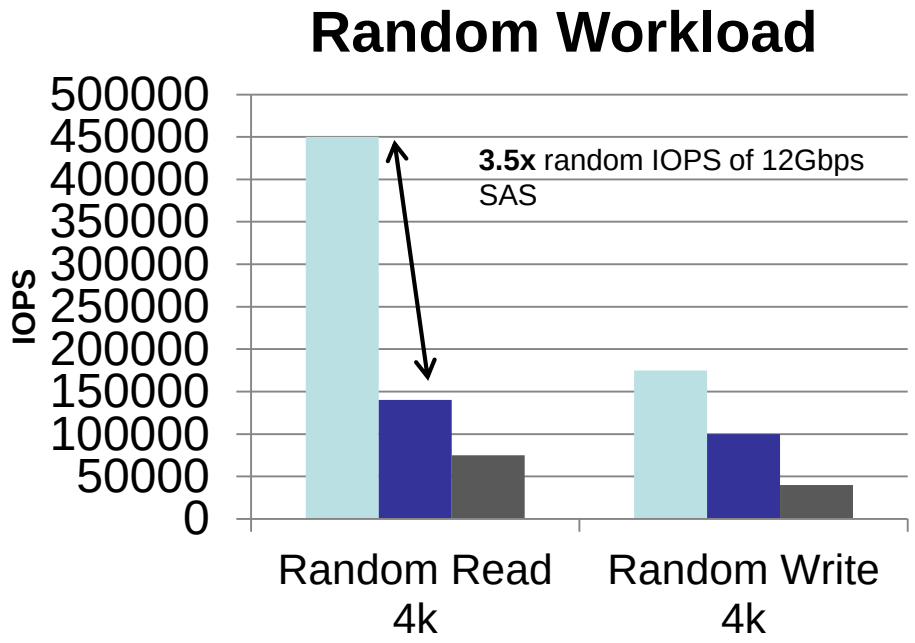
Why NVM-express for any computer/server?

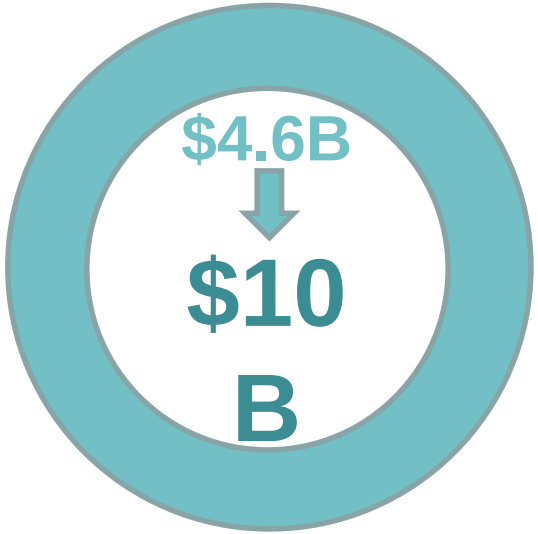
Single Drive: Up to 6x the Performance of SATA* SSDs at Half the Latency and CPU utilization





Market Overview

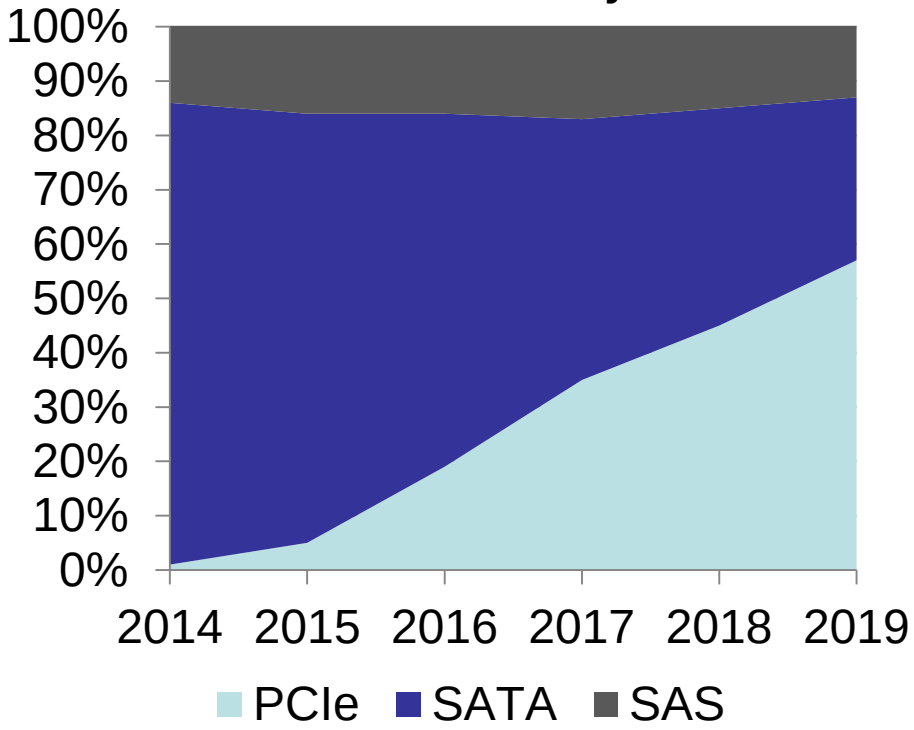
Massive data growth is driving SSDs into the data center with NVMe as the interface of choice



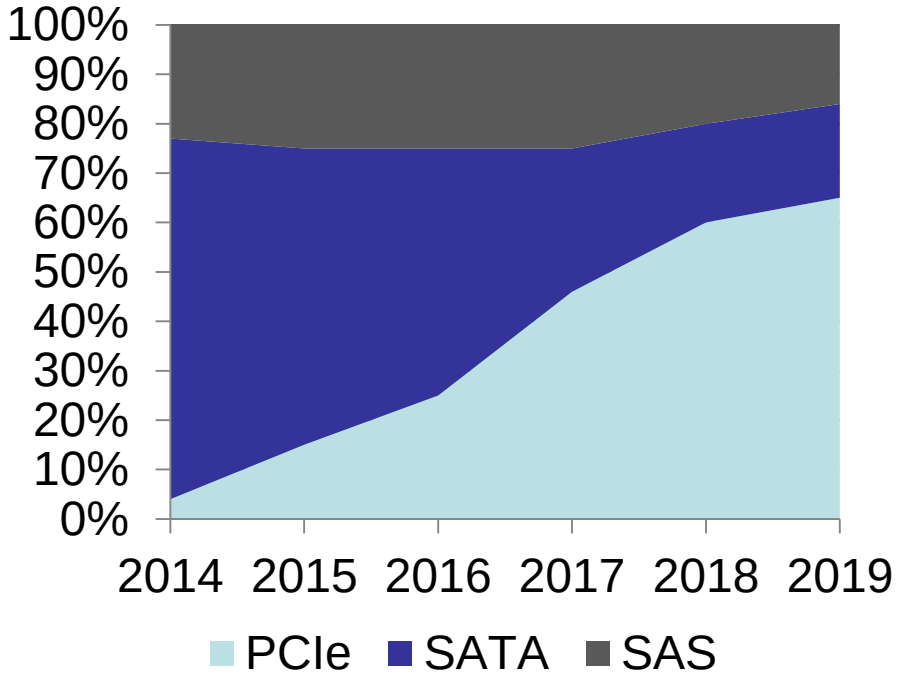
Data Center SSD Market
Will be approaching $10B
In 2018, was $4.6B in 2014

NVMe by 2017
Half the data center SSD market is NVMe by 2017

Data Center SSD Units by Interface



Data Center SSD total GB by Interface



Current Market NVM-e Requirements

- Scalable Direct Attached storage expansion solution that supports NVMe
- Half height interface cards to fit in any server
- Support 2.5” drive form factor
- 1U better than 2U
- Support hot swap of drives
- Generic to all drive vendors (Intel, HGST, Sandisk, Toshiba etc.)
- Market ready in 2016

Minimum Market Requirements for 1U NVM-e Storage Appliance

8 Drives
Up To 26TB Capacity

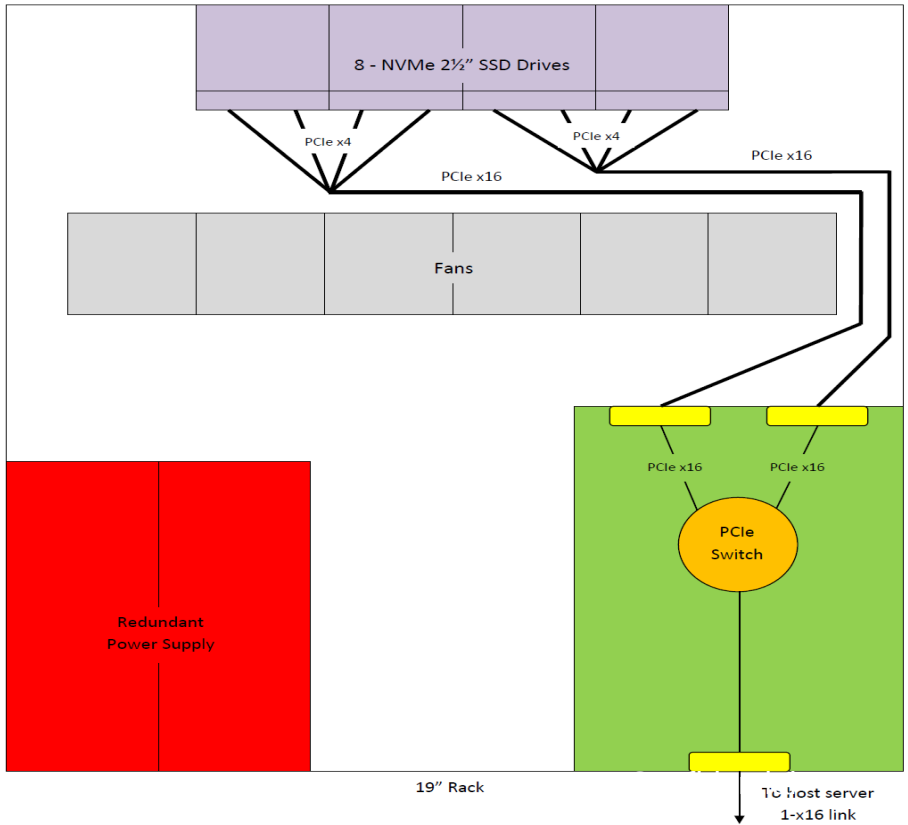
X16 lane connection to generic host

Up to 12+GB/s bandwidth (12 times BW of high end SAS)

650 W Redundant Power Supplies

Scalability for large data center configurations

Remote monitoring capability



Basic Architectural Structure 1U NVM-e Storage Device

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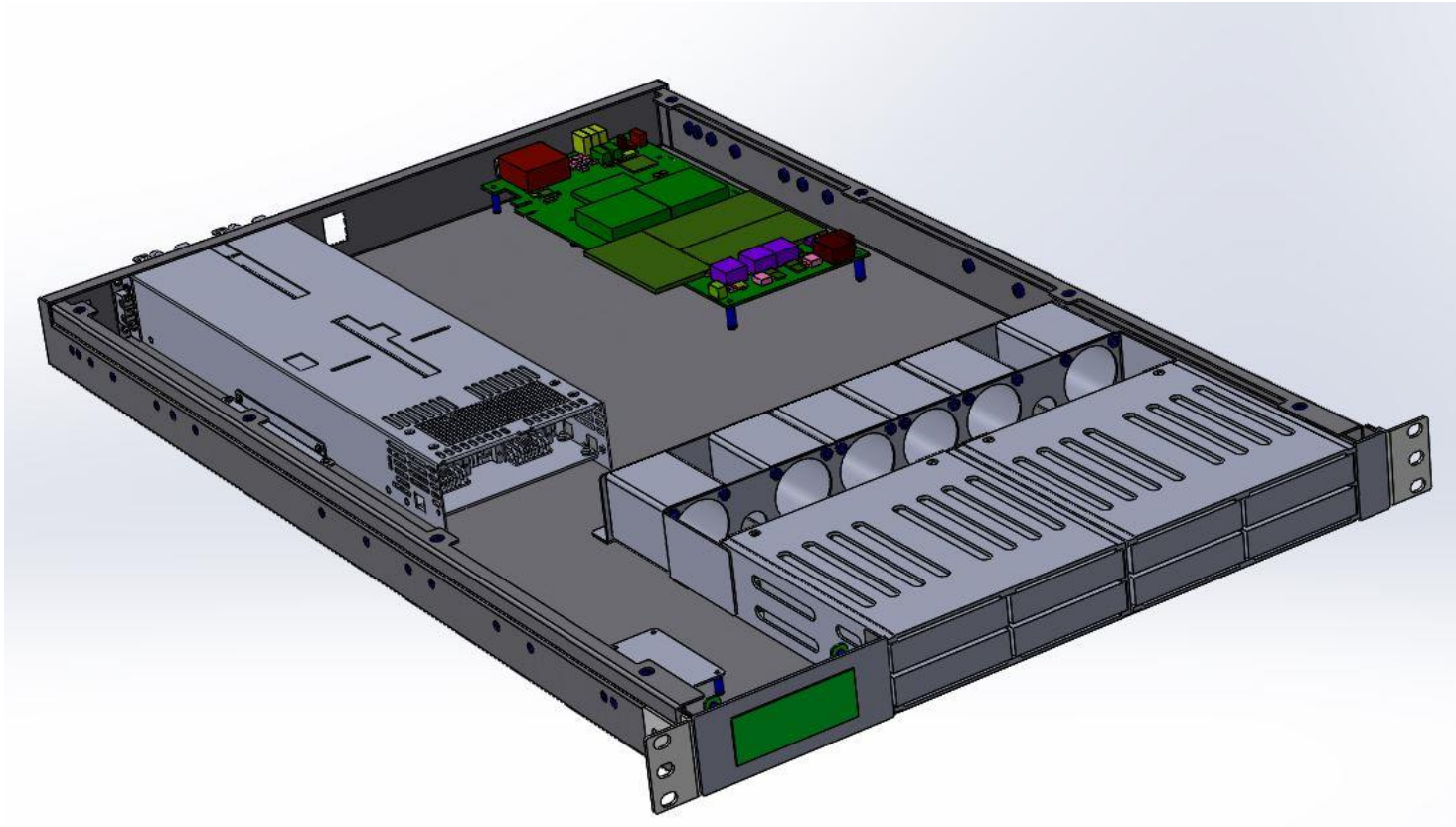
Proposed Hardware Configuration



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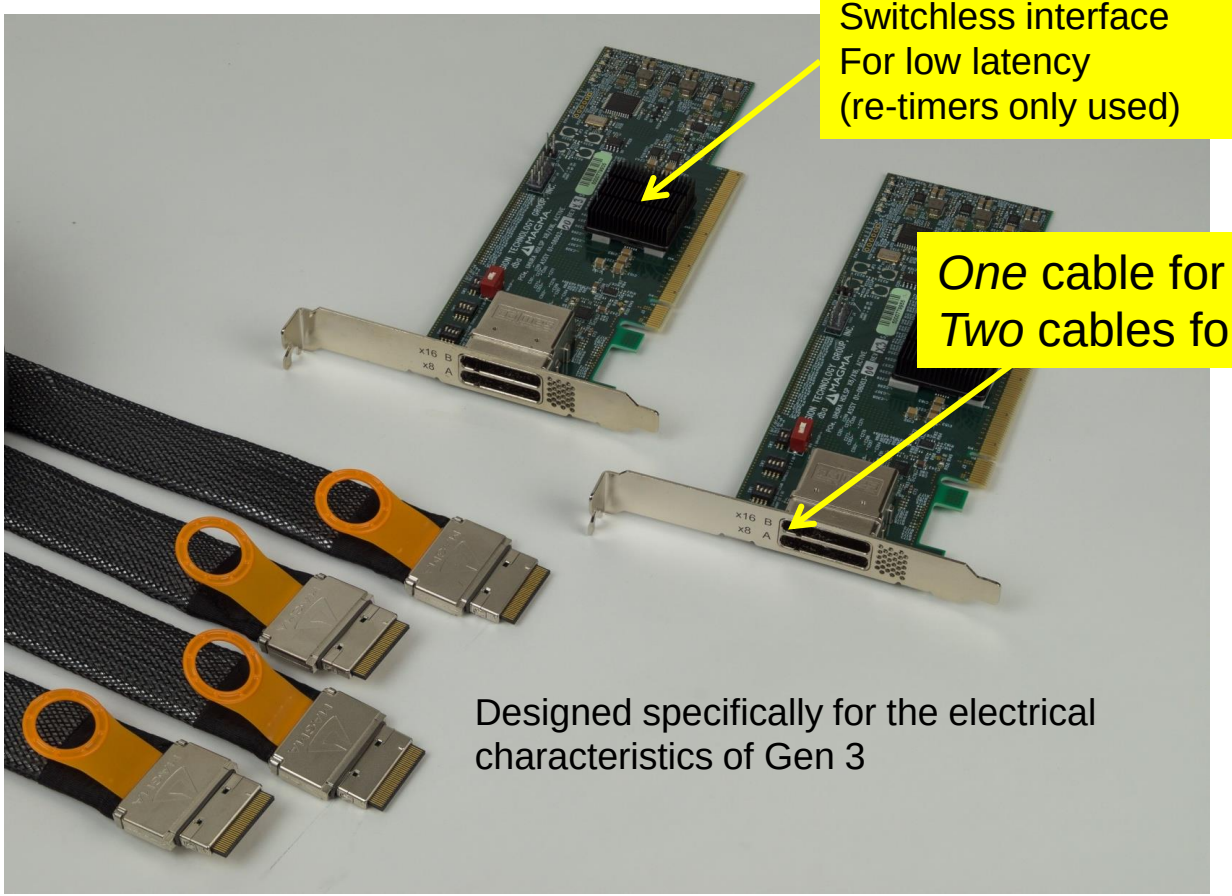
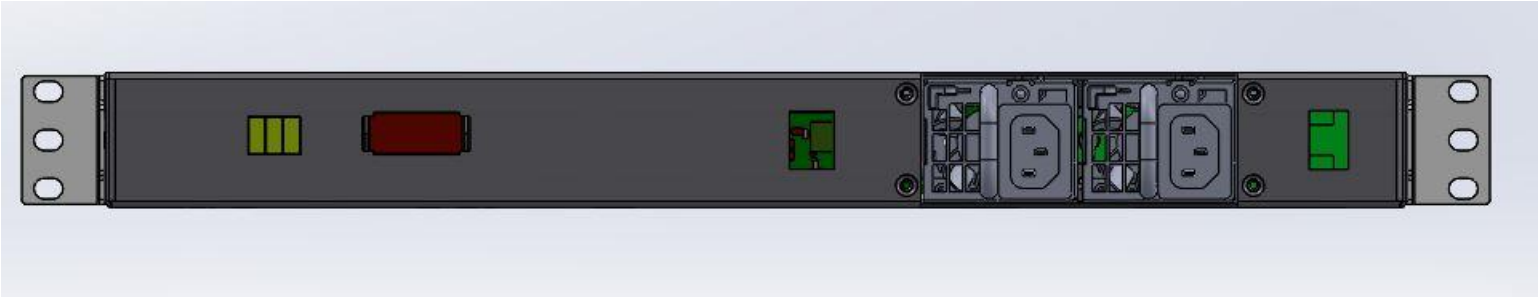
Plan for x16 Gen3 Link

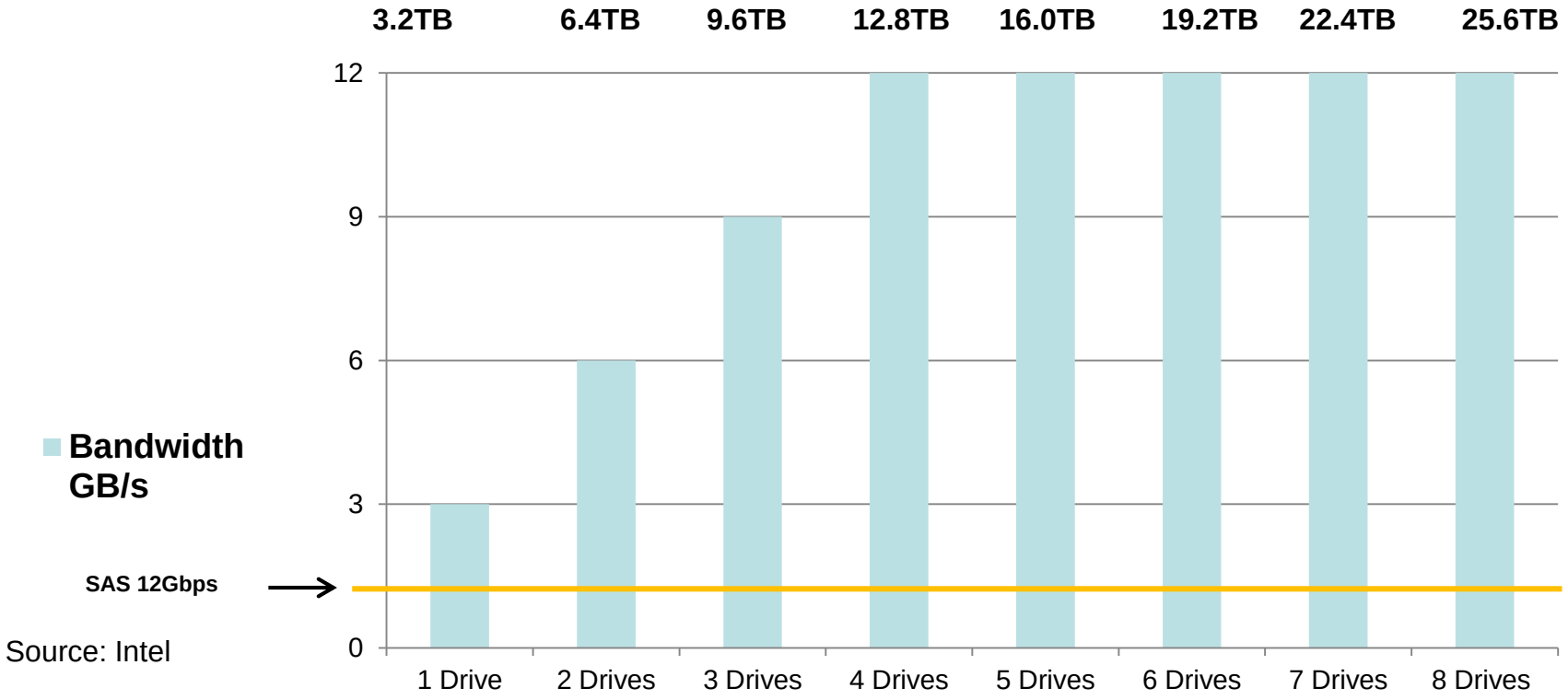


Proposed Product Design

- Eight 2.5” drive capacity = ~25 Tbytes
- LCD Display – operating parameters/temps
- 1U
- Dual/redundant power supplies



Anticipated Sequential Read Performance vs. SAS



Source: Intel

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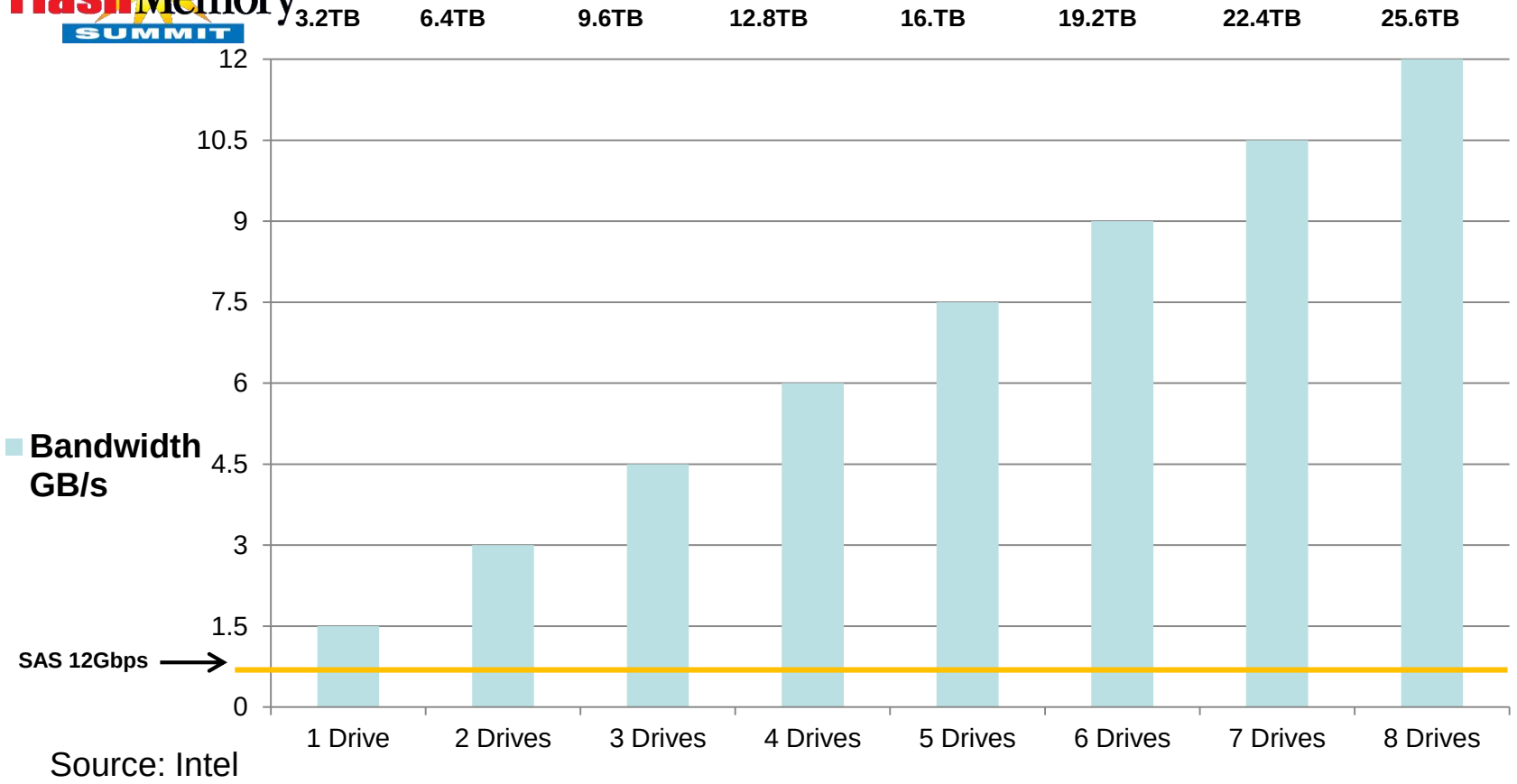
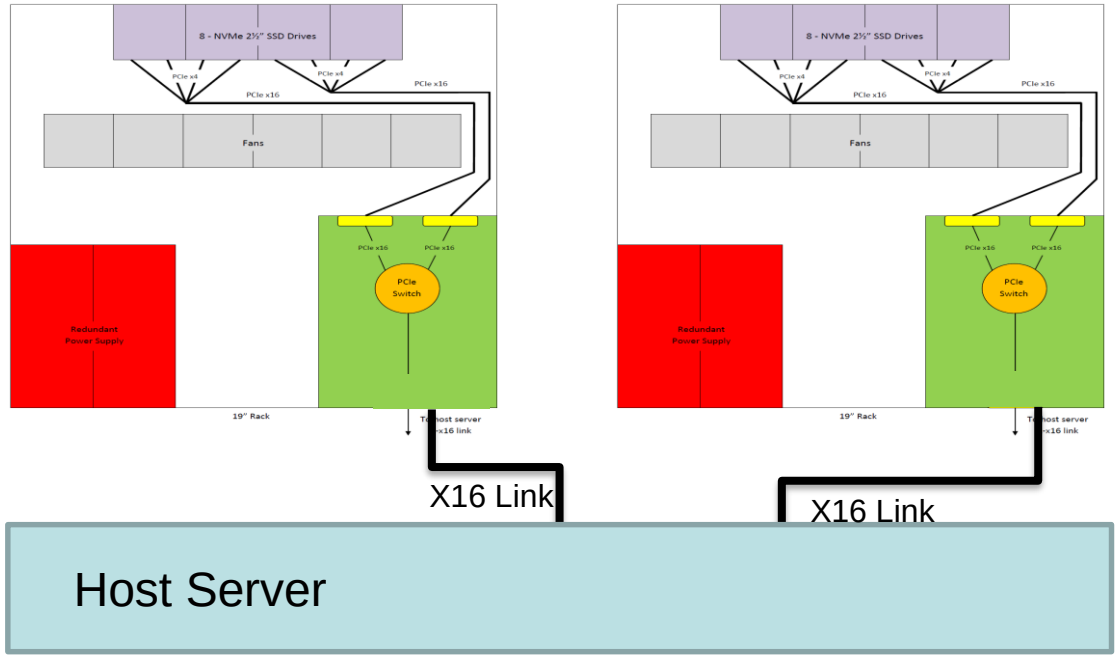


Source: Intel

Scalability with one Server



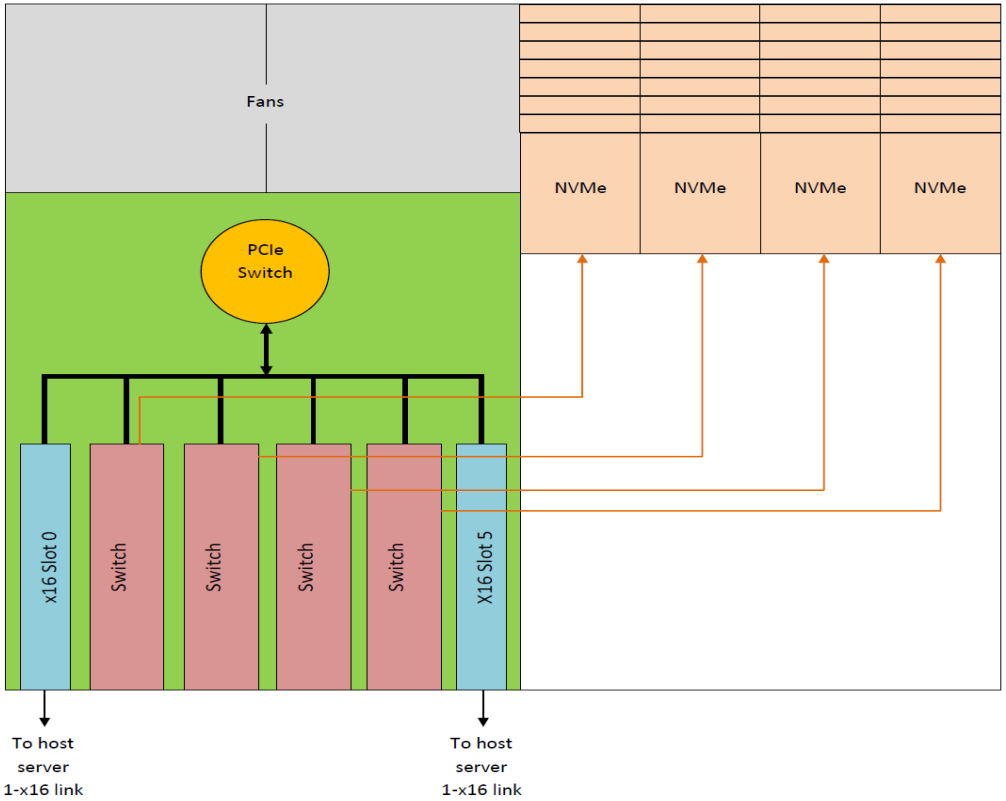
16 Drives
Up To 50TB Capacity

X32 lane connection to host

Up to 25+GB/s bandwidth

3U system configuration

Scalability using expansion chassis



Design Criteria:

Leverage existing expansion design to scale to higher capacity in single enclosure

Up to 32 Drives
Up To 100TB Capacity

X32 lane connection to host

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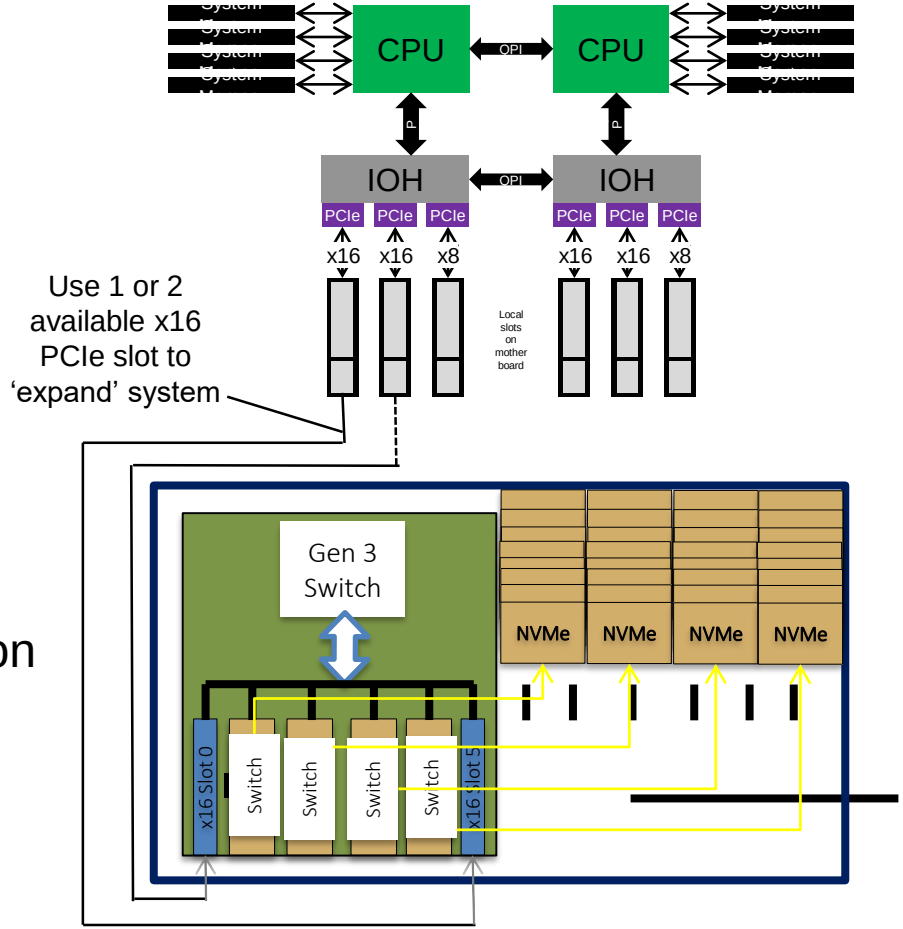

Gen3 Expansion Chassis

Greater density capability

- Support up to 32 NVM-e 2.5" SSD drives in 4U rack
- Greater than 100TB capacity
- Up to 32 PCI-e Gen3 lane connection to host server
- 24 GB bandwidth
- 6 Million IOPs

Attaching to 1 CPU avoids QPI


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