Session 202-B: Choosing the Best Interface for Your Application

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Session Overview

Multiple choices for SSD interfaces

- SAS – 6Gb/s, 12Gb/s and 24Gb/s (future)
- SATA – 6Gb/s
- PCIe – NVMe, AHCI, SFF-8639, SATA Express, many form factors

Which is the best fit for your application?

When / how things transition?

Choosing the Best Interface for Your Application

Panelists:

- Jeff Janukowicz, Research Director, IDC
- Don Jeanette, VP, TrendFocus
- Matt Bryson, VP Research, ABR
- Dennis Martin, President, Demartek

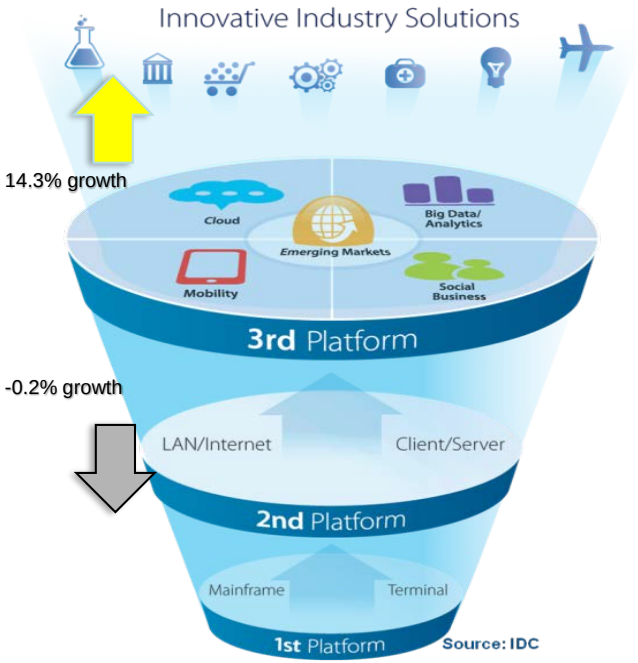
SCSI Trade Association

The Changing Role of Storage in the Data Center

Jeff Janukowicz

Research Director - IDC

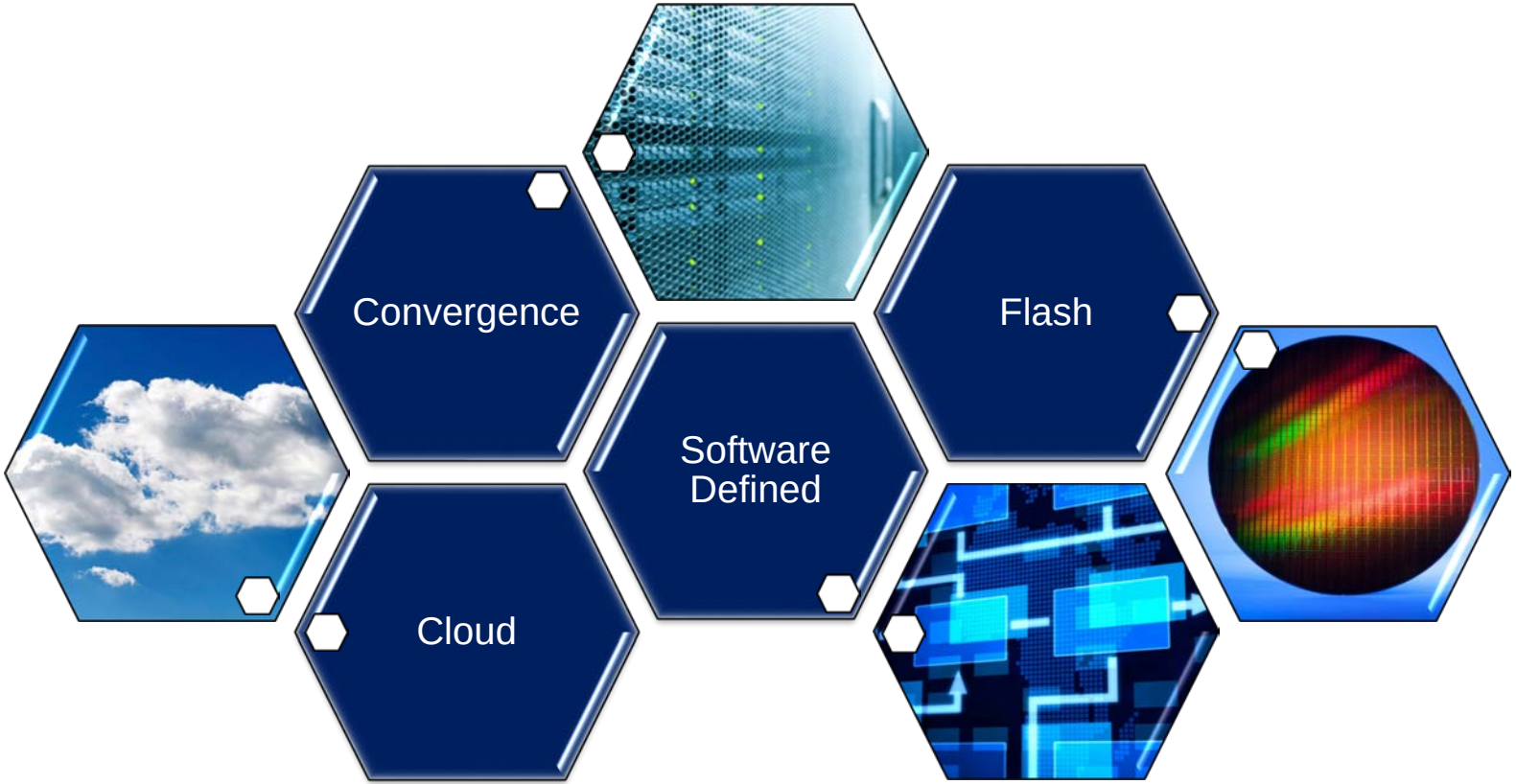
The Third Platform Changes Everything



- Cloud, big data/analytics, mobility, social media collectively define the 3rd computing platform
- They are disrupting the legacy (2nd) platform industry in a big way
- New workloads introducing significantly different I/O profiles and throughput requirements
- Virtualization drives the I/O blender effect
- Data growth on a massive scale
- Traditional storage does not meet performance or agility requirements cost-effectively
- Driving the need for new storage technologies and architectures

Innovation in the 3rd Platform

Key Enterprise Data Storage Technologies



Closing Thoughts …

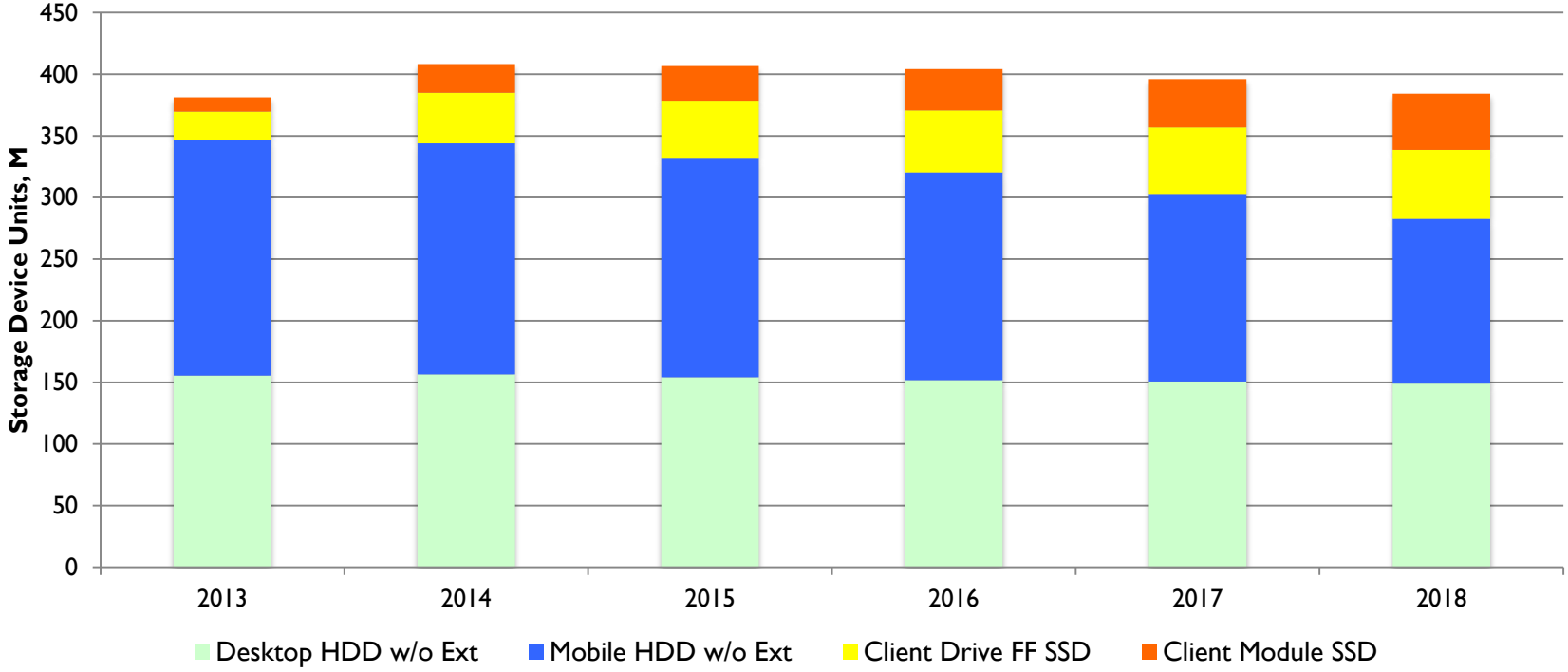
- Data Center Infrastructure is Changing
  - 2nd platform infrastructure continues and will be made better
  - New applications / workloads are driving different requirements
  - New storage technologies and architectures will gain traction
  - Technologies: Flash (SSDs), Performance-optimized HDDs, and/or Capacity-optimized HDDs
  - Interfaces: sATA, SAS, PCIe, and Memory Bus will all coexist
    - Performance (IOPs, bandwidth, latency, consistency, power)
    - Cost ($, $/GB, $/IOPs)
  - Ecosystem influence design choices
    - Server-attached vs Network-attached, Standards, Driver support, etc.

SAS, SATA, PCIe

Where is the Volume & Why?

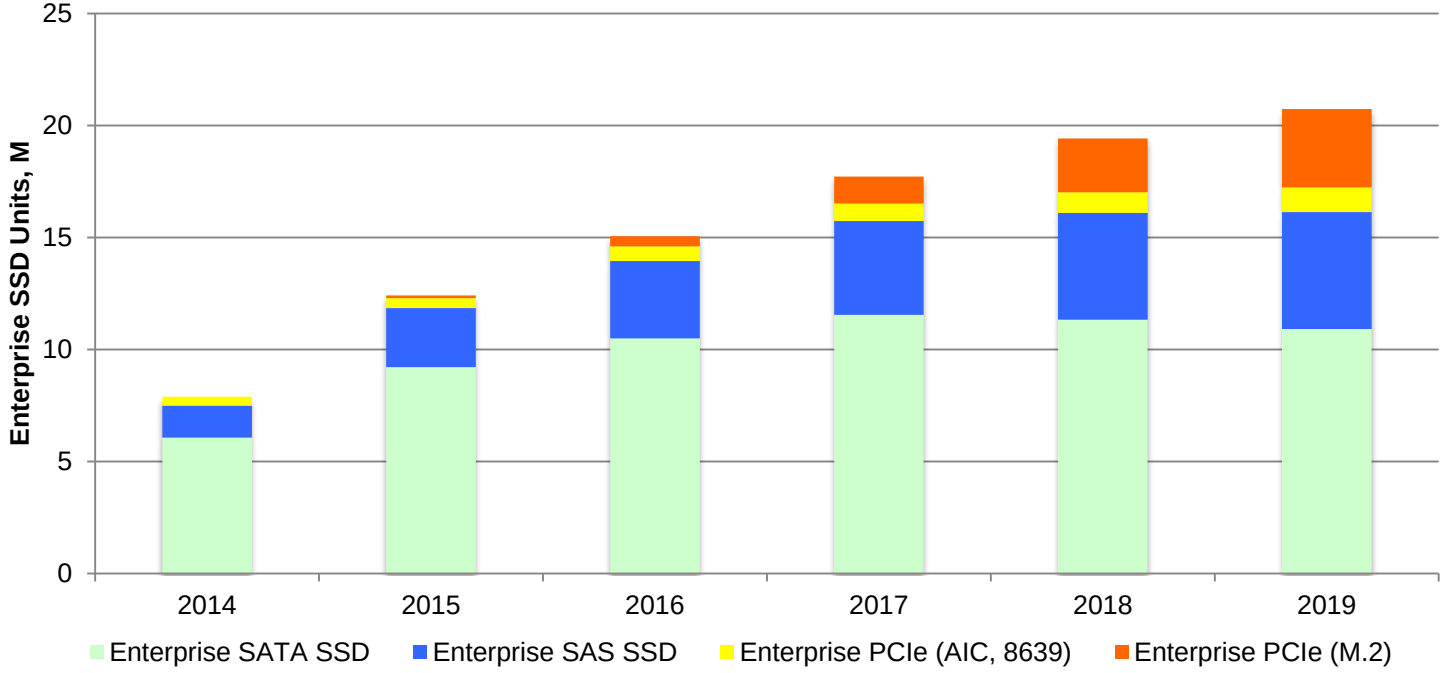
Don Jeanette
TRENDFOCUS

PC Storage Forecast: SSD & HDD



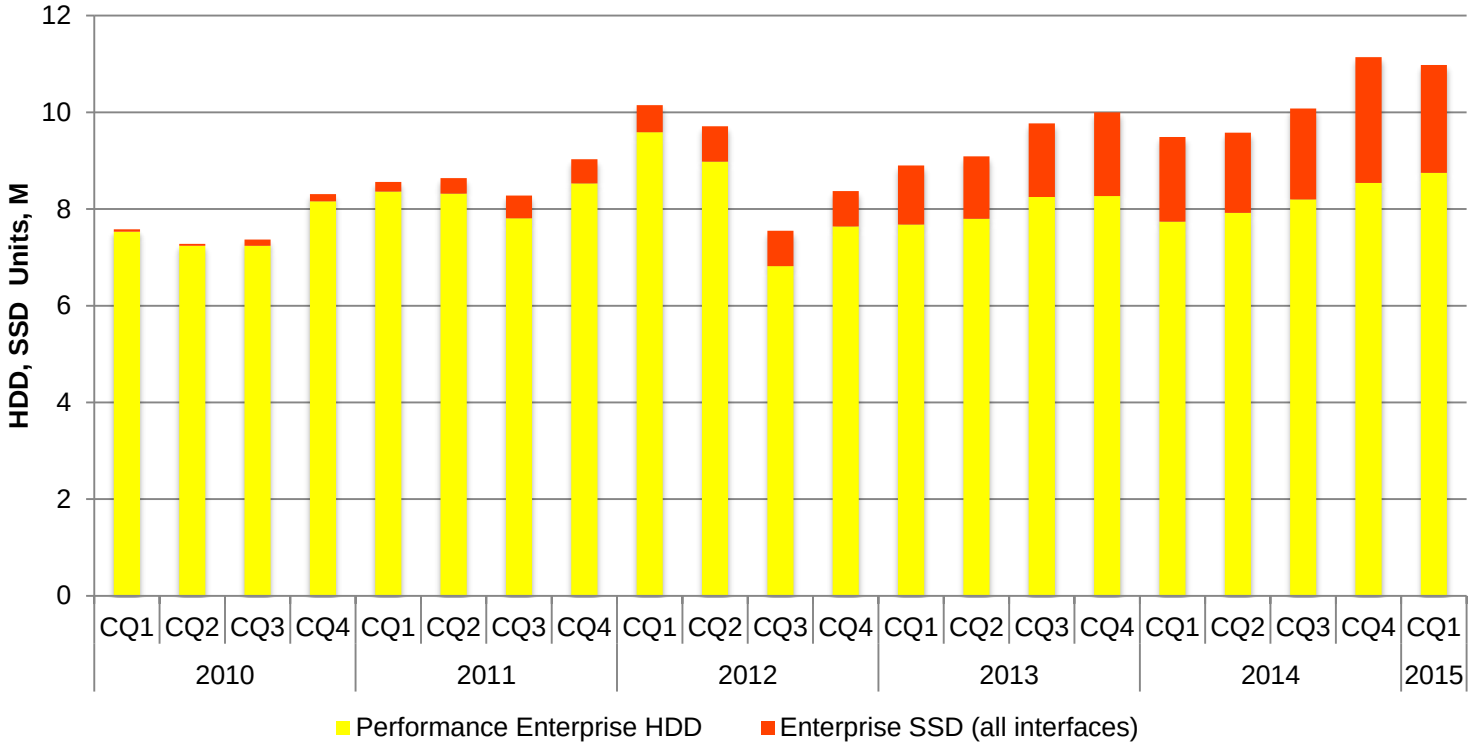
*Different PC sub segments have very different requirements
*What drives volumes in one segment may be an inhibitor in another

Enterprise SSD Units



*What market segment you are targeting? What is the use case?
*For one interface to replace another - Consider incumbent technologies, continuity of supply, competitors' priorities, qual cycles, price points, etc…
* "It's not broke, don't fix it;" "It's good enough."

Enterprise – SSD v. Perf. HDD



*Vast majority of Perf HDD is SAS
*SAS SSDs continue to show healthy growth

Interface Stickiness

A History of Slow Transitions and Roadmap Uncertainty Support the Status Quo

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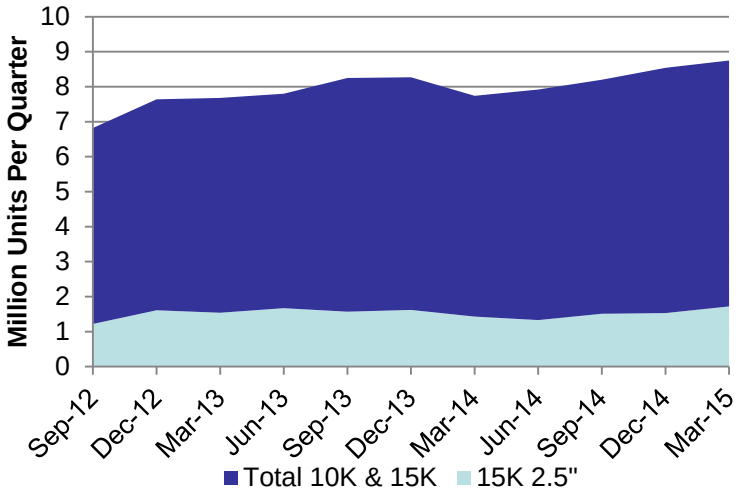
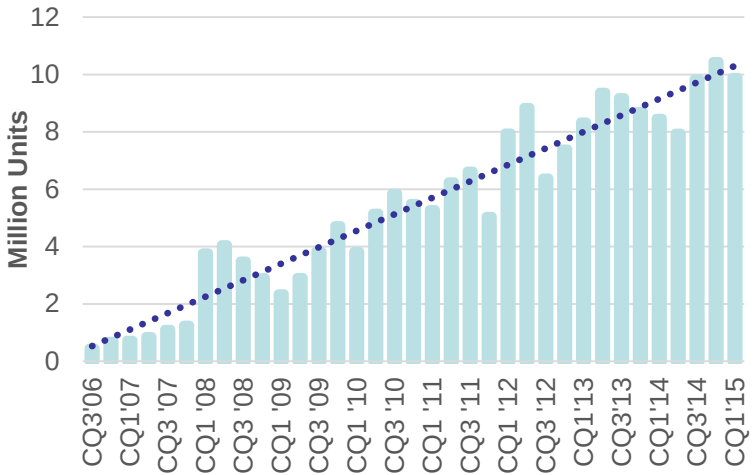
HDDs Ensure Long SAS/SATA Tail

Steady SAS HDD Volumes



High Cap SATA/SAS Growth



Because there is no good alternative to high capacity drives for cheap readily accessible storage, SATA/SAS will remain a significant portion of the information ecosystem.

Sources: ABR Estimates and TrendFocus Data

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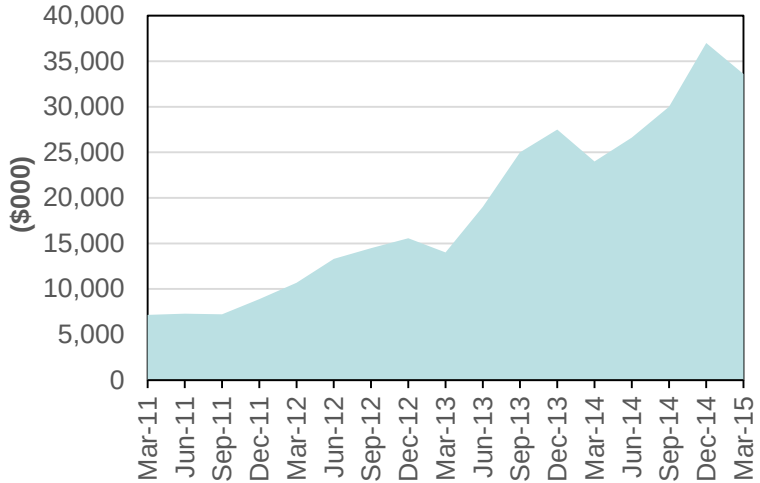
Today's Landscape

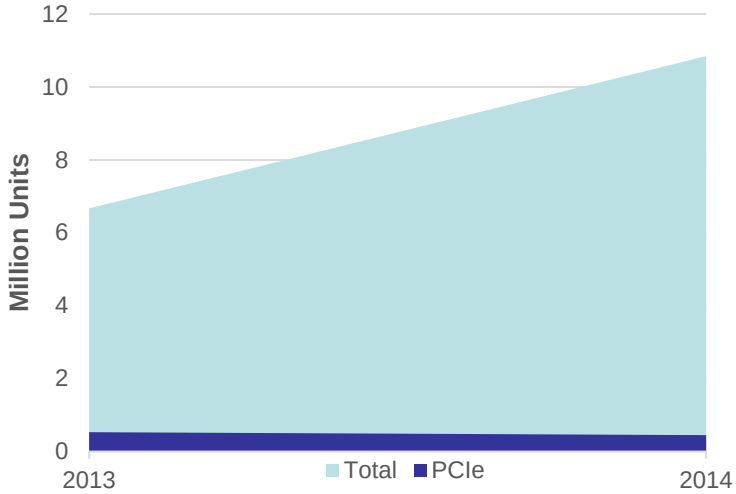
- SAS and SATA Connectivity Still Dominate
- Scale-out Has Gravitated Towards InfiniBand
  - EMC XtremIO, Isilon, VMAX; IBM XIV; etc.
- Devices are Still Primarily SAS and SATA
  - PCIe based Solutions haven't scaled (Violin & Fusion)
  - Next Gen PCIe architectures not GA

Interconnect Change is Slow

Mellanox InfiniBand Storage & Database Related Sales



Annual Enterprise SSD Shipments



Sources: ABR Estimates and Gartner Data

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Difficulties With Prognostication

New Technologies Confuse Roadmaps

- Server Attached
  - PCIe SSDs or Next Generation Memory?
- Ethernet Drives?
  - No traction yet.
- Omni-Path?
  - Can Intel dominate beyond the CPU (GPU, FPGA, transport?

Choosing the Best Interface for Your Application

Dennis Martin, President, Demartek

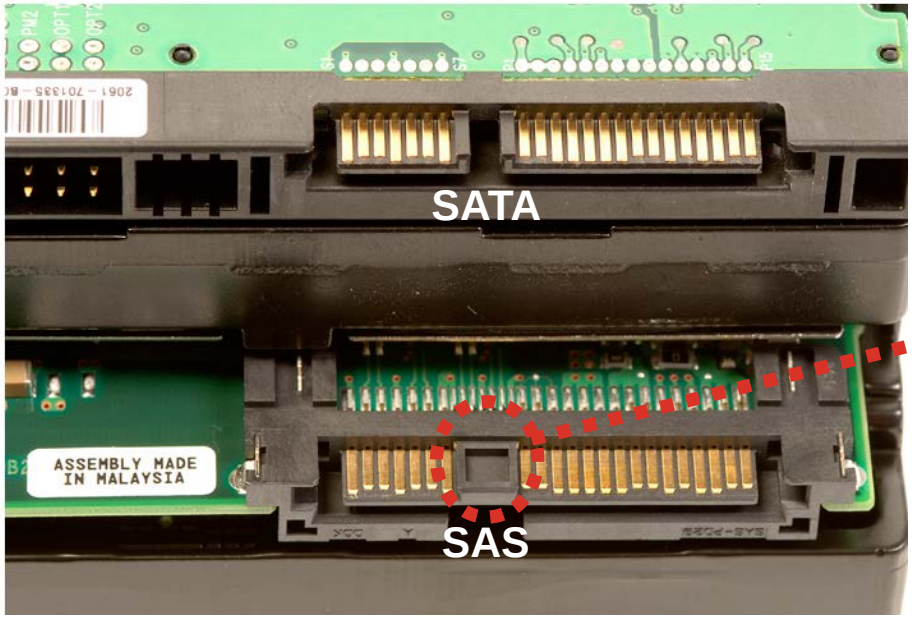
SATA

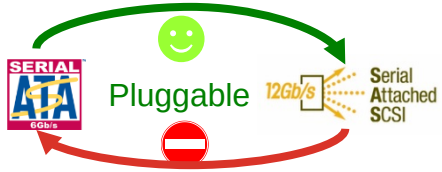
- Device (drive) types
  - Common for client (consumer) SSDs & HDDs
  - Sometimes used for enterprise SSDs & HDDs
- Mostly for inside the case connections
  - eSATA allows for short external distances
- SATA is point-to-point, single device per cable or connector
- Traditional SATA has no roadmap beyond 6 Gbps
  - Some new enterprise features planned
  - Unclear if SATA Express will gain acceptance in the market

SAS

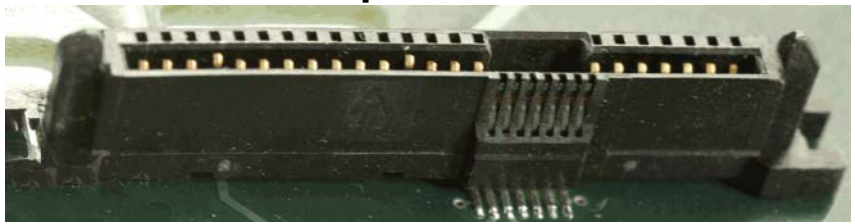
- Device (drive) types
  - Usually used for enterprise SSDs & HDDs
  - Supports single, dual and wide-port devices
- Internal and external enterprise-class storage
  - Internal devices, JBODs and SAN-attached arrays
  - SCSI command protocol used in FC, FCoE, iSCSI and SAS
  - SAS frequently used to connect drive shelves to each other
  - Supports up to 16K devices on single “fabric”
- Many years of history and compatibility
  - Well-developed chipsets, HBAs, RAID controllers, etc.
  - Roadmap for 24 Gbps, probably concurrent with PCIe 4.0

SAS / SATA Compatibility





SAS Backplane Connector



Accommodates both SAS & SATA Drives

NVMe

- Scalable host controller interface designed for enterprise and client systems that use PCI Express SSDs
  - Designed with Flash memory and technologies coming after Flash memory in mind (non-volatile memory)
  - Much faster (lower latency) software stack than existing storage stacks such as SAS and SATA
- In-box drivers for Windows and Linux now
- Faster individual devices than other interfaces
  - PCIe card and drive form factor (SFF-8639 → U.2)
  - Not as well-established, but ramping up quickly

Real-World Performance

- View my presentation notes from yesterday's session 104-C: "How Flash-Based Storage Performs on Real Applications"
  - www.demartek.com/FlashMem

Applications

- SATA is great for client (consumer) uses
  - Lowest cost
- SAS is great for addressing a large number of devices with a single interface
- NVMe is great for raw speed and very low latency

Storage Interface Comparison

- View the Demartek Storage Interface Comparison reference page
  - Search for "**Storage Interface Comparison**" in your favorite search engine