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

Cameron T Brett
Toshiba America Electronic Components, Inc.
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
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

- Convergence
- Cloud
- Software Defined
- Flash
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
*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

Matt Bryson – mbryson@abr-is.com
ABR Investment Strategy, LLC is an investment adviser providing research to institutional investors. The material herein is based on data from third-party sources ABR Investment Strategy, LLC considered to be reliable, but it is not guaranteed as to accuracy or completeness. This report is neither intended nor should it be considered as an offer or the solicitation of an offer to sell or buy any security. Any opinions expressed reflect ABR Investment Strategy, LLC’s opinion as of the report date and are subject to change without notice. ABR Investment Strategy, LLC, its affiliates, directors, officers and associates shall have no liability for investment decisions based upon, or the results obtained from, the information provided herein. Past performance of securities or other financial instruments is not indicative of future performance.

ABR Investment Strategy, LLC, its affiliates, and/or its individual partners, officers and/or members of their families may have a position in the subject securities which may be consistent with or contrary to the recommendations contained herein, and may make purchases and/or sales of those securities in the open market or otherwise. Changes in the securities discussed in the attached report are subject to market conditions, including price volatility and share liquidity.

The views expressed in this research report accurately reflect the personal views of the analysts as to the subject securities and issuers; and no part of the analyst compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this report. The various research content provided does not take into account the unique investment objectives, financial situation or particular needs of any specific individual investor.

If you have any questions, please contact ABR Investment Strategy, LLC.
HDDs Ensure Long SAS/SATA Tail

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
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
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
- **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

Port B

SAS Backplane Connector

Accommodates both SAS & SATA Drives
- 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