Empowering the Gen-4 Storage Transition

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Microsemi (a Microchip Company)
Agenda

Who are we?

Market Trends

Innovation
Who is Microchip?

**Microchip Technology Inc.**

- Headquartered in Chandler, Arizona
- ~19,000 Employees
- ~$6B Annual Revenue
- Market Verticals:
  - Data Center
  - Automotive
  - Industrial / Medical
  - Aerospace & Defense
  - Communications
  - Consumer
Data Center Solutions Division Heritage

2002
- adaptec by PMC
- SmartRaid
- Flash Controller

2016
- Microsemi

2018
- Microchip
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<th>Infrastructure</th>
<th>Storage</th>
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<td>Switchtec PCIe Switches</td>
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<td>Adaptec RAID &amp; IO Controllers</td>
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<td>SXP SAS Expanders</td>
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Change and Innovation in Storage Continues to Accelerate
PCIe Gen 4 Will Be Widely Deployed in CY2020
Diverse Set of Media, Form Factors and Interfaces to Manage
SSDs are Getting Very Large
.. and Application Needs are Diverse
Innovation in Storage Media is Driving Latencies Lower...
But Each Tier is More Costly
GPU Use Cases are Proliferating
Security Requirements are Increasing
Innovation is Required To Meet New Challenges

Performance  Flexibility  Security
Innovation is Required To Meet New Challenges
A Low Latency End-to-End PCIe Gen 4 Storage Subsystem

**PCIe Gen 4 NVMe SSD**
- Low Latency
- 8GB/s Bandwidth
- >2M IOPs

**PCIe Gen 4 Programmable PCIe Switch**
- Low Latency
- Enterprise Class Reliability
- Power Optimized
Enabling a Variety of Media to Take Advantage of PCIe Gen 4 Bandwidth

- 16 GBps
- 9.6 GBps
- >20 GBps

CPU
- x8 PCIe Gen4
- 12Gbps SAS Controller
- x8 12G SAS
- 12Gbps SAS Expander

OR

- x100 SAS/SATA
- x24 SAS

HDD

SSD
24G SAS as a Backbone of the PCIe Gen 4 Data Center

16 GBps

9.6 GBps $\rightarrow$ 19.2 GBps

>20 GBps

x8 PCIe Gen4

x8 24G SAS

x100 SATA

x24 SAS
24G SAS Delivers Full B/W to PCIe Gen 4 Systems with Lower Speed Drives

Dynamic Channel Multiplexing
Innovation is Required To Meet New Challenges

*Flexibility*
PCle Fabrics and Composability

Dynamic Resource Allocation
Resource Sharing with Standard Device Drivers
Lowest Latency Fabric to Enable Performance SSDs
PCle Fabrics and Composability

Host A

Switchtec PAX #1

Switchtec PAX #3

Host B

Switchtec PAX #2

Switchtec PAX #4

GPU

NVMe

GPU

NVMe

GPU

NVMe
Rich Data Services for All Media Types

- Uncompromised NVMe performance
- Multi-protocol data protection
- Unified Storage Management

Programmable Storage Interconnect

- PCIe Gen 4 NVMe
- SAS SSD / HDD
- SATA SSD / HDD
Flashtec™
A Fully Programmable Flash Controller

- Acceleration of memory technology transitions
- Hyperscale optimized SSDs
- Computational storage
- Feature fast-tracking

Media Flexibility
Software Defined Flash
Innovation is Required To Meet New Challenges

Security
The Trusted Data Center

Creating the World’s Most Secure Storage Infrastructure

- **Proven RAID Stack**: Ensures Information Integrity and Performance
- **Line Rate Encryption**: Superior Security and Flexibility
- **Hardware Root of Trust & Attestation**: Ensures FW Integrity and Authenticity, Ensures Compliance with Data Center Policy

**Data Protection**

**Data-at-rest Encryption**

**Hardware Root of Trust Attestation**
Microsemi Announces Early Adopter Sampling of Industry’s Highest Performing Enterprise Gen 4 PCIe Controller

*New NVMe 3016 Device Offers the Most Flexible and Programmable Controller for Enterprise and Cloud Workloads*

*Flash Memory Summit: Aug. 7-9*
Santa Clara, California
Microsemi Announces Availability of Low Latency, Low Power, High Reliability Gen 4 PCIe Switches

New Switchtec PCIe Switches Provide 16 GT/s PCIe Connectivity for Machine Learning, Data Center Servers and Storage Markets

Flash Memory Summit: Aug. 7-9
Santa Clara, California
Microsemi Announces Industry’s First Tri-Mode Capable Storage I/O Controllers and RAID-on-Chip Controllers Supporting PCIe Gen 4 and 24G SAS

New 16 Nanometer Controllers Will Enable Storage Infrastructure for the PCIe Gen 4 Data Center

Flash Memory Summit: Aug. 7-9
Santa Clara, California
Microsemi Announces Industry’s First 24G SAS Expanders for Data Center Storage

New Family Addresses High Bandwidth Storage Needs to Unlock Full Performance Capabilities of PCIe Gen 4-Capable Systems

*Flash Memory Summit*: Aug. 7-9
Santa Clara, California
Microsemi is Empowering Gen 4 Storage

- Latency Optimized
- Composability
- Eliminating Bottlenecks to Storage
- Trusted Platform
- Optimal Power
- Leading Density
- Programmable Flash Controllers
Visit us at **Booth #213**
to Experience How Microsemi is **Empowering** the Gen 4 Transition