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Datacenter Initiatives and Programs for Storage

Mark Carlson
Principal Engineer, Industry Standards
Toshiba Memory America
Initiatives

• Storage Interfaces
  - NVMe
  - T10/T13
• Storage Management
  - Redfish
  - Swordfish
• Form Factors
  - SFF
Storage Interfaces

- Hyperscalers have unique requirements for storage devices at datacenter scale
  - Eliminate/Reduce tail latency
  - Eliminate “noisy neighbor” interference with multiple apps using the same (large) drive
- These requirements impact the storage interfaces used for SSDs and HDDs
- For NVMe, I/O Determinism has resulted in changes to the NVMe standard
  - NVM Sets – divide an SSD into isolated smaller groups of media
  - Predictable Latency – time based Windowing for predictable reads without background task interference
- For T10/T13, changes are being discussed for fast fail and media types
  - OCP Storage – propose changes after working out details in subteam “streams”
  - Ad Hoc – open (to all) discussions with INCITS members
Storage Management

• Management of storage devices has issues in a scale out environment
  - Host based agents are largely used to gather data from attached devices
  - A conversion/adaptation from proprietary to common models is needed per vendor
• To scale out better, devices should accept and report core information in a common format. Vendor specific information should be available using the same protocol.
• DMTF has a standard called Redfish that has done this for systems management and it is gaining traction in datacenters
• Redfish has basic storage drive models that can be used for inventory and telemetry
• SNIA has an extension to Redfish for storage management called Swordfish
  - This can serve as a common model for SDS and other higher level storage software
Form Factors

• The U.2 form factor has wide adoption in datacenters and will likely continue to dominate hard drive devices for the foreseeable future.

• However for SSDs, this may prove to be too limiting going forward.

• M.2 form factor is becoming popular but limits the capacity of SSDs.
  - Carrier cards (some in the new form factors) can extend M.2 into bigger FRUs.

• New form factors are intended to serve for both carrier cards and single controller drives.

• EDSFF has created a number of new SSD for factors and these have now been standardized by SNIA SFF.

• JEDEC is working on NGSFF (leveraging M.2) and M.3.
1U Long

- Standard available as SFF-TA-1007 from the SNIA.org website
- Developed by the EDSFF group and submitted to SNIA
  - Hyperscaler members include Facebook and Microsoft Azure
- Products are being announced based on this form factor
- Can be used by carrier cards to hold M.2 and 1U Short SSDs

Example system with 1U Long cards
1U Short

- Standard available as **SFF-TA-1006** from the SNIA.org website
- Products are being announced based on this form factor
- Can be used in carrier cards or as a standalone add-in card for systems

Example systems with 1U Short cards
3” Media

- Standard available as **SFF-TA-1008** from the SNIA.org website
- Designed to either fit sideways in a 1U chassis or vertically in a 2U chassis
- Similar in capacity as tradition U.2 devices
- There are both short and long versions standardized
- Single (7.5mm) and double (16.8mm) width options
Connector for new Form Factors

• All of these new form factors share a common, next generation connector
• Standard available as SFF-TA-1002 from the SNIA.org website
• Options for x4, x8 and x16 PCIe lanes and future proofed for Gen4 and Gen5 speeds
• Should also work for future interconnect standards such as GenZ
NGSFF

• Proposal for a form factor based on an expanded M.2 type connector
• Connector may accommodate M.2 cards
• Currently being worked in JEDEC
• Not yet publically available
Discussion

• These initiatives are slowly changing the storage industry to better address hyperscaler requirements for the datacenter
• Should also help tier two datacenter customers following the hyperscaler practices
• Recommend: Get involved!
  − OCP Storage, SNIA, DMTF, others

− What other initiatives might we create to help solve datacenter problems?