

STORAGE INDUSTRY SUMMIT

Realizing the
Benefits of the
Convergence of
Storage and Memory

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NVM technology and New storage taxonomy

Ahmed Shihab

NetApp

FSG Chief Architect



Is storage being disrupted?

- Looking from the application
- Expectations are changing
- Fundamental assumptions challenged
 - ◆ Cost, Latency, Coding
 - ◆ Solid State vs Magnetic Media
- Data is being spread around the Cloud

Latency Disruption



Memory as storage
300ns Media

PCM SSD
10us Media

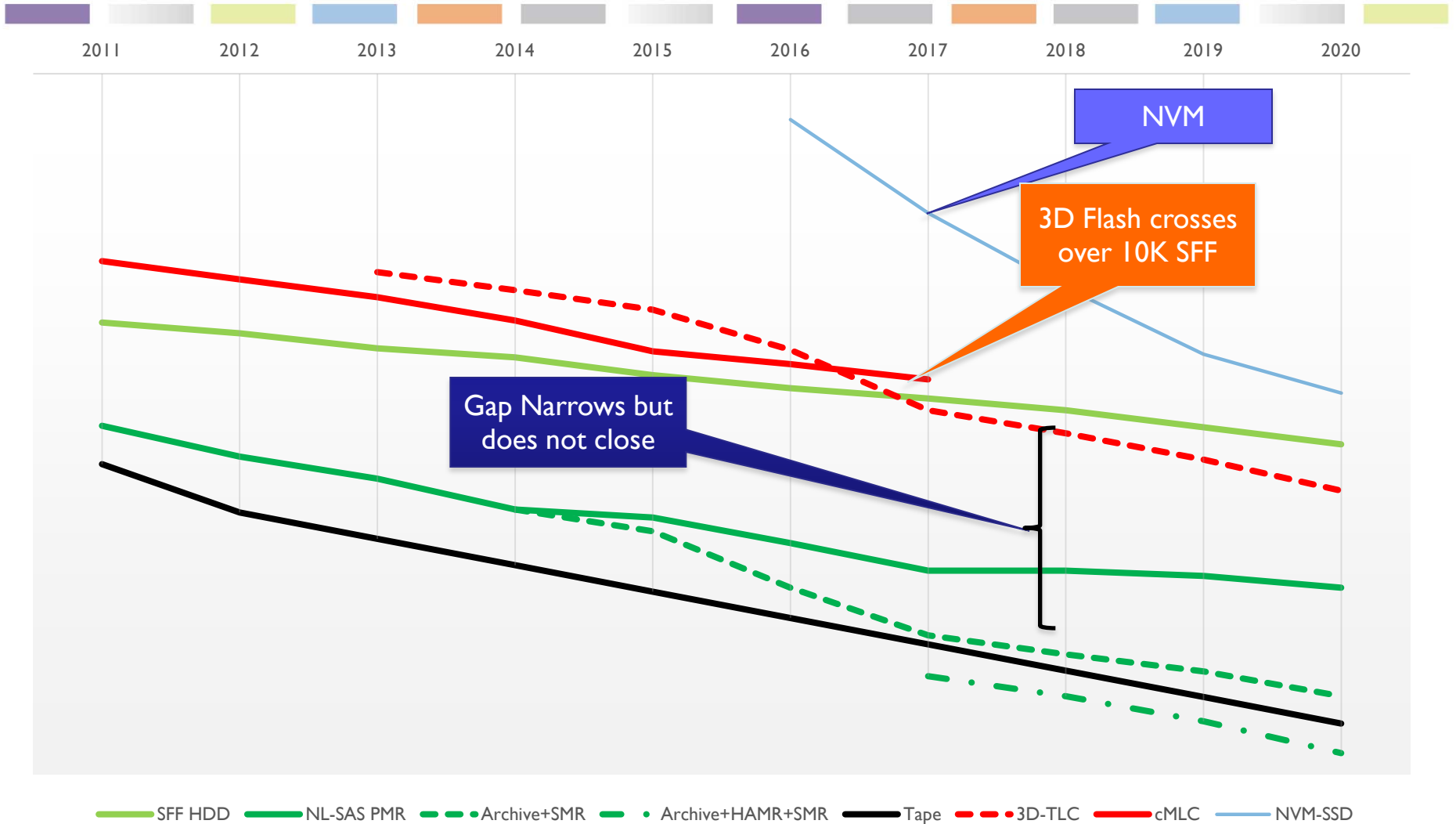
Flash SSD
300us Media

Near-line HDD
10ms Media

Archive
10s+ Media

- Dynamic Range of Media Latency is Expanding
 - ◆ Factor of 1,000,000 difference
- Wear Characteristics are different
 - ◆ From “never” to a few months

Cost Disruptions



So what?

- Performance changes + cost disparities
- Different access controls for each media type
- Different coding techniques
 - ◆ RAID tuned for each media type
 - ◆ What works for Flash, PCM different from NL and Archive
- Connectivity to media
 - ◆ Moving away from proprietary interconnects
 - ◆ Ethernet everywhere

New Taxonomy

- Data Management
 - ◆ Handle transparent data movement at lowest cost
- Storage Management
 - ◆ Manage data resilience & protection for specific media
- Collectively manage interconnect resilience

Data Management

Manage Transparent, Policy driven data movement between layers

Separate Storage and Data Management

Data Protection	Data Protection	Data Protection	Data Protection	Data Protection
Memory 300ns Media	PCM SSD 10uS Media	Flash SSD 300us Media	Near-line HDD 10ms Media	Archive 10s+ Media

Final Thoughts

- NVM is a new storage class
 - ◆ x1000 improvement in latency
 - ◆ Storage efficiency is necessary (think early days of flash)
- Application expectations are changing
 - ◆ Faster
 - ◆ Data is spread around lots of places
 - ◆ Local, fast and expensive to distant, slow and cheap-(ish)
- Final Final thought
 - ◆ NVM will become the dominant storage tier
 - ◆ Magnetic will still be lower cost but SLOW!
 - ◆ Have to manage the disparity in costs and latency!