

STORAGE INDUSTRY SUMMIT

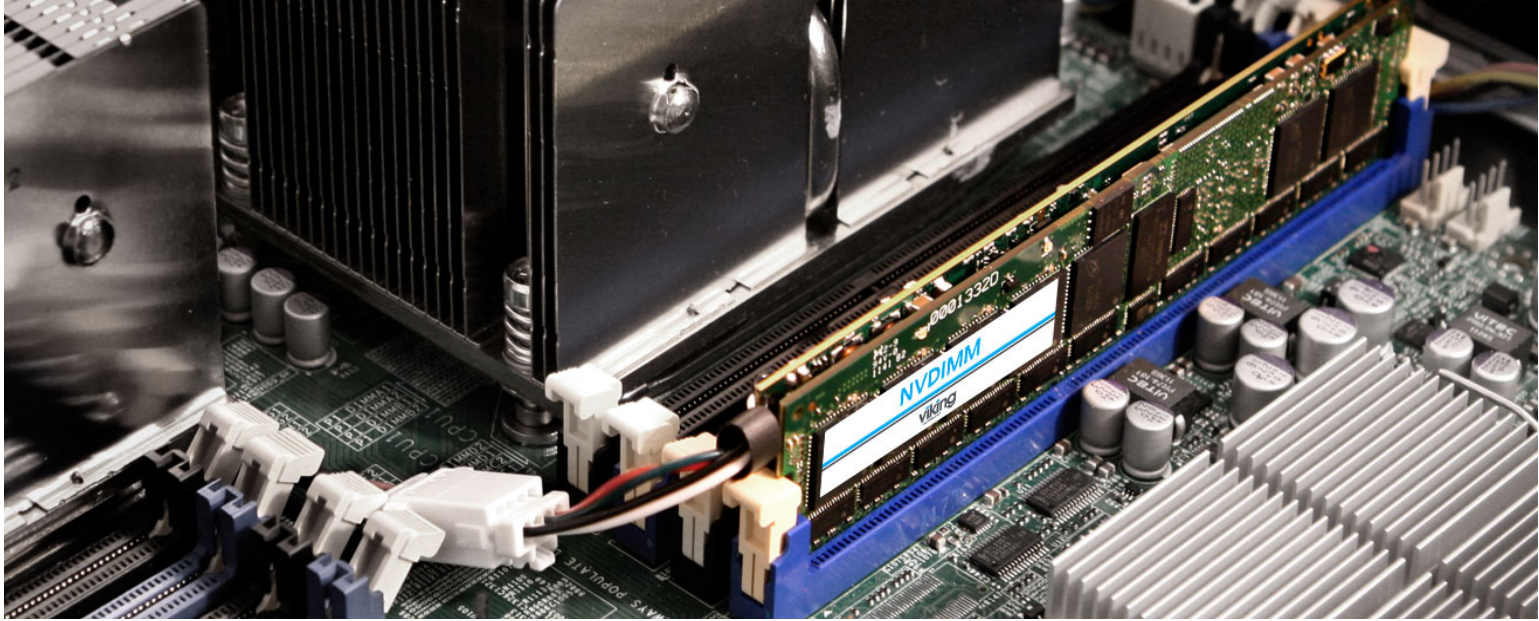
The Future of Computing:
The Convergence of Memory
and Storage through
Non-Volatile Memory (NVM)

JANUARY 28, 2014, SAN JOSE, CA



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Viking Technology
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NVDIMM Technology Overview



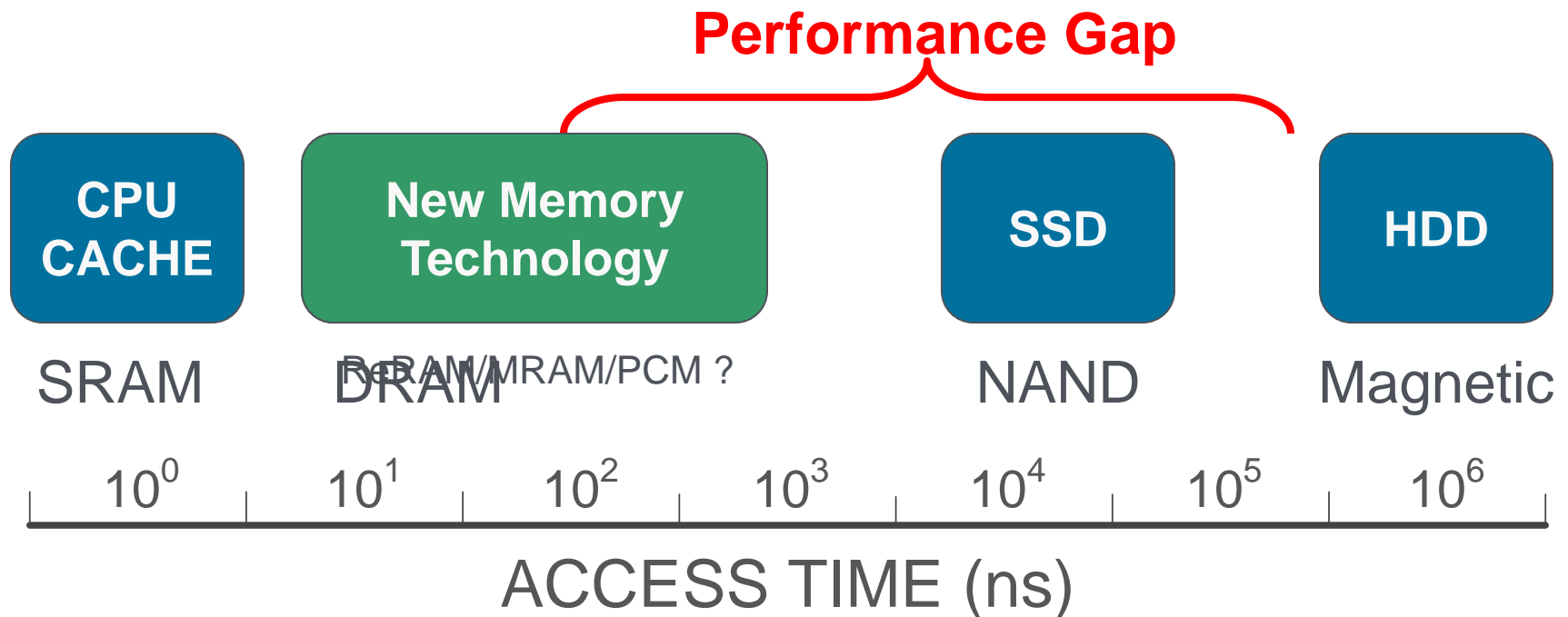
NVDIMM'S

- Reside on the Memory Channel (DDR3/DDR4)
- Retain data in the event of an unexpected power loss
- Combine memory technologies (DRAM & Flash)
- Require independent power source to ensure main memory persistence.

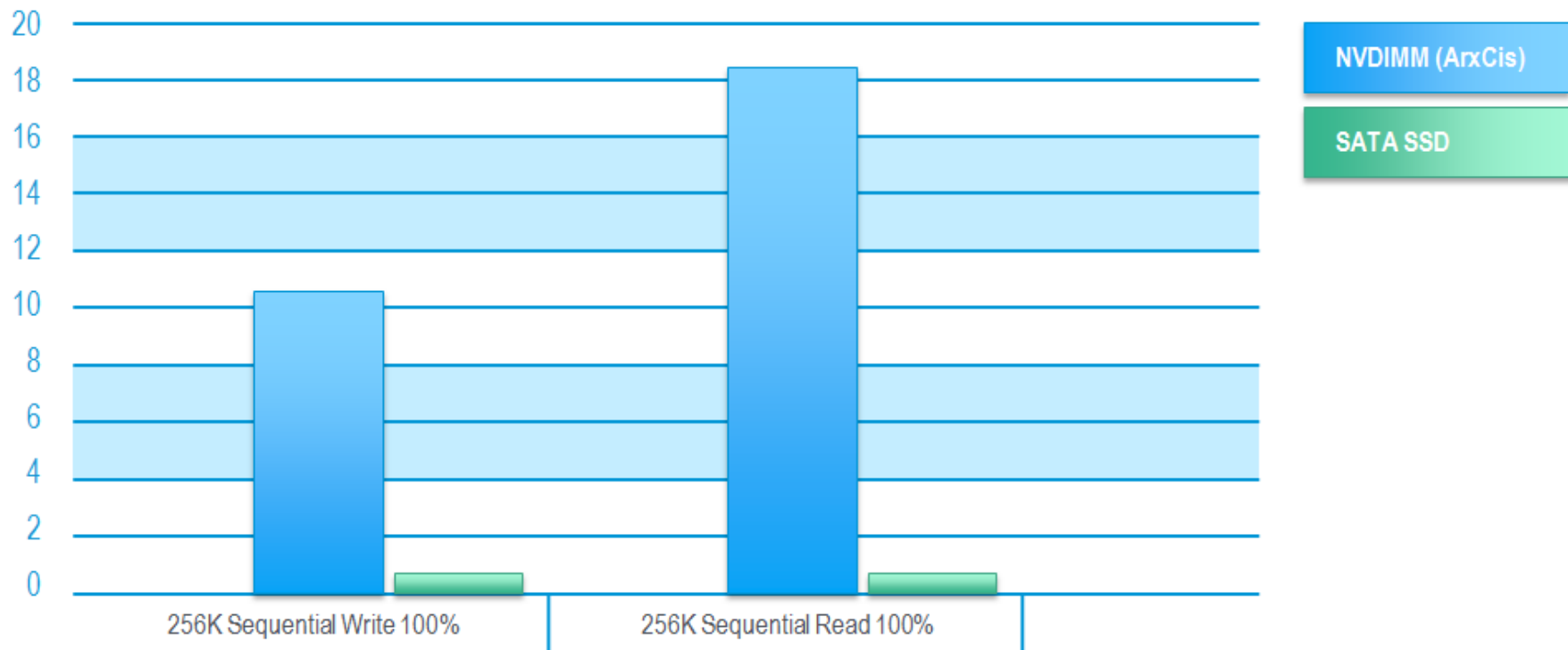
- Fits well with the NVM Programming Model (as pre-cursor to SCM)
- Deliver new levels of Storage Performance
- Databases can Run Faster & Recover Quicker
- Can enhance both SSD endurance and reliability.

MEMORY/STORAGE HIERARCHY

- Data-Intensive Applications Need Fast Access To Storage
- Large Performance Gap Between Main Memory And HDD
- SSDs Have Narrowed The Gap, But a Big Gap Still Exists
- Until "The SCM" Emerges – Opportunity For Innovation!

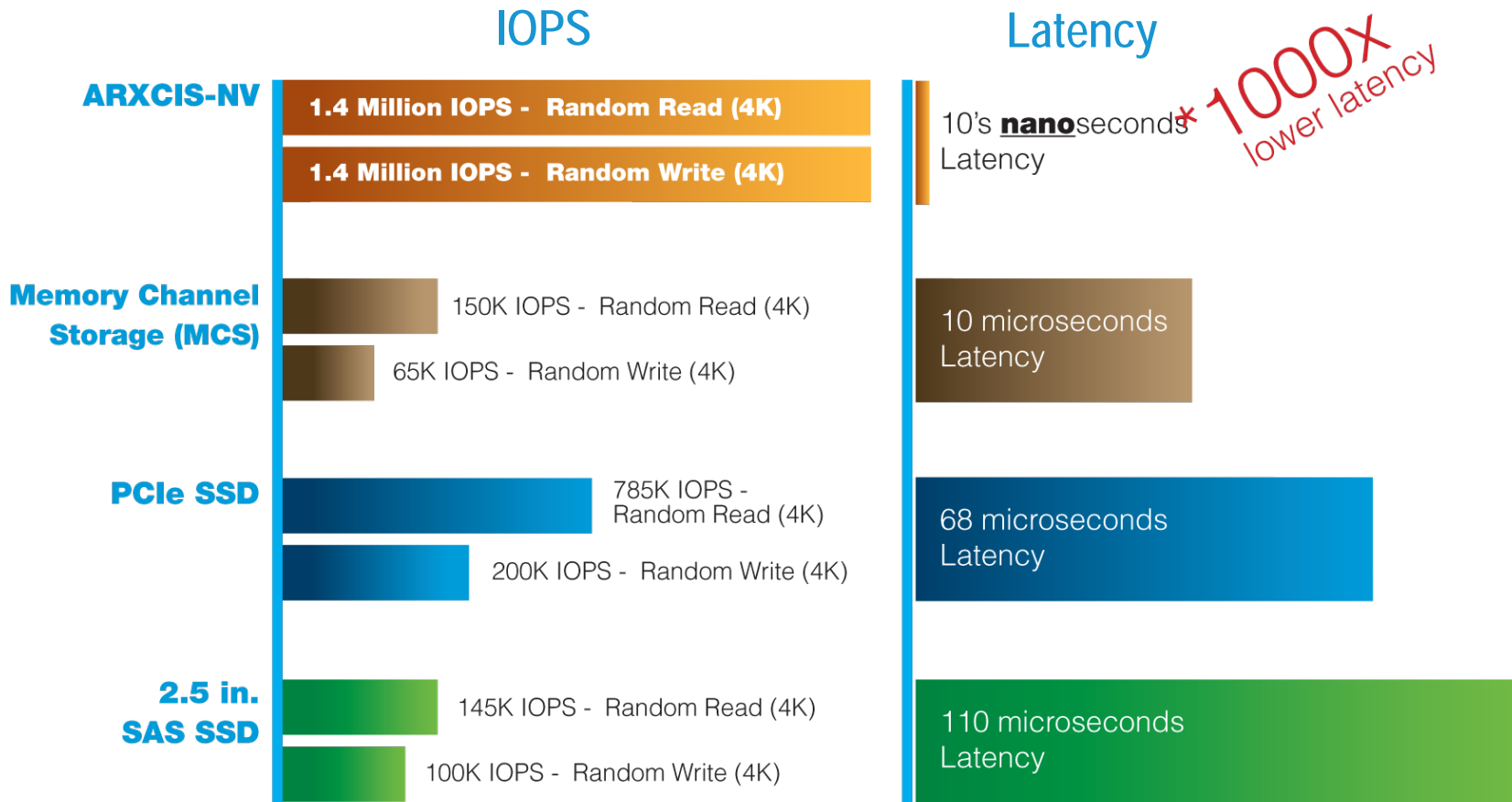


NVDIMM PERFORMANCE (BANDWIDTH – GB/sec)



Benchmark: VDBENCH, Platform: Intel Sandybridge, Linux, Two DDR3-1333 NVDIMMs as interleaved pair (channel interleaving), PRAMFS vs. SATA SSD as Linux block device

NVDIMM TECHNICAL COMPARISON



- Is \$/GB the right metric beyond HDD
- \$/IOP or Cost per PB Written ?

* PCIe & SAS SSD Latency & IOPS are averages from multiple vendors

NVDIMM SIG: SNIA-SSSI

NVDIMM SiG Formed

Organized under SNIA-SSSI to help:

- Accelerate awareness & Adoption of NVDIMMs
- Vendors collaborate to Broaden Industry Support & Knowledge

SNIA's history of developing Standards & providing education..

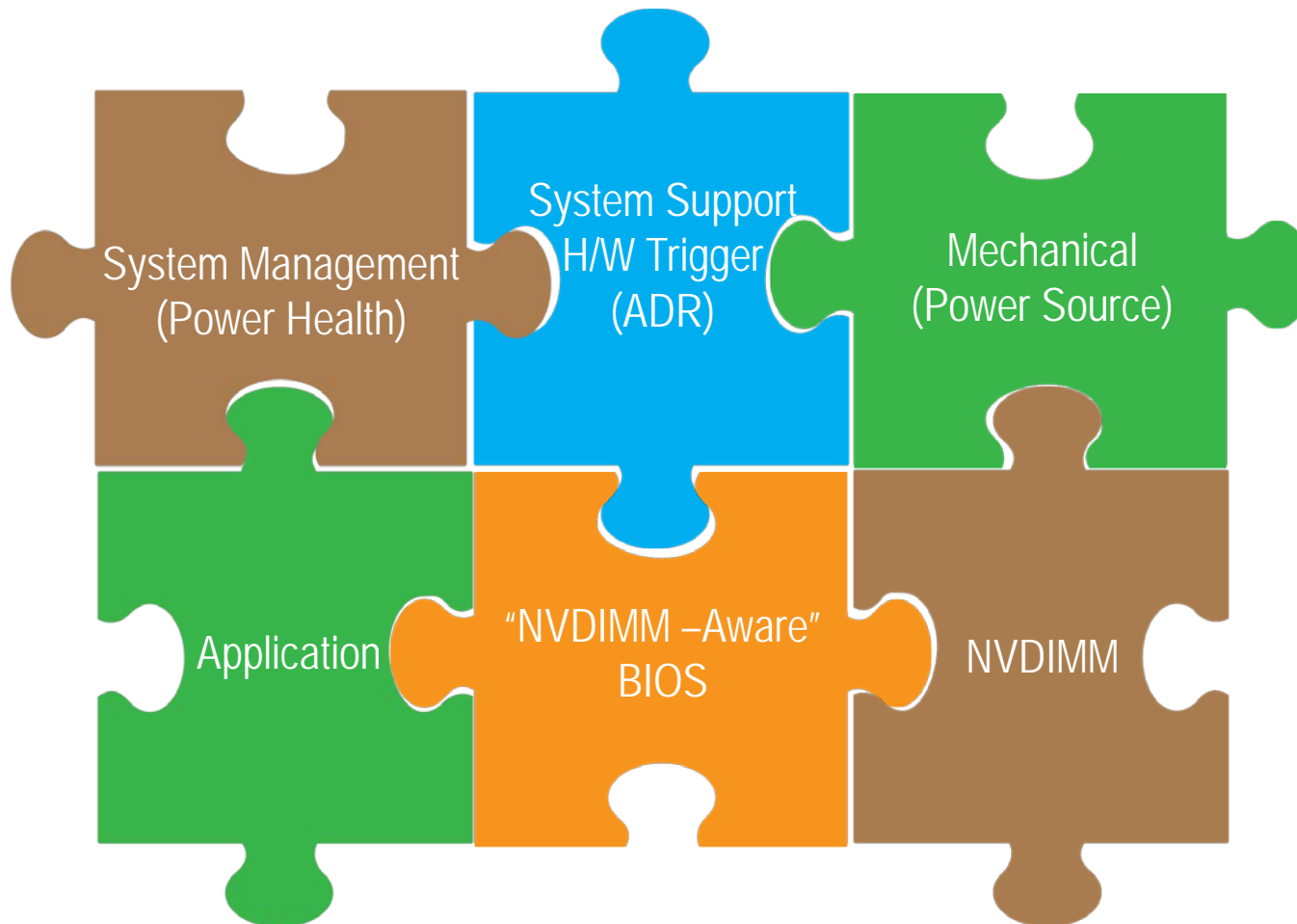
- The NVM Programming Model / TWG
- Ideal venue for NVDIMM SiG Support

NVDIMM SiG will educate on:

- How system vendors can design in NVDIMM
- Communicate Industry Standards as they evolve
- Develop market understanding of NVDIMM Technology
- Communicate how New Programming models help deliver value

HIGH LEVEL SYSTEM CONSIDERATIONS

The “Pieces of the Puzzle” that are required for NVDIMM Integration



ECOSYSTEM, STANDARDS & STATUS

JEDEC: DDR4 Pinout Definition (DRAM)
DDR4 Optional 12V Power Pins (284 to 288-pin)
Module Mechanical Outline

NVDIMM Modules: Multiple Vendor Support

NVDIMM Enabled Platforms: DDR3 – Limited OEM/ODM Support
DDR4 /Grantley – Widespread Support

BIOS: OEMs/ODMs: POR NVDIMM Support for Grantley

SW/OS/Application: In Process...

* Next Speaker to review Hyperscale/Megacloud NVDIMM Use Cases