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SNIA Seminar 4 Birds-of-a-Feather Persistent Memory Futures

Flash Memory Summit 2018



Welcome to SNIA Education Afternoon at Flash Memory Summit 2018

Agenda

1:00 pm – 1:50 pm	SNIA Tutorial 1 <i>A Case for Flash Storage</i> Dejan Kocic, NetApp
1:50 pm – 2:45 pm	SNIA Tutorial 2 <i>What if Programming and Networking Had a Storage Baby Pod?</i> John Kim, Mellanox Technologies and J Metz, Cisco Systems
2:45 pm – 3:00 pm	Break
3:00 pm – 3:50 pm	SNIA Tutorial 3 <i>Buffers, Queues, and Caches</i> John Kim, Mellanox Technologies and J Metz, Cisco Systems
4:00 pm – 5:00 pm	SNIA Tutorial 4 <i>Birds-of-a-Feather – Persistent Memory Futures</i> Jeff Chang, SNIA Persistent Memory and NVDIMM SIG Co-Chair



170
industry leading
organizations



2,500
active contributing
members



50,000
IT end users & storage
pros worldwide

Join SNIA at These Upcoming Events



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SDC
18

**Storage Developer
Conference
2018**

9/24-9/27 Santa Clara, CA

SDC discount
registration
cards in
FMS bags & at
**SNIA booth
820**

SNIA PERSISTENT MEMORY
PM SUMMIT

JANUARY 24, 2019 | SANTA CLARA, CA

Complimentary
registration
now open at
**[snia.org/pm-
summit](http://snia.org/pm-summit)**

Persistent Memory and NVDIMM SIG Charter

- To accelerate the awareness and adoption of Persistent Memories and NVDIMMs for computing architectures
- The Persistent Memory and NVDIMM SIG will:
 - ◆ Educate on the types, benefits, value, and integration of Persistent Memories
 - ◆ Communicate usage of the NVM Programming Model developed to simplify system integration of current and future PM technologies
 - ◆ Influence and collaborate with middleware and application vendors to support Persistent Memories
 - ◆ Develop user perspective case studies, best practices, and vertical industry requirements
 - ◆ Coordinate with industry standards groups and promote industry standards related to PM and NVDIMM
 - ◆ Synchronize and communicate a common Persistent Memory taxonomy

A Brief History of the NVDIMM SIG

BEFORE SIG

Proprietary Implementations
Different Messaging
No Common Taxonomy
No Ecosystem



October '13

NVDIMM SIG started as open
"incubator" program within SSSI

September 12, 2013

NVDIMM Summit Meeting @ IDF
to discuss category mktg plan

AFTER SIG

Common Specifications
Common Messaging
Common Taxonomy
Ecosystem Development

January 27, 2014

NVDIMM SIG formerly announced

August 1, 2014

Officially joined SNIA/SSSI

SIG Activities/Accomplishments

- Wkly -> Mthly Calls
- Tradeshows/Demos
- Whitepapers/Articles
- Benchmarks
- Webinars/Tutorials
- JEDEC Specs

FUTURE?

- NVDIMM-P
- Emerging PM Tech
- ISV Adoption
- Interop/Test Specs
- Encryption Stds

< 2013

2013

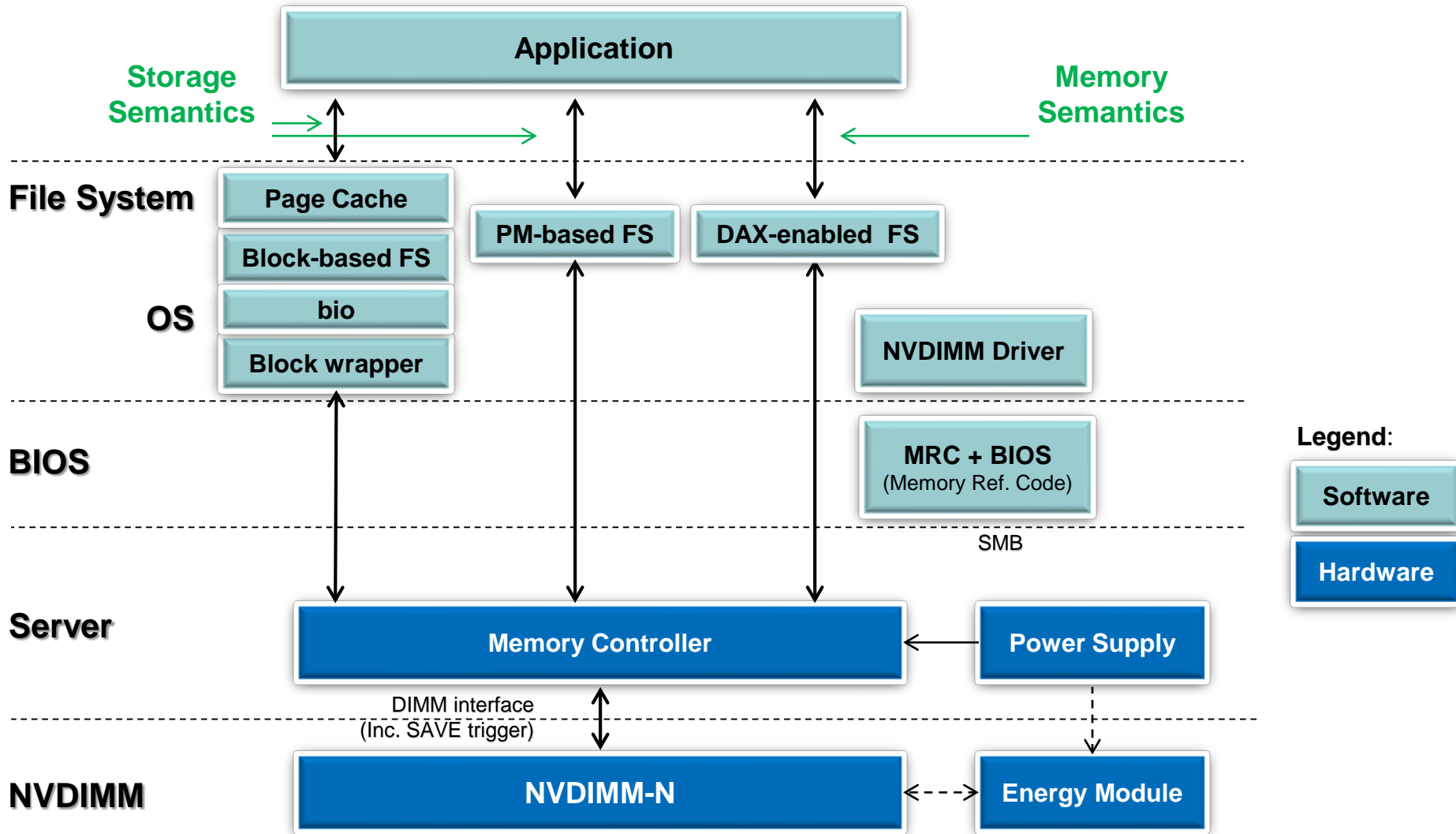
2014

2015

2016

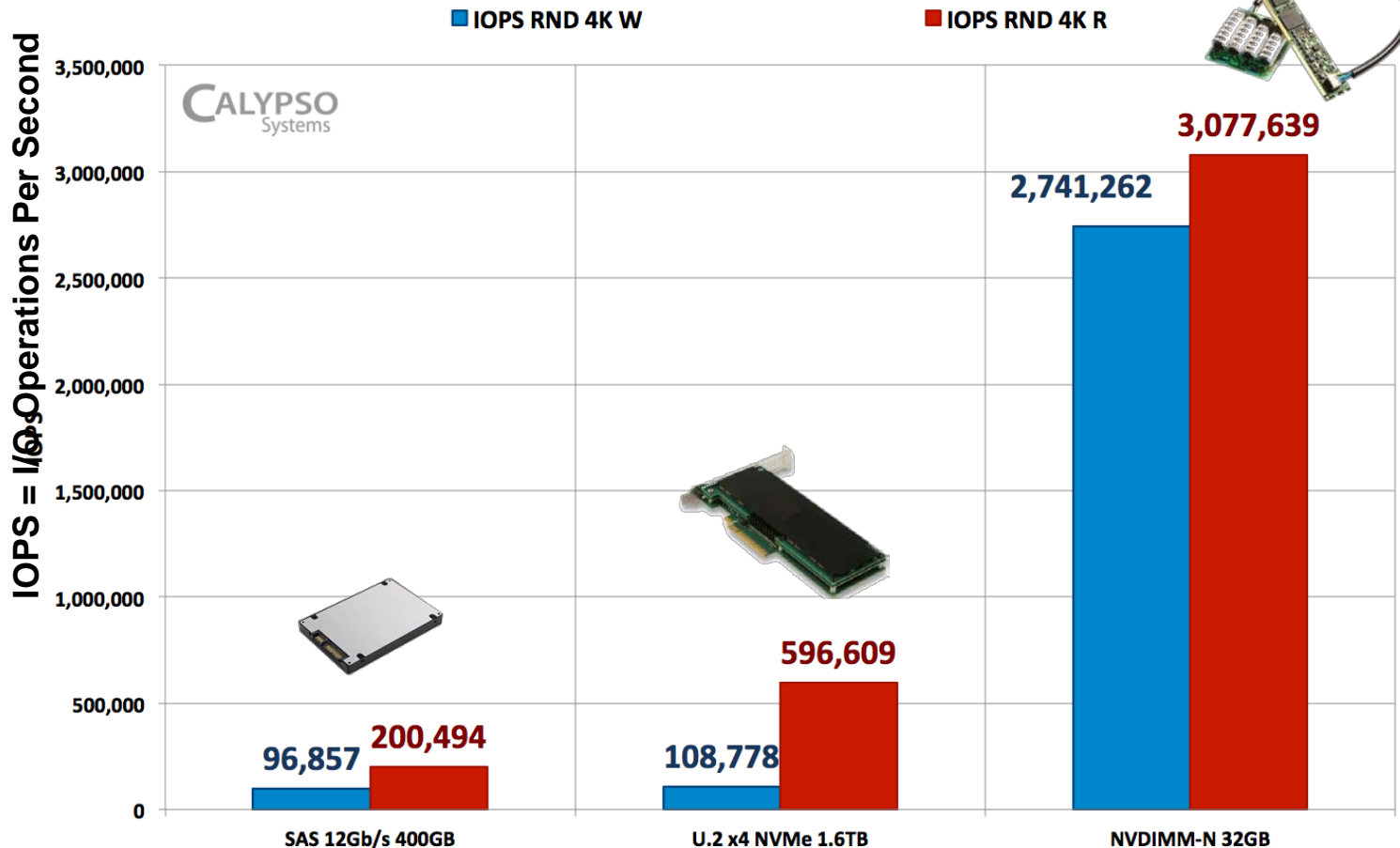
2017

NVDIMM-N Cookbook



NVDIMM Benchmarks

IOPS RND 4K Writes & Reads: NVDIMM-N v U.2 v SAS



All data taken from PTS-E v1.1 DIRTH Tests using CTS test software. SAS and U.2 SSDs tested on Calypso RTP Intel S2600COE, Dual 2687W 8 core 3.2 Ghz, 32GB DDR3 RAM. Four NVDIMM-N Modules tested on SuperMicro X10DR1, Dual E5 2670V3, 32GB DDR4 RAM with Intel Open Source NVDIMM-N Development Block IO Driver and CTS test Software.

JEDEC Specs Now Publicly Available

DESIGNERS + THINGS

DECEMBER 2-3, 2015
SAN JOSE CONVENTION CENTER

REGISTER NOW

ARM TechCon

NOV 10-12, 2015
SANTA CLARA CONVENTION CENTER

GISTER
CW

designlines MEMORY

News & Analysis

JEDEC Announces Support for Hybrid NVDIMM Modules

Gary Hilson

6/2/2015 1:00 AM EDT

2 comments

NO RATINGS
LOGIN TO RATE

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TORONTO — JEDEC Solid State Technology Association has approved the first standards for support of hybrid DDR4 memory modules.

The standards work is being done by JEDEC's [JC-45 Committee for Memory Modules](#), which developed the non-volatile DIMM (NVDIMM) taxonomy in collaboration with Storage Network Industry Association's NVDIMM Special Interest Group (SIG), a sub-committee of SNIA's [Solid State Storage Initiative](#).

The new standard defines hybrid DDR4 memory modules as those that plug into standard DIMM sockets and appear like a DDR4 SDRAM to the system controller, yet contain non-volatile memories such as NAND flash on the module. These hybrid module families may share the memory channel with other standard DDR4 DIMMs. Publication of the standard is expected later this year, said Bill Gervasi, co-vice-chair of the JEDEC JC-45 Committee for DRAM Modules, in an interview EE Times.

Standards & Documents Search: nvdimm

2 results

Results

Title	Document #	Date
DDR4 NVDIMM-N DESIGN STANDARD (Revision 1.0) This standard defines the electrical and mechanical requirements for 288-pin, 1.2 Volt (VDD), Double Data Rate, Synchronous SDRAM Nonvolatile Dual In-Line Memory Modules with NAND Flash backup (DDR4 NVDIMM-N). A DDR4 NVDIMM-N is a Hybrid Memory Module with a DDR4 DIMM interface consisting of DRAM that is made nonvolatile through the use of NAND Flash. NVDIMM-N modules adhere to the Byte Addressable Energy Backed Interface Standard, JESD245, that provides detailed logical behavior, interface, and register definitions. These DDR4 NVDIMM-N modules are intended for use as main memory or storage when installed in PCs. Item 2233.27	JESD248	Sep 2016
BYTE ADDRESSABLE ENERGY BACKED INTERFACE The purpose of this standard is definition of an energy backed byte addressable function on a nonvolatile dual in-line memory module (NVDIMM). This standard defines the feature set and commands implemented by the energy backed byte addressable function on the NVDIMM. Item 2233.22, 2233.20A	JESD245A	Sep 2016

Persistent Memory and NVDIMM SIG Roster

SNIA.
SSSI | SOLID STATE STORAGE



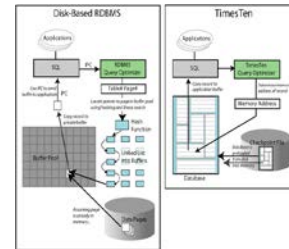
➤ Help drive PM adoption by:

- ◆ Clearing the path of all obstacles
 - › Promote & coordinate standards for the software interface
 - › Coordinate with JEDEC to ensure that the hardware interface is standardized
 - This includes protocols for firmware upgrades
- ◆ Promote/Inform the world about PM technology
 - › Host webcasts and tutorials on the use of PM
 - › White papers and other collateral

You're Invited to Contribute!

- SNIA Persistent Memory & NVDIMM SIG is advancing the awareness & adoption of Persistent Memory and NVDIMMs for computing architectures
- We're looking for companies and individuals to identify work items and activities including
 - ◆ Developing user perspective case studies, best practices, and vertical industry requirements
 - ◆ Synchronizing and communicating a common Persistent Memory taxonomy

Persistent Memory Adds Value Across Diverse Applications



Relational Database

MSFT SQL
MySQL
Maria DB
Oracle

Log acceleration:
write combining
and caching

Scale-out Storage

Vmware VSAN
MSFT Azure
Store Virtual

Tiering, caching,
write buffering, meta-
data storage

Virtual Desktop Infrastructure

Vmware VDI
Citrix HDI

Higher VM
consolidation

Big Data

- Mongo DB
- Cludera
- HortonWorks
- Hadoop
- Cassandra
- MSFT SQL Hadoop

Higher performance

In Memory Database

SAP HANA
MSFT SQL Hekaton
XAP Gigaspace

Journaling,
Transaction logs

Middleware

Java
.NET

Optimized
abstraction

HPC

HPC

Check point
acceleration

What's in it for new members?

- Draft off the success of SSSI: recognized as the most successful Initiative within SNIA

- Marketing:
 - Vendor neutral and multi-vendor messaging, collateral, webinars and so on
 - “Category Marketing”: recognizing a class of technology components with vendor-specific differences minimized, for these specific purposes
 - Seamless integration with the recognized NVDIMM SIG
 - We can engineer a relationship or taxonomy between each set of vendors, to the benefit of each, and more powerful than if we did nothing

- Standards
 - Single, recognized voice to standards organizations such as JEDEC
 - Complementary, recognized and appreciated role of a marketing organization and a purpose-built standards organization



Thank You!

**Learn more about SNIA's work in
Persistent Memory at
snia.org/PM**