



# The NVMe *Inflection Point*

**Derek D. Dicker** Vice President and Business Unit Manager, Performance Storage Business Unit



*Developing Semiconductors  
Since 1959*

- Headquarters in Aliso Viejo, California
- ~4,800 Employees
- \$1.7B FY16 Revenue Forecast
- End Market Focus:
  - Aerospace & Defense
  - Communications
  - Industrial
  - Datacenter



Power Matters.™



## *More than 1,000 FPGAs on Each A380*

*Flight Computers, Engine Controls, Cockpit Displays,  
Power Distribution*



*...and Microsemi is in the Dreamliner, too.*



*#1 Market Segment Share*  
*Aerospace & Defense Semiconductors*



*Co-Inventor & Market Leader*  
*Power over Ethernet*



*World Leader in Precise Timing Solutions  
60%+ Worldwide Market Segment Share in  
Sync for Commercial Applications*







Performance

—

Reliability

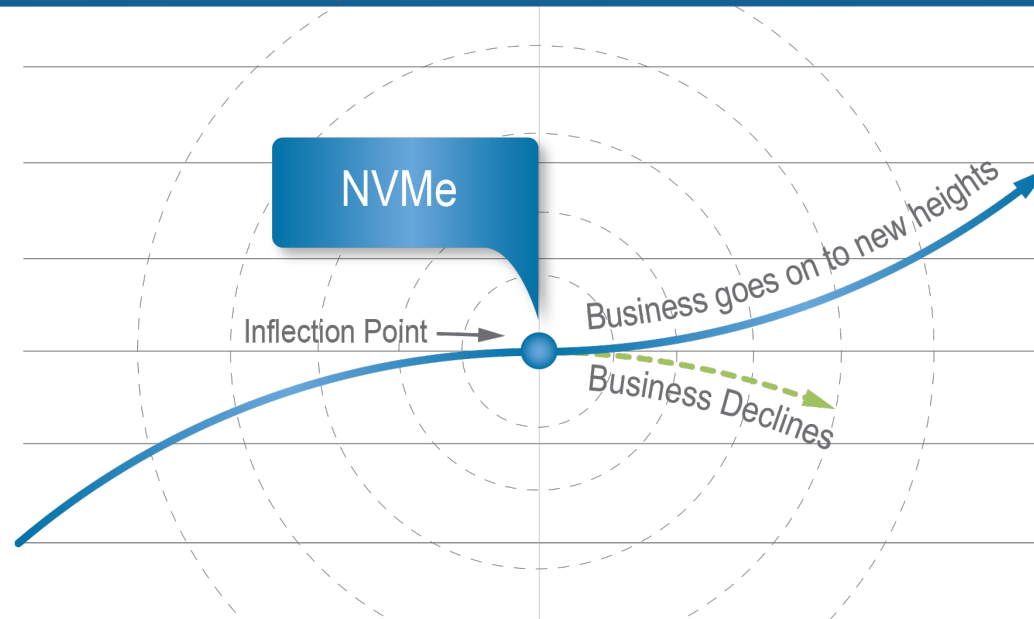
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Security

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Power

# Inflection Point



“ ...a strategic inflection point is a time in the life of business when its fundamentals are about to change. That change can mean an opportunity to rise to new heights. — Andy Grove ”

## Early Adopters of PCIe in Storage



*Few players, and no standards to drive volume economics - i.e. proprietary.*

# Flash Memory Summit 2014

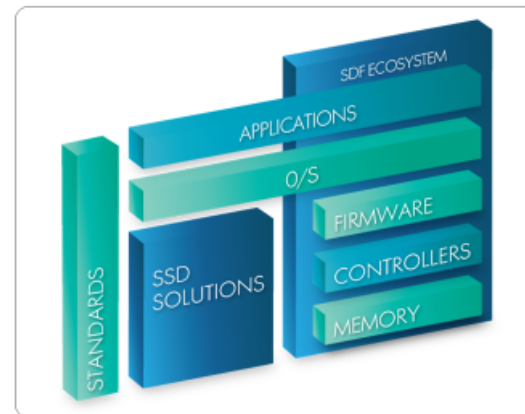
## EMERGENCE OF STANDARDS



SSD FORM FACTOR  
WORKING GROUP

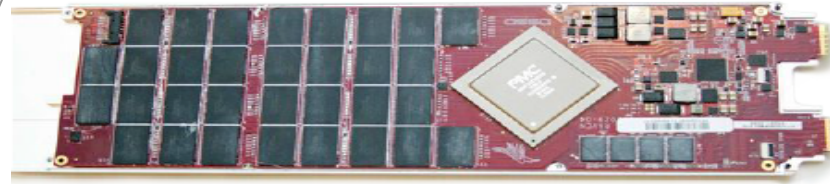


## SDF ECOSYSTEM



# Flashtec NVMe1032 SSD Controller

## EMC DSSD D5



tom's IT PRO  
REAL-WORLD BUSINESS TECHNOLOGY



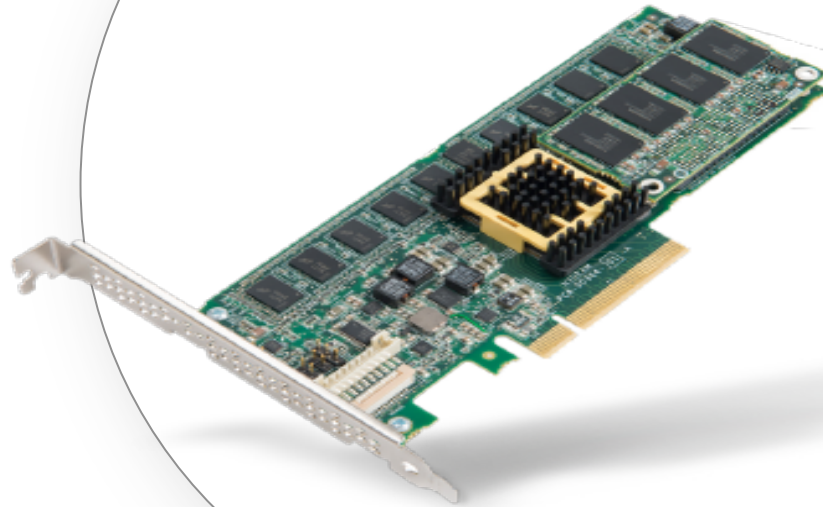
“ The SSD controllers are also compatible with numerous types of NAND, such as MLC, SLC and TLC NAND with either ONFI or Toggle interfaces. This affords...a broad range of options for flash vendors, which is important to ensure...access to competitively priced flash. ”

[www.tomsitpro.com/articles/emc-dssd-d5-rack-scale-flash,1-3266.html](http://www.tomsitpro.com/articles/emc-dssd-d5-rack-scale-flash,1-3266.html)

# Radian Memory Systems RMS-325

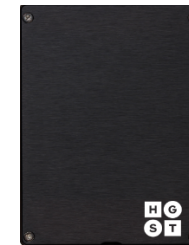


# Microsemi Flashtec™ NVRAM Drive



# Microsemi Flashtec™ Momentum

- Enterprise NVMe SSD, Hyperscale SSD, and All Flash Array SSD
- Add-In Card, 2.5", and Custom Form Factors
- 5 of 6 NAND Manufacturers Used







*Microsemi Announces Production Release of  
Second Generation High Performance Flashtec  
NVMe Controllers (NVMe2032/NVMe2016)*

*Devices Part of Company's Product Showcase at  
Flash Memory Summit Aug. 9-11 in Santa Clara,  
California*



PRESS RELEASE

# Flash Memory Summit 2015

## The Ripple Effect of NVM





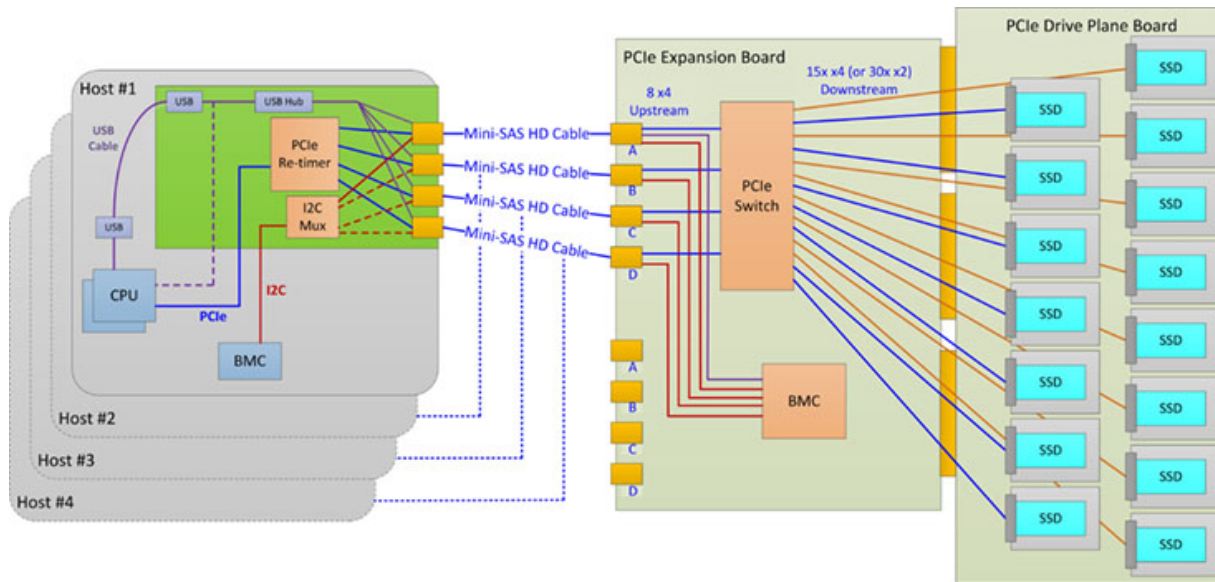
facebook

## Introducing Lightning: A flexible NVMe JBOF

Source: <https://code.facebook.com/posts/989638804458007/introducing-lightning-a-flexible-nvme-jbof/>



# facebook




*...we want the NVMe JBOD to behave like a SAS JBOD...*

<https://code.facebook.com/posts/989638804458007/introducing-lightning-a-flexible-nvme-jbod/>



 **Microsemi**  
Power Matters.<sup>™</sup>  
**SWITCHTEC™**  
**PSX PCIe®**  
**STORAGE SWITCH**

 **Microsemi**  
Power Matters.<sup>™</sup>  
**FLASHTEC™**  
**NVMe CONTROLLER**  
**NVMe 2032/2016**



# “Nebula 2U” NVMe Expansion Storage System



*Microsemi Provides the Industry's Highest Density, Lowest Power PCIe Switch for Data Center, Communications, Defense and Industrial Applications*

*Switchtec PFX Enables High-Reliability PCIe Solutions*



PRESS RELEASE

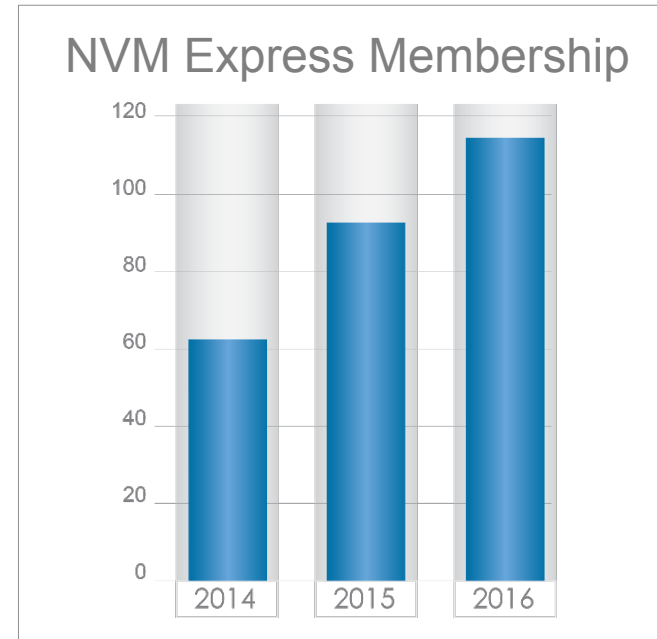
## How Can We Bend the Curve?

- Broadly-adopted Standards
- Cost-Effective NVMe SSDs
- Systems Infrastructure



## Workgroup Continues to Grow

- The Workgroup has gone from 61 to 115 members in under 2 years
- Direction and governance led by a 12 company Board of Directors



EMC<sup>2</sup>



SAMSUNG



ORACLE

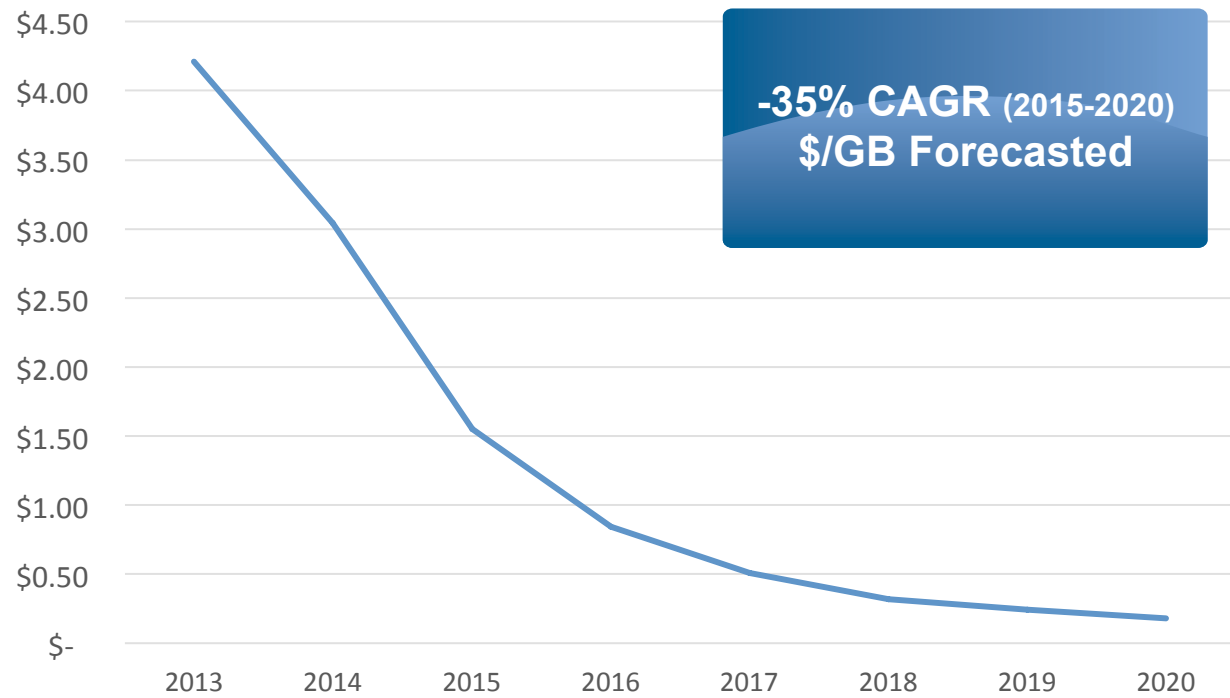


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# Standards, Standards, Standards

- NVM Express Standard Variants
  - Base Specification  
*Adding SRIOV and Other Enhancements*
  - Enclosure Management (NVMe-MI)  
*Addressing Enclosure Management*
  - NVMe Over Fabrics (NVMe-oF)  
*Demonstrating Interoperability*

## Enterprise NVMe SSD Pricing Forecast



Source: IDC May 2016 SSD Forecast, PCIe SSD Data



*Microsemi Extends Flashtec Product Line with NVMe Controllers Optimized for Mainstream, High-Capacity Enterprise and Data Center SSDs*

*New Devices to be Showcased at Flash Memory Summit Aug. 9-11 in Santa Clara, California*



PRESS RELEASE

# Systems Infrastructure

- NVMe SSDs
- Servers with U.2-enabled Drive Bays
- JBOFs
- RAID Solutions
- NVMe over Fabrics

Coming Soon

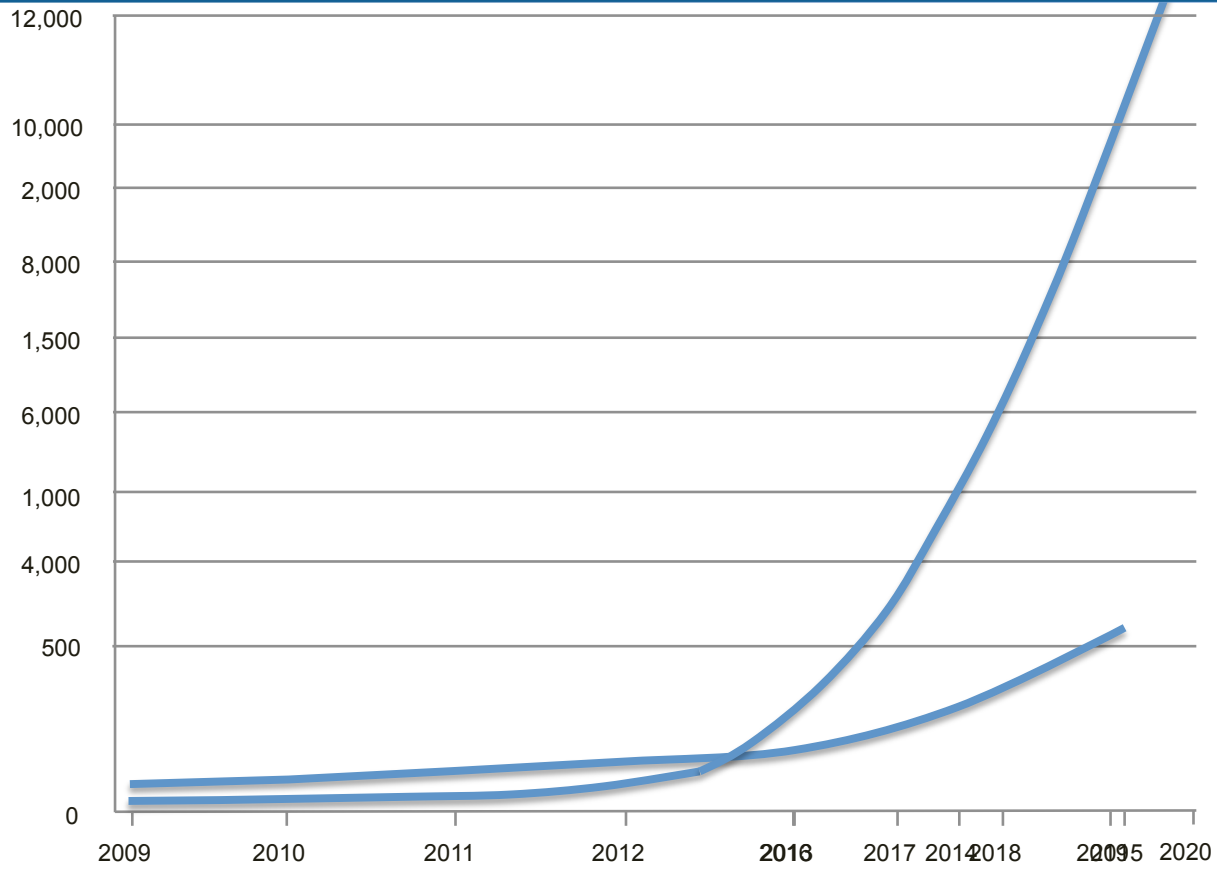
Coming Soon



## What's Next to Drive the NVMe Inflection?

- ✓ Broadly-adopted Standards
- ✓ Cost-Effective NVMe SSDs
- ✓ Systems Infrastructure

# We're Just Getting Started



Source: IDC #US40422516



Visit us at **Booth # 213**

to experience how Microsemi is  
accelerating the NVMe Inflection