

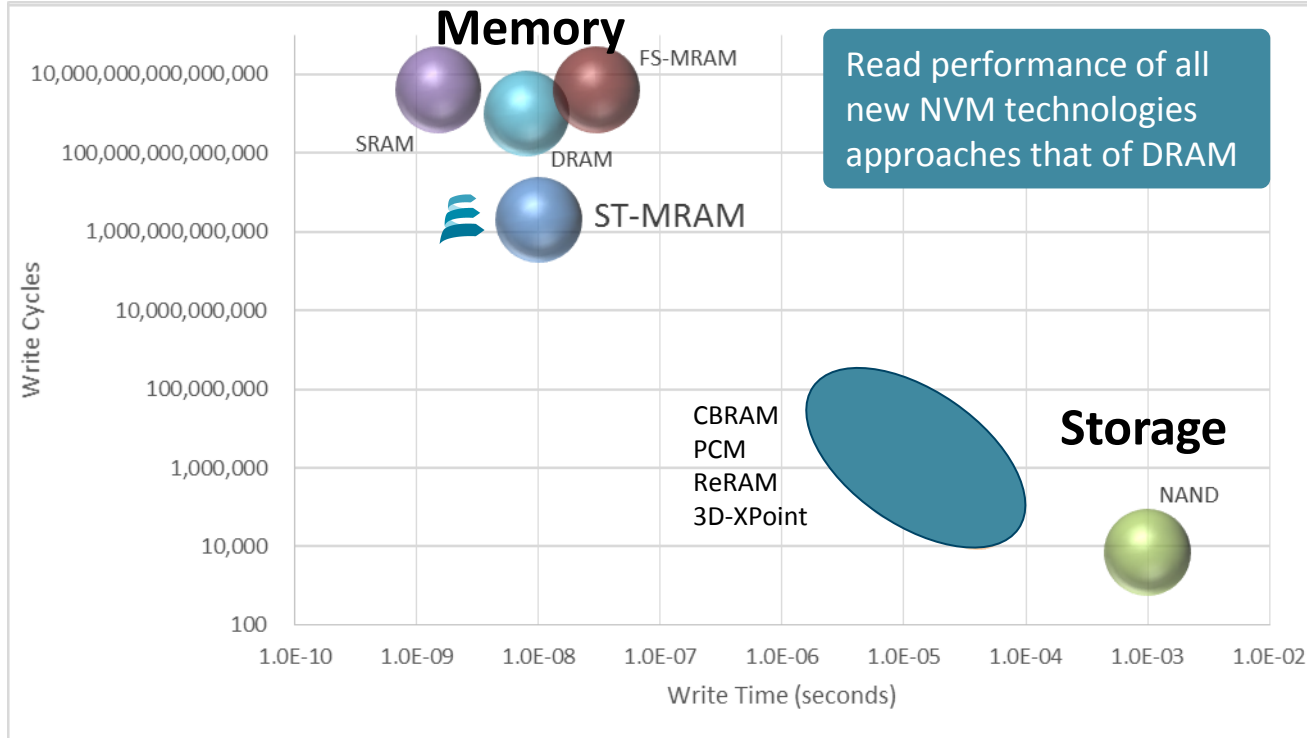


# "Persistence at Memory Speed to Accelerate Enterprise Applications"

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VP Systems Solutions  
Everspin Technologies, Inc.



# STMRAM Positioning

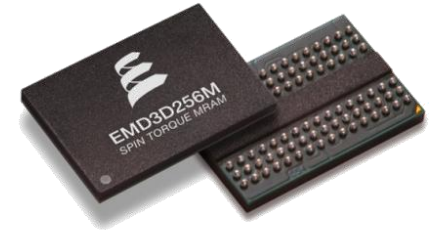


- MRAM is only SCM that can be written enough times to avoid wear leveling
- Write performance is a requirement for a true SCM, otherwise it is just faster storage
- Combinations of technologies provide real world solutions



# ST-MRAM Enabling Enterprise Applications

- Last year we showed you 256Mb with pMTJ
- 1Gb SCM (storage class memory) is here!
- Now enables acceleration of enterprise storage systems



4x capacity increase in 1 year  
16x capacity increase in just 4 years



Flash Memory Summit

# nvNITRO™ - Enabling 2 $\mu$ s Storage



Ultra-low 2 $\mu$ s latency

- Blazing 1,500,000 IOPs performance
- Durable, persistent memory
- Block and byte mode access
- Peer to peer
- Standard Windows/Linux NVMe drivers

Inherently power fail safe

Unlimited uniform endurance

No recovery time

Runs in common server thermal environments



Flash Memory Summit

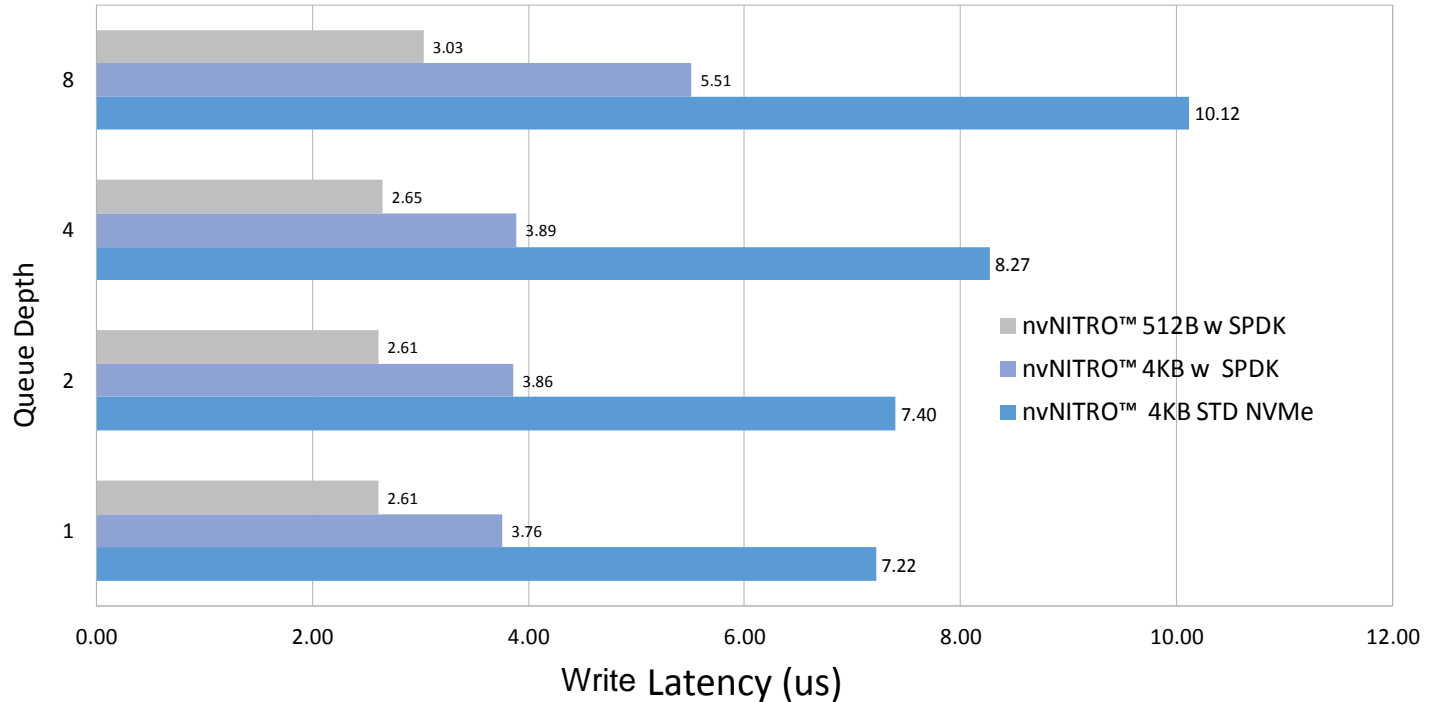
# Performance Characteristics



# Very Low Latency

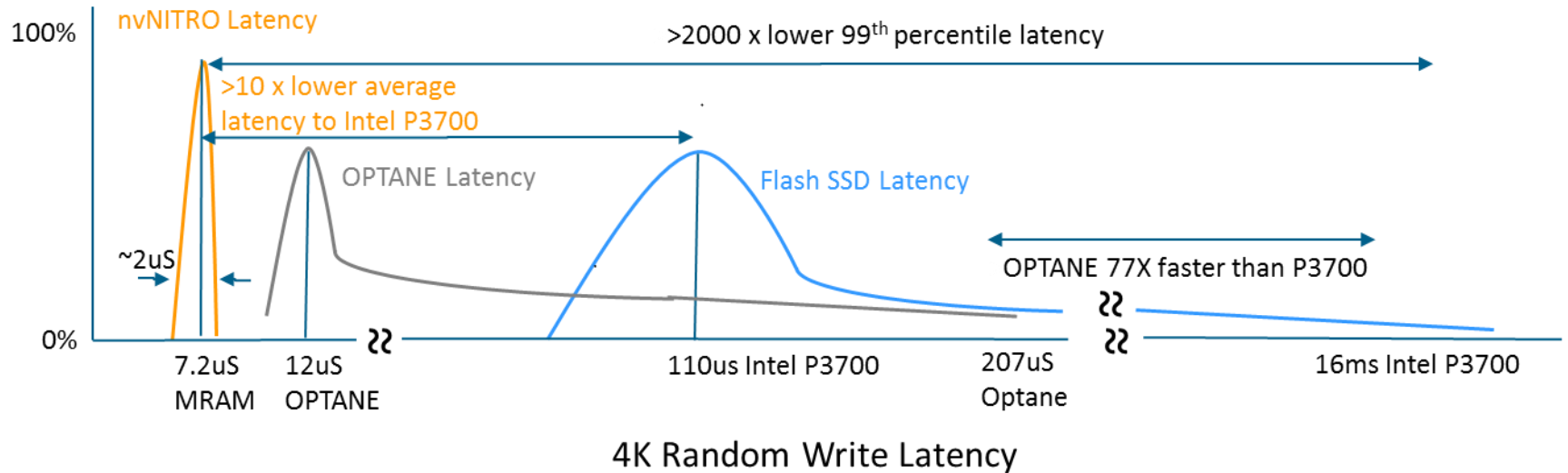
Standard drivers post interrupts to signal completion

SPDK polls for completions





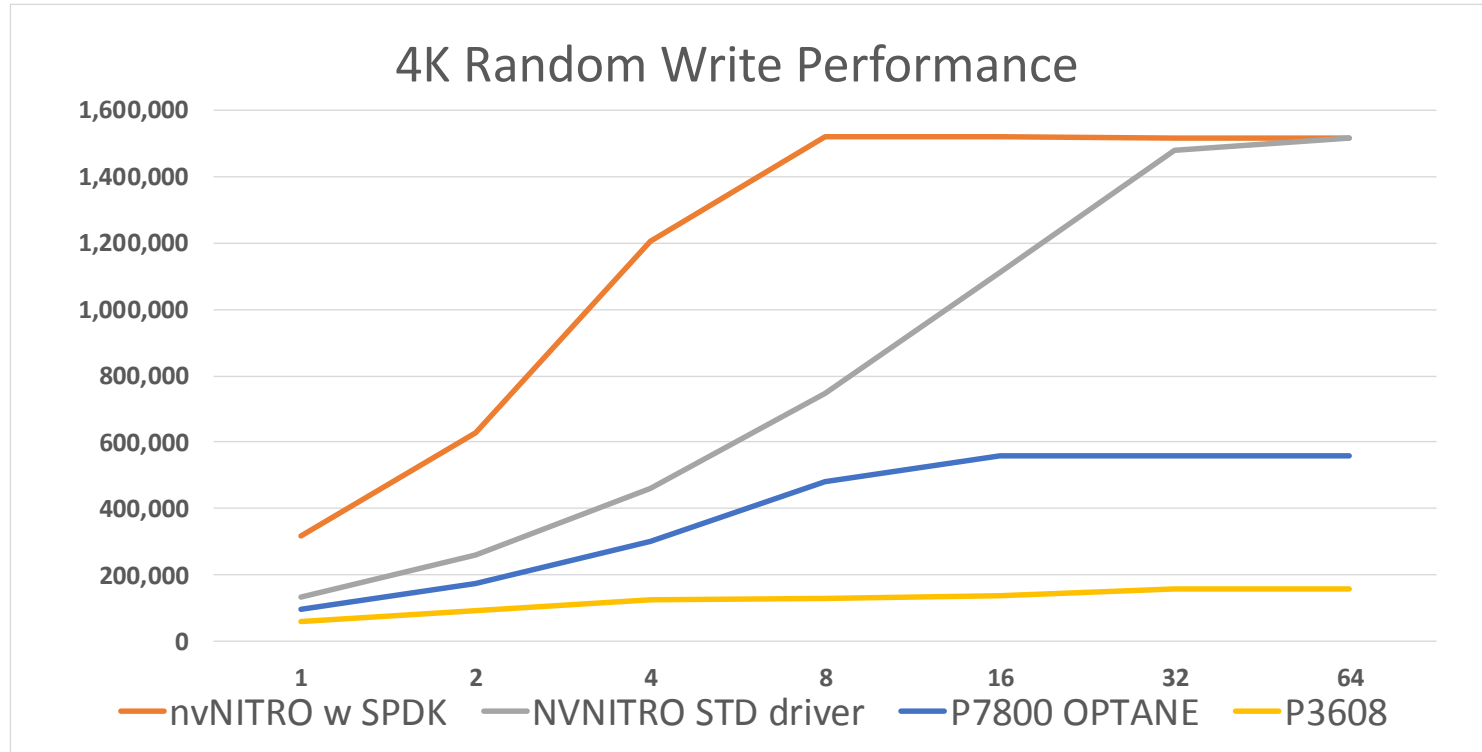
# Very Low and Consistent Latency



When latency really matters averages don't!



# Industry Leading Write Performance





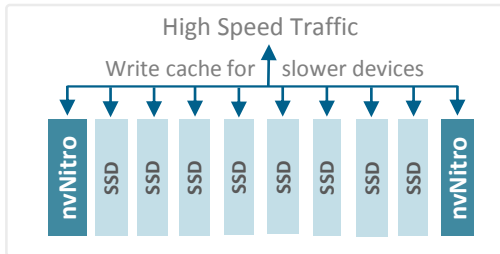


# nvNITRO™ Usage Models

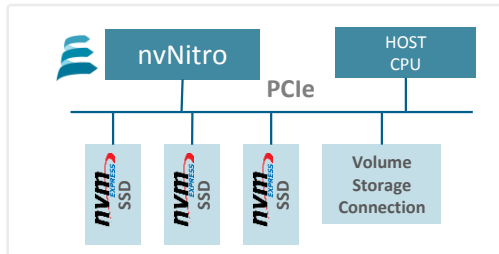
How do you use something that is  
incredibly fast but small?



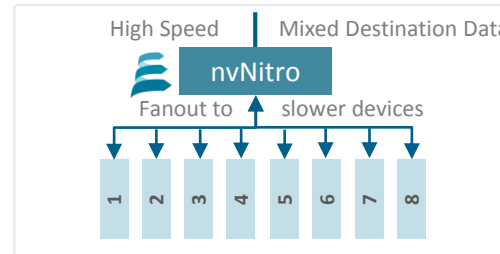
# Enterprise Storage Acceleration



SSD Storage Array



File Systems

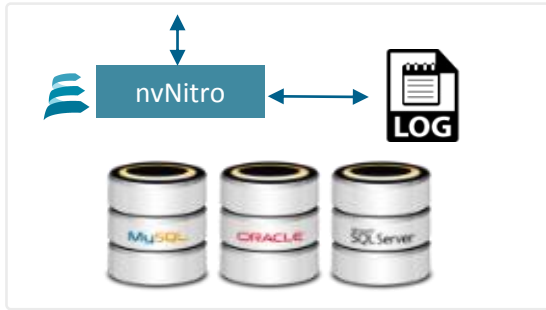


Burst Data Serializer

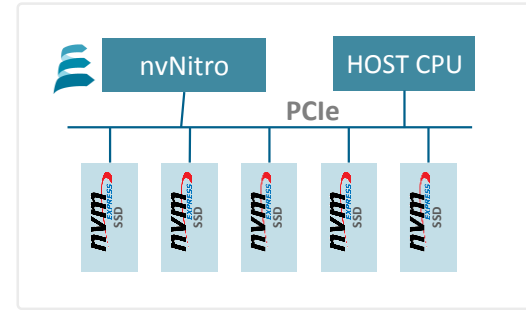
Power Fail Safe for Buffers, Caches & Journals



# Enterprise Application Acceleration



Tiering & OLTP Log Cache (LC)



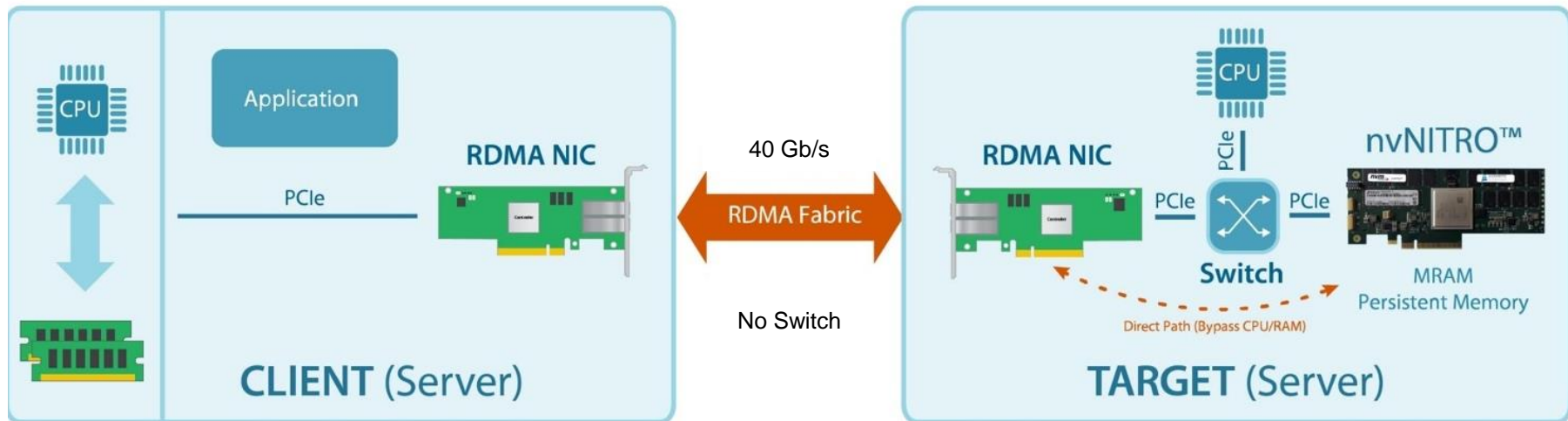
Software & NVMe RAID

Power Fail Safe Database Logs and RAID Journals & Data in Flight



# Remote Persistent Memory Systems

## Peer-to-Peer with Byte Mode



- **Write 10M 64-Byte msgs/sec remotely to a power fail safe buffer**
  - End-End latency of less than 2uS
- **Write 4GB/s of data to a remote power fail safe buffer on 40Gb/s fabric**



# Solve Your Latency Challenges NOW

- 1GB Application Development platform available now
- Production HHHL and U.2 (1GB and 2GB densities) available this year
- 4X Density available next year

## Thank You