NVM Express® over Fabrics
Storage Solutions for Real-time Analytics

Presented by
Paul Prince, CTO

Mangstor

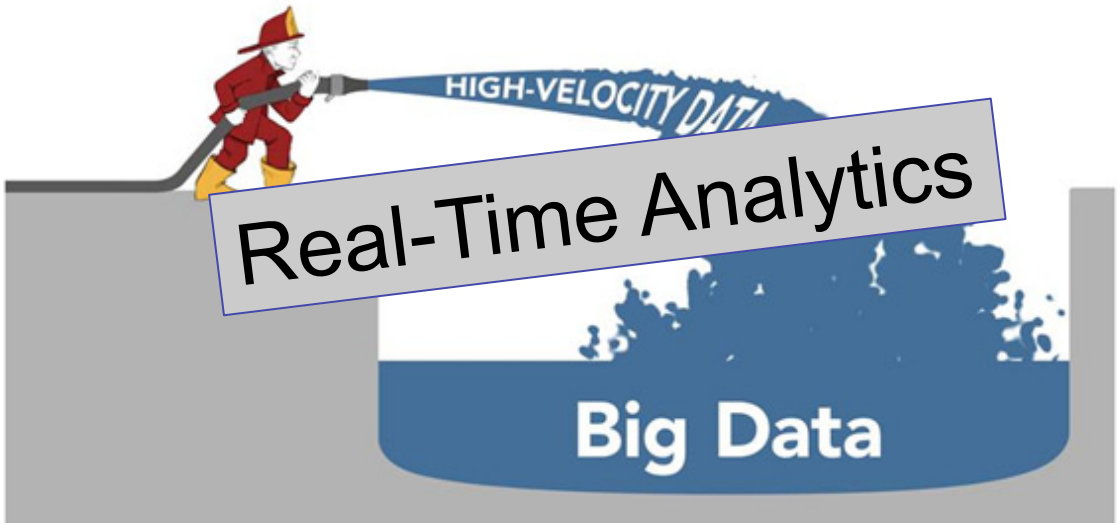
NVMe Over Fabrics… " NVMf "

- Why do we need NVMf ?
- What is it ?
- How does it fit in the Market ?
- Example Solutions
- What's in the Future ?

At the Intersection of High Velocity & Big Data

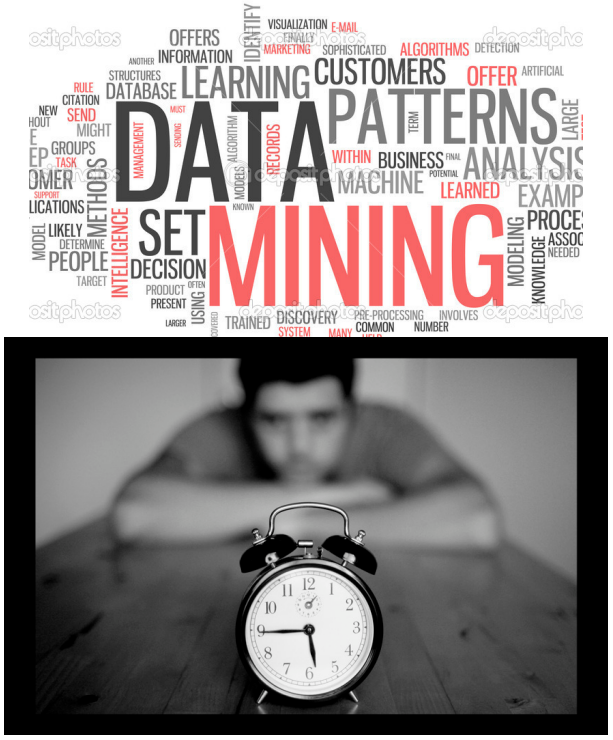
High-Velocity Data
- Real-Time
- Performance & Volume Challenges
- Use Cases: Operations & Analytics

Big Data
- Batch Process
- Volume Challenge
- Use Case: Analytics



Source: ScaleDB

…I need to get more business value out of my datacenter [CIO]



…the questions are getting more complex and the answers have to be there immediately [Data Scientist]

Looking for Needles

"Identify full-length transcripts using 2nd and 3rd generation sequencing in bone marrow cell populations"

Cancer Center project

6/25/2014

Wellstein/Riegel Laboratory, Lombardi Cancer Center, Washington DC 20007

Source: Slideshare

Agenda

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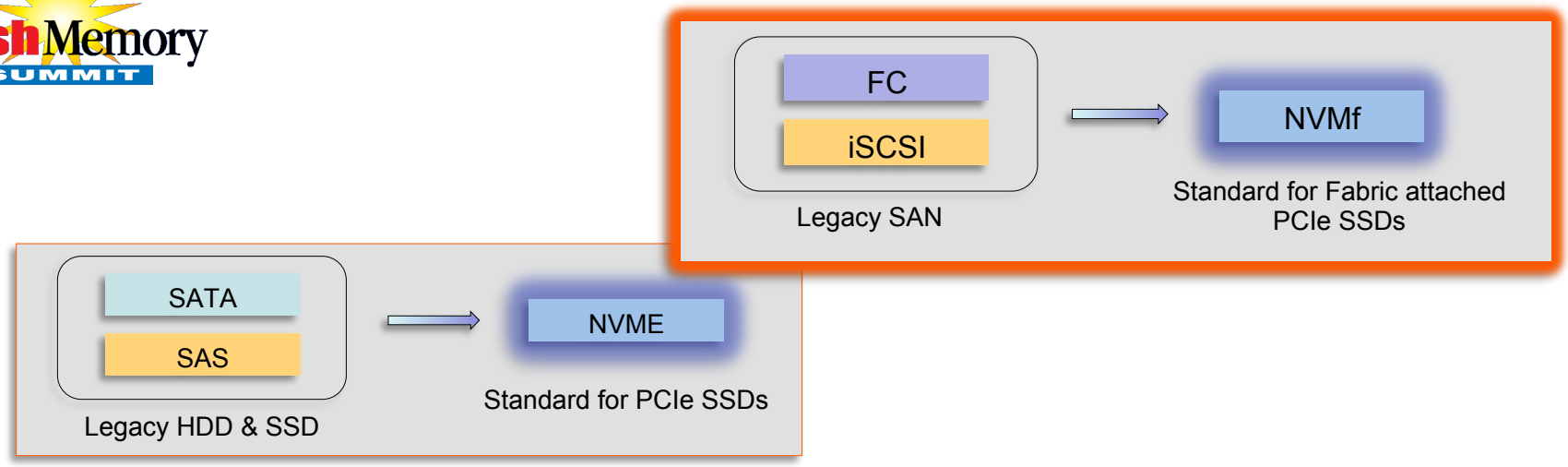
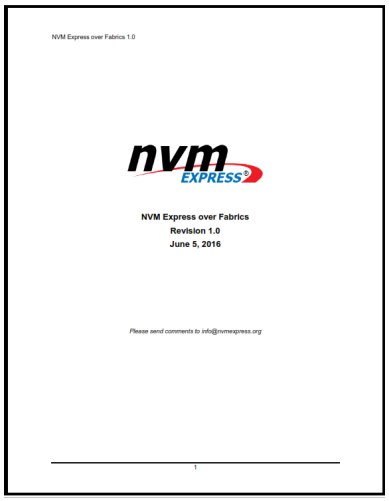

FC
iSCSI
Legacy SAN
NVMf
Standard for Fabric attached PCIe SSDs
SATA
SAS
Legacy HDD & SSD
NVME
Standard for PCIe SSDs


NVM Express over Fabrics 1.0

nvm EXPRESS

NVM Express over Fabrics
Revision 1.0
June 5, 2016

Please send comments to info@nvmexpress.org

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NVM EXPRESS®

NVM Express® over Fabrics Specification Released

NVMe Management Interface Specification Also Published

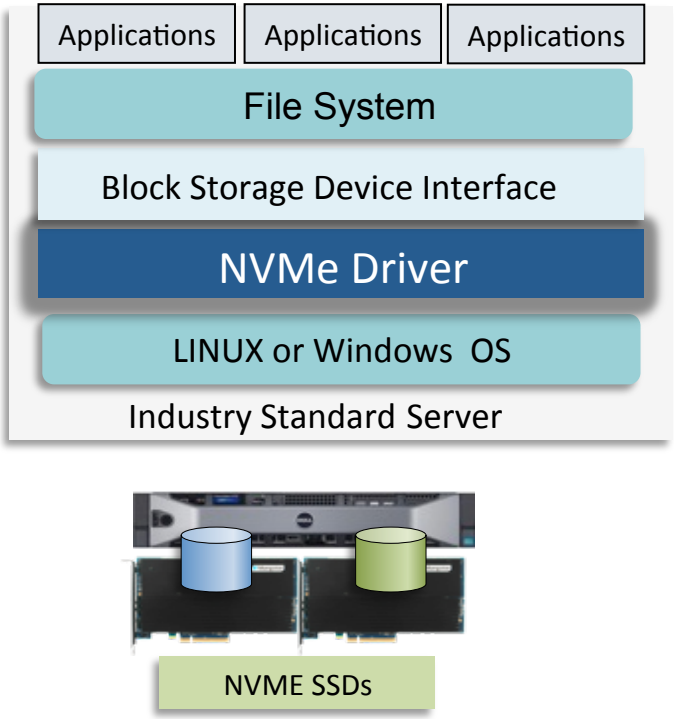
WAKEFIELD, Mass. – June 9, 2016 – NVM Express, Inc., the organization that developed the NVM Express® specification for accessing solid-state storage technologies on a PCI Express (PCIe) bus, today announced the release of its NVM Express over Fabrics specification for accessing storage devices and systems over Ethernet, Fibre Channel, InfiniBand™, and other network fabrics. NVM Express, Inc. has also recently published Version 1.0 of the NVM Express Management Interface specification.

The NVM Express over Fabrics specification extends the benefits of NVM Express beyond rack-scale architectures to datacenter-wide Fabric architectures supporting thousands of solid state devices, where using a fabric as an attach point to the host is more appropriate than using PCI Express.

Storage technologies are rapidly advancing to provide significant performance improvement for today's cutting-edge applications. NVM Express over Fabrics enables efficient storage I/O and reduction of I/O stack overheads. NVMe over Fabrics is an essential technology to extend NVMe storage connectivity such that NVMe-enabled hosts can access NVMe-enabled storage systems in the datacenter, thereby ensuring that today's solid state storage technologies is fully unlocked, and that the network itself is not a bottleneck.

> "…extends the benefits of NVM Express beyond rack-scale architectures to datacenter-wide Fabric architectures supporting thousands of solid state devices…"

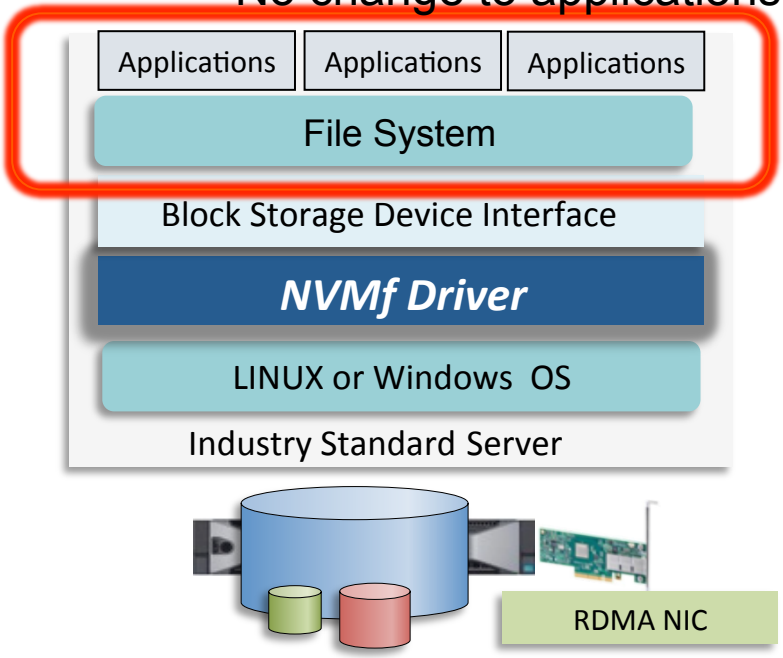
NVMe Local SSD model

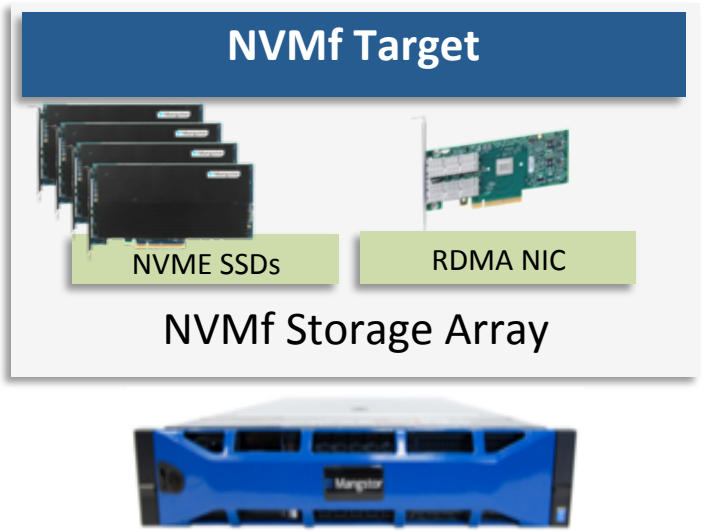


- ✓ Industry standard interface (Multiple sources)
- ✓ Great IO performance
- ✗ Fixed storage per server
- ✗ SW RAID required for large volumes

NVMf Remote SSD model

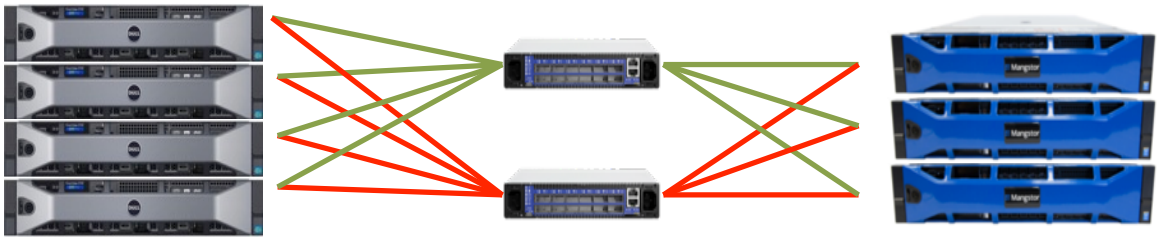
No change to applications



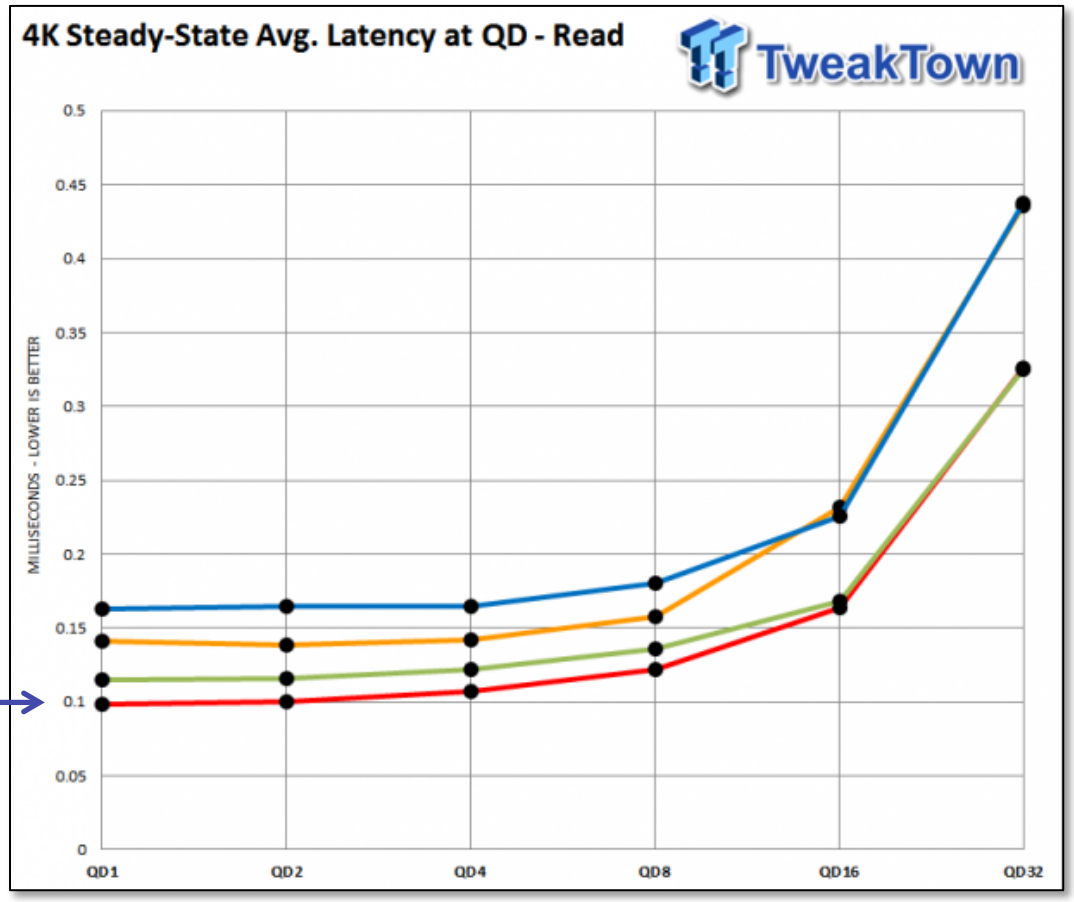


NVMf Benefits

- ✓ Industry standard interface (Multiple sources)
- ✓ Unlimited storage per server
- ✓ Scale storage independent of servers
- ✓ Efficient shared storage
- ✓ HA is straightforward
- ✓ ***Greater*** IO performance



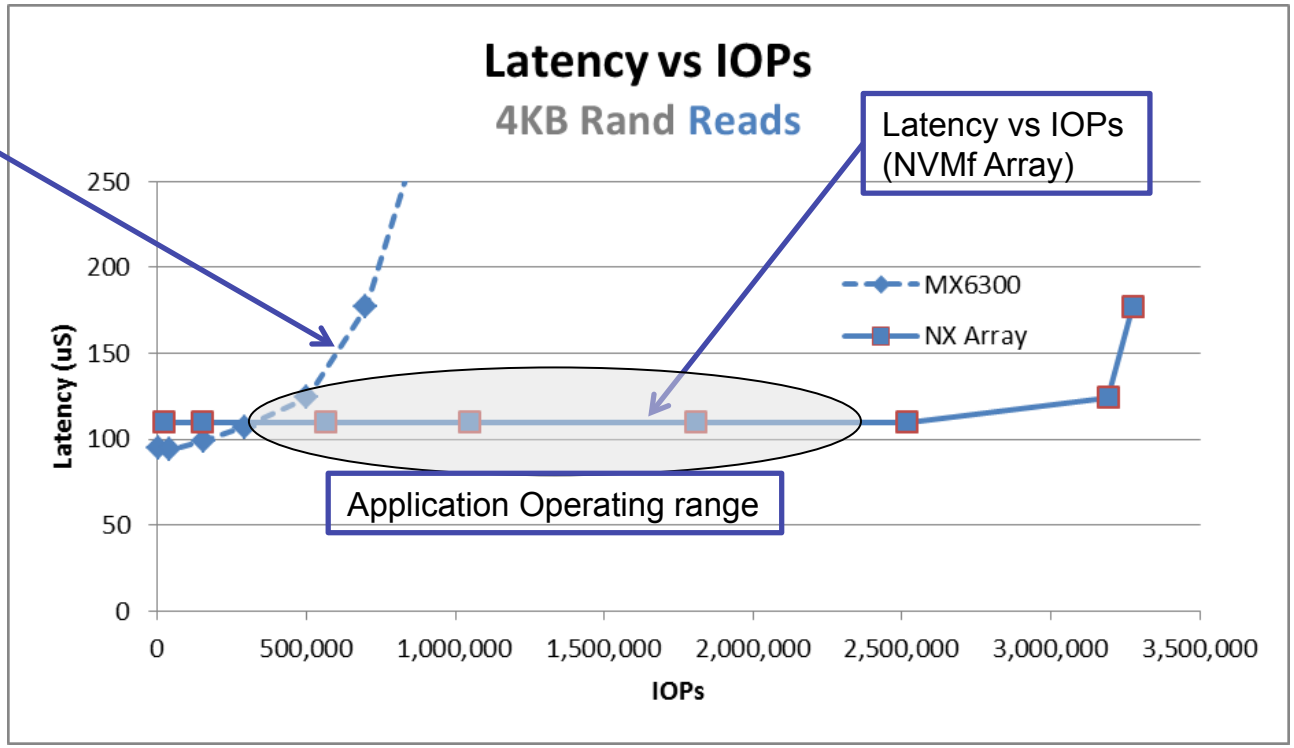
Typical SSD Latency (Reads)



100 uS

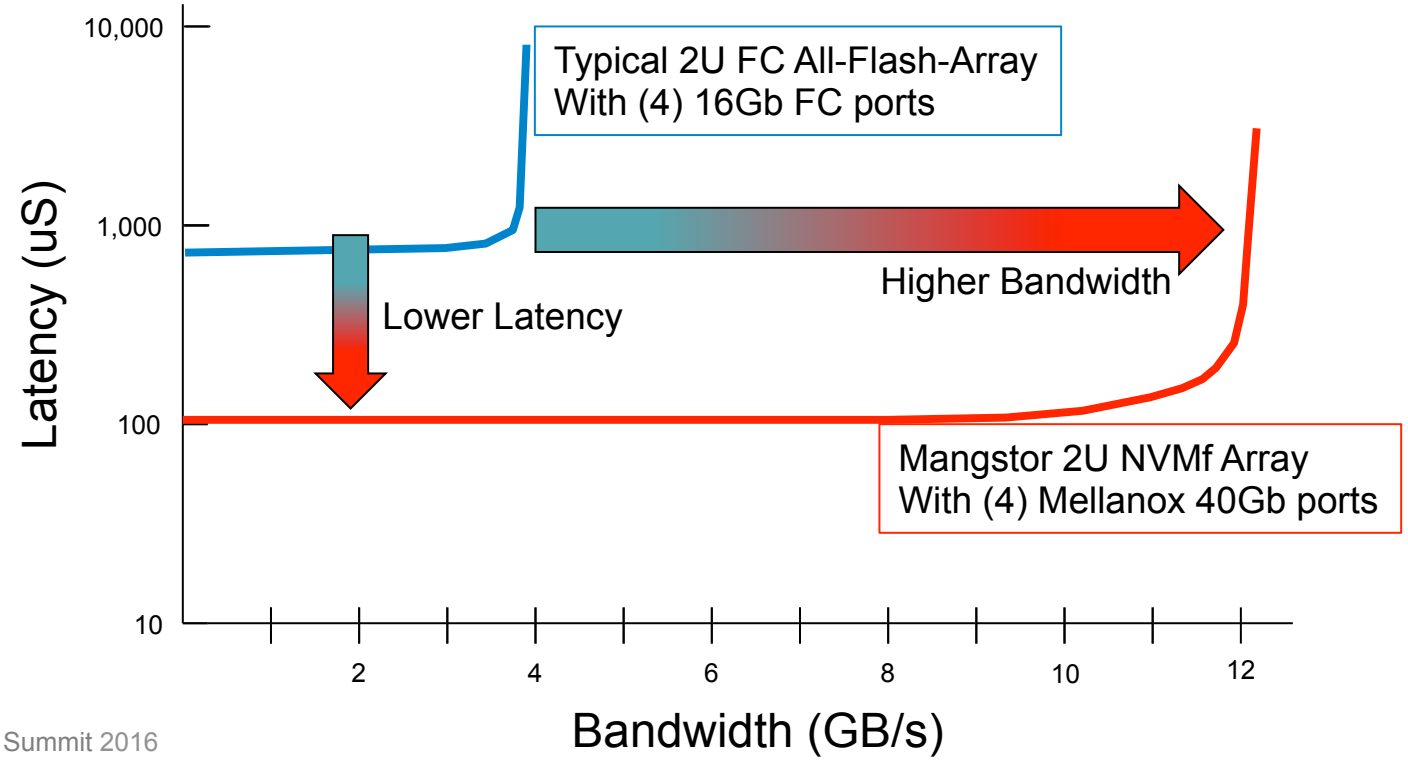
Local SSD vs NVMf Array (Reads)

Latency vs IOPs
Industry leading SSD



Source: Mangstor labs. Array data using (4) MX6300 SSDs and (2) Dual-port Mellanox Connect-X4™ 40Gb RoCE NICs connected thru Mellanox MSX1012 switch

NVMf is the new ***FAST***



The result…

…lightning fast query results with bigger databases

…get more work done with fewer compute resources

…keep up with fast influx of data and analyze it at the same time

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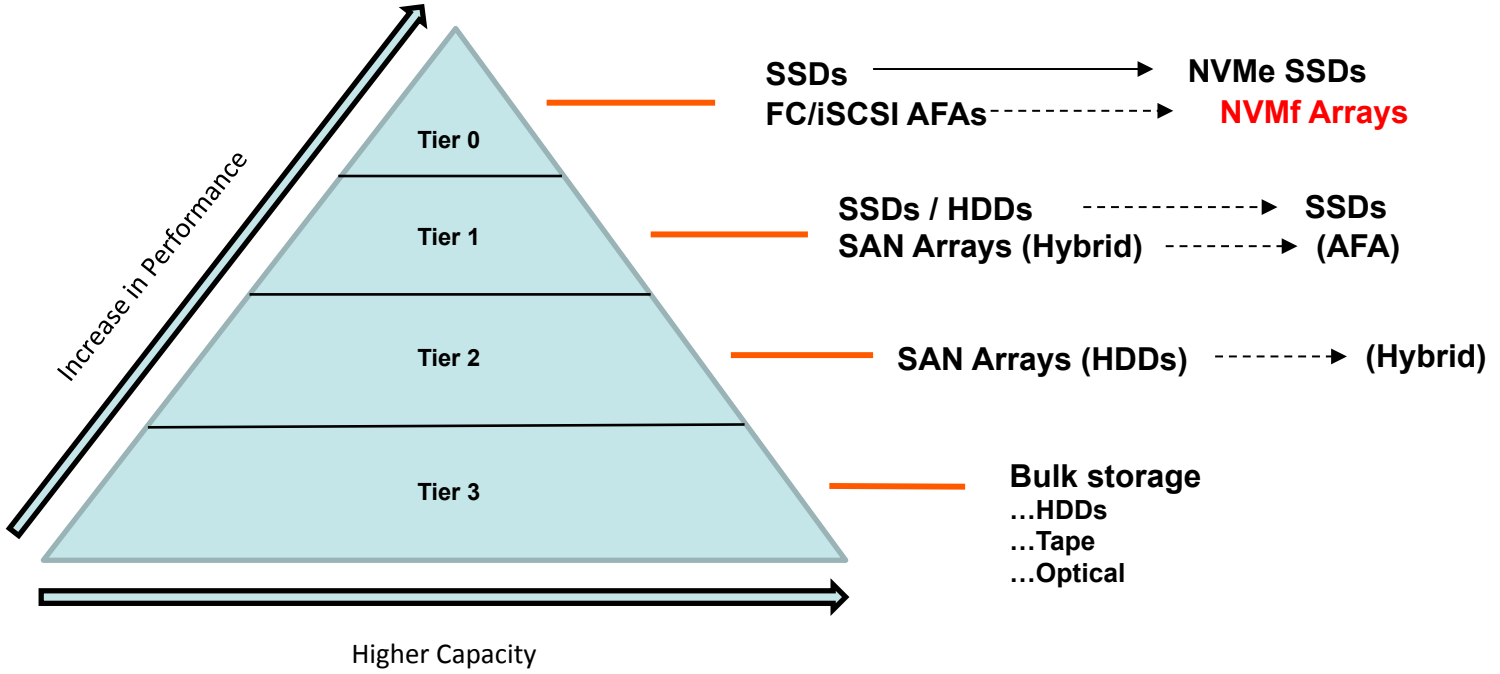
Storage Tiers

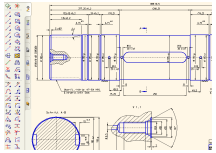


NVMf is ideal for:

HPC Applications:

Aerospace

Automotive



EDA

Financial

Life Sciences

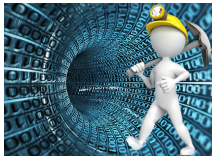
Oil & Gas

Database Applications

Online Shopping

Online Shop Analysis

Data Warehouse



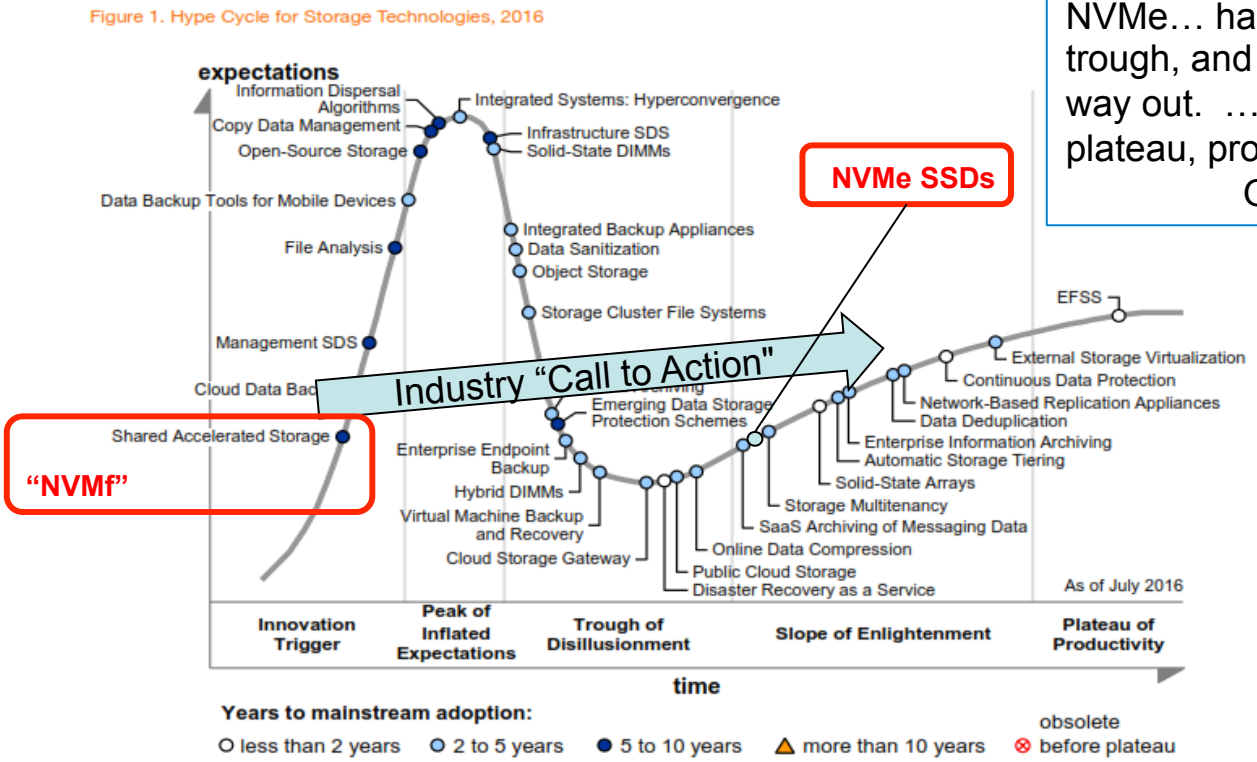
Data Mining

Gov't Applications

Military & Defense

Hype Cycle for Storage Technologies, 2016

NVMe… has gone through the trough, and is now working its way out. …2-5 years before the plateau, probably closer to 5.
Gartner, August 2016



Source: Gartner July 2016

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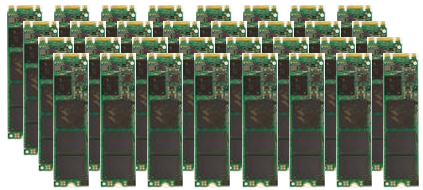
Solutions

Using all variants of NVMe devices

Add-In-Card

2.5” (U.2)

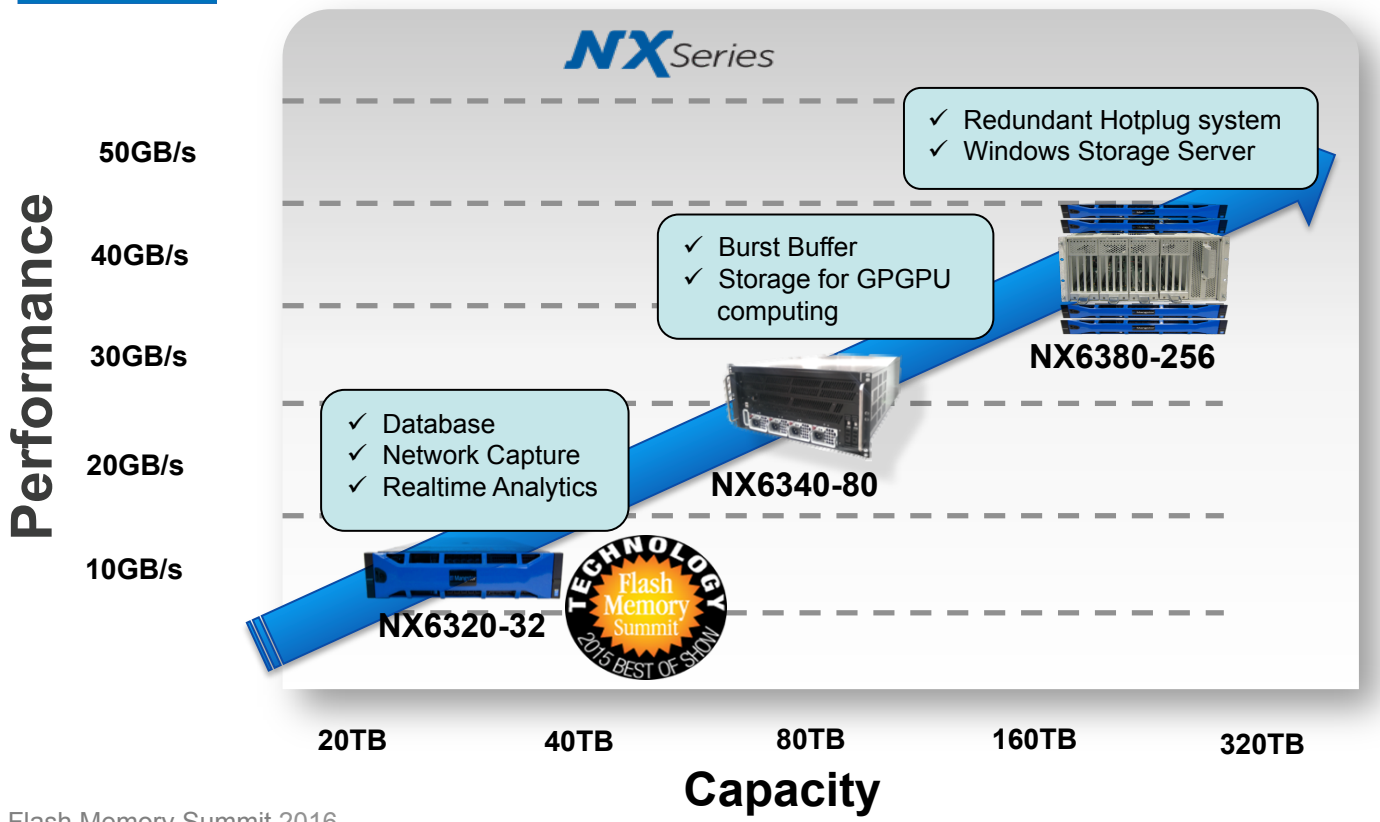


110mm (M.2)

Many chassis options…

Mangstor NVMf Product Portfolio

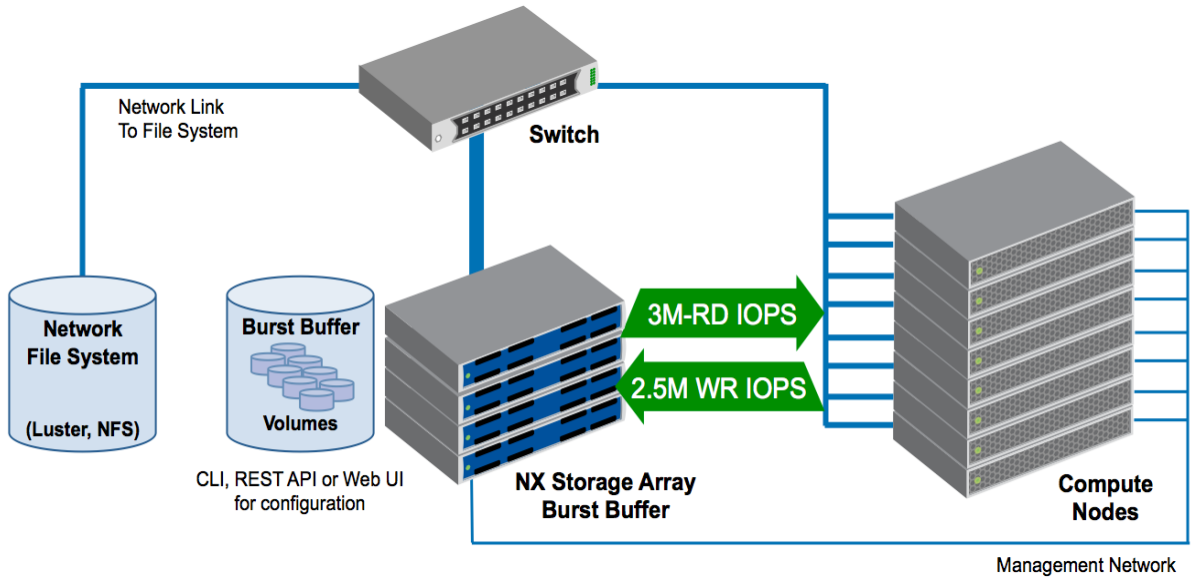
Available today!



- 640 TB
- 240 GB/s

In One 42U rack

Application: Burst Buffer



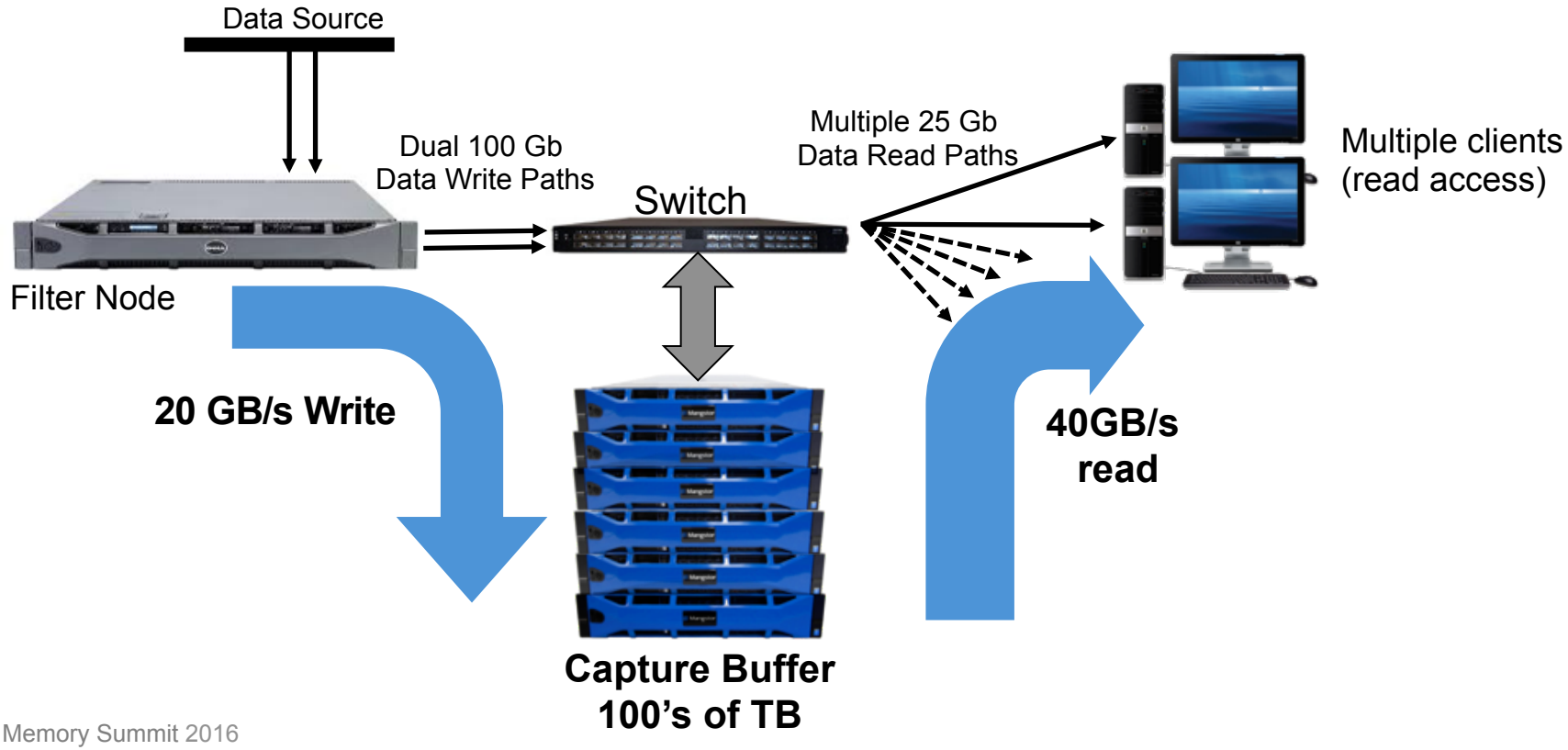
Use:

- Post-processing analysis of large simulation jobs
- In-transit visualization and analysis

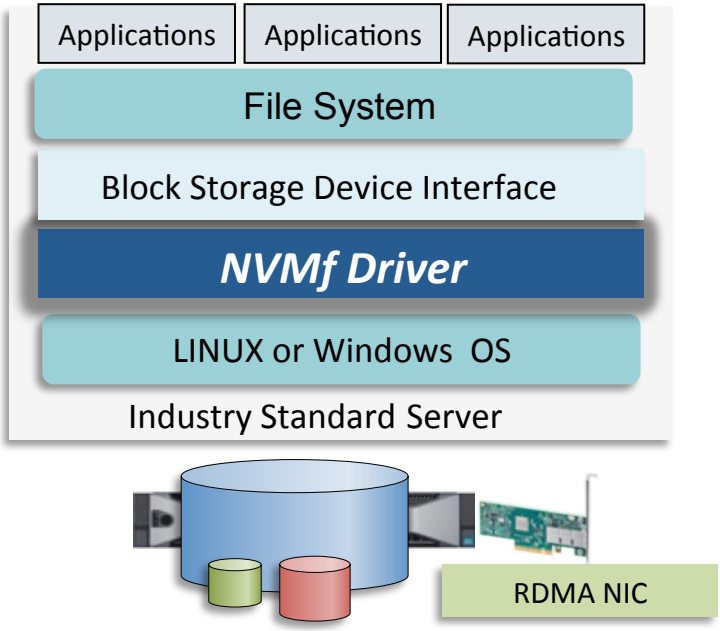
Burst Buffer Benefits:

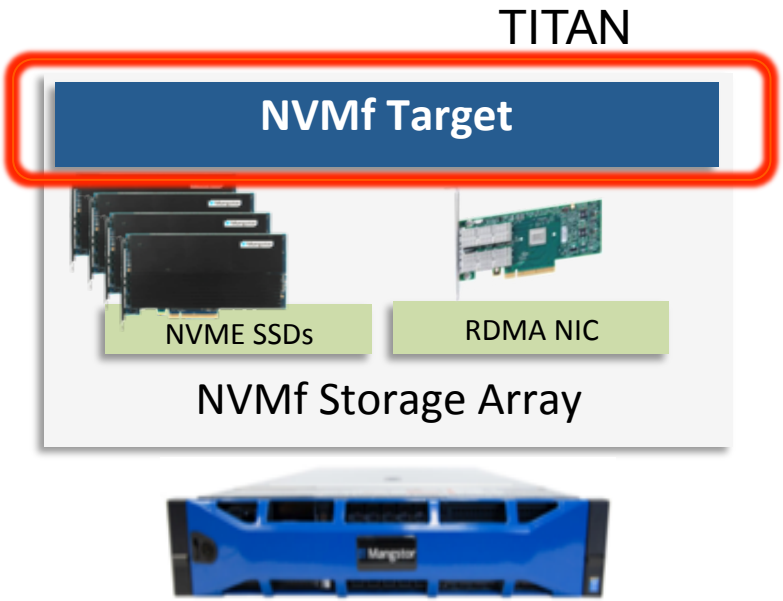
- Accelerated application analysis
- Fast temporary space
- Staging area large input files
- Persistent fast storage

Application: Data Capture & Analysis

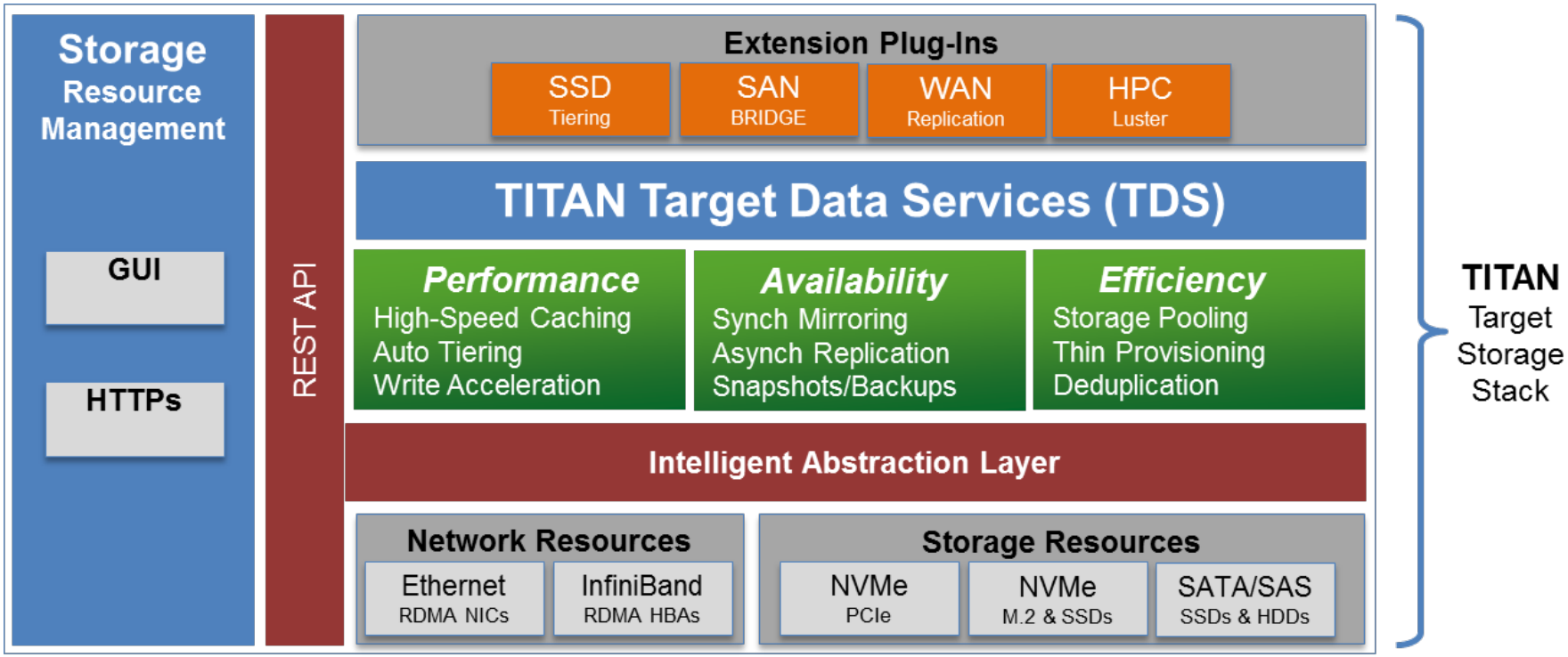


Introducing Mangstor TITAN

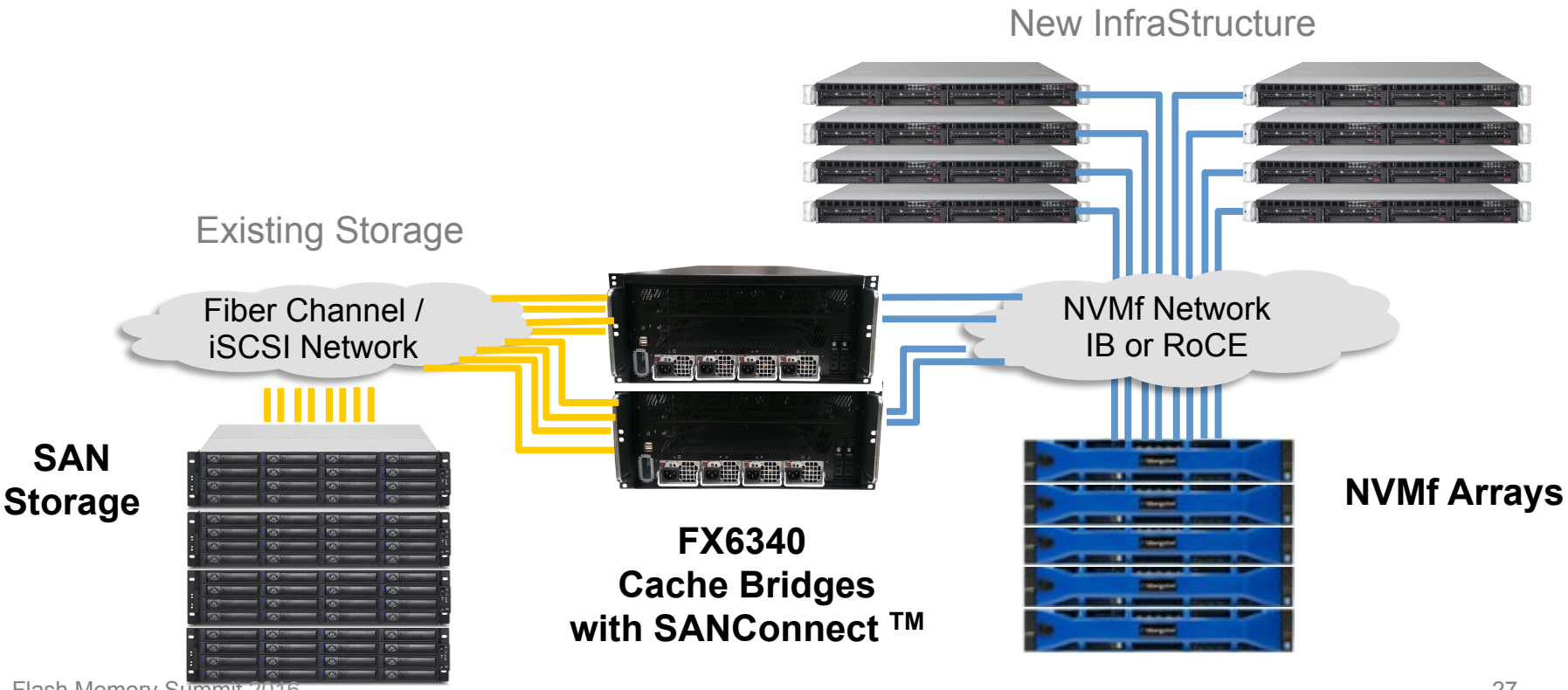




Mangstor *TITAN* NVMf Target SW



Connecting NVMf to SANs
SANConnect ™



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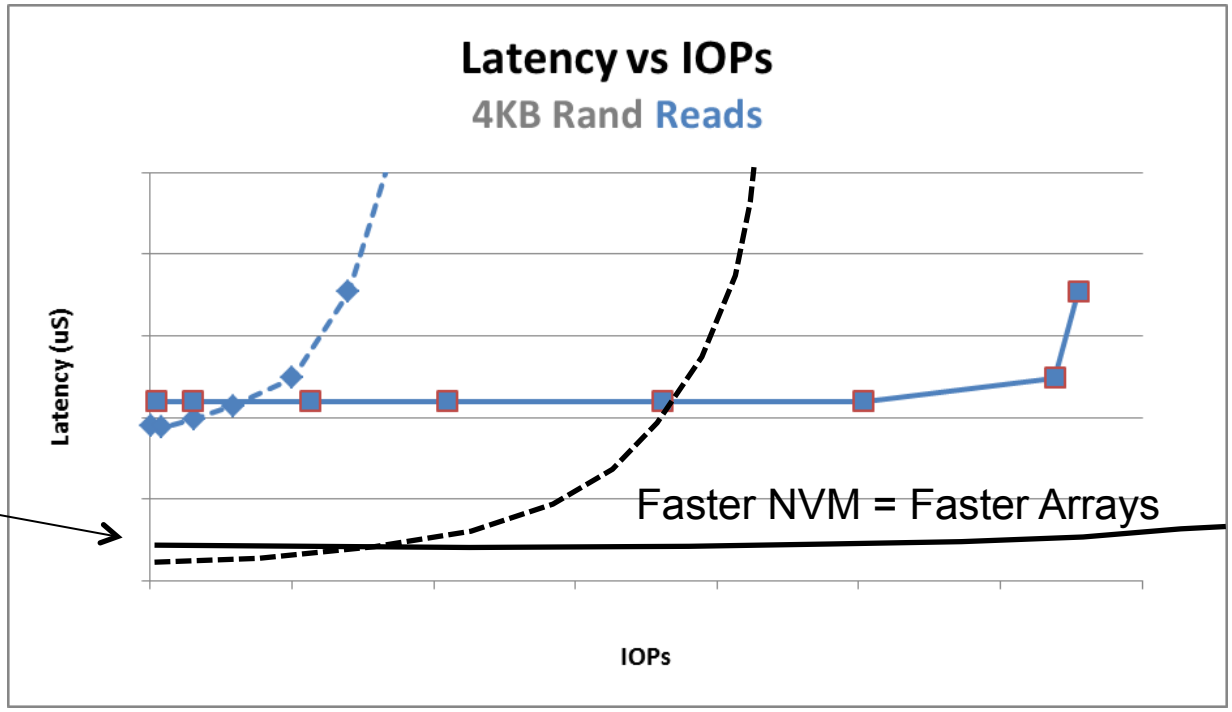
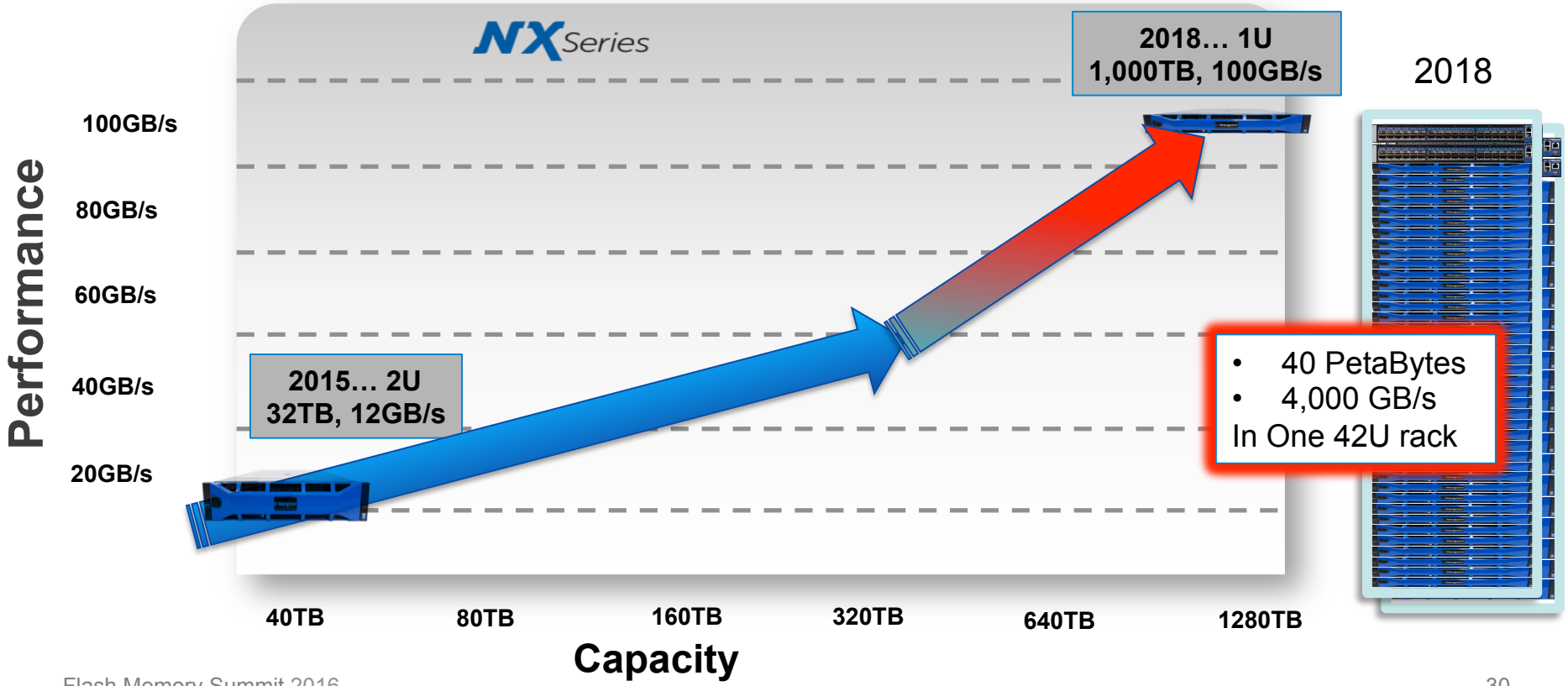
What about faster NVM?



Network overhead matters more

Where we are headed



Thank You

Paul Prince, CTO

www.mangstor.com