

# G2M Research Presentation

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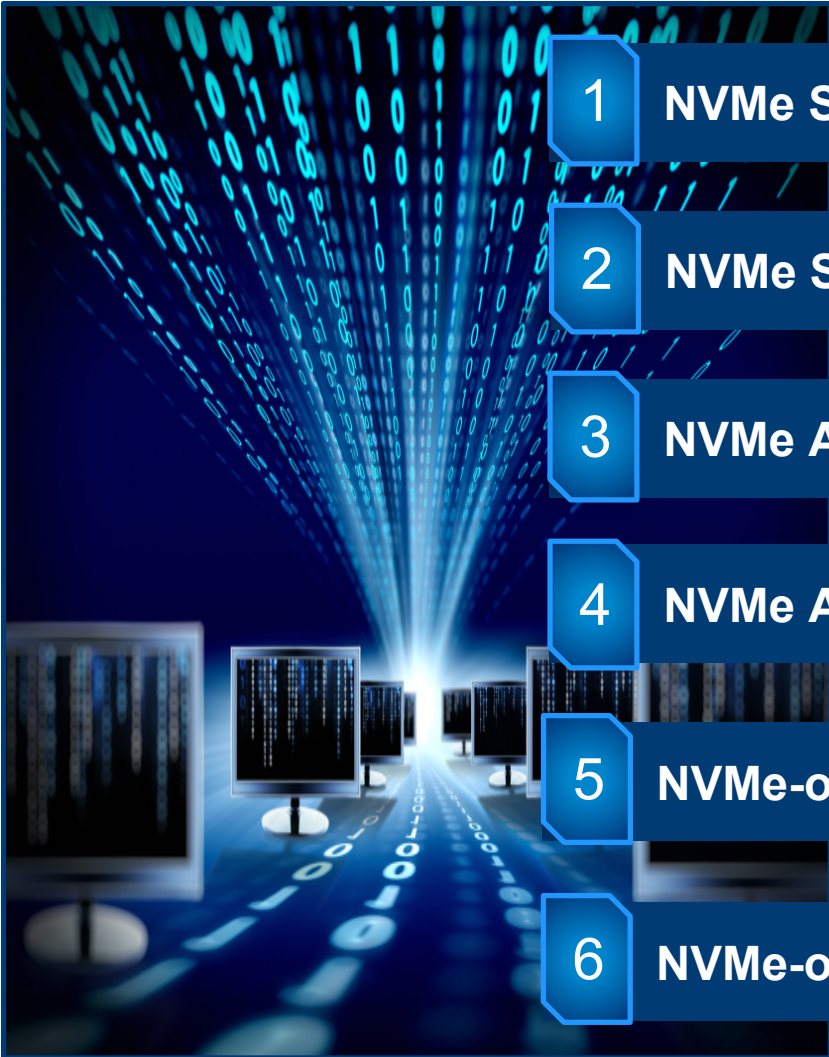
## ▶ Flash Memory Summit 2018

August 7, 2018

## ▶ The “Easy Facts” about NVMe

- ▶ NVMe SSDs will become ubiquitous over the next 1-2 years
  - This will be true for the Cloud, Enterprise, and Consumer Markets
  - SATA SSDs will primarily be focused on the HDD replacement market and for legacy all-flash arrays (AFAs)
- ▶ NVMe over Fabric (NVMe-oF) will ***eventually*** become the transport of choice for scale-out flash storage (SOFS), AFAs
  - Adoption has been paced by the adoption of NVMe by major flash array vendors
  - Ethernet flavors of NVMe-oF will be the predominant fabric connecting SOFS and AFAs to servers
  - Question is NVMe-oRoCE vs NVMe-oTCP, and standard NICs/RNICs vs FPGA/SoC implementations
- ▶ NVMe SSDs will migrate away from HDD-based “shapes”

# NVMe Market Size and Health – Spring 2018

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- 1 NVMe SSDs: 23 companies (+2), 96 models (+29)
  - 2 NVMe Servers: 13 companies (+4), 93 models (+56)
  - 3 NVMe AFAs: 11 companies (+3), 21 models (+13)
  - 4 NVMe Appliances: 8 companies (+1), 21 models (+13)
  - 5 NVMe-oF HBA/NICs/RNICs: 5 companies, 53 models
  - 6 NVMe-oF Accelerated Adapters: 6 companies (+1)

## Key Highlights From the NVMe Ecosystem

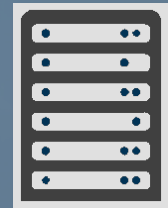
The # of available NVMe SSD models/series has increased 43% in the last 6 months



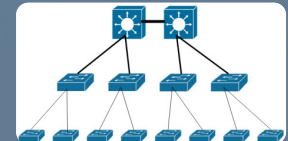
Every major All-Flash Array (AFA) company now offers NVMe and NVMe-oF based AFAs



The # of NVMe Servers has increased by 151%, while NVMe Storage Appliances increased by 62%



The # of NVMe-oF adapter models has increased by over 220% in the past 6 months



## Final Thoughts

- ▶ NVMe-based storage will follow the adoption pattern of AFAs
  - First in high-performance applications and real-time analytics
  - Then across nearly every mainline enterprise/cloud application
  - Think about it from the standpoint of “would you put a HDD in your next laptop”?
- ▶ Disaggregation (either as “distributed arrays” or as scale-out flash storage) is already happening, and will accelerate
  - Look for both to become part of HCI implementations
- ▶ Traffic congestion management will be a major hurdle that NVMe over Ethernet will have to resolve to become ubiquitous
  - LOTS of work in this area by a lot of companies, organizations
  - This is a fundamental issue with converged fabrics

## G2M Research Contact Information

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  - YouTube: - <http://bit.ly/1RhSDRQ>
  - SlideShare: <http://www.slideshare.net/G2MCommunications>



# Acronyms and Definition Check Point

Term	Definition
NVMe™	Non-Volatile Memory Express®
NVMe-oF™	Non-Volatile Memory Express® over Fabrics (Ethernet, InfiniBand, Fiber Channel)
NVMe Bay	NVMe connected 2.5" device slot typical installed into servers & arrays
NVMe I/O Block	NVMe based I/O card (Ethernet, InfiniBand, Fiber Channel)
NVMe Accelerator Block	NVMe based CPU, GPU or FPGA based card for analytics or clustering
SSD	Solid State Drive
M.2	A small form factor "mezzanine" SSD for laptops and cloud servers
U.2	The new name for an SFF-8639 connector (primary NVMe Bay connector); 2.5" form factor
RDMA	Remote Direct Memory Access (Typically RoCE or iWARP )
RoCE	Remote Direct Memory Access over Converged Ethernet
iWARP	internet Wide Area RDMA Protocol
AFA	All Flash Array
Hyperscale	Non-enterprise servers or data center such as OCP, Cloud, Google etc.
PCIe®	Peripheral Component Interconnect Express
PCIe AOC	PCIe Add-On Card (for NVMe, usually an SSD form factor)
SAS/SATA	Serial Attached SCSI/Serial Advanced Technology Attachment (originally a HDD interface)
SATA	Serial AT (Advanced Technology) Attachment
SOFS	Scale-Out Flash Storage Software
SDS	Software Defined Storage