Optimizing Storage Solutions for Data Center Applications

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Addressing the Next Waves of Innovation & Productivity Growth

Megascale SW-Defined Infrastructure

1st Wave
1983
Personal computing

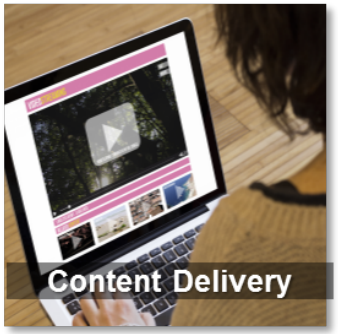
2nd Wave
1995
Internet era

3rd Wave
2007
Mobile era

4th Wave
2011
Cloud era

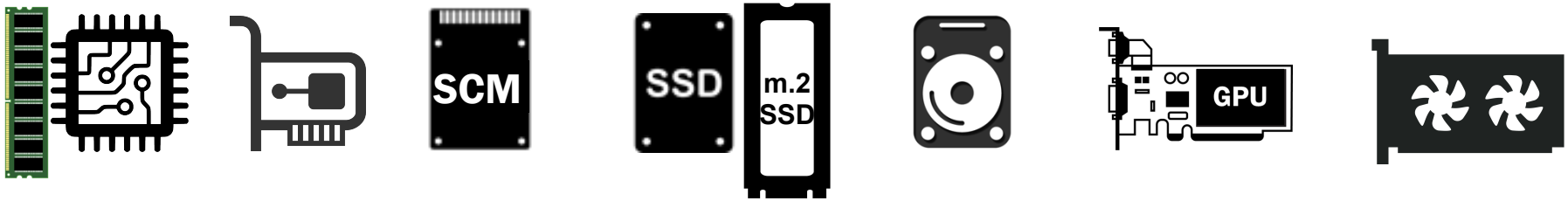
5th Wave
2018
Data era

Increasing Data Generated Driving Multiple Data Center Workloads



Continuously evolving with tomorrow's being unknown

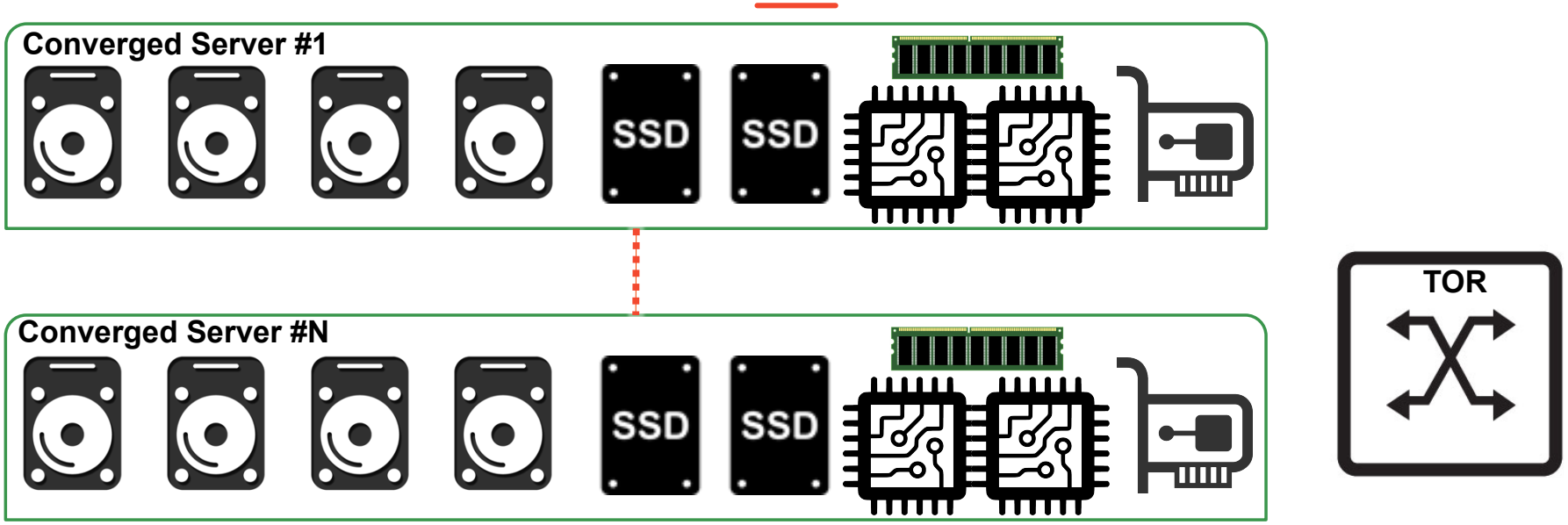
Data Center Clients Seek “Optimal” Resources for their Application



Compute	Networking	NVMe Storage Class Memory	SATA & NVMe SSD Storage	SAS & SATA HDD Storage	GPU Accelerators	Application Accelerators

Most data center operators utilizing software-defined converged servers
Innovators have moved to disaggregated infrastructure starting with storage

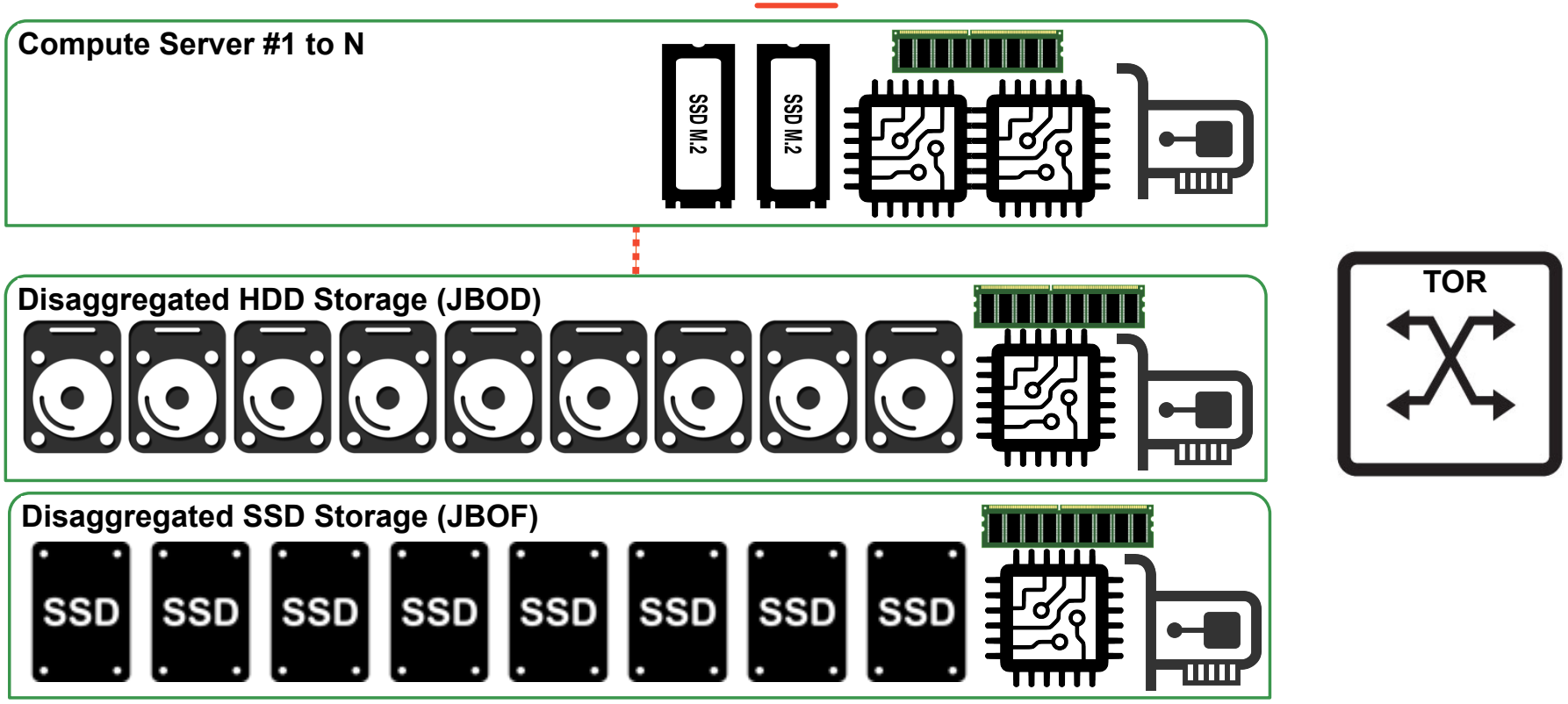
Today's Converged Server Infrastructure Architecture



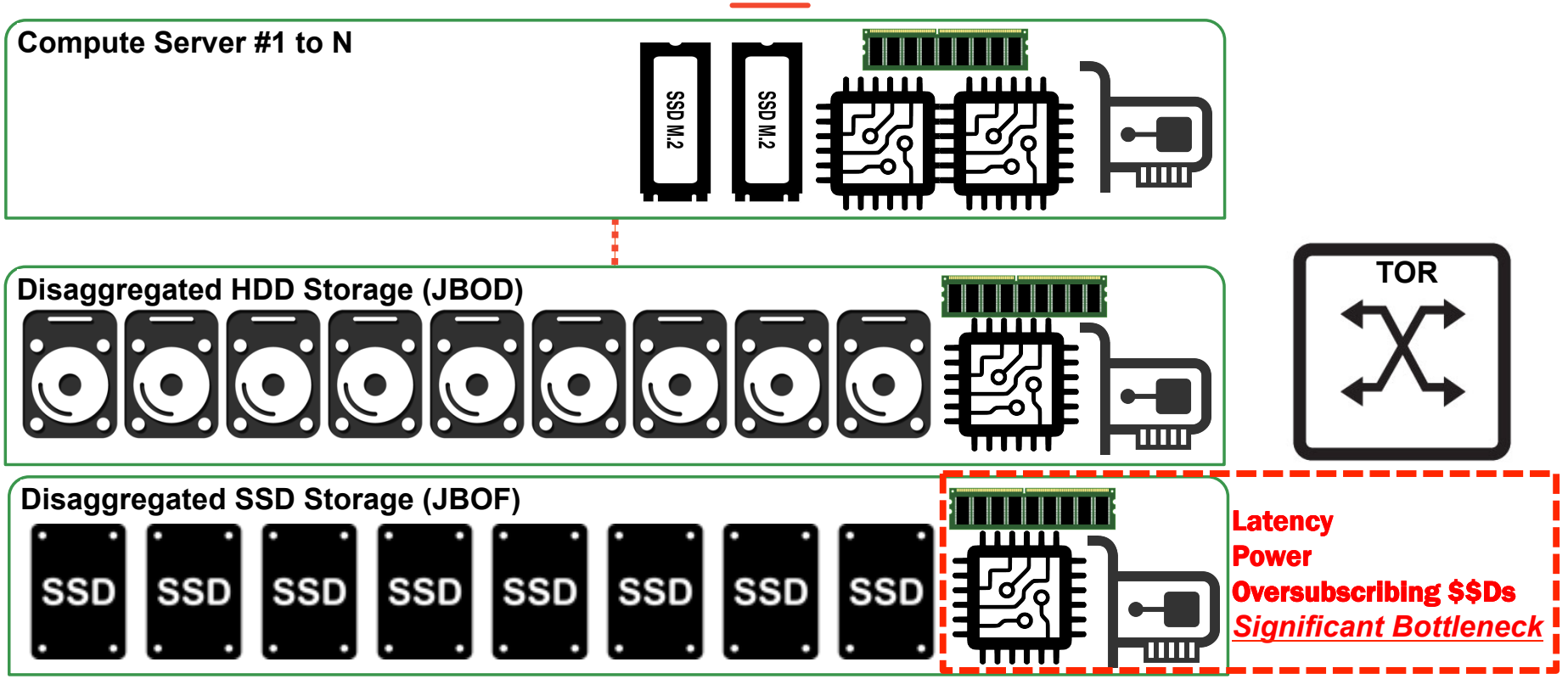
Common building block designed to balance efficiency vs growth

Challenged to address evolving data center application requirements

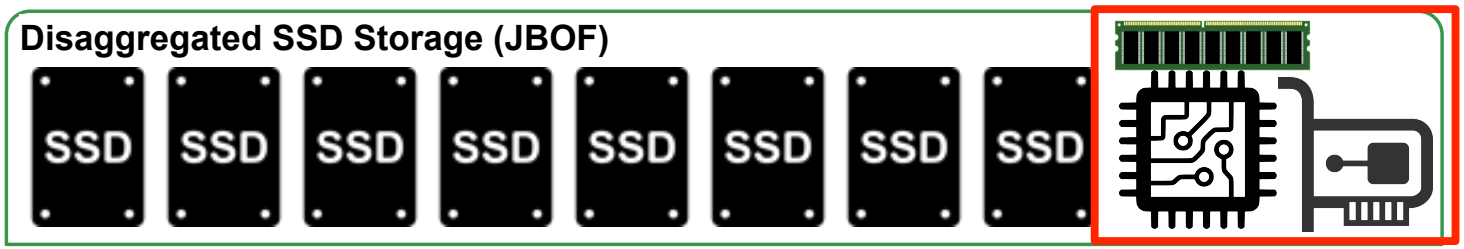
Today's Disaggregated Storage Solutions Improve Efficiencies

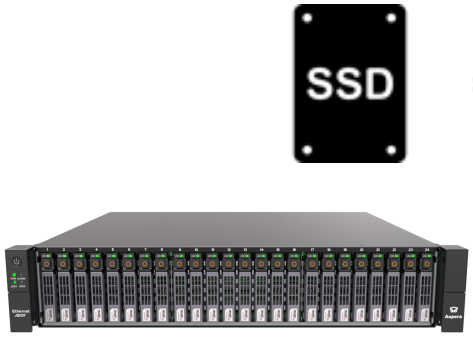


Today's Disaggregated Storage Solutions Improve Efficiencies but…



How Significant is Bottleneck?





PCIe Gen3x4 32Gbps → 768Gbps

PCIe Gen4x4 64Gbps → 1.5Tbps

PCIe Gen5x4 128Gbps → 3.0Tbps

Huge bandwidth pipe bottleneck combined with CPU+DRAM+NIC+PCIe switch power, cost & latency increase TCO

New high-performance, low-latency scalable architecture needed

Introducing Revolutionary Disaggregation Building Block

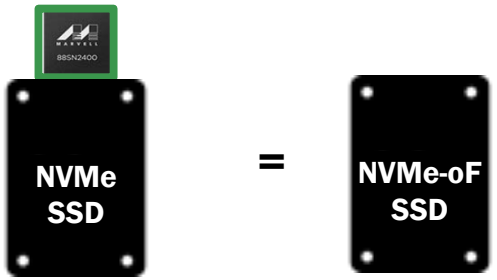
MARVELL®

Industry's 1st NVMe-oF SSD Converter Controller

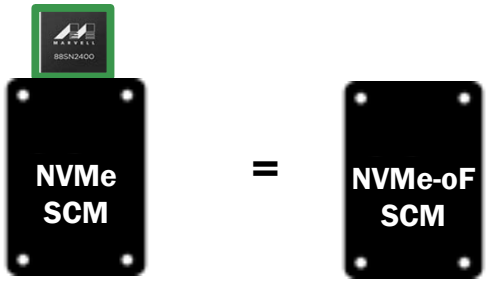
Turns any x4 NVMe SSD into a 25G NVMe-oF SSD
<750ns latency
upto 700kIOPS
<1.5W operating power
13x13mm package

https://www.marvell.com/storage/system-solutions/nvme-controllers/

NVMe-oF Converter Controller Enables NVMe-oF SSD & SCM



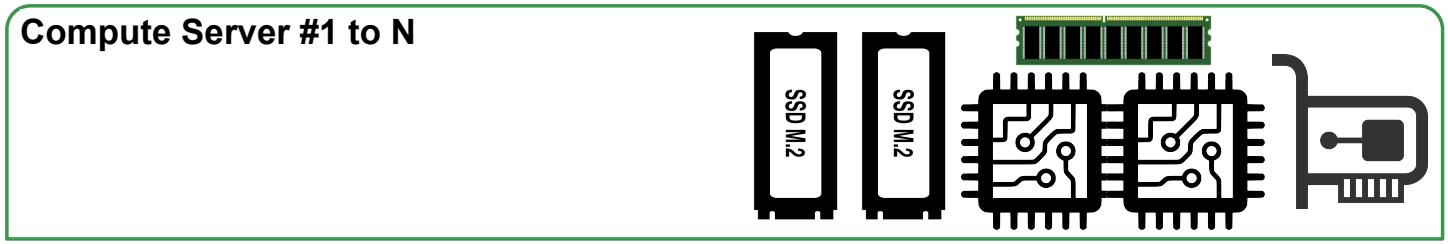
NVMe-oF SSD
upto 700k IOPs
<700ns added latency



NVMe-oF SCM
upto 700k IOPs
<700ns added latency

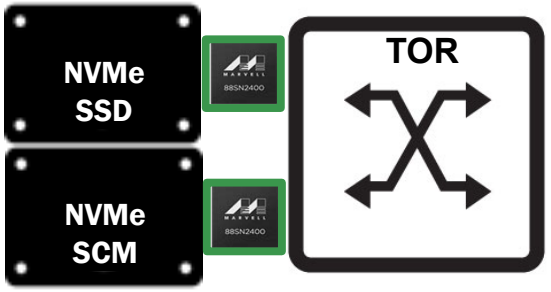
https://www.marvell.com/storage/system-solutions/nvme-controllers/

Tomorrow's SW-Defined Data Center with TOR NVMe-oF SSDs & SCM



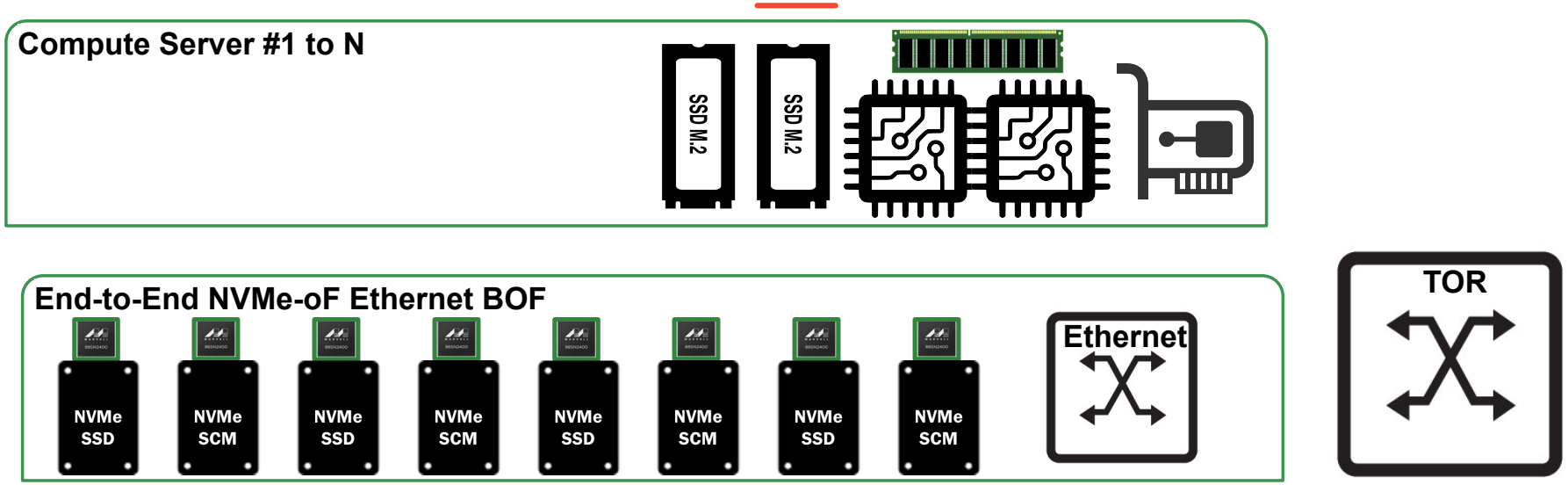
Shared high performance low-latency 700k IOPS SSD

Shared high performance low-latency 700k IOPS SCM
Lower than NVMe-oF SSD latency



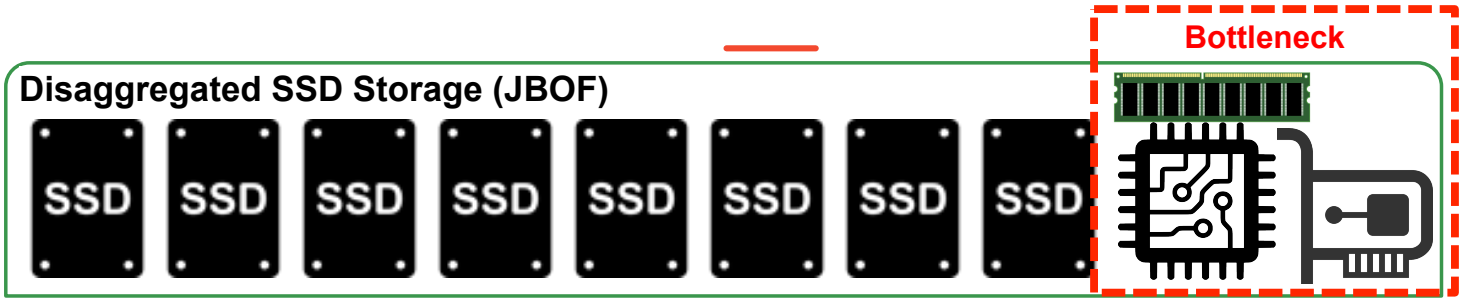
Top-of-rack low-latency, linear scalable NVMe-oF SSDs & SCM

Tomorrow's SW-Defined Data Center with End-to-End NVMe-oF EBOF



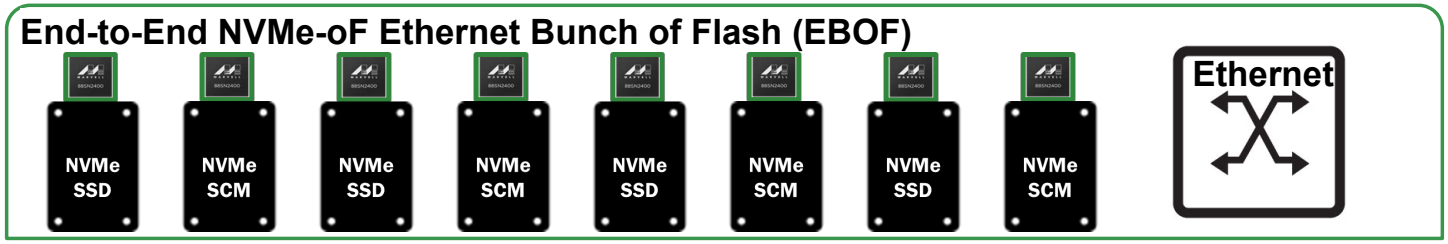
End-to-End NVMe-oF EBOF: simple, scalable linear native performance!
Optimizes $ per IOPS & IOPs per GB
24 NVMe-oF SSDs = upto 16M IOPs

Comparing Traditional NVMe-oF JBOF vs End-to-End EBOF



High TCO

Limited performance, high CPU power & high BOM



Low TCO

Simple native scalable performance with extremely lower power consumption

>65%* TCO Savings excluding SSDs

*Toshiba & Marvell TCO analysis

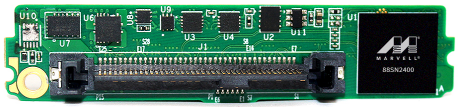
Live FMS Demo in Toshiba Booth

2RU 24 x NVMe-oF SSD High-Availability Ethernet BOF
Dual 6x100GE

2.5” U.2 Dual-ported
Native NVMe-oF SSD

14M IOPs!!!

Future Enterprise Storage Array



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Aupera
Making Video Alive

MARVELL®

Summary

- Cloud & data generation eras driving need for new software-defined infrastructure
- Current converged server & disaggregated architectures challenged to scale
- Marvell NVMe-oF SSD converter controller revolutionizes DC storage units of scale
- End-to-end NVMe-oF Ethernet BOF offers data centers highest storage performance

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Visit Marvell & Toshiba FMS booths for NVMe-oF innovations

Thank you