Introducing Industry's First Native NVMe RAID Accelerator

Overview

Company founded **1995**	FY20 revenue **$2.7B**
Employees **5,000+**	Patents worldwide **10,000+**

Located in **Santa Clara, CA**

R&D centers in **US, Israel, India, Germany, China**

Marvell's Mission

We develop and deliver semiconductor solutions that move, store, process and secure the world's data faster and more reliably than anyone else.

Marvell offers

the most complete data infrastructure portfolio

Processors
#1 in baseband and data plane processors

Storage
#1 in HDD and SSD controllers, Fibre Channel

Networking
#2 in Switches and PHYs

Security
#1 in security processors

Marvell Flash

Unleashing high-performance, accelerated data storage

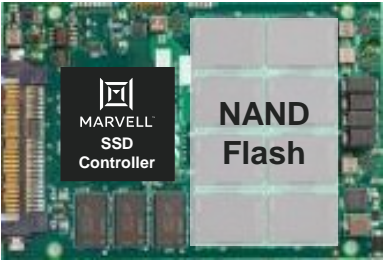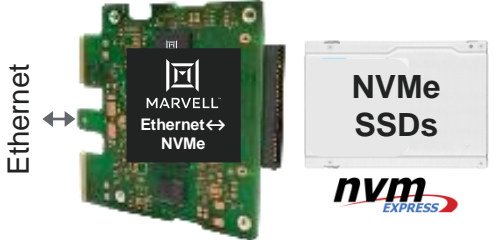- >300M SSD controllers shipped

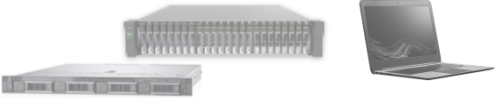- 2,300+ storage-related patents

- 7 generations of SSD interfaces spanning SATA, SAS, PCIe and Ethernet

Premier Flash storage silicon supplier

Merchant & custom ASICs | Firmware | NAND flexibility | Solution customization

Store
Market leader

NAND Flash

MARVELL SSD Controller

Data Center
Low latency

Edge
User experience

Accelerate
15-year storage expertise

MARVELL NVMe Accelerator

NVMe SSDs

Data Center
Efficiency, multi-tenant

Convert
Industry innovator

Ethernet

MARVELL Ethernet↔NVMe

NVMe SSDs

Data Center
Scalability, utilization

Industry's first native NVMe RAID accelerator

- **Key Application**: HW RAID 1 (replication) across NVMe M.2 SSDs
- **Main Use Case:** Improving Server NVMe boot resiliency
- **Performance**: 3x-6x compared with SATA solutions
- **Easy to consume and integrate**:
  - Native OS NVMe host or in-box drivers
  - No on-going licensing fees
  - System OEM customizable
- **Ultra-efficient design**: DRAM-less design (88NR2241)
  - Low latency and low power optimized single chip architecture
  - No battery / supercap required on the card
- **Complete Turnkey Solution**: IC, FW and Board

MARVELL 88NR2241 — NVMe M.2 SSDs

nvm EXPRESS

In-box driver support:

Windows Server   Linux

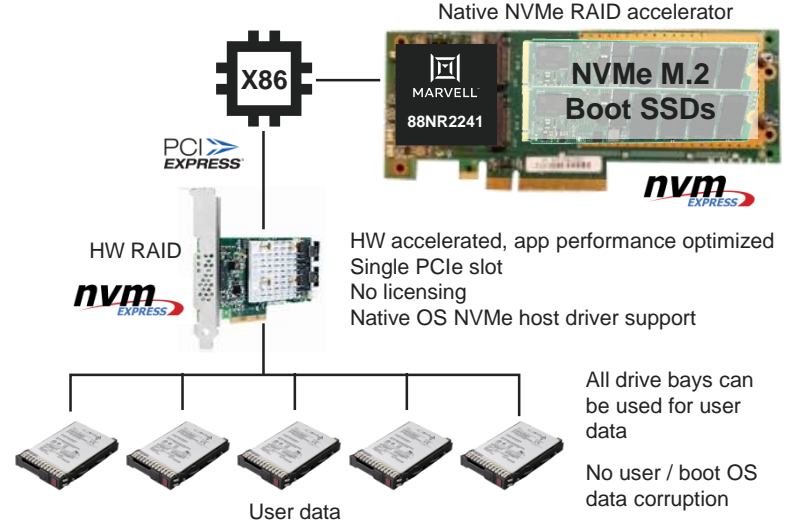Microsoft Hyper-V   Red Hat   SUSE

vmware

Fast-track NVMe storage consolidation transition from SAS/SATA

NVMe high availability boot storage made easy

Traditional RAID storage 👎

Modern RAID storage

Native NVMe RAID accelerator

X86

MARVELL 88NR2241

NVMe M.2 Boot SSDs

nvm EXPRESS

Option #1: CPU RAID
Application performance impact
Multiple connections
SW licensing

HW RAID

Option #2: Add boot SSDs to user RAID
Consume drive bays reducing storage capacity
User data mixed with Boot OS SSD
Proprietary drivers required

User data

HW accelerated, app performance optimized
Single PCIe slot
No licensing
Native OS NVMe host driver support

All drive bays can be used for user data

No user / boot OS data corruption

User data

Requirement to separate OS/boot vs. user data
Virtualized and HCI

- OS/boot isolation is critical for data integrity and virtual machine high availability

- Failures in user data can impact access to log and critical system recovery data
  - Significant impact to IT management serviceability

- High availability systems demand HW RAID
  - Optimize CPU system resources for VMs
  - Continuous uptime of multi-tenant environments

vmware®

"Hosts that boot from a disk have a local VMFS. If you have a disk with VMFS that runs VMs, you must **separate the disk for an ESXi boot that is not for vSAN. In this case you need separate controllers.**"

https://docs.vmware.com/en/VMware-vSphere/7.0/com.vmware.vsphere.vsan-planning.doc/GUID-B09CE19D-A3F6-408C-AE69-35F65CBE66E1.html

Only Marvell offers an NVMe boot optimized HW RAID solution

HPE first to market with native NVMe RAID
HPE NS204i-p Gen10 plus boot controller (HPE P/N: P12965-B21)

- NVMe boot controller for HPE ProLiant and Apollo server system platforms
- Integrated 480GB NVMe drive capacity x2 (auto RAID 1 duplication)
- Native OS NVMe host driver support: VMware, Windows server, RHEL, SUSE
- No user configuration needed; boot applications only
  - Secure firmware update; UEFI management port
- Log files, scratch partitions
- OS/boot storage isolation
- 4X faster reads than SATA

Hewlett Packard Enterprise
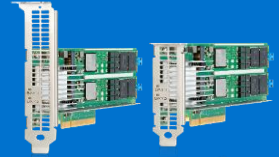
"HPE has a decades-long collaboration with Marvell in delivering joint solutions that optimize storage, server and networking technologies to help customers transform their data centers and target growing workload needs. We look forward to continuing this collaboration by being the first to support Marvell's new accelerator solution in our state-of-the-art NVMe OS Boot Device, which is offered on the HPE ProLiant servers and HPE Apollo systems to target a range of workloads such as virtualization, AI, analytics, HPC, and HCI."

Krista Satterthwaite, vice president, HPE Compute Product Management

Available today with your HPE server

Target customers and applications

- Server virtualization
  - VMware
  - Microsoft Hyper-V
  - RHEL/SUSE virtualization

- Hyper converged infrastructure
  - HPE vSAN Ready Node
  - HPE ProLiant DX/Nutanix
  - HPE ProLiant for Microsoft Azure Stack HCI
  - HPE Nimble dHCI

- Application servers connected to disk arrays
  - Need server boot only

"Marvell's approach at designing a hardware-optimized NVMe RAID 1 accelerator centers on an incredible level of optimization, providing accelerated performance coupled with lower power footprint compared with existing SATA/SAS RAID offerings. This NVMe RAID 1 accelerator should be a top consideration for the mission-critical data center, mainly in cluster architecture, such as HCI, which requires high availability and quick recovery of data."

Scott Sinclair, senior analyst, ESG

Based on Marvell's leadership NVMe silicon accelerator

Native NVMe RAID accelerator

x8

MARVELL™

NR2241

Dual x4

Best-in-class NVMe data protection
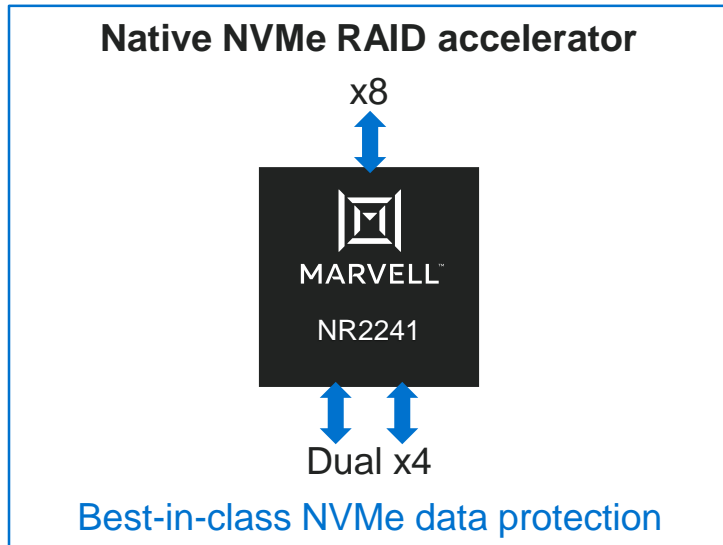
Plug-n-play w/ native OS NVMe host driver support

Unique DRAM-less flow through architecture

Hardware RAID protection

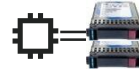Dramatic performance and reliability improvement for Enterprise and Data Center applications

Support any orchestration / management layer

System OEM vendor customizable

Additional tier-1 OEMs and solutions expected to launch soon!

Native NVMe RAID accelerator value summary
Boot OS applications

	Mix Boot & User HW RAID	CPU SW RAID	Native NVMe HW RAID
Application performance	Full	Poor	Full
Driver integration	Proprietary	Proprietary	Native OS NVMe Host
SW licensing	?	?	None
Drive bays for user data	Reduced	All	All
PCIe ports for boot	One	Two	One
User / boot separation	No	Yes	Yes

The clear solution winner for NVMe boot OS applications!

Key takeaways

1	Leadership native NVMe RAID solution available today

2	Simple, easy deployment with native OS NVMe host driver support

3	Now available with HPE servers targeting high availability & virtualized apps

4	A critical requirement for NVMe storage and multi-tenant environments

5	Marvell provides silicon solutions to accelerate the adoption of NVMe

Q&A