Marvell® 88NR2241-B NVMe RAID 1 Accelerator

Highly reliable replication for Boot OS applications for volume servers and storage infrastructure

Overview

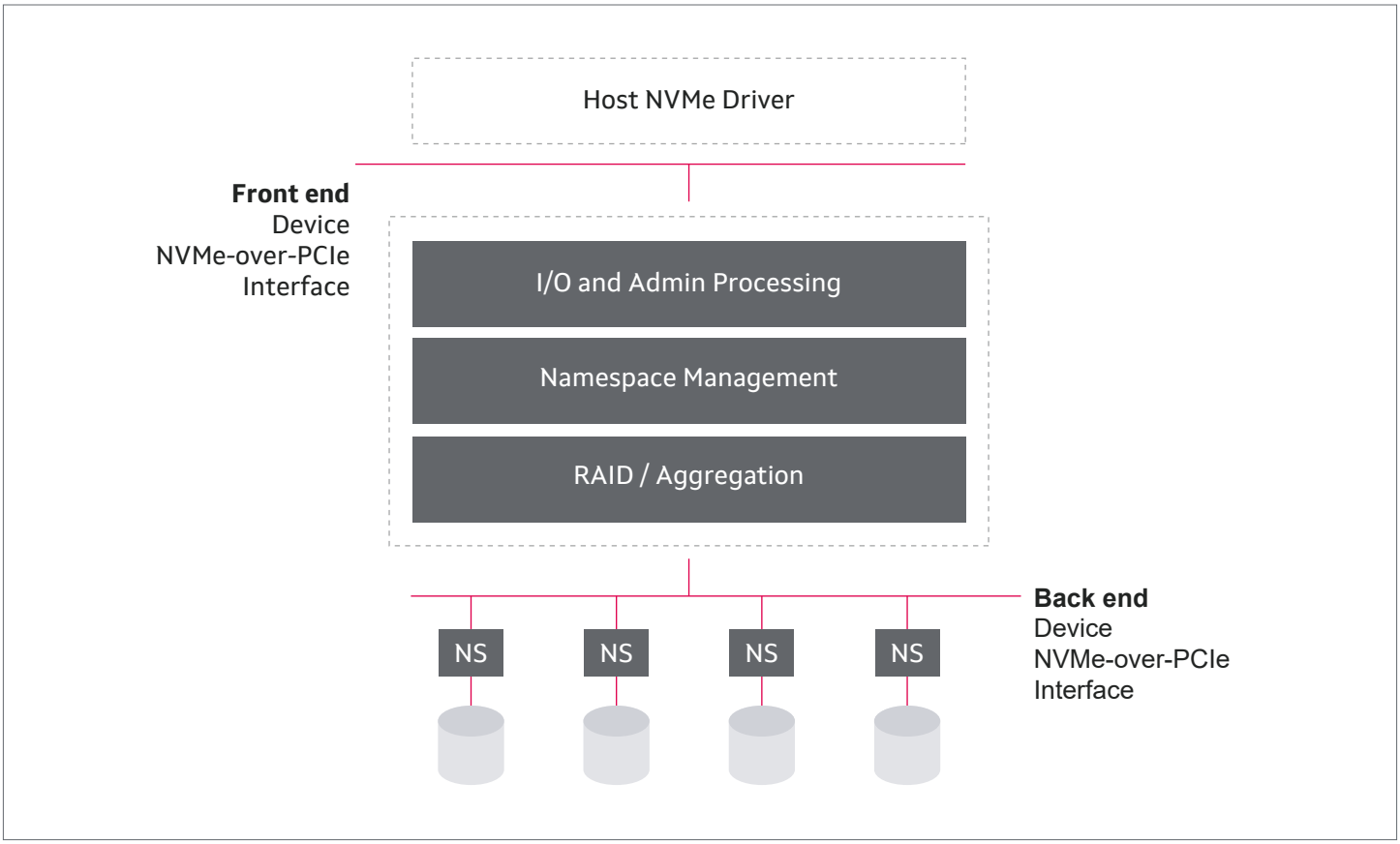
The 88NR2241-B is Marvell's leading NVMe RAID 1 accelerator targeted for the virtualized server and hyperconverged infrastructure (HCI) markets that require high availability of their solid state drive (SSD) Flash storage data. By extending Marvell's SATA/SAS legacy controllers' feature set into the NVMe space, the accelerator provides enterprise-class performance, data redundancy, and easy serviceability with standard NVMe drives.

The NVMe accelerator has a DRAM-less architecture and provides low latency NVMe transactions with minimum overhead. With the RAID feature set, the accelerator can virtualize multiple physical NVMe SSDs into a single logical unit for the purposes of RAID 1 data redundancy.

No custom drivers are necessary as the accelerator supports native NVMe in-box drivers and is compatible with most popular operating systems today such as VMware ESXi, Windows Server and popular Linux distributions.

The accelerator utilizes a "fast path" for IO commands that provides sub-microsecond latencies. In additional, the accelerator separates admin commands from IO commands for streamlined performance. Further customization is available to allow support of vendor unique commands that can be used in addition to the defined NVMe command set, as well as support for "pass-through" mode - allowing commands to directly bypass the accelerator. The accelerator supports various in-band and out-of-band (OOO) management protocols and conforms to standard NVMe-MI. A full list of features is provided in the table below.

Block Diagram



Key Features

Features	Benefits
8-lane PCIe endpoint (EP) on host interface side and root complex (RC) on back-end interface	• Flexibility to configurable both host and back-end interfaces individually • One 8-lane or dual 4-lane EP • Two 4-lane or four 2-lane RC
Standard NVMe in-box driver support	• No vendor specific drivers needed • Compliant to standard NVMe spec v1.3 • Plug-and-play capabilities with support for most major OSs such as VMware ESXi and Windows Server • Certifications with VMware and Microsoft
Fast Path Processing Subsystem (FPS)	• Low latency offload with hardware accelerators for RAID 1 • Command parsing, based on RAID configuration, that submits fast path read and write • Separation of IO and Admin Commands • Up to 1.6 Million Read IOPS (4k Random Read)
NVMe-MI Management Protocol support	• Support for various management protocols and compliant with NVMe-MI 1.1: • NVMe-MI MCTP over PCIe VDM • NVMe-MI MCTP over I2C/SMBus • NVMe-MI In-band
Device Hot Plug with Multiple SSD support	• Seamless discovery of new NVMe SSD devices • Up to four physical SSDs • Carve up SSDs into multiple namespaces
Support for PassThru and Vender Unique (VU) Commands	• Customization on a per command basis with the ability to provide direct pass through of commands to back-end drives.
Diagnostic Tools	• Extensive debug capabilities and configuration flexibility through CLI tools • Connections through URAT and JTAG • Access to device SMART logs and controller event logs
Adoption of DMTF open standard management protocols	• MCTP over PCI VDM • PLDM for Redfish Device Enablement • PLDM for Monitoring and Control • PLDM for Firmware Update • Support for various DMTF Redfish standards such as Storage, Volume & Drive Schema, and Storage Device Message Registry for Alerts.

Target Applications

NVMe server boot cards

MARVELL

To deliver the data infrastructure technology that connects the world, we're building solutions on the most powerful foundation: our partnerships with our customers. Trusted by the world's leading technology companies for 25 years, we move, store, process and secure the world's data with semiconductor solutions designed for our customers' current needs and future ambitions. Through a process of deep collaboration and transparency, we're ultimately changing the way tomorrow's enterprise, cloud, automotive, and carrier architectures transform—for the better.

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