High Performance NVMe for PCIe-based storage

IPM-NVMe_Device

NVM Express compliant

Key Features

- NVM Express Compliant
- Automatic Command Processing
- Multi-Channel DMA
- Up to 65536 I/O queues
- All commands/log management
- Legacy interrupt/MSI/MSI-X support
- Full NVMe registers support
- Asynchronous event management
- Low Power architecture
- Available for PCIe Gen1/2/3/4/5/6
- Host Memory Buffer management
- Controller Memory Buffer management

Benefits

- UNH-IOL NVM Express certified
- Ultra low latency
- Very high throughput
- Low power architecture
- Cost reduction thanks to interface standardization
- Validated IP reduces time to-market

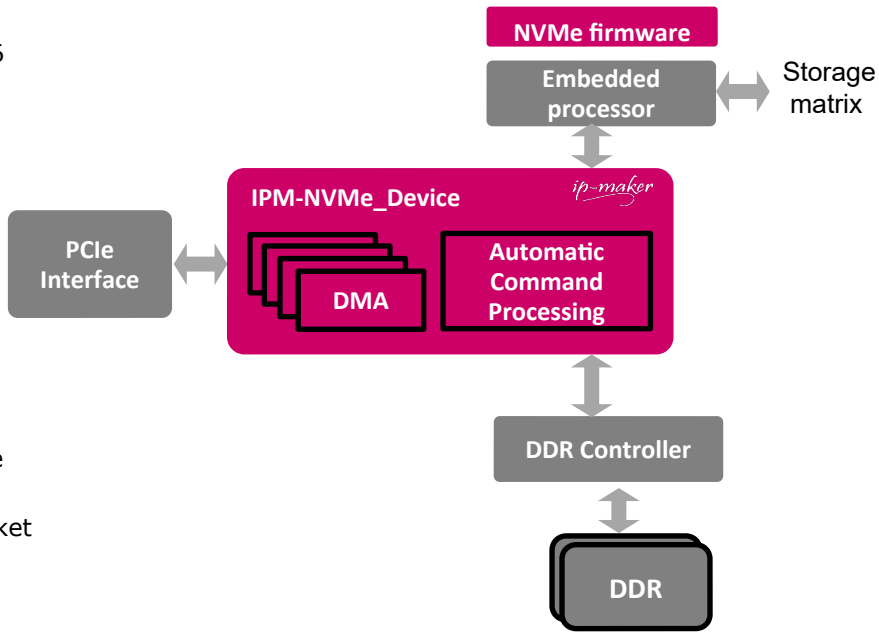
Deliverables

- Verilog RTL source code
- Full hardware reference design
- Synthesis scripts
- Technical documentation
- Technical support

Overview

Typical storage controllers are composed of a communication interface and a Nandflash controller. In this case, all the data flow is managed by the external host processor. However, this architecture cannot sustain high performance applications. The IPM-NVMe_Device IP core designed by IP-Maker is a powerful data transfer manager integrated into the PCIe SSD Controller between the communication interface and the Nandflash controller, therefore off-loading the host CPU.

The IP-Maker NVMe IP is UNH-IOL NVM Express compliant. It is part of the official NVMe integrator's list: https://www.iol.unh.edu/registry/nvme

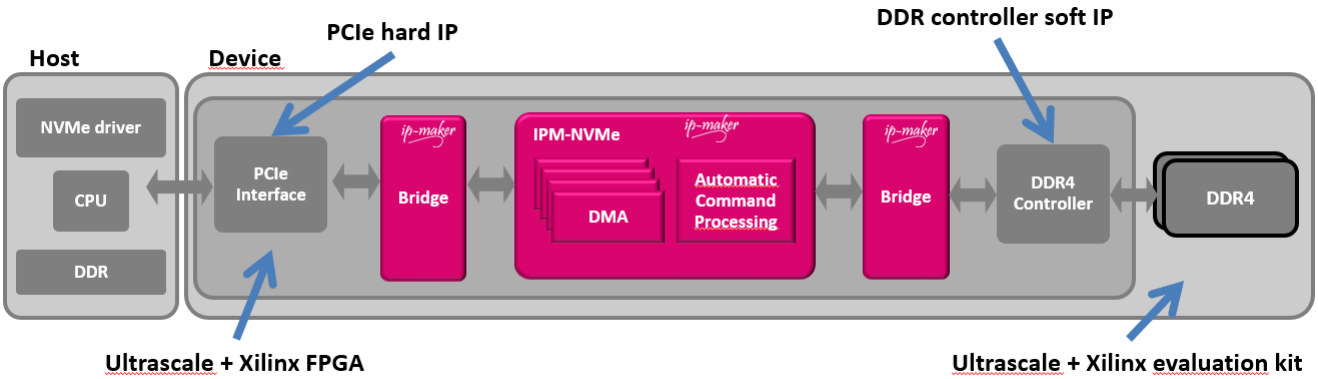


Server manufacturers benefit from driver standardization. All PCIe SSDs NVM Express-compliant support a unique driver providing ease-of-use and cost-reduced software development.

The IP-Maker IPM-NVMe_Device IP core is fully-featured and easy to use in FPGA and SoC designs. The full hardware architecture, which is gates number optimized, provides a power efficient IOPS rate, leading to low power SSD controller capabilities.

Full hardware Reference Design

The NVMe IP can be used in both ASIC and FPGA. It has been ported and validated on multiple Xilinx Ultrascale; Ultrascale + and 7-series; Versal familly FPGAs and also Lattice Certus Pro and AvantX. The following reference design is available for evaluation and demonstration purpose.



Applications

PCIe SSD

The IP-Maker IPM-NVMe_Device IP, integrated with the IP-Maker IPM-UNFC flash and IPM-BCH ECC controllers IPs can be used for a whole PCIe SSD design. It provides all the necessary features for both consumer and enterprise products.

NVMe NVRAM drive

Adding NVRAM technology to the low latency NVMe reference is a smart choice for NVMe NVRAM drives design. This solution may provide both capacity and performance. Then, such NVMe NVRAM drives could be used for high performance OLTP databases, big data analytics or AI applications.

Persistent Memory SSD

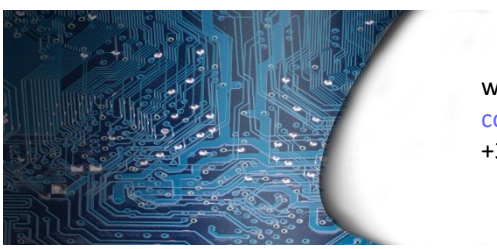
NVMe NVRAM drives is a perfect starting point before moving to the next generation of non-volatile memories such as MRAM or ReRAM. These memories come with a very low latency compared to Nandflash. With a successful NVMe NVRAM design, a new design based on such memories will be successful as well.

Host Bus Adapater (HBA)

The IPM-NVMe_Device IP could also be used in a PCIe-based storage product without using any embedded NVM media, but instead providing connectivity to other devices such as SATA SSD, HDD or network interface.

NVMe to NVMe

The IP core can be used to agglomerate multiple data flow to multiple NVMe storage endpoints. This allows to add quality of service (encryption, duplication ….) in total transparency of your global system.



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