



# NVIDIA BLUEFIELD-3 DPU

Programmable Data Center Infrastructure on-a-Chip

The NVIDIA® BlueField®-3 data processing unit (DPU) is the 3<sup>rd</sup>-generation data center infrastructure-on-a-chip that enables organizations to build software-defined, hardware-accelerated IT infrastructures from cloud to core data center to edge. With 400Gb/s Ethernet or NDR 400Gb/s InfiniBand network connectivity, BlueField-3 DPU offloads, accelerates, and isolates software-defined networking, storage, security, and management functions in ways that profoundly improve data center performance, efficiency, and security.

Providing powerful computing, and a broad range of programmable acceleration engines in the I/O path, BlueField-3 is perfectly positioned to address the infrastructure needs of the most demanding applications, while delivering full software backward compatibility through the NVIDIA DOCA™ software framework.

BlueField-3 DPUs transform traditional computing environments into secure and accelerated virtual private clouds, allowing organizations to run application workloads in secure, multi-tenant environments. Decoupling data center infrastructure from business applications, BlueField-3 enhances data center security, streamlines operations and reduces total cost of ownership. Featuring NVIDIA's in-network computing technology, BlueField-3 enables the next generation of supercomputing platforms, delivering optimal bare-metal performance and native support for multi-node tenant isolation.

## PORTFOLIO

- > 1, 2, 4 ports with up to 400Gb/s connectivity
- > 16GB on-board DDR5 memory
- > Form factors: HHHL, FHHL
- > M.2 / U.2 connectors options for direct attached storage
- > 1GbE out-of-band management port



BlueField-3 DPU – 2x 200Gb/s FHHL form factor

## Key Software-Defined, Hardware-Accelerated Applications



### Cloud Networking

Cloud overlay, SDN acceleration, NAT, load balancer, NFV, video streaming



### Storage

NVMe™ over Fabrics (NVMe-oF™), NVMe/TCP™, elastic storage, hyper converged infrastructure (HCI), encryption, data integrity, data deduplication, de-compression, erasure coding/RAID



### Security

Distributed next-generation firewall, IDS/IPS, root of trust, micro-segmentation, DDOS prevention



### HPC / AI

Cloud-native supercomputing, multi-tenancy and security, communication accelerations



### Telco and Edge

Cloud RAN, virtualized edge gateways, VNF acceleration, edge microservers

## Features

### Network and Host Interfaces

#### Network Interfaces

- > Ethernet - 1, 2, 4 ports with up to 400 Gb/s connectivity
- > InfiniBand - Single port of NDR (400Gb/s), or dual ports of NDR200 / HDR (200Gb/s)

#### PCI Express Interface

- > 32 lanes of PCIe Gen 5.0
- > PCIe switch bi-furcation of up to 16 downstream ports
- > Non-transparent bridging (NTB) support

### Compute and Memory

#### Arm CPU Cores

- > Up to 16 Armv8.2+ A78 Hercules cores (64-bit)
- > 8MB L2 cache
- > 16MB LLC system cache

#### Programmable Datapath Accelerator

- > 16 cores, 256 threads
- > Programmability through DOCA
- > Heavy multi-threading applications acceleration

#### DDR DIMM Support

- > Dual DDR5 5600MT/s DRAM controllers
- > 16GB on-board DDR5
- > ECC error protection support

### Hardware Accelerations

#### Security

- > Secure boot with Public key accelerator (PKA) root-of-trust
  - > Secure firmware update
  - > Flash encryption
  - > Cerberus compliant

- > Functional isolation layer
- > Regular expression (RegEx) matching processor
- > MACsec/IPsec/TLS data-in-motion encryption
  - > AES-GCM 128/256-bit key
- > AES-XTS 256/512-bit data-at-rest encryption
- > Connection tracking for stateful firewall
- > Public key accelerator (PKA)
  - > RSA, Diffie-Hellman, DSA, ECC, EC-DSA, EC-DH
- > True random number generator (TRNG)

#### Storage

- > BlueField SNAP - Elastic block storage - NVMe™ and VirtIO-blk
- > NVMe-oF™ and NVMe/TCP™ acceleration
- > Decompression engine
- > Erasure coding for RAID implementation
- > M.2 / U.2 connectors for direct attached storage

#### Networking

- > RoCE, Zero Touch RoCE
- > ASAP² - Accelerated Switch and Packet Processing® for SDN and VNF acceleration
- > Single Root I/O Virtualization (SR-IOV)
- > VirtIO acceleration
- > Overlay network acceleration
  - > VXLAN, GENEVE, NVGRE
- > Programmable flexible parser: user defined classification
- > Connection tracking (L4 firewall)
- > Flow mirroring, sampling and statistics
- > Header rewrite
- > Hierarchical QoS
- > Stateless TCP offloads

#### HPC/AI Accelerations

- > HPC / AI All-to-All engine
- > NVIDIA GPUDirect
- > NVIDIA GPUDirect Storage (GDS)
- > HPC MPI Tag Matching

#### Advanced Timing and Synchronization

- > IEEE 1588v2 (any profile)
- > G.8273.2 Class C
- > PTP hardware clock (PHC)
- > Line rate hardware timestamp
- > SyncE
- > G.8262.1 (eEEC)
- > Configurable PPS In and PPS Out
- > Time triggered scheduling
- > Time-based SDN acceleration

#### Boot Options

- > Secure boot (RSA authenticated)
- > Remote boot over Ethernet
- > Remote boot over iSCSI
- > PXE and UEFI

#### Management

- > 1GbE out-of-band management port
- > NC-SI, MCTP over SMBus, and MCTP over PCIe
- > PLDM for Monitor and Control DSP0248
- > PLDM for Firmware Update DSP026
- > I²C interface for device control and configuration
- > SPI interface to flash
- > eMMC memory controller
- > UART
- > USB

## Ordering Information

For information about NVIDIA ordering information, please contact your NVIDIA sales representative.

### Learn More

Learn more about **NVIDIA BlueField-3 DPU** at [www.pny.eu](http://www.pny.eu)