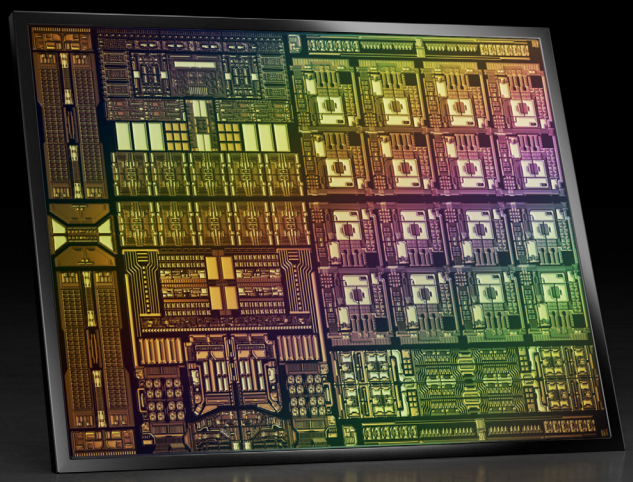
NVIDIA BLUEFIELD-3 DPU

PROGRAMMABLE DATA CENTER INFRASTRUCTURE ON-A-CHIP



The NVIDIA® BlueField®-3 data processing unit (DPU) is the 3rd-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.

Support: For information about NVIDIA support packages, please contact your NVIDIA sales representative or visit our **Support Index page.**

To learn more about the NVIDIA BlueField-3 visit **www.nvidia.com/dpu**

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