



NVIDIA MELLANOX BLUEFIELD-2 HIGH PERFORMANCE ETHERNET SMARTNIC



NVIDIA® Mellanox® BlueField®-2 SmartNIC delivers advanced functionality, unmatched performance and agility for today's most demanding workloads. By combining the industry leading ConnectX®-6 Dx network adapter with an array of Arm® cores, BlueField-2 delivers a perfect blend of hardware and software accelerations. BlueField-2 brings agile and high performance solutions for security, machine learning, cloud, edge computing and storage applications while reducing total cost of ownership.

BlueField-2 SmartNIC features the second generation BlueField-2 Data Processing Unit (DPU)—an innovative and high-performance programmable networking engine. The DPU integrates an array of eight powerful 64-bit Armv8 A72 cores interconnected by a coherent mesh with a DDR4 memory controller and a dual-port Ethernet network controller.

BlueField-2 SmartNIC supports dual QSFP56 ports at link speeds of 10/25/50/100 GbE or a single port of 200 GbE, a 1 GbE out-of-band management port for the Arm subsystem, and includes an integrated 16-lane PCIe Gen 3.0/4.0 switch.

BlueField-2 SmartNIC complete portfolio includes a variety of form factors including HHHL (half height, half length), FHHL (full height, half length), and Open Compute Project Spec 3.0 (OCP 3.0 Small Form Factor).

At the heart of BlueField-2 SmartNIC is the industry-leading ConnectX-6 Dx network adapter with unprecedented built-in hardware functionality, performance and resiliency. BlueField-2 hardware accelerations include advanced RDMA/RoCE capabilities as well as innovative cryptography, storage and networking accelerations. Relying on these built-in offloads, the BlueField-2 powerful array of Arm cores can be programmed for sophisticated custom accelerations and control path manipulations. BlueField-2 also benefits from the rich Arm ecosystem to deliver complete solutions to cloud operators and service providers.

Key Applications

- > Virtualized and bare metal cloud services
- > NVMe storage virtualization
- > Network Function Virtualization (NFV)
- > Security applications such as DDoS and Deep Packet Inspection (DPI)
- > Microservers built for edge computing

Portfolio

- > Dual ports of 10/25/50/100 GbE or a single port of 200 GbE
- > 8GB/16GB on-board DDR4 memory
- > Various form factors: HHHL, FHHL and OCP 3.0 SFF

Key Features

- > Best-in-class hardware offloads with Arm processing power, including:
 - > ASAP² - Accelerated Switch and Packet Processing®
 - > NVMe SNAP™ storage emulation
 - > IPsec/TLS data-in-motion
 - > AES-XTS data-at-rest
 - > Regular expression (RegEx) and DPI accelerations
 - > SHA 256-bit hardware acceleration
- > Hardware Root of Trust (RoT)
- > 1 GbE out-of-band management port

FEATURES*

Network and Host Interfaces

Network Interfaces

- > Dual ports of 10/25/50/100 GbE, or
- > Single port of 200 GbE

PCI Express Interface

- > 8 or 16 lanes of PCIe Gen 3.0/4.0
- > PCIe switch with up to 8 downstream ports
- > Support for MSI/MSI-X

Arm/DDR Subsystem

Arm Cores

- > Up to 8 Armv8 A72 cores (64-bit) pipeline
- > Arm NEON™ 128b SIMD execution unit
- > Arm VFPv4 single and double precision floating point acceleration (IEEE 754)
- > Cache coherent mesh interconnect
- > Each 2 Arm cores share 1 MB L2 cache
- > 6 MB L3 cache with plurality of eviction policies

DDR4 DIMM Support

- > Single DDR4 DRAM controller
- > 8GB/16GB on-board DDR4
- > ECC error protection support

Hardware Accelerations

Security

- > IPsec/TLS data-in-motion encryption
 - > AES-GCM 128/256 bit key
- > AES-XTS 256/512 bit data-at-rest encryption
- > SHA 256 bit hardware acceleration
- > Regular expression (RegEx) acceleration
- > Arm A64, A32 & T32 cryptography instructions for:
 - > AES, SHA-1, SHA-224, and SHA-256
 - > Finite field arithmetic
- > Hardware Public Key Accelerator
 - > RSA, Diffie-Hellman, DSA, ECC, EC-DSA, EC-DH
- > True Random Number Generator (TRNG)
- > Hardware Root of Trust
 - > Cerberus compliant

Storage

- > NVMe SNAP™
- > NVMe over Fabric offloads

RDMA/RoCE

- > Zero-touch RoCE configuration
- > Selective repeat
- > Collective / vector collective operations
- > GPUDirect®
- > Enhanced atomic operations
- > 16 million I/O channels

TCP/IP Transport

- > Stateless offloads for:
 - > TCP/UDP/IP
 - > LSO/LRO/Checksum/RSS/TSS/HDS
 - > VLAN insertion/stripping

Hardware-based I/O Virtualization

- > SR-IOV
 - > Up to 1K Virtual Functions
 - > Up to 56 Physical Functions per host
- > VirtIO
- > Multi-function per port
- > VMware NetQueue support
- > Virtualization hierarchies
- > Virtualizing physical functions on a physical port
- > 1K ingress and egress QoS levels
- > Guaranteed QoS for VMs

Overlay Networks

- > Hardware offload of encapsulation and decapsulation of NVGRE, VXLAN and Geneve
- > Header rewrite (NAT)

Boot Options

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

Host Management

- > NC-SI, MCTP over SMBus and MCTP over PCIe
- > PLDM for Monitor and Control DSP0248
- > PLDM for Firmware Update DSP026
- > 1GbE out-of-band management port
- > SDN management interface for managing the eSwitch
- > I²C interface for device control and configuration
- > General purpose I/O pins
- > SPI interface to flash
- > eMMC memory controller
- > UART
- > USB

Software

Software Development Toolchain

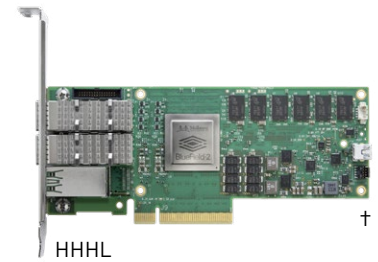
- > Native and cross-compile GNU toolchain
- > Compatible with Arm DS-5 and other commercial development and profiling tools

Software Support

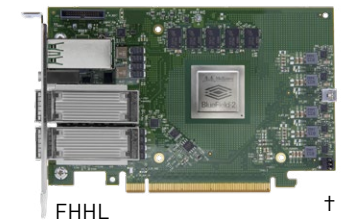
- > CentOS
- > Ubuntu Commercial Linux Distribution

Yocto-based Linux Distribution

- > OpenFabrics Enterprise Distribution (OFED)
- > Arm-optimized versions of all Mellanox drivers and software stack
- > IDS/IPS tools such as Snort and Suricata
- > Optimized Arm DPDK and ConnectX PMD



HHHL †



FHHL †



OCP 3.0 SFF †

† For illustration only. Actual products may vary.

* This section describes hardware features and capabilities. Please refer to the driver and firmware release notes for feature availability.

ORDERING INFORMATION

Table 1 - Part Numbers and Feature Set Breakdown

OPN	Max. Speed	No. of Ports	PCIe Support	Cores Speed	Crypto*	DDR Memory	1GbE OOB	Form Factor	
MBF2M322A-AENOT	25GbE	2x SFP56	Gen 3.0/4.0 x8	2.0GHz	Crypto disabled	8GB on-board	Yes	HHHL Tall Bracket	
MBF2M322A-AEEOT					Crypto enabled				
MBF2M332A-AENOT	25GbE	2x SFP56	Gen 3.0/4.0 x8	2.0GHz	Crypto disabled	16GB on-board	Yes		
MBF2M332A-AEEOT					Crypto enabled				
MBF2H322A-AENOT	25GbE	2x SFP56	Gen 3.0/4.0 x8	2.5GHz	Crypto disabled	8GB on-board	Yes		
MBF2H322A-AEEOT					Crypto enabled				
MBF2H332A-AENOT	25GbE	2x SFP56	Gen 3.0/4.0 x8	2.5GHz	Crypto disabled	16GB on-board	Yes		
MBF2H332A-AEEOT					Crypto enabled				
MBF2M912A-AENAB	25GbE	2x SFP56	Gen 3.0/4.0 x16	2.0GHz	Crypto disabled	8GB on-board	No		OCP 3.0 SFF
MBF2M912A-AEEAB					Crypto enabled				
MBF2M922A-AENAB	25GbE	2x SFP56	Gen 3.0/4.0 x16	2.0GHz	Crypto disabled	16GB on-board	No		
MBF2M922A-AEEAB					Crypto enabled				
MBF2H526A-CENOT	100GbE	2x QSFP56	Gen 4.0 x16	2.5GHz	Crypto disabled	8GB on-board	Yes	FHHL Tall Bracket	
MBF2H526A-CEEOT					Crypto enabled				
MBF2H516A-CENOT	100GbE	2x QSFP56	Gen 4.0 x16	2.5GHz	Crypto disabled	16GB on-board	Yes		
MBF2H516A-CEEOT					Crypto enabled				
MBF2M526A-CENOT	100GbE	2x QSFP56	Gen 4.0 x16	2.0GHz	Crypto disabled	8GB on-board	Yes		
MBF2M526A-CEEOT					Crypto enabled				
MBF2M516A-CENOT	100GbE	2x QSFP56	Gen 4.0 x16	2.0GHz	Crypto disabled	16GB on-board	Yes		
MBF2M516A-CEEOT					Crypto enabled				

* Hardware Root of Trust (RoT) or secure boot is not supported on these models, please contact Mellanox for additional information.

Table 2 - Licenses Sold Separately

OPN	Description
BF1-NVMESNAP-BNS-1	One perpetual license to use NVMe SNAP on one adapter of BlueField-2. Includes Mellanox Technical Support and Warranty – Silver, 1 Year.
Contact Mellanox	One perpetual license to use RegEx acceleration on one adapter of BlueField-2. Includes Mellanox Technical Support and Warranty – Silver, 1 Year.

Support:

For information about NVIDIA Mellanox support packages, please contact your NVIDIA Mellanox Technologies sales representative or visit our [Support Index page](#).

Learn more at www.mellanox.com/products/smartnic

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