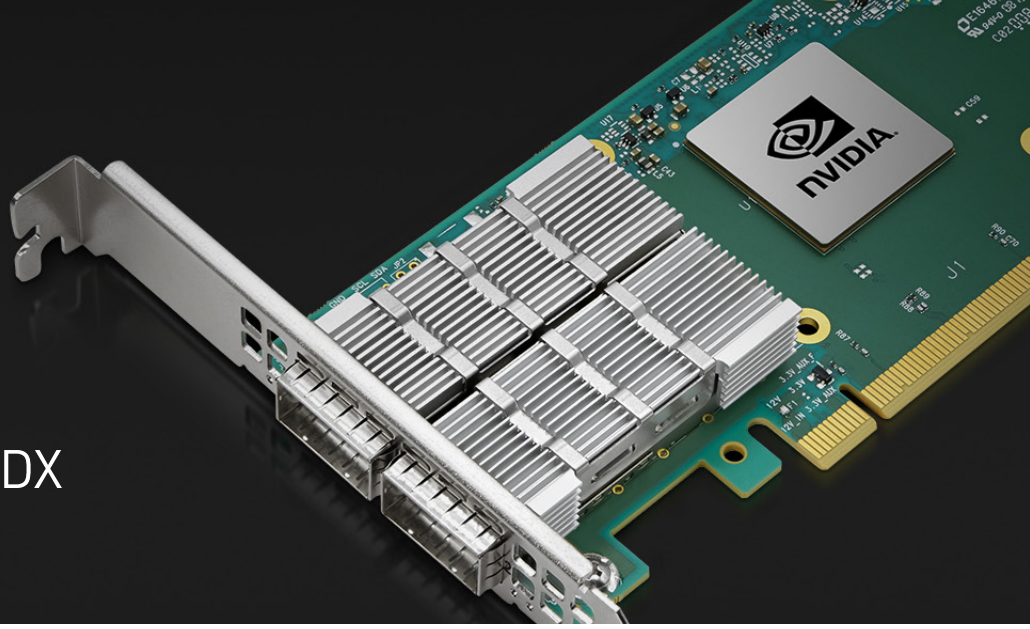
DATASHEET



NVIDIA CONNECTX-6 DX

Ethernet SmartNIC

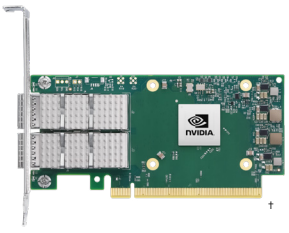
Advanced Networking and Security for the Most Demanding Cloud and Data Center Workloads

NVIDIA® ConnectX®-6 Dx is a highly secure and advanced smart network interface card (SmartNIC) that accelerates mission-critical cloud and data center applications, including security, virtualization, SDN/NFV, big data, machine learning, and storage. ConnectX-6 Dx provides up to two ports of 100Gb/s or a single port of 200Gb/s Ethernet connectivity and is powered by 50Gb/s (PAM4) or 25/10 Gb/s (NRZ) SerDes technology.

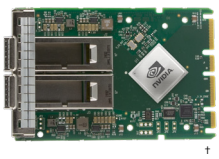
ConnectX-6 Dx features virtual switch (vSwitch) and virtual router (vRouter) hardware accelerations delivering orders-of-magnitude higher performance than software-based solutions. ConnectX-6 Dx supports a choice of single-root I/O virtualization (SR-IOV) and VirtIO in hardware, enabling customers to best address their application needs. By offloading cloud networking workloads, ConnectX-6 Dx frees up CPU cores for business applications while reducing total cost-of-ownership.

In an era where data privacy is key, ConnectX-6 Dx provides built-in inline encryption/decryption, stateful packet filtering, and other capabilities, bringing advanced security down to every node with unprecedented performance and scalability.

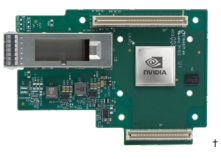
Built on the solid foundation of NVIDIA's ConnectX line of SmartNICs, ConnectX-6 Dx offers best-in-class RDMA over Converged Ethernet (RoCE) capabilities, enabling scalable, resilient, and easy-to-deploy RoCE solutions. For data storage, ConnectX-6 Dx optimizes a suite of storage accelerations, bringing NVMe-oF target and initiator offloads.



PCIe x16 HHHL Card



OCP 3.0 Small Form Factor



OCP 2.0 Form Factor

PRODUCT SPECIFICATIONS

Maximum total bandwidth	**200Gb/s**
Supported Ethernet speeds	**10/25/40/50/100/200GbE**
Number of network ports	**1/2**
Network interface technologies	**NRZ/PAM4**
Host interface	**PCIe Gen4.0 x16, with NVIDIA Multi-Host™ technology**
DPDK message rate	**Up to 215Mpps**
Platform security	**Hardware root-of-trust and secure firmware update**
Form factors	**PCIe HHHL, OCP2, OCP3.0 SFF**
Network interfaces	**SFP+, QSFP+, DSFP**

SOLUTIONS

- Cloud-native, web 2.0, hyperscale
- Enterprise data centers
- Cybersecurity
- Big data analytics
- Scale-out compute and storage infrastructure
- Telco and network function virtualization (NFV)
- Cloud storage
- Machine learning and AI
- Media and entertainment

† For illustration only. Actual products may vary.

Network Interface

- Dual ports of 10/25/40/50/100 GbE, or a single port of 200GbE

Host Interface

- 16 lanes of PCIe Gen4, compatible with PCIe Gen2/Gen3
- Integrated PCI switch
- NVIDIA Multi-Host and NVIDIA Socket Direct™

Virtualization/Cloud Native

- SR-IOV and VirtIO acceleration
  - Up to 1K virtual functions per port
  - 8 physical functions
- Support for tunneling
  - Encap/decap of VXLAN, NVGRE, Geneve, and more
  - Stateless offloads for overlay tunnels

NVIDIA ASAP² Accelerated Switching & Packet Processing

- SDN acceleration for:
  - Bare metal
  - Virtualization
  - Containers
- Full hardware offload for OVS data plane
- Flow update through RTE_Flow or TC_Flower
- Flex-parser
- Hardware offload for:
  - Connection tracking (Layer 4 firewall)
  - NAT
  - Header rewrite
  - Mirroring
  - Sampling
  - Flow aging
  - Hierarchical QoS
  - Flow-based statistics

Cybersecurity

- Inline hardware IPsec encryption and decryption
  - AES-GCM 128/256-bit key
  - RoCE over IPsec
- Inline hardware TLS encryption and decryption
  - AES-GCM 128/256-bit key
- Data-at-rest AES-XTS encryption and decryption
  - AES-XTS 256/512-bit key
- Platform security
  - Hardware root-of-trust
  - Secure firmware update

Stateless Offloads

- TCP/UDP/IP stateless offload
- LSO, LRO, checksum offload
- Receive side scaling (RSS) also on encapsulated packet
- Transmit side scaling (TSS)
- VLAN and MPLS tag insertion/stripping
- Receive flow steering

Storage Offloads

- Block-level encryption: XTS-AES 256/512-bit key
- NVMe over Fabrics offloads for target machine
- T10 DIF signature handover operation at wire speed, for ingress and egress traffic
- Storage protocols: SRP, iSER, NFS RDMA, SMB Direct, NVMe-oF

Advanced Timing and Synchronization

- Advanced PTP
  - IEEE 1588v2 (any profile)
  - PTP hardware clock (PHC) (UTC format)
  - Nanosecond-level accuracy
  - Line rate hardware timestamp (UTC format)
  - PPS in and configurable PPS out
- Time-triggered scheduling
- PTP-based packet pacing
- Time-based SDN acceleration (ASAP²)
- Time-sensitive networking (TSN)
- Dedicated precision timing card option

RDMA over Converged Ethernet (RoCE)

- RoCE v1/v2
- Zero-touch RoCE: no ECN, no PFC
- RoCE over overlay networks
- Selective repeat
- Programmable congestion control interface
- GPUDirect®

Management and Control

- NC-SI, MCTP over SMBus and MCTP over PCIe—Baseboard Management Controller interface, NCSI over RBT in Open Compute Project (OCP) 2.0/3.0 cards
- PLDM for Monitor and Control DSP0248
- PLDM for Firmware Update DSP0267
- I²C interface for device control and configuration

Remote Boot

- Remote boot over Ethernet
- Remote boot over iSCSI
- UEFI and PXE support for x86 and Arm servers

Ordering Information

For NVIDIA ordering information, please contact your NVIDIA sales representative or visit the online ConnectX-6 Dx user manuals: **PCIe HHHL form factor**, **OCP 3.0 form factor** and **OCP 2.0 form factor**.

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

Learn more

Learn more at **NVIDIA.com/en-us/networking/ethernet/connectx-6-dx**