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.

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.

PRODUCT SPECIFICATIONS

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Maximum total bandwidth</td>
<td>200Gb/s</td>
</tr>
<tr>
<td>Supported Ethernet speeds</td>
<td>10/25/40/50/100/200GbE</td>
</tr>
<tr>
<td>Number of network ports</td>
<td>1/2</td>
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<tr>
<td>Network interface technologies</td>
<td>NRZ/PAM4</td>
</tr>
<tr>
<td>Host interface</td>
<td>PCIe Gen4.0 x16, with NVIDIA Multi-Host™ technology</td>
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<tr>
<td>DPDK message rate</td>
<td>Up to 215Mpps</td>
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<tr>
<td>Platform security</td>
<td>Hardware root-of-trust and secure firmware update</td>
</tr>
<tr>
<td>Form factors</td>
<td>PCIe HHHL, OCP2, OCP3.0 SFF</td>
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<tr>
<td>Network interfaces</td>
<td>SFP+, QSFP+, DSFP</td>
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</tbody>
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PCIe x16 HHHL Card
OCP 3.0 Small Form Factor
OCP 2.0 Form Factor
**Features(*)**

**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_Flow
- Flex-parser: user-defined classification
- 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
- 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
- PC 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 at NVIDIA.com/en-us/networking/ethernet/connectx-6-dx

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