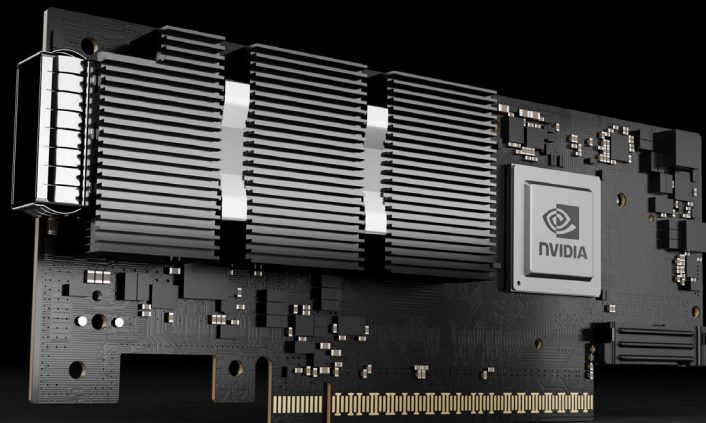




# ConnectX-7 400G Adapters

Accelerated networking for modern data center infrastructures.



The NVIDIA® ConnectX®-7 family of **remote direct-memory access (RDMA) network adapters** supports InfiniBand and Ethernet protocols and a range of speeds up to 400 gigabits per second (Gb/s). It enables a wide range of advanced, scalable, and secure networking solutions that address traditional enterprise needs up to the world's most demanding AI, scientific computing, and hyperscale cloud data center workloads.

## Accelerated Networking and Security

ConnectX-7 provides a broad set of software-defined, hardware-accelerated networking, storage, and security capabilities, which enable organizations to modernize and secure their IT infrastructures. ConnectX-7 also powers agile and high-performance solutions from edge to core data centers to clouds, all while enhancing network security and reducing total cost of ownership.

## Accelerate Data-Driven Scientific Computing

ConnectX-7 provides ultra-low latency, extreme throughput, and innovative NVIDIA In-Network Computing engines to deliver the acceleration, scalability, and feature-rich technology needed for today's modern scientific computing workloads.

## Features\*

### InfiniBand Interface

- > InfiniBand Trade Association Spec 1.5 compliant
- > RDMA, send/receive semantics
- > 16 million input/output (IO) channels
- > 256 to 4 kilobyte maximum transmission unit (MTU), 2Gb messages

### Ethernet Interface

- > Up to four network ports supporting NRZ, PAM4 (50G and 100G), in various configurations
- > Up to 400Gb/s total bandwidth
- > RDMA over converged Ethernet (RoCE)

### Product Specifications

<b>Supported network protocols</b>	InfiniBand, Ethernet
<b>Total bandwidth</b>	400Gb/s
<b>InfiniBand speeds</b>	NDR 400Gb/s, HDR 200Gb/s, EDR 100Gb/s
<b>Ethernet speeds</b>	400GbE, 200GbE, 100GbE, 50GbE, 25GbE, 10Gb
<b>Number of network ports</b>	1, 2, or 4
<b>Host interface</b>	PCIe Gen5, up to 32 lanes
<b>Form factors</b>	PCIe HHHL/FHHL and OCP3.0 TSFF/SFF
<b>Interface technologies</b>	NRZ (10G, 25G), PAM4 (50G, 100G)

## Enhanced InfiniBand Networking

- > Hardware-based reliable transport
- > Extended Reliable Connected (XRC)
- > Dynamically Connected Transport (DCT)
- > NVIDIA GPUDirect® RDMA
- > GPUDirect Storage
- > Adaptive routing support
- > Enhanced atomic operations
- > Advanced memory mapping, allowing user mode registration (UMR)
- > On-demand paging (ODP), including registration-free RDMA memory access
- > Enhanced congestion control
- > Burst buffer offload
- > Single root IO virtualization (SR-IOV)
- > Optimized for high-performance computing (HPC) software libraries, including:
  - > NVIDIA HPC-X®, NVIDIA Unified Communication X (UCX®), NVIDIA Unified Collective Communication (UCC), NVIDIA Collective Communications Library (NCCL), OpenMPI, MVAPICH, MPICH, OpenSHMEM, partitioned global address space (PGAS)
- > Collective operations offloads
- > Support for NVIDIA Scalable Hierarchical Aggregation and Reduction Protocol (SHARP)™
- > Rendezvous protocol offload
- > In-network on-board memory

## Remote Boot

- > Remote boot over InfiniBand
- > Remote boot over Internet Small Computer Systems Interface (iSCSI)
- > Unified Extensible Firmware Interface (UEFI)
- > Preboot Execution Environment (PXE)

## Enhanced Ethernet Networking

- > Zero-touch RoCE
- > NVIDIA Accelerated Switch and Packet Processing (ASAP2)™ for software-defined networking (SDN) and virtual network functions (VNF)
  - > Open vSwitch (OVS) acceleration
  - > Overlay network acceleration: Virtual Extensible LAN (VXLAN), Generic Network Virtualization Encapsulation (GENEVE), Network Virtualization using Generic Routing Encapsulation (NVGRE)
  - > Connection tracking (L4 firewall) and network address translation (NAT)
  - > Flow mirroring, header rewrite, hierarchical quality of service (QoS)
- > Single-root IO virtualization (SR-IOV)
- > Stateless Transmission Control Protocol (TCP) offloads

## Storage Accelerations

- > Block-level encryption: XEX-based tweaked codebook mode with ciphertext stealing-Advanced Encryption Standard (XTS-AES) 256/512-bit key
- > Non-Volatile Memory Express over Fabrics (NVMe-oF) and NVMe/TCP acceleration
- > T10 Data Integrity Field (T10-DIF) signature handover
- > Server Routing Protocol (SRP), Internet Small Computer Systems Interface (iSCSI) Extensions for RDMA (iSER), Network File System (NFS) over RDMA, Server Message Block (SMB) Direct

## Management and Control

- > Network controller sideboard interface (NC-SI), Management Component Transport Protocol (MCTP) over System Management Bus (SMBus), and MCTP over PCIe
- > Platform Level Data Model (PLDM) for Monitor and Control DSP0248
- > PLDM for Firmware Update DSP0267
- > PLDM for Redfish Device Enablement DSP0218
- > PLDM for Field-Replaceable Unit (FRU) DSP0257
- > **Security Protocols and Data Models (SPDM) DSP0274**
- > Serial Peripheral Interface (SPI) to flash
- > Joint Test Action Group (JTAG) Institute of Electrical and Electronics Engineers (IEEE) 1149.1 and IEEE 1149.6

## Cybersecurity

- > Platform security:
  - > Secure boot with hardware root of trust
  - > Secure firmware update
  - > Flash encryption
  - > Device attestation
- > Internet Protocol Security (IPsec)/Transport Layer Security (TLS)/Media Access Control Security (MACSec) 128/256-bit key data-in-motion encryption
- > IPsec for RoCE and Ethernet

## Advanced Timing and Synchronization

- > Advanced Precision Time Protocol (PTP): IEEE 1588v2 (any profile), G.8273.2 Class C, 12 nanosecond accuracy, line-rate hardware timestamp (UTC format)
- > SyncE: Meets G.8262.1 (eEEEC)
- > Configurable packets per second (PPS) in and out
- > Time-triggered scheduling
- > PTP-based packet pacing

## Compatibility

### PCI Express Interface

- > PCIe Gen 5.0 compatible, 32 lanes
- > Support for PCIe bifurcation
- > NVIDIA Multi-Host™ supports connection of up to four hosts
- > PCIe switch Downstream Port Containment (DPC)
- > Support for Message Signaled Interrupts (MSI)/MSI-X mechanisms

## Portfolio and Ordering Information

The portfolio of ConnectX-7 network adapters and ordering information is available in the ConnectX-7 user manuals:

**PCIe adapters manual** and **OCF 3.0 adapters manual**.

## Ready to Get Started?

To learn more about InfiniBand adapters, visit:

**[nvidia.com/infiniband-adapters](https://nvidia.com/infiniband-adapters)**

To learn more about Ethernet network interface cards (NICs), visit: **[nvidia.com/ethernet-adapters](https://nvidia.com/ethernet-adapters)**