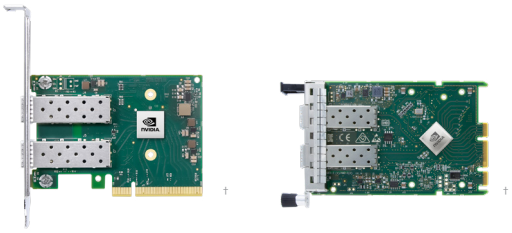
DATASHEET

NVIDIA CONNECTX-6 LX

25G/50G Ethernet SmartNIC (PCIe HHHL/OCP3)

NVIDIA® ConnectX®-6 Lx Ethernet smart network interface cards (SmartNIC) deliver scalability, high performance, advanced security capabilities, and accelerated networking with the best total cost of ownership for 25GbE deployments in cloud and enterprise data centers. The SmartNICs support up to two ports of 25GbE, or a single-port of 50GbE connectivity, along with PCI Express Gen3 and Gen4 x8 host connectivity to deliver cutting-edge 25GbE performance and security for uncompromising data centers.



SDN Acceleration

NVIDIA ASAP² - Accelerated Switch and Packet Processing™ technology offloads the software-defined networking (SDN) data plane to the SmartNIC, accelerating performance and offloading the CPU in virtualized or containerized cloud data centers. Customers can accelerate their data centers with an SR-IOV or VirtIO interface while continuing to enjoy their SDN solution of choice. The ConnectX-6 Lx ASAP² rich feature set accelerates public and on-premises enterprise clouds and boosts communication service providers' (CSP) transition to network function virtualization (NFV). ASAP² supports these communication service providers by enabling packet encapsulations, such as MPLS and GTP, alongside cloud encapsulations, such as VXLAN, GENEVE, and others.

Industry-leading RoCE

Following in the ConnectX tradition of providing industry-leading RDMA over Converged Ethernet (RoCE) capabilities, ConnectX-6 Lx enables more scalable, resilient, and easy-to-deploy RoCE solutions. With Zero Touch RoCE (ZTR), the ConnectX-6 Lx allows RoCE payloads to run seamlessly on existing networks without special configuration, either to priority flow control (PFC) or explicit congestion notification (ECN), for simplified RoCE deployments. ConnectX-6 Lx ensures RoCE resilience and efficiency at scale.

Secure Your Infrastructure

In an era where data privacy is key, ConnectX-6 Lx adapters offer advanced, built-in capabilities that bring security down to the endpoints with unprecedented performance and scalability. ConnectX-6 Lx offers IPsec inline encryption and decryption acceleration. ASAP² connection-tracking hardware offload accelerates Layer 4 firewall performance.

ConnectX-6 Lx also delivers supply chain protection with hardware root-of-trust (RoT) for secure boot and firmware updates using RSA cryptography and cloning-protection, via a device-unique key, to guarantee firmware authenticity.

SMARTNIC PORTFOLIO

- 10/25/50 Gb/s Ethernet
- Various form factors:
  - PCIe low-profile
  - OCP 3.0 small form factor (SFF)
- Connectivity options:
  - SFP28, QSFP28
- PCIe Gen3 and Gen4 x8
- Crypto and non-crypto versions

KEY FEATURES

- Line speed message rate of 75Mpps
- Advanced RoCE
- ASAP² - Accelerated Switching and Packet Processing
- IPsec inline crypto acceleration
- Overlay tunneling accelerations
- Stateful rule checking for connection tracking
- Hardware root-of-trust and secure firmware update
- Best-in-class PTP performance
- Open Data Center Committee (ODCC) compatible

SOLUTIONS

- Enterprise data centers
- Cloud-native, web 2.0, hyperscale
- Secured infrastructure
- NFV

† For illustration only. Actual products may vary.

Features*

Network Interface

- Two SerDes lanes supporting 25Gb/s per lane, for various port configurations:
  - 2x 10/25 GbE
  - 1x 50GbE

Host Interface

- PCIe Gen 4.0, 3.0, 2.0, 1.1
- 16.0, 8.0, 5.0, 2.5 GT/s link rate
- 8 lanes of PCIe
- MSI/MSI-X mechanisms
- Advanced PCIe capabilities

Virtualization/Cloud Native

- Single root IOV (SR-IOV) and VirtIO acceleration
  - Up to 512 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

- SDN acceleration for:
  - Bare metal
  - Virtualization
  - Containers
- Full hardware offload for OVS data plane
- Flow update through RTE_Flow or TC_Flower
- OpenStack support
- Kubernetes support
- Rich classification engine (Layer 2 to Layer 4)
- 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-XTS 256/512-bit key
  - IPsec over RoCE
- 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 packets
- Transmit side scaling (TSS)
- VLAN and MPLS tag insertion/stripping
- Receive flow steering

Advanced Timing and Synchronization

- Advanced PTP
  - IEEE 1588v2 (any profile)
  - Precision time protocol (PTP) hardware clock (PHC) (UTC format)
  - Line rate hardware timestamp (UTC format)
- Time-triggered scheduling
- PTP-based packet pacing
- Time-based SDN acceleration

Storage Accelerations

- NVMe over Fabrics offloads for target
- Storage protocols: iSER, NFSoRDMA, SMB Direct, NVMe-oF, and more

RDMA over Converged Ethernet

- RoCE v1/v2
- Zero Touch RoCE (ZTR): no ECN, no PFC
- RoCE over overlay networks
- IPsec over RoCE
- Selective repeat
- NVIDIA GPUDirect®
- Dynamically connected transport (DCT)
- Burst buffer offload

Management and Control

- NC-SI, MCTP over SMBus and MCTP over PCIe - Baseboard Management Controller interface, NCSI over RBT in OCP cards
- PLDM for Monitor and Control DSP0248
- PLDM for Firmware Update DSP0267

Remote Boot

- Remote boot over Ethernet
- Remote boot over iSCSI
- Unified extensible firmware interface (UEFI) support for x86 and Arm servers
- Pre-execution environment (PXE) boot

Standards*

- IEEE 802.3ae 10 Gigabit Ethernet
- 25/50 Ethernet Consortium 25G and 50G supporting all FEC modes
- IEEE 802.3by 25G supporting all FEC modes
- IEEE 802.3ad, 802.1AX Link Aggregation
- IEEE 802.3az Energy Efficient Ethernet (supports only "Fast-Wake" mode)
- IEEE 802.3ap based auto-negotiation and KR startup
- IEEE 802.1Q, 802.1P VLAN tags and priority
- IEEE 802.1Qaz (ETS)
- IEEE 802.1Qbb (PFC)
- IEEE 802.1Qbg
- IEEE 1588v2
- IEEE 1149.1 and IEEE 1149.6 JTAG
- PCI Express Gen3 and Gen4

Ordering Information

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

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

Learn more

Find out more about ConnectX-6 Lx at **www.nvidia.com/en-us/networking/ethernet/connectx-6-lx**