ConnectX®-6 EN 200Gb/s Adapter

World’s first 200Gb/s Ethernet network adapter, offering world-class performance, smart offloads and In-Network Computing, leading to the highest return on investment for Big Data, Machine Learning, Cloud, Web 2.0, and Storage applications.

ConnectX-6 EN offers unprecedented world-class performance, providing two ports of 200Gb/s for Ethernet connectivity, sub-600 ns latency and 200 million messages per second. With Mellanox Multi-Host™ supporting up-to 8 independent hosts, integrated PCIe switch, NVMe over Fabric and security offloads, ConnectX-6 offers the highest performance and most flexible solution for the most demanding data center applications.

ConnectX-6 is a groundbreaking addition to the Mellanox ConnectX series of industry-leading adapters. In addition to all the existing innovative features of past versions, ConnectX-6 offers a number of enhancements to further improve performance and scalability. ConnectX-6 EN supports 200, 100, 50, 40, 25, and 10Gb/s Ethernet speeds.

Cloud and Web2.0 Environments

Telco, Cloud and Web2.0 customers developing their platforms on Software Defined Network (SDN) environments are leveraging the Virtual Switching capabilities of the Operating Systems on their servers to enable maximum flexibility in the management and routing protocols of their networks.

Open V-Switch (OVS) is an example of a virtual switch that allows Virtual Machines to communicate among themselves and with the outside world. Software-based virtual switches, traditionally residing in the hypervisor, are CPU intensive, affecting system performance and preventing full utilization of available CPU for compute functions.

To address this, ConnectX-6 offers Mellanox Accelerated Switching And Packet Processing (ASAP3) Direct technology to offload the vSwitch/vRouter by handling the data plane in the NIC hardware while maintaining the control plane unmodified. As a result, significantly higher vSwitch/vRouter performance is achieved without the associated CPU load.

The vSwitch/vRouter offload functions supported by ConnectX-5 and ConnectX-6 include encapsulation and de-capsulation of overlay network headers, as well as stateless offloads of inner packets, packet headers re-write (enabling NAT functionality), hairpin, and more.

In addition, ConnectX-6 offers intelligent flexible pipeline capabilities, including programmable flexible parser and flexible match-action tables, which enable hardware offloads for future protocols.

Storage Environments

NVMe storage devices are gaining momentum, offering very fast access to storage media. The evolving NVMe over Fabric (NVMeOF) protocol leverages RDMA connectivity to remotely access NVMe storage devices efficiently, while keeping the end-to-end NVMe model at lowest latency. With its NVMeOF target and initiator offloads, ConnectX-6 brings further optimization to NVMeOF, enhancing CPU utilization and scalability.

Storage customers will benefit from the embedded 16-lane PCIe switch, which allows
them to create standalone appliances in which ConnectX-6 is directly connected to the SSDs. By leveraging ConnectX-6 PCIe Gen3/Gen4 capability, customers can build large, efficient high speed storage appliances with PCIe Gen3/Gen4 NVMe devices.

Similar to previous ConnectX generations, ConnectX-6 enables Host Chaining, an innovative storage rack design by which different servers can be connected with no need for a switch. Mellanox Multi-Host technology has been improved even further in ConnectX-6, allowing for up to eight hosts to be connected to a single adapter by segmenting the PCIe interface into multiple and independent interfaces. With a variety of new rack design alternatives, ConnectX-6 lowers the total cost of ownership (TCO) in the data center by reducing CAPEX (cables, NICs, and switch port expenses), and OPEX (cutting down on switch port management and overall power usage).

**Security**

ConnectX-6 offers a crucial innovation to network security by providing block-level encryption. Data in transit undergoes encryption and decryption as it is stored or retrieved. The encryption/decryption, based on the IEEE XTS-AES standard, is offloaded by the ConnectX-6 hardware, saving latency and offloading CPU. ConnectX-6 block-level encryption offload enables protection between users sharing the same resources, as different encryption keys can be used.

By performing encryption in the adapter, ConnectX-6 also renders encryption unnecessary elsewhere in the network, such as in storage. Moreover, ConnectX-6 supports Federal Information Processing Standards (FIPS) compliance, alleviating the systemic need for self-encrypted disks. With this capability, customers are free to choose their preferred storage device, including byte-addressable and NVDIMMs that otherwise would be used without encryption.

**Machine Learning and Big Data Environments**

Data analytics has become an essential function within many enterprise data centers, clouds and Hyperscale platforms. Machine learning relies on especially high throughput and low latency to train deep neural networks and to improve recognition and classification accuracy. As the first adapter to deliver 200Gb/s throughput, ConnectX-6 is the perfect solution to provide machine learning applications with the levels of performance and scalability that they require.

ConnectX-6 utilizes the RDMA technology to deliver low-latency and high performance. ConnectX-6 enhances RDMA network capabilities even further by delivering end-to-end packet level flow control.

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**COMPATIBILITY**

**PCI EXPRESS INTERFACE**

- PCIe Gen 4.0, 3.0, 2.0, 1.1 compatible
- 2.5, 5.0, 8, 16GT/s link rate
- 32 lanes of PCIe Gen3 or 16 lanes of PCIe Gen4
- Support for PCIe x1, x2, x4, x8, and x16 configurations
- PCIe Atomic
- TLP (Transaction Layer Packet) Processing Hints (THP)
- Embedded PCIe switch
- Advanced Error Reporting (AER)

- PCIe switch Downstream Port Containment (DPC) enablement for PCIe hot-plug
- Access Control Service (ACS) for peer-to-peer secure communication
- Process Address Space ID (PASID) Address Translation Services (ATS)
- IBM CAPIv2 (Coherent Accelerator Processor Interface)
- Support for MSI/MSI-X mechanisms

**OPERATING SYSTEMS/DISTRIBUTIONS**

- RHEL, SLES, Ubuntu and other major Linux distributions
- Windows
- FreeBSD
- VMware
- OpenFabrics Enterprise Distribution (OFED)
- OpenFabrics Windows Distribution (WinOF-2)

**CONNECTIVITY**

- Interoperability with Ethernet switches (up to 200GbE, as 4 lanes of 50Gb/s data rate)
- Passive copper cable with ESD protection
- Powered connectors for optical and active cable support

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