ConnectX®-6 EN IC
200GbE Ethernet Adapter IC

World’s first 200GbE Ethernet network adapter offering unprecedented, industry-leading 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 is a groundbreaking addition to the Mellanox ConnectX series of industry-leading adapters, providing two ports of 200GbE for Ethernet connectivity, sub 0.8usec latency and 215 million messages per second. With Mellanox Multi-Host® support for up to 8 independent hosts, an integrated PCIe switch, NVMe over Fabric and security offloads, ConnectX-6 offers the highest performance and most flexible solution for today’s demanding data center applications.

ConnectX-6 EN supports 200, 100, 50, 40, 25, and 10 GbE Ethernet speeds.

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 200GbE connectivity per port</td>
<td>Most intelligent, highest performance fabric for compute and storage infrastructures</td>
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<tr>
<td>Maximum bandwidth of 200Gb/s</td>
<td>Cutting-edge performance in virtualized HPC networks including Network Function Virtualization (NFV)</td>
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<tr>
<td>Up to 215 million messages/sec</td>
<td>Advanced storage capabilities including block-level encryption and checksum offloads</td>
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<tr>
<td>Sub 0.8usec latency</td>
<td>Host Chaining technology for economical rack design</td>
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<tr>
<td>Mellanox Multi-Host with advanced quality of service (QoS) capabilities</td>
<td>Smart interconnect for x86, Power, Arm, GPU and FPGA-based platforms</td>
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<tr>
<td>Block-level AES-XTS hardware encryption</td>
<td>Flexible programmable pipeline for new network flows</td>
</tr>
<tr>
<td>FIPS capable</td>
<td>Enabler for efficient service chaining</td>
</tr>
<tr>
<td>8 network lanes support both 50G SerDes (PAM4) and 25G SerDes (NRZ) based ports</td>
<td>Efficient I/O consolidation, lowering data center costs and complexity</td>
</tr>
<tr>
<td>PCIe Gen 4.0 and Gen 3.0 support</td>
<td>-</td>
</tr>
<tr>
<td>RoHS compliant</td>
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</table>

Storage Environments

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

Additionally, as in 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.

Cloud and Web 2.0 Environments

Cloud, Web 2.0 and Telecommunications customers build their data centers to maximize the performance and flexibility of applications running on the CPU. Software Defined Network (SDN) environments leverage the virtual switching capabilities of the operating systems to achieve maximum flexibility in network management and routing protocols. Open vSwitch (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.

With Mellanox ASAP® - Accelerated Switch and Packet Processing® Direct technology, significantly higher vSwitch/vRouter performance is achieved without the associated CPU load.
ConnectX-6 supports various vSwitch/vRouter offload functions including:

- Encapsulation and de-capapsulation of overlay network headers
- 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 will enable hardware offloads of future protocols.

**Standard & Multi-Host Management**

Mellanox’s host management technology for standard and multi-host platforms optimizes board management and power, performance and firmware update management via NC-SI, MCTP over SMBus and MCTP over PCIe, as well as PLDM for Monitor and Control DSP0248 and PLDM for Firmware Update DSP0267.

**Security**

ConnectX-6 block-level encryption offers a critical innovation to network security. As data in transit is stored or retrieved, it undergoes encryption and decryption. The ConnectX-6 hardware offloads the IEEE AES-XTS encryption/decryption from the CPU, saving latency and CPU utilization. It also guarantees protection for users sharing the same resources through the use of dedicated encryption keys.

By performing block-storage encryption in the adapter, ConnectX-6 excludes the need for self-encrypted disks. This allows customers the freedom to choose their preferred storage device, including byte-addressable and NVDIMM devices that traditionally do not provide encryption. Moreover, ConnectX-6 can support Federal Information Processing Standards (FIPS) compliance.

**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 high throughput and low latency to train deep neural networks and to improve recognition and classification accuracy. 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 RoCE Congestion Control, achieving end-to-end best performance.

**Compatibility**

**PCI Express Interface**
- PCIe Gen 4.0, 3.0, 2.0, 1.1 compatible
- 2.5, 5.0, 8, 16 GT/s link rate
- 32 lanes as 2x 16-lanes of PCIe
- Support for PCIe x1, x2, x4, x8, and x16 configurations
- PCIe Atomic
- TLP (Transaction Layer Packet) Processing Hints (TPH)
- Embedded PCIe switch
- Advanced Error Reporting (AER)

- PCIe switch Downstream Port Containment (OPC) 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 CAPv2 (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**
- 50G SerDes (PAM4) and 25G SerDes (NRZ) based ports
- Interoperability with Ethernet switches up to 200GbE
- Passive copper cable with ESD protection
- Powered connectors for optical and active cable support
Table 1 - IC Ordering Part Numbers

<table>
<thead>
<tr>
<th>Ethernet Supported Speeds (GbE)</th>
<th>No. of Network Ports</th>
<th>Crypto Support</th>
<th>PCI Express Configuration</th>
<th>OPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>100, 50, 40, 25, 10</td>
<td>2</td>
<td>No crypto</td>
<td>PCIe Gen 4.0/3.0 x32</td>
<td>MT28908A0-NCCF-CE</td>
</tr>
<tr>
<td>100, 50, 40, 25, 10</td>
<td>2</td>
<td>Crypto enabled</td>
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* This section describes hardware features and capabilities. Please refer to the driver and firmware release notes for feature availability.