Flexible I/O for the Dynamic Data Center

Mellanox 10/25/40/50/56/100 Gigabit Ethernet Converged Network Adapters
Mellanox continues its leadership in providing high-performance networking technologies by delivering superior productivity and scaling in 10/25/40/50/56/100 Gigabit Ethernet Adapters, enabling data centers to do more with less.

**VALUE PROPOSITIONS**

- Data centers deploying virtualized servers see higher demands on the I/O infrastructure. With support for 10/25/40/50/56/100 Gb/s transfer rates, 64 physical functions and up to 512 virtual functions, Mellanox adapters can satisfy the bandwidth demands of a virtualized environment. And with backwards compatibility, the Ethernet cards can be deployed in early generation fabrics giving IT managers an upgrade migration path to 25, 40, 50 and 100 GbE.

- Web 2.0 and cloud service providers need high bandwidth virtualization support and CPU offloads to achieve the highest productivity from their data centers. Mellanox Ethernet adapters support virtualization, Overlay Networks, CPU offloads and RDMA over Converged Ethernet (RoCE), enabling data center efficiency and scalability.

- Financial institutions utilizing high frequency trading or data exchange applications require low latency fabrics. Mellanox Ethernet adapters deliver low latency Sockets and RDMA solutions for the ultimate performance optimization.
World-Class Ethernet Performance

Mellanox Ethernet adapters utilizing IBTA RoCE technology provide efficient RDMA services, delivering high performance to bandwidth and latency sensitive applications. With link-level interoperability within existing Ethernet infrastructure, network administrators can leverage existing data center fabric management solutions.

Applications utilizing TCP/UDP/IP transport can achieve industry-leading throughput over 10/25/40/50/56/100GbE. The hardware-based stateless offload and flow steering engines in Mellanox adapters reduce the CPU overhead of IP packet transport, freeing more processor cycles to work on applications. Data Plane Development Kit (DPDK) and sockets acceleration software further increase performance for latency sensitive applications.

I/O Virtualization

Mellanox Ethernet adapters provide dedicated adapter resources and guaranteed isolation and protection for virtual machines (VMs) within the server. Mellanox adapters give data center managers better server utilization and LAN and SAN unification while reducing cost, power, and cable complexity.

Overlay Networks

New large-scale clouds require the implementation of Overlay Network protocols in order to overcome the issues of security and isolation within the cloud and the limitations on the number of existing VLANs. Mellanox Ethernet adapters with hardware offload capability for VXLAN, GENEVE and NVGRE brings a unique value to cloud providers, enabling them to reduce their CPU overhead and consequently to reduce OPEX and CAPEX by supporting more cloud tenants over the same infrastructure. Moreover, ConnectX-4 EN and ConnectX-4 Lx EN hardware capabilities for encapsulating and decapsulating the Overlay Networks’ protocol headers further improve the utilization of the cloud servers.
Quality of Service
Resource allocation per application or per VM is provided and protected by the advanced QoS supported by Mellanox adapters. Service levels for multiple traffic types can be based on IETF DiffServ or IEEE 802.1p/Q, along with the DCB enhancements, allowing system administrators to prioritize traffic by application, virtual machine, or protocol. This powerful combination of QoS and prioritization provides the ultimate fine-grain control of traffic – ensuring that applications run smoothly in today’s complex environment.

Coherent Accelerator Processor Interface (CAPI)
With its support for CAPI, ConnectX-4 EN provides the best performance for Power and OpenPower based platforms. Such platforms benefit from better interaction between the Power CPU and the ConnectX-4 EN adapter, lower latency, higher efficiency of storage access, and better Return on Investment (ROI), as more applications and more Virtual Machines run on the platform.

Complete End-to-End Ethernet Networking
Mellanox adapters are part of a full 10/25/40/50/56/100 Gigabit Ethernet end-to-end portfolio for data centers, which also includes switches, application acceleration packages, and cables. Mellanox’s SwitchX and Spectrum families of Ethernet switches and Unified Fabric Management software incorporate advanced tools that simplify networking management and installation, and provide the needed capabilities for the highest scalability and future growth. Mellanox's messaging and storage acceleration packages deliver additional capabilities for the ultimate server performance. With Mellanox end to end, IT managers can be assured of the highest performance, most efficient network fabric.

Flexibility
The ConnectX-4 Lx EN Programmable adapter can be used to accelerate security applications, Deep Packet Inspection, Compression/Decompression and many other functions that require data acceleration engines to improve performance in modern data centers, private and public clouds, Web 2.0 infrastructures, telecommunications, and high performance computing applications. The addition of the FPGA on board provides users with maximum flexibility to offload CPU utilization by migrating portions of their data processing logic to the FPGA.

Benefits
- Improved productivity and efficiency
- Smart interconnect for x86, Power, ARM, and GPU-based compute and storage platforms
- Industry-leading throughput and latency performance
- Enabling I/O consolidation by supporting TCP/IP, Storage and RDMA over Ethernet transport protocols on a single adapter
- Support for industry-standard SR-IO Virtualization technology with delivery of VM protection and granular levels of QoS to applications
- High-availability and high-performance for data center networking
- Cutting-edge performance in virtualized Overlay Networks (VXLAN and NVGRE)
- Increased VM count per server ratio
- Software compatible with standard TCP/UDP/IP and iSCSI stacks
- High level silicon integration and no external memory design provides low power, low cost and high reliability
- Programmable adapters for easy development of user applications and deployment to an FPGA on-board

Target Applications
- Public and private clouds
- Data analytics applications
- Web 2.0 data centers and cloud computing
- Data center virtualization
- Low latency financial services
- I/O consolidation (single unified wire for networking, storage and clustering)
- Video streaming
- Enterprise data center applications
- Accelerating back-up and restore operations
- Machine learning and Big Data applications
**ConnectX® 3**

**Ports**
- 1 x 1/10GbE
- 2 x 1/10GbE
- 1 x 1/10/40/56GbE
- 2 x 1/10/40/56GbE

**Connector**
- SFP+
- SFP+
- QSFP
- QSFP

**Cabling Type**
- Direct Attached Copper SR and LR Fiber Optic

**Host Bus**
- PCIe 3.0

**Features**
- Stateless Offload, RDMA, SR-IOV, DCB, Precision Time Protocol

**OS Support**
- Linux, Windows, VMWare, FreeBSD

**Order Number**
- MCX311A-XCAT
- MCX312A-XCAT
- MCX313A-BCAT
- MCX314A-BCAT

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**ConnectX® 3**

**Ports**
- 1 x 1/10GbE
- 2 x 1/10GbE
- 1 x 1/10/40/56GbE
- 2 x 1/10/40/56GbE

**Connector**
- SFP+
- SFP+
- QSFP
- QSFP

**Cabling Type**
- Direct Attached Copper SR and LR Fiber Optic

**Host Bus**
- PCIe 3.0

**Features**
- Stateless Offload, VXLAN and NVGRE Offload, RDMA, SR-IOV, DCB, Precision Time Protocol

**OS Support**
- Linux, Windows, VMWare, FreeBSD

**Order Number**
- MCX311A-XCCT
- MCX312B-XCCT
- MCX313A-BCCT
- MCX314A-BCCT

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**ConnectX® 3**

**Ports**
- 1 x 1/10GbE
- 2 x 1/10GbE
- 1 x 1/10/40/56GbE
- 2 x 1/10/40/56GbE

**Connector**
- SFP+
- SFP+
- QSFP
- QSFP

**Cabling Type**
- Direct Attached Copper SR and LR Fiber Optic

**Host Bus**
- PCIe 3.0

**Features**
- Stateless Offload, VXLAN and NVGRE Offload, RDMA, SR-IOV, DCB, Precision Time Protocol

**OS Support**
- Linux, Windows, VMWare, FreeBSD

**Order Number**
- MCX311A-XCCT
- MCX312B-XCCT
- MCX313A-BCCT
- MCX314A-BCCT

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**ConnectX® 4**

**Ports**
- 1 x 1/10GbE
- 2 x 1/10GbE
- 1 x 1/10/25GbE

**Connector**
- QSFP28

**Host Bus**
- PCI Express 3.0 x16

**Features**
- RoCE, GPUDirect, SR-IOV, Overlay Networks, Stateless Offloads, Signature Handover, Dynamically Connected Transport

**OS Support**
- Linux, Windows, VMware, FreeBSD

**Order Number**
- MCX415A-B
- MCX416A-B
- MCX415A-G
- MCX416A-G
- MCX415A-C
- MCX416A-C
- MCX413A-B
- MCX414A-B
- MCX413A-G
- MCX414A-G

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**ConnectX® 4**

**Ports**
- 1 x 1/10GbE
- 2 x 1/10GbE
- 1 x 1/10/40GbE
- 2 x 1/10/40GbE

**Connector**
- SFP+
- SFP+
- QSFP
- QSFP

**Cabling Type**
- Direct Attached Copper SR and LR Fiber Optic

**Host Bus**
- PCIe 3.0

**Features**
- Stateless Offload, VXLAN and NVGRE Offload, RDMA, SR-IOV, DCB, Precision Time Protocol

**OS Support**
- Linux, Windows, VMWare, FreeBSD

**Order Number**
- MCX4111A-XCAT
- MCX4121A-XCAT
- MCX4131A-BCCT
- MCX414A-BCCT

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**ConnectX® 4Lx**

**Ports**
- 1 x 10GbE
- 2 x 10GbE
- 1 x 25GbE
- 2 x 25GbE

**Connector**
- QSFP28

**Host Bus**
- PCI Express 3.0 x8

**Features**
- RoCE, GPUDirect, SR-IOV, Overlay Networks, Stateless Offloads, Signature Handover, Dynamically Connected Transport, FPGA as 'bump-on-the-wire'

**OS Support**
- Linux

**FPGA**
- Xilinx Kintex® UltraScale™ XCKU040
- Xilinx Kintex® UltraScale™ XCKU060

**Order Number**
- MCX4731A-BCAT
- MCX4732A-BCAT

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*Please visit Mellanox's web site for more cable information, best usage practice and availability.*
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<th>FEATURE SUMMARY</th>
<th>SAFETY</th>
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<td><strong>SAFETY</strong></td>
<td><strong>COMPLIANCE</strong></td>
<td><strong>COMPATIBILITY</strong></td>
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<tr>
<td>– IEEE 802.3bj, 802.3bm 100 Gigabit Ethernet</td>
<td>– CAN/CSA-C22.2 No. 60950-1</td>
<td>– Fits x8 or x16 slots</td>
<td>– MIB, MIB-II, MIB-II Extensions, RMON, RMON 2</td>
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<td>– 25G Ethernet Consortium 25, 50 Gigabit Ethernet</td>
<td>– EN 60950-1</td>
<td>– Support for MSI/MSI-X mechanisms</td>
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<td>– IEEE 802.3ba 40 Gigabit Ethernet</td>
<td>– IEC 60950-1</td>
<td>– Coherent Accelerator Processor Interface (CAPI)</td>
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<td>– IEEE 802.3ae 10 Gigabit Ethernet</td>
<td><strong>EMC (EMISSIONS)</strong></td>
<td>– Passive copper cable with ESD protection</td>
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<td>– IEEE 802.3az Energy Efficient Ethernet</td>
<td>– FCC Part 15 (CFR 47), Class A</td>
<td>– Powered connectors for optical &amp; active cable support</td>
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<td>– IEEE 802.3ap based auto-negotiation and KR startup</td>
<td>– ICES-003 ,Class A</td>
<td>– QSF to SFP+ connectivity through QSA module</td>
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<td>– Proprietary Ethernet protocols (20/40GBASE-R2, 50/56GBASE-R4)</td>
<td>– EN50522 ,Class A</td>
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<td>– IEEE 802.3ad, 802.1AX Link Aggregation</td>
<td>– CISPR22 ,Class A</td>
<td>– Interoperable with 10/25/40/50/56/100Gb Ethernet switches</td>
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<td>– IEEE 802.10, 802.1P VLAN tags and priority</td>
<td>– AS/NZS CISPR 22, Class A ( IEC mark)</td>
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<td>– RHEL/CentOS</td>
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<td>– IEEE 802.1Qau (QCN) – Congestion Notification</td>
<td>– VCCI Class A</td>
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<td>– IEEE 802.1Qaz (ETS)</td>
<td>– EN50504</td>
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<td>– IEEE 802.1Qbb (PFC)</td>
<td>– KC (Korea)</td>
<td><strong>OPERATING SYSTEMS/DISTRIBUTIONS</strong></td>
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<td>– IEEE 802.1Qbg</td>
<td><strong>ENVIRONMENTAL</strong></td>
<td><strong>OPERATING CONDITIONS</strong></td>
<td>– OpenFabrics Enterprise Distribution (OFED)</td>
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<td>– Jumbo frame support (9.6KB)</td>
<td>– EU: IEC 60068-2-29: Shocks, Type I / II</td>
<td>– Air flow: 100LFM @ 55°C</td>
<td><strong>MANAGEMENT</strong></td>
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<td><strong>TCP/UDP/IP STATELESS OFFLOAD</strong></td>
<td>– EU: IEC 60068-2-32: Fall Test</td>
<td>– Requires 3.3V, 12V supplies</td>
<td>– MIB, MIB-II, MIB-II Extensions, RMON, RMON 2</td>
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<tr>
<td>– TCP/UDP/IP checksum offload</td>
<td><strong>REMOTE BOOT</strong></td>
<td><strong>GENERAL</strong></td>
<td>– Configuration and diagnostic tools</td>
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<td>– TCP Large Send (&lt; 64KB) or Giant Send</td>
<td>– Remote boot over Ethernet</td>
<td>– Adapters for Open Compute Project (OCP)</td>
<td><strong>OPERATING SYSTEMS/DISTRIBUTIONS</strong></td>
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<td>– (64KB-16MB) Offload for segmentation</td>
<td>– Remote boot over iSCSI</td>
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<td><strong>COMPATIBILITY</strong></td>
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<td>– Receive Side Scaling (RSS) up to 32 queues</td>
<td>– PXE and UEFI</td>
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<td>– Line rate packet filtering</td>
<td><strong>APPLICATION ACCELERATOR FPGA</strong></td>
<td>– Fits x8 or x16 slots</td>
<td>– Adapters with combined UEFI/Legacy ROM</td>
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<td><strong>ADDITIONAL CPU OFFLOADS</strong></td>
<td>Two available configurations:</td>
<td>– Support for MSI/MSI-X mechanisms</td>
<td>– Coherent Accelerator Processor Interface (CAPI)</td>
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<tr>
<td>– RDMA over Converged Ethernet (RoCE)</td>
<td>– Xilinx Kintex® UltraScale® XCKU040</td>
<td>– Coherent Accelerator Processor Interface (CAPI)</td>
<td>– PCI Express Interface</td>
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<tr>
<td>– Traffic steering across multiple cores</td>
<td>– Xilinx Kintex® UltraScale® XCKU060</td>
<td>– Fits x8 or x16 slots</td>
<td>– MIB, MIB-II, MIB-II Extensions, RMON, RMON 2</td>
</tr>
<tr>
<td>– Intelligent interrupt coalescence</td>
<td></td>
<td>– Support for MSI/MSI-X mechanisms</td>
<td>– Configuration and diagnostic tools</td>
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<tr>
<td>– Stateless offloads for Overlay Networks and tunneling protocols</td>
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<td>– Coherent Accelerator Processor Interface (CAPI)</td>
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<td>– Hardware offload of encapsulation and decapsulation of NVGRE and VXLAN Overlay Networks</td>
<td></td>
<td>– PCI Express Interface</td>
<td>– Adapters with combined UEFI/Legacy ROM</td>
</tr>
</tbody>
</table>

* Product images may not include heatsink assembly; actual product may differ.
** For programmable cards only.