ACCELERATED NETWORKING AND SECURITY FOR THE MOST ADVANCED CLOUD WORKLOADS

The NVIDIA® ConnectX®-7 SmartNIC is optimized to deliver accelerated networking for modern cloud, artificial intelligence, and traditional enterprise workloads. ConnectX-7 provides a broad set of software-defined, hardware accelerated networking, storage, security, and management capabilities which enable organizations to transform and secure their IT infrastructures.

Extending the tradition of NVIDIA’s industry leading innovation for networking, ConnectX-7, is available in 1, 2, or 4-port configurations and delivers up to 400Gb/s of bandwidth. With features such as NVIDIA ASAP2 - Accelerated Switching and Packet Processing®, advanced RoCE, NVIDIA GPUDirect® Storage, and in-line hardware acceleration for TLS/IPsec/MACsec encryption/decryption, ConnectX-7 empowers agile and high-performance solutions from edge to core data centers and clouds, all while enhancing network security and reducing the total cost of ownership.

Available in PCIe and OCP3.0 form factors, ConnectX-7 empowers solutions for cloud, hyperscale, and enterprise networking.

<table>
<thead>
<tr>
<th>PRODUCT SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Total Bandwidth</td>
</tr>
<tr>
<td>Supported Ethernet</td>
</tr>
<tr>
<td>Speeds</td>
</tr>
<tr>
<td>Number of Network Ports</td>
</tr>
<tr>
<td>Network Interface</td>
</tr>
<tr>
<td>Technologies</td>
</tr>
<tr>
<td>Host Interface</td>
</tr>
<tr>
<td>Cards Form Factors</td>
</tr>
<tr>
<td>Network Interfaces</td>
</tr>
</tbody>
</table>

Accelerate Software-Defined Networking

With NVIDIA ConnectX-7 ASAP2 technology built-in, accelerates software-defined networking with no CPU penalty, delivering up to 250Mpps of DPDK performance.

Provide Security from Edge to Core

Hardware engines in ConnectX-7 offload and accelerate security, with in-line encryption/decryption of TLS, IPsec, and MACsec.

Enhance Storage Performance

ConnectX-7 enables high-performance storage and data access with RoCE and GPUDirect Storage and accelerates NVMe-oF over both RoCE and TCP.

Enable Precision Timing

ConnectX-7 provides extremely accurate time synchronization for data-center applications and timing-sensitive infrastructures.
FEATURES

**Network Interface**
- Up to 4 network ports supporting NRZ, PAM4 (50G and 100G), in various ports configurations:
  - 1 x 10/25/40/50/100/200/400GbE
  - 2 x 10/25/40/50/100/200/400GbE
  - 4 x 10/25/40/50/100/200GbE
- Up to 400Gb/s total bandwidth

**Host Interface**
- 32 lanes of PCIe Gen 5.0, 4.0, 3.0, 2.0, 1.1
- 32.0, 16.0, 8.0, 5.0, 2.5 GT/s link rate
- Integrated PCI switch
- NVIDIA Multi-Host™ and NVIDIA Socket Direct™ (up to 8 hosts)
- MSI/MSI-X mechanisms
- Advanced PCIe capabilities
- 8 physical functions

**ASAP²**
- SDN acceleration for:
  - Bare metal
  - Virtualization
  - Containers
- Single Root IOV (SR-IOV) and VirtIO acceleration
- Support up to 2,000 virtual functions
- Support for MPLS and GTP tunneling
- Encap/decap of VXLAN, NVGRE, Geneve, eCPRI, and more
- Stateless offloads for overlay tunnels
- Full hardware offload for OVS data plane
- Flow update through RTE_Flow or TC_Flower
- VMware NSX-T N-VDS acceleration
- Rich classification engine (L2 to L4)
- Flex-parser: user-defined classification
- Hardware offload for:
  - Connection tracking (L4 firewall)
  - NAT
  - Header rewrite
  - Mirroring
  - Sampling
  - Flow aging
  - Hierarchical QoS
  - Flow-based statistics

**Operating System Support**
- In-box drivers for major operating systems:
  - Linux - RHEL, Ubuntu
  - Windows
  - FreeBSD
- Virtualization and containers
  - VMware ESX
  - Kubernetes
  - Docker

**VNF Acceleration**
- Hardware offload programmable pipeline:
  - Packet classification on network layers L2 to L4 and tunneled traffic such as GTP and VXLAN
  - Packet dispatching to multiple cores
  - Multi-threaded API for concurrent update of offloaded rules
  - ASAP² accelerations/actions: counters, QoS, NAT, aging, mirroring, sampling, flow tag
  - Hairpin flow for full hardware offload
  - Highly-scalable number of classifications and actions
  - Application access to hardware statistics
  - Application access to crypto offloads

**Cyber Security**
- Inline hardware IPsec encryption and decryption
  - AES-GCM 128/256-bit key
  - IPSec over RoCE
- Inline hardware TLS encryption and decryption
  - AES-GCM 128/256-bit key
- Inline hardware MACsec encryption and decryption
  - AES-GCM 128/256-bit key
  - AES-GCM-XPN 128/256-bit key
- Data-at-rest AES-XTS encryption and decryption
  - AES-XTS 256/512-bit key
- Platform security
  - Secure boot with hardware root-of-trust
  - Secure firmware update
  - Flash encryption

**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]
  - Meets 6.8237.2 Class C standard
  - PTP hardware clock (PHC) [UTC format]
  - 12 nanosecond accuracy
  - Line rate hardware timestamp [UTC format]
  - SyncE
  - Meets 6.8262.1 [eEEC]

**Storage Accelerations**
- NVMe™ over Fabrics storage target offloads
- NVMe™ over PCIe acceleration
- Storage protocols: iSER, NFSoRDMA, SMB Direct, NVMe-oF™, and more

**RDMA over Converged Ethernet**
- RoCE
  - Zero-Touch RoCE: no ECN, no PFC
  - RoCE over overlay networks
  - IPsec over RoCE
  - Selective repeat
  - GPUDirect
  - Dynamically Connected Transport (DCT)
  - Burst buffer offload

**Management and Control**
- SMBus 2.0
- Network Controller Sideband Interface (NC-SI)
- NC-SI, MCTP over SMBus and MCTP over PCIe - Baseboard Management Controller interface
- PLDM for Monitor and Control DSP0248
- PLDM for Firmware Update DSP026
- I2C interface for device control and configuration
- General Purpose I/O pins
- SPI interface to flash
- JTAG IEEE 1149.1 and IEEE 1149.6

**Remote Boot**
- Remote boot over Ethernet
- Remote boot over iSCSI
- UEFI support for x86 and Arm servers
- PXE boot

**Form Factors and Options**
- PCIe HHHL/FHHL
- OCP 3.0 SFF

To learn more about the NVIDIA ConnectX SmartNICs visit [www.nvidia.com/en-us/networking/ethernet-adapters/](http://www.nvidia.com/en-us/networking/ethernet-adapters/)

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