



NVIDIA ConnectX-7 Cards for OCP Spec 3.0 User Manual

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1 About This Manual

This is the User Guide for adapter cards based on the NVIDIA® ConnectX®-7 integrated circuit device for Open Compute Project Spec 3.0. These adapters' connectivity provides the highest-performing low latency and most flexible interconnect solution for servers supporting OCP spec 3.0 adapter cards used in Enterprise Data Centers and High-Performance Computing environments.

2 Ordering Part Numbers

The table below provides the ordering part numbers (OPN) for the available ConnectX-7 cards for OCP Spec 3.0.

NVIDIA SKU	Legacy OPN	Port Type	Supported Speed	OCP3.0 Form Factor	PCI Express	Multi-Host and Socket Direct	Crypto	Secure Boot	Bracket Type	Lifecycle
900-9X7 60-0078-MB1 ¹	MCX753 436MS-HEBB ¹	Dual-port QSFP12, Port split capable	InfiniBand: NDR200/HDR Ethernet: 200GbE (Default Mode)	Small Form Factor (SFF)	PCIe 5.0 x16	Multi-Host and Port Split	-	✓	Thumbscrew (Pull Tab) TSFF Bracket	Prototype
900-9X7 60-0018-MB2	MCX753 436MC-HEAB	Dual-port QSFP12	InfiniBand: NDR200/HDR Ethernet: 200GbE (Default Mode)	Small Form Factor (SFF)	PCIe 5.0 x16	✓	✓	✓	Thumbscrew (Pull Tab) Bracket	Mass Production
900-9X7 60-0078-MB0	MCX753 436MS-HEAB	Dual-port QSFP12	InfiniBand: NDR200/HDR Ethernet: 200GbE (Default Mode)	Small Form Factor (SFF)	PCIe 5.0 x16	✓	-	✓	Thumbscrew (Pull Tab) Bracket	Mass Production
900-9X7 AX-004 NMC0	MCX753 43AMC-NEAC	Single-port OSFP	InfiniBand: NDR (Default Mode) Ethernet: 400GbE	Tall Small Form Factor (TSFF)	PCIe 5.0 x16	✓	✓	✓	Thumbscrew (Pull Tab) TSFF Bracket	Mass Production
900-9X7 AX-003 NMC0	MCX753 43AMS-NEAC	Single-port OSFP	InfiniBand: NDR (Default Mode) Ethernet: 400GbE	Tall Small Form Factor (TSFF)	PCIe 5.0 x16	✓	-	✓	Thumbscrew (Pull Tab) TSFF Bracket	Mass Production
900-9X7 A6-00B3-SIO	MCX713 434AS-ADAI	Quad-Port SFP56	Ethernet: 25GbE	Small Form Factor (SFF)	PCIe 5.0 x16	✓	-	✓	Internal Lock SFF Bracket	Prototype

NVIDIA SKU	Legacy OPN	Port Type	Supported Speed	OCP3.0 Form Factor	PCI Express	Multi-Host and Socket Direct	Crypto	Secure Boot	Bracket Type	Lifecycle
Note ¹ : The supported speed listed here is the default configuration. For the complete list of supported port configurations and instructions on how to change to the desired configuration, refer to Port Splitting Configurations .										

Intended Audience

This manual is intended for the installer and user of these cards.

The manual assumes basic familiarity with InfiniBand and Ethernet network and architecture specifications.

3 Technical Support

Customers who purchased NVIDIA products directly from NVIDIA are invited to contact us through the following methods:

- URL: www.nvidia.com → Support
- E-mail: enterprisesupport@nvidia.com

Customers who purchased NVIDIA M-1 Global Support Services, please see your contract for details regarding Technical Support.

Customers who purchased NVIDIA products through an NVIDIA-approved reseller should first seek assistance through their reseller.

4 Related Documentation

MLNX_OFED for Linux User Manual and Release Notes	User Manual describing OFED features, performance, band diagnostic, tools content, and configuration. See MLNX_OFED for Linux Documentation .
WinOF-2 for Windows User Manual and Release Notes	User Manual describing WinOF-2 features, performance, Ethernet diagnostic, tools content, and configuration. See WinOF-2 for Windows Documentation .
NVIDIA VMWare for Ethernet User Manual	User Manual and release notes describing the various components of the NVIDIA ConnectX® NATIVE ESXi stack. See VMware® ESXi Drivers Documentation .
NVIDIA Firmware Utility (mlxup) User Manual and Release Notes	NVIDIA firmware update and query utility used to update the firmware. Refer to Firmware Utility (mlxup) Documentation .
NVIDIA Firmware Tools (MFT) User Manual	User Manual describing the set of MFT firmware management tools for a single node. See MFT User Manual .
InfiniBand Architecture Specification Release 1.2.1, Vol 2 - Release 1.4, and Vol 2 - Release 1.5	InfiniBand Specifications
IEEE Std 802.3 Specification	IEEE Ethernet Specifications
Open Compute Project 3.0 Specifications	https://www.opencompute.org/
PCI Express Specifications	Industry Standard PCI Express Base and Card Electromechanical Specifications. Refer to PCI-SIG Specifications .
LinkX Interconnect Solutions	LinkX InfiniBand cables and transceivers are designed to maximize the performance of High-Performance Computing networks, requiring high-bandwidth, low-latency connections between compute nodes and switch nodes. NVIDIA offers one of the industry's broadest portfolio of QDR/ FDR10 (40Gb/s), FDR (56Gb/s), EDR/HDR100 (100Gb/s), HDR (200Gb/s) and NDR (400Gb/s) cables, including Direct Attach Copper cables (DACs), copper splitter cables, Active Optical Cables (AOCs) and transceivers in a wide range of lengths from 0.5m to 10km. In addition to meeting IBTA standards, NVIDIA tests every product in an end-to-end environment ensuring a Bit Error Rate of less than 1E-15. Read more at LinkX Cables and Transceivers .

5 Document Conventions

When discussing memory sizes, MB and MBytes are used in this document to mean size in mega Bytes. The use of Mb or Mbits (small b) indicates the size in megabits. In this document, PCIe is used to mean PCI Express.

6 Introduction

6.1 Product Overview

This is the *User Guide* for InfiniBand/VPI adapter cards based on the ConnectX-7 integrated circuit device for OCP Spec 3.0. These adapters' connectivity provides the highest-performing and most flexible interconnect solution for servers supporting OCP 3.0 used in Enterprise Data Centers and High-Performance Computing environments. ConnectX-7 network adapters are offered in two form factors and various flavors: stand-up PCIe and Open Compute Project (OCP) Spec 3.0 cards. This user manual covers the OCP 3.0 cards, for the low-profile PCIe stand-up cards hardware user manual, please refer to [ConnectX-7 PCIe Stand-up Cards User Manual](#).

Providing up to two ports of NDR200 and 200GbE or a single port of NDR and 400GbE connectivity, and PCIe Gen 5.0 x16 host connectivity, ConnectX-7 is a member of NVIDIA's world-class, award-winning, ConnectX family of network adapters. Continuing NVIDIA's consistent innovation in networking, ConnectX-7 provides agility and efficiency at every scale. ConnectX-7 delivers cutting-edge performance and security for uncompromising data centers.

In addition to the Small Form Factor (SFF) form factor, ConnectX-7 for OCP 3.0 cards are available in the newly added Tall-SFF (TSFF) spec form factor, taking into account the added height of the card to allow better thermal performance. Contact NVIDIA for more details.

6.1.1 Port Splitting

ConnectX-8 SuperNICs offer a variety of network port configurations designed to meet the demands of different environments and deployments.

The Port Splitting feature allows a single physical networking module to be split into multiple network ports. This provides flexibility in optimizing port configurations for various network topology use cases. For the supported OPNs and configurations, refer to [Port Splitting Configurations](#).

6.2 System Requirements

Item	Description
PCI Express slot	In PCIe x16 Configuration PCIe Gen 5.0/4.0 (16 GT/s / 32GT/s) through x16 edge connector.
System Power Supply	Refer to Specifications
Operating System	• In-box drivers for major operating systems: • Linux: RHEL, Ubuntu • Windows • Virtualization and containers • VMware ESXi (SR-IOV) • Kubernetes • OpenFabrics Enterprise Distribution (OFED) • OpenFabrics Windows Distribution (WinOF-2)

Item	Description
Connectivity	• Interoperable with 1/10/25/40/50/100/200/400 Gb/s Ethernet switches and SDR/DDR/EDR/HDR100/HDR/NDR200/NDR InfiniBand switches • Passive copper cable with ESD protection • Powered connectors for optical and active cable support

6.3 Package Contents

Category	Qty	Item
Cards	1	ConnectX-7 adapter card for OCP 3.0
Accessories	1	Thumbscrew (Pull Tab) Bracket

For more detailed information, see [Specifications](#).

6.4 Features and Benefits



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

Feature	Description																											
InfiniBand Architecture Specification v1.5 compliant	ConnectX-7 delivers low latency, high bandwidth, and computing efficiency for high-performance computing (HPC), artificial intelligence (AI), and hyperscale cloud data center applications. ConnectX-7 is InfiniBand Architecture Specification v1.5 compliant.																											
	InfiniBand Network Protocols and Rates:																											
	<table><tr><th rowspan="2">Protocol</th><th rowspan="2">Standard</th><th colspan="2">Rate (Gb/s)</th><th rowspan="2">Comments</th></tr><tr><th>4x Port (4 Lanes)</th><th>2x Ports (2 Lanes)</th></tr><tr><td>NDR/ NDR200</td><td>IBTA Vol2 1.5</td><td>425</td><td>212.5</td><td>PAM4 256b/257b encoding and RS-FEC</td></tr><tr><td>HDR/ HDR100</td><td>IBTA Vol2 1.4</td><td>212.5</td><td>106.25</td><td>PAM4 256b/257b encoding and RS-FEC</td></tr><tr><td>EDR</td><td>IBTA Vol2 1.3.1</td><td>103.125</td><td>51.5625</td><td>NRZ 64b/66b encoding</td></tr><tr><td>FDR</td><td>IBTA Vol2 1.2</td><td>56.25</td><td>N/A</td><td>NRZ 64b/66b encoding</td></tr></table>	Protocol	Standard	Rate (Gb/s)		Comments	4x Port (4 Lanes)	2x Ports (2 Lanes)	NDR/ NDR200	IBTA Vol2 1.5	425	212.5	PAM4 256b/257b encoding and RS-FEC	HDR/ HDR100	IBTA Vol2 1.4	212.5	106.25	PAM4 256b/257b encoding and RS-FEC	EDR	IBTA Vol2 1.3.1	103.125	51.5625	NRZ 64b/66b encoding	FDR	IBTA Vol2 1.2	56.25	N/A	NRZ 64b/66b encoding
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FDR	IBTA Vol2 1.2	56.25	N/A	NRZ 64b/66b encoding																								

Feature	Description																								
Up to 400Gb/s Ethernet	ConnectX-7 adapter cards comply with the following IEEE 802.3 standards: 400GbE / 200GbE / 100GbE / 50GbE / 40GbE / 25GbE / 10GbE																								
	<table><tr><th>Protocol</th><th>MAC Rate</th></tr><tr><td>IEEE802.3ck</td><td>100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)</td></tr><tr><td>IEEE802.3cd IEEE802.3bs IEEE802.3cm IEEE802.3cn IEEE802.3cu</td><td>50/100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)</td></tr><tr><td>IEEE 802.3bj IEEE 802.3bm</td><td>100 Gigabit Ethernet</td></tr><tr><td>IEEE 802.3by Ethernet Consortium25</td><td>25/50 Gigabit Ethernet</td></tr><tr><td>IEEE 802.3ba</td><td>40 Gigabit Ethernet</td></tr><tr><td>IEEE 802.3ae</td><td>10 Gigabit Ethernet</td></tr><tr><td>IEEE 802.3cb</td><td>2.5/5 Gigabit Ethernet (For 2.5: support only 2.5 x1000BASE-X)</td></tr><tr><td>IEEE 802.3ap</td><td>Based on auto-negotiation and KR startup</td></tr><tr><td>IEEE 802.3ad IEEE 802.1AX</td><td>Link Aggregation</td></tr><tr><td>IEEE 802.1Q IEEE 802.1P VLAN tags and priority</td><td></td></tr><tr><td>IEEE 802.1Qau (QCN) Congestion Notification IEEE 802.1Qaz (ETS) EEE 802.1Qbb (PFC) IEEE 802.1Qbg IEEE 1588v2 IEEE 802.1AE (MACSec) Jumbo frame support (9.6KB)</td><td></td></tr></table>	Protocol	MAC Rate	IEEE802.3ck	100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)	IEEE802.3cd IEEE802.3bs IEEE802.3cm IEEE802.3cn IEEE802.3cu	50/100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)	IEEE 802.3bj IEEE 802.3bm	100 Gigabit Ethernet	IEEE 802.3by Ethernet Consortium25	25/50 Gigabit Ethernet	IEEE 802.3ba	40 Gigabit Ethernet	IEEE 802.3ae	10 Gigabit Ethernet	IEEE 802.3cb	2.5/5 Gigabit Ethernet (For 2.5: support only 2.5 x1000BASE-X)	IEEE 802.3ap	Based on auto-negotiation and KR startup	IEEE 802.3ad IEEE 802.1AX	Link Aggregation	IEEE 802.1Q IEEE 802.1P VLAN tags and priority		IEEE 802.1Qau (QCN) Congestion Notification IEEE 802.1Qaz (ETS) EEE 802.1Qbb (PFC) IEEE 802.1Qbg IEEE 1588v2 IEEE 802.1AE (MACSec) Jumbo frame support (9.6KB)	
	Protocol	MAC Rate																							
	IEEE802.3ck	100/200/400Gb/s Gigabit Ethernet (Include ETC enhancement)																							
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	IEEE 802.3bj IEEE 802.3bm	100 Gigabit Ethernet																							
	IEEE 802.3by Ethernet Consortium25	25/50 Gigabit Ethernet																							
	IEEE 802.3ba	40 Gigabit Ethernet																							
	IEEE 802.3ae	10 Gigabit Ethernet																							
	IEEE 802.3cb	2.5/5 Gigabit Ethernet (For 2.5: support only 2.5 x1000BASE-X)																							
	IEEE 802.3ap	Based on auto-negotiation and KR startup																							
	IEEE 802.3ad IEEE 802.1AX	Link Aggregation																							
	IEEE 802.1Q IEEE 802.1P VLAN tags and priority																								
	IEEE 802.1Qau (QCN) Congestion Notification IEEE 802.1Qaz (ETS) EEE 802.1Qbb (PFC) IEEE 802.1Qbg IEEE 1588v2 IEEE 802.1AE (MACSec) Jumbo frame support (9.6KB)																								
Memory Components	• SPI - includes 256Mbit SPI Quad Flash device. • FRU EEPROM - Stores the parameters and personality of the card. The EEPROM capacity is 128Kbit (or 16KB). FRU I2C address is (0x50) and is accessible through the PCIe SMBus. (Note: Address 0x58 is reserved.)																								
Overlay Networks	In order to better scale their networks, datacenter operators often create overlay networks that carry traffic from individual virtual machines over logical tunnels in encapsulated formats such as NVGRE and VXLAN. While this solves network scalability issues, it hides the TCP packet from the hardware offloading engines, placing higher loads on the host CPU. ConnectX-7 effectively addresses this by providing advanced NVGRE and VXLAN hardware offloading engines that encapsulate and de-encapsulate the overlay protocol.																								
Quality of Service (QoS)	Support for port-based Quality of Service enabling various application requirements for latency and SLA.																								
Hardware-based I/O Virtualization	ConnectX-7 provides dedicated adapter resources and guaranteed isolation and protection for virtual machines within the server.																								

Feature	Description
Storage Acceleration	A consolidated compute and storage network achieves significant cost-performance advantages over multi-fabric networks. Standard block and file access protocols can leverage: • RDMA for high-performance storage access • NVMe over Fabric offloads for the target machine • NVMe over TCP acceleration
SR-IOV	ConnectX-7 SR-IOV technology provides dedicated adapter resources and guaranteed isolation and protection for virtual machines (VM) within the server.
High-Performance Accelerations	• Collective operations offloads • Vector collective operations offloads • MPI tag matching • MPI_Alltoall offloads • Rendezvous protocol offload
RDMA Message Rate	330-370 million messages per second.
Secure Boot	The secure boot process assures booting of authentic firmware/software that is intended to run on ConnectX-7. This is achieved using cryptographic primitives using asymmetric cryptography. ConnectX-7 supports several cryptographic functions in its HW Root-of-Trust (RoT) that has its key stored in on-chip FUSES.
Secure Firmware Update	The Secure firmware update feature enables a device to verify digital signatures of new firmware binaries to ensure that only officially approved versions can be installed from the host, the network, or a Board Management Controller (BMC). The firmware of devices with “secure firmware update” functionality (secure FW), restricts access to specific commands and registers that can be used to modify the firmware binary image on the flash, as well as commands that can jeopardize security in general. For further information, refer to the MFT User Manual .
Advanced storage capabilities	Block-level encryption and checksum offloads.
Host Management	ConnectX-7 technology maintains support for host manageability through a BMC. ConnectX-7 PCIe stand-up adapter can be connected to a BMC using MCTP over SMBus or MCTP over PCIe protocols as if it is a standard NVIDIA PCIe stand-up adapter card. For configuring the adapter for the specific manageability solution in use by the server, please contact NVIDIA Support. • Protocols: PLDM, NCSI • Transport layer – RBT, MCTP over SMBus and MCTP over PCIe • Physical layer: SMBus 2.0 / I2C interface for device control and configuration, PCIe • PLDM for Monitor and Control DSP0248 • PLDM for Firmware Update DSP026 • IEEE 1149.6 • Secured FW update • FW Recovery • NIC reset • Monitoring and control • Network port settings • Boot setting
RDMA and RDMA over Converged Ethernet (RoCE)	ConnectX-7, utilizing IBTA RDMA (Remote Data Memory Access) and RoCE (RDMA over Converged Ethernet) technology, delivers low-latency and high-performance over InfiniBand and Ethernet networks. Leveraging datacenter bridging (DCB) capabilities as well as ConnectX-7 advanced congestion control hardware mechanisms, RoCE provides efficient low-latency RDMA services over Layer 2 and Layer 3 networks.

Feature	Description
NVIDIA PeerDirect™	PeerDirect™ communication provides high-efficiency RDMA access by eliminating unnecessary internal data copies between components on the PCIe bus (for example, from GPU to CPU), and therefore significantly reduces application run time. ConnectX-7 advanced acceleration technology enables higher cluster efficiency and scalability to tens of thousands of nodes.
CPU Offload	Adapter functionality enables reduced CPU overhead allowing more available CPU for computation tasks. • Flexible match-action flow tables • Open VSwitch (OVS) offload using ASAP2® • Tunneling encapsulation/decapsulation
NVIDIA Multi-Host	NVIDIA® Multi-Host technology enables next-generation Cloud, Web 2.0 and high-performance data centers to design and build new scale-out heterogeneous compute and storage racks with direct connectivity between multiple hosts and the centralized network controller. This enables direct data access with the lowest latency to significantly improve densities and maximizes data transfer rates. For more information, please visit NVIDIA Multi-Host Solutions .

7 Supported Interfaces

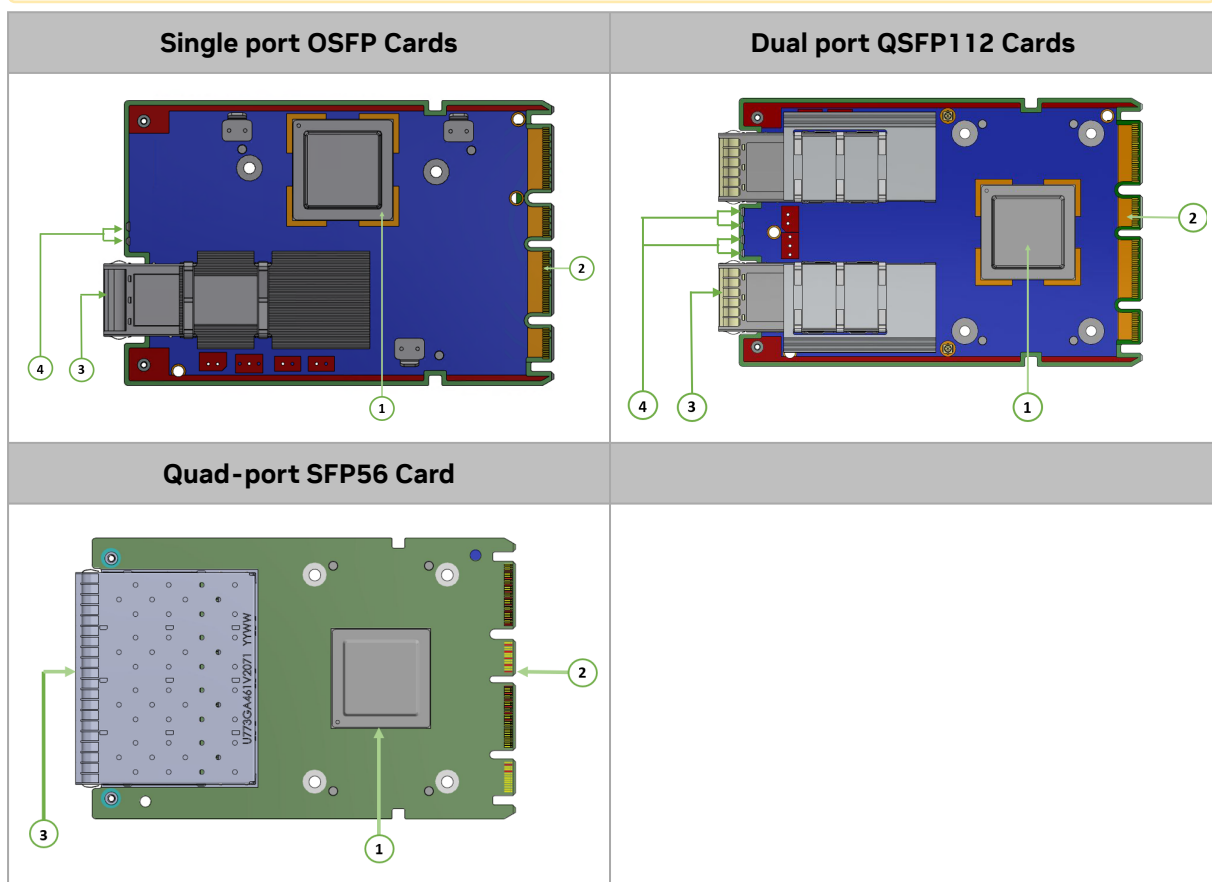
This section describes the ConnectX-7 supported interfaces. Each numbered interface that is referenced in the figures is described in the following table with a link to detailed information.

7.1 ConnectX-7 Layout and Interface Information

The below figures show the component side of the NVIDIA ConnectX-7 adapter card. Each numbered interface that is referenced in the figures is described in the following table with a link to detailed information.



The below figures are for illustration purposes only and might not reflect the current revision of the adapter card.



Item	Interface	Description
1	ConnectX-7 IC	ConnectX-7 Integrated Circuit
2	PCI Express Interface	PCIe Gen 5.0 through x16 edge connector

Item	Interface	Description
3	Networking Interfaces	Network traffic is transmitted through the adapter card QSFP112/OSFP connectors. The networking connectors allow for the use of modules, optical and passive cable interconnect solutions.
4	Networking Ports LEDs	Two I/O LEDs per port to indicate speed and link status
	FRU EEPROM	FRU EEPROM capacity 16KB
	SMBus Interface	Allows BMC connectivity using MCTP over SMBus or MCTP over PCIe protocols.
	Voltage Regulators	Voltage supply pins that feed onboard regulators.

7.2 Interfaces Detailed Description

7.2.1 ConnectX-7 IC

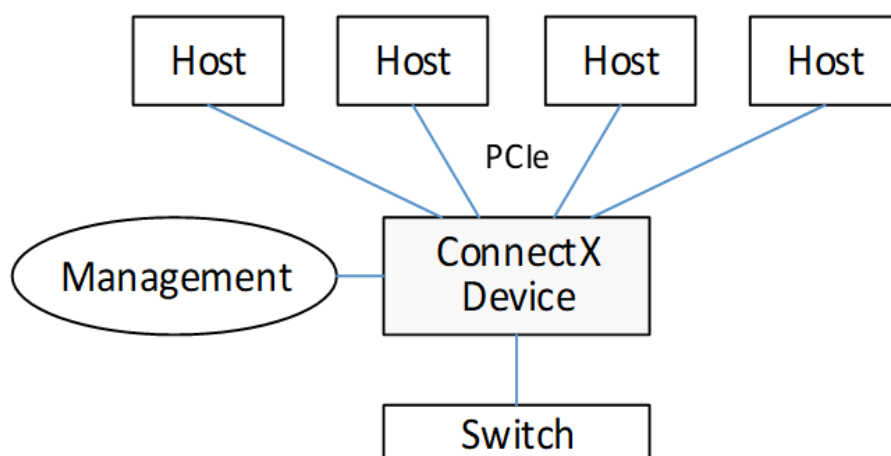
The ConnectX-7 family of adapter IC devices delivers two ports of NDR200/200GbE) or a single-port of NDR/400GbE connectivity paired with best-in-class hardware capabilities that accelerate and secure cloud and data-center workloads.

7.2.1.1 NVIDIA Multi-Host™ Support

In addition to building exceptionally high bandwidth to the data center, the ConnectX-7 device enables leveraging this speed across the entire data center utilizing its NVIDIA Multi-Host feature.

Using its 16-lane PCI Express interface, a single ConnectX-7 device can provide 400GbE interconnect for up to four independent hosts without any performance degradation.

The figure below shows a ConnectX-7 device with NVIDIA Multi-Host connected to four separate hosts, each with a PCIe x4 interface, on one side to a switch on the other side.



The below bifurcation are optional for the adapter's x16 PCIe interface:

- x1 PCIe x16, x1 PCIe x8, x1 PCIe x4
- x2 PCIe x8, x2 PCIe x4, x2 PCIe x2, x2 PCIe x1
- x4 PCIe x4, x4 PCIe x2, x4 PCIe x1

Multi-host capable cards also support Socket-Direct applications and work as regular Single-Host cards, depending on the type of server they are plugged into, assuming the server complies with the OCP 3.0 spec.

According to the OCP 3.0 spec, the adapter card advertises its capability through the PRSNTB[3:0]# pins. The server determines the configuration through the BIF[2:0]# pins, which it drives to the adapter card.

The **NVIDIA OCP3.0 card** has an internal logic that uses the BIF[2:0]# data and determines the correct operating mode to boot at. The combination of the PRSNTB[3:0]# and BIF[2:0]# pins deterministically sets the PCIe lane width for a given combination of OCP 3.0 cards and baseboard. The logic and the decoding table can be found in the OCP 3.0 spec (Chapter 3.5 PCIe Bifurcation Mechanism).

For example:

the NVIDIA OCP 3.0 Multi-host adapter drives 0100 on PRSNTB[3:0]# to the server.

If Server Drives	Adapter PCIe Mode
000	Single-Host Mode: x1 PCIe x16
001	Socket Direct Mode: x2 PCIe x8
010	Socket Direct Mode: x4 PCIe x4
101	Multi-Host Mode: x2 PCIe x8
110	Multi-Host Mode: x4 PCIe x4

7.2.2 PCI Express Interface

The table below describes the supported PCIe interface in ConnectX-7 OCP 3.0 adapter cards.

- PCIe Gen 5.0 compliant, 4.0, 3.0, 2.0 and 1.1 compatible
- 2.5, 5.0, 8.0, 16.0 and 32GT/s link rate x16
- Support for PCIe bifurcation: Auto-negotiates to x16, x8, x4, x2, or x1
- NVIDIA Multi-Host™ supports connection of up to 4x hosts
- Transaction layer packet (TLP) processing hints (TPH)
- PCIe switch Downstream Port Containment (DPC)
- Advanced error reporting (AER)
- Access Control Service (ACS) for peer-to-peer secure communication
- Process Address Space ID (PASID)
- Address translation services (ATS)
- Support for MSI/MSI-X mechanisms
- Support for SR-IOV

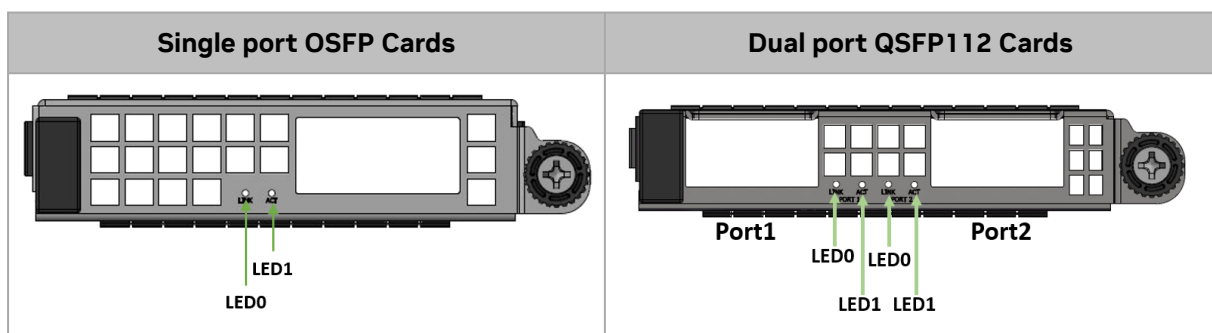
7.2.3 Networking Interfaces

Protocol	Specifications
Ethernet	The network ports are compliant with the IEEE 802.3 Ethernet standards listed in Features and Benefits . Ethernet traffic is transmitted through the networking connectors on the adapter card.
InfiniBand	The network ports are compliant with the <i>InfiniBand Architecture Specification, Release 1.5</i> . InfiniBand traffic is transmitted through the cards' networking connectors.

7.2.4 Networking Ports LEDs Specifications

There are two I/O LEDs per port to indicate port speed and link status.

- LED0 is a bi-color LED (Yellow and Green)
- LED2 is a single-color LED (Green)



State	Bi-Color LED (Yellow/Green)	Single Color LED (Green)									
Beacon command for locating the adapter card	1Hz blinking Yellow	OFF									
Error	4Hz blinking Yellow Indicates an error with the link. The error can be one of the following: <table> <tr> <th>Error Type</th><th>Description</th><th>LED Behavior</th></tr> <tr> <td>I²C</td><td>I²C access to the networking ports fails</td><td>Blinks until error is fixed</td></tr> <tr> <td>Over-current</td><td>Over-current condition of the networking ports</td><td>Blinks until error is fixed</td></tr> </table>	Error Type	Description	LED Behavior	I ² C	I ² C access to the networking ports fails	Blinks until error is fixed	Over-current	Over-current condition of the networking ports	Blinks until error is fixed	ON
Error Type	Description	LED Behavior									
I ² C	I ² C access to the networking ports fails	Blinks until error is fixed									
Over-current	Over-current condition of the networking ports	Blinks until error is fixed									
Link Up	In full port speed: the Green LED is solid In less than full port speed: the Yellow LED is solid	ON									
Physical Activity	The Green LED will blink.	Blinking									

7.2.5 FRU EEPROM

FRU EEPROM allows the baseboard to identify different types of OCP 3.0 cards. FRU EEPROM is accessible through SMCLK and SMDATA. FRU EEPROM address is defined according to SLOT_ID0 and SLOT_ID1 and its capacity is 16KB.

7.2.6 SMBus Interface

ConnectX-7 technology maintains support for manageability through a BMC. ConnectX-7 OCP 3.0 adapter can be connected to a BMC using MCTP over SMBus or MCTP over PCIe protocols as if it is a standard NVIDIA OCP 3.0 adapter. For configuring the adapter for the specific manageability solution in use by the server, please contact NVIDIA Support.

7.2.7 Voltage Regulators

The adapter card incorporates a CPLD device that implements the OCP 3.0 host scan chain and controls the networking port logic LED (LED0). It draws its power supply from the 3.3V_EDGE and 12V_EDGE rails.

8 Hardware Installation

Installation and initialization of ConnectX-7 adapter cards for OCP Spec 3.0 require attention to the mechanical attributes, power specifications, and precautions for electronic equipment.

8.1 Safety Warnings



Safety warnings are provided here in the English language. For safety warnings in other languages, refer to [Adapter Installation Safety Instructions](#).

Note that not all warnings are relevant to all models.

	General Installation Instructions Read all installation instructions before connecting the equipment to the power source.
	Jewelry Removal Warning Before you install or remove equipment that is connected to power lines, remove jewelry such as bracelets, necklaces, rings, watches, and so on. Metal objects heat up when connected to power and ground and can meltdown, causing serious burns and/or welding the metal object to the terminals.
	Over-temperature This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 55°C (131°F). An airflow of 200LFM at this maximum ambient temperature is required for HCA cards and NICs. To guarantee proper airflow, allow at least 8cm (3 inches) of clearance around the ventilation openings.
	During Lightning - Electrical Hazard During periods of lightning activity, do not work on the equipment or connect or disconnect cables.
	Copper Cable Connecting/Disconnecting Some copper cables are heavy and not flexible, as such, they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings and instructions.
	Equipment Installation This equipment should be installed, replaced, or serviced only by trained and qualified personnel.
	Equipment Disposal The disposal of this equipment should be in accordance to all national laws and regulations.
	Local and National Electrical Codes This equipment should be installed in compliance with local and national electrical codes.
	Hazardous Radiation Exposure • Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure. For products with optical ports. • CLASS 1 LASER PRODUCT and reference to the most recent laser standards: IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:20

8.2 Installation Procedure Overview

The installation procedure involves the following steps:

Step	Procedure	Direct Link
1	Check the system's hardware and software requirements.	Refer to System Requirements
2	Pay attention to the airflow consideration within the host system	Refer to Airflow Requirements
3	Follow the safety precautions	Refer to Safety Precautions
4	Follow the pre-installation checklist	Refer to Pre-Installation Checklist
5	(Optional) Replace the assembled OCP 3.0 bracket with the desired form factor bracket	Refer to OCP 3.0 Bracket Replacement Instructions
6	Install the adapter card in the system	Refer to Installation Instructions
7	Connect cables or modules to the card	Refer to Cables and Modules
8	Identify the adapter card in the system	Refer to Identify the Card in Your System

8.2.1 System Requirements



Unless otherwise specified, NVIDIA products are designed to work in an environmentally controlled data center with low levels of gaseous and dust (particulate) contamination. The operating environment should meet severity level G1 as per ISA 71.04 for gaseous contamination and ISO 14644-1 class 8 for cleanliness level.

8.2.1.1 Hardware Requirements



For proper operation and performance, please make sure to use a PCIe slot with a corresponding bus width and that can supply sufficient power to your card. Refer to the Specifications section of the manual for more power requirements.

A system with a PCI Express x16 slot for OCP spec 3.0 is required for installing the card.

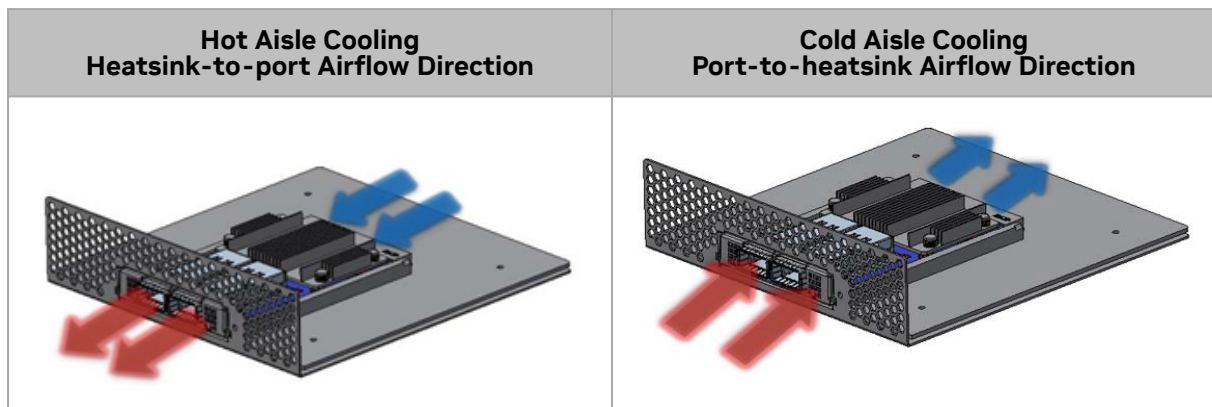
8.2.1.2 Airflow Requirements

ConnectX-7 adapter cards are offered with two airflow patterns: from the heatsink to the network ports, and vice versa, as shown below.

Please refer to the "Specifications" chapter for airflow numbers for each specific card model.



All cards in the system should be planned with the same airflow direction.



8.2.1.3

Software Requirements

- See Operating Systems/Distributions section under the Introduction section.
- Software Stacks - NVIDIA OpenFabric software package MLNX_OFED for Linux, WinOF-2 for Windows, and VMware. See the [Driver Installation](#) section.

8.2.2 Safety Precautions



The adapter is being installed in a system that operates with voltages that can be lethal. Before opening the case of the system, observe the following precautions to avoid injury and prevent damage to system components.

1. Remove any metallic objects from your hands and wrists.
2. Make sure to use only insulated tools.
3. Verify that the system is powered off and is unplugged.
4. It is strongly recommended to use an ESD strap or other antistatic devices.

8.2.3 Pre-Installation Checklist

1. Unpack the ConnectX-7 adapter card.

Unpack and remove the ConnectX-7 card. Check the parts for visible damage that may have occurred during shipping. Please note that the cards must be placed on an antistatic surface.



Please note that if the card is removed hastily from the antistatic bag, the plastic ziplock may harm the EMI fingers on the networking connector. Carefully remove the card from the antistatic bag to avoid damaging the EMI fingers.

2. Shut down your system if active:

Turn off the power to the system, and disconnect the power cord. Refer to the system documentation for instructions. Before you install the ConnectX-7 card, make sure that the system is disconnected from power.

8.2.4 OCP 3.0 Bracket Replacement Instructions

The OCP 3.0 adapter card is shipped assembled either with a thumbscrew (pull-tab) bracket, an internal-lock bracket, or an ejector-latch bracket. If this form factor is suitable for your requirements, you can skip the remainder of this section and move to Installation Instructions. If you need to replace the assembled OCP 3.0 bracket with a different form-factor bracket, please follow the instructions in this section.



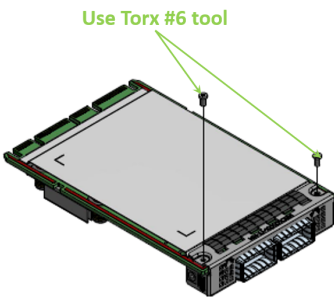
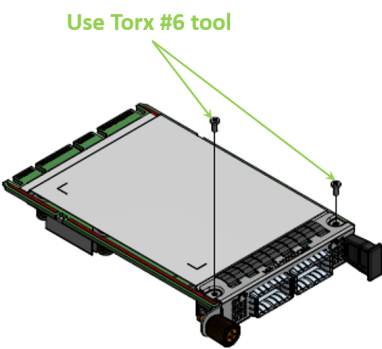
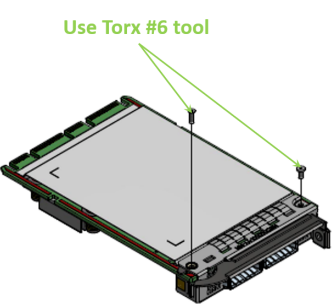
Due to risk of damaging the EMI gasket, it is not recommended to replace the bracket more than three times.

To replace the bracket you will need the following parts:

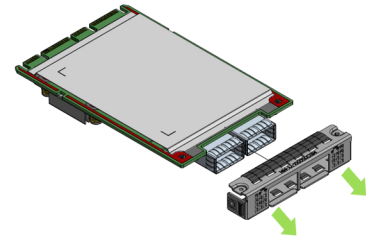
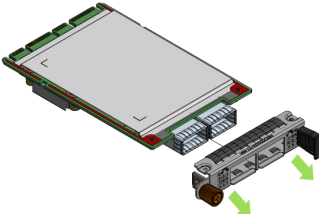
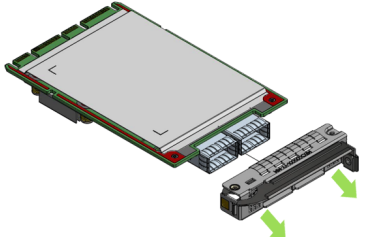
- The new bracket of the desired form factor.
- The screws supplied with the new bracket kit.
- The required torx tool type as specified in the instructions.

Removing the Existing Bracket

1. Using the torx tool type listed in the below table, remove the screws according to the instructions per OCP 3.0 bracket type.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
		

2. Gently separate the bracket from the OCP 3.0 card.

Internal Lock Bracket	Pull-tab Bracket	Ejector-Latch Bracket
		

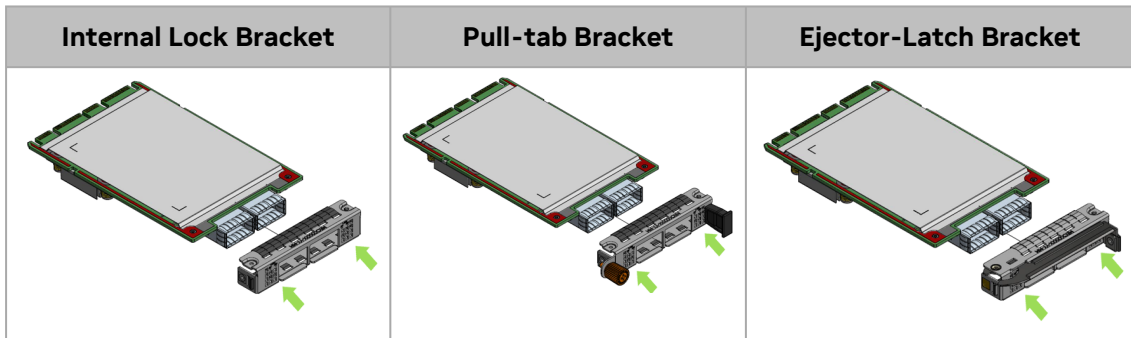


Be careful not to put stress on the LEDs on the adapter card.

3. Save the two screws.

Installing the New Bracket

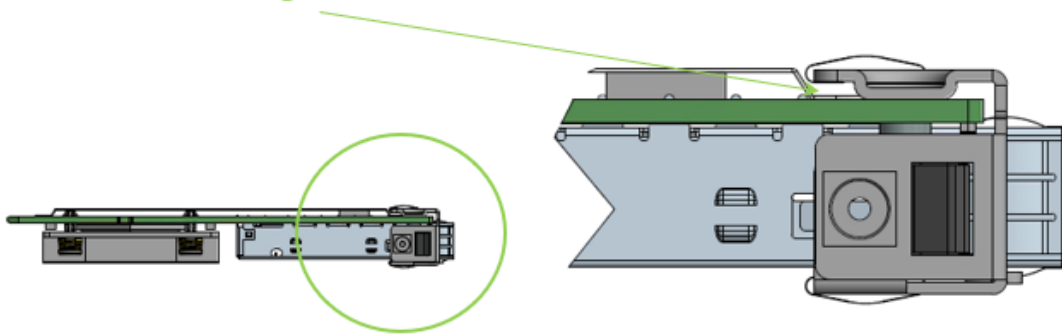
1. Assemble the new bracket onto the card.



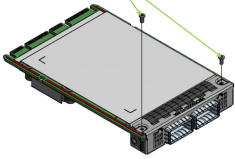
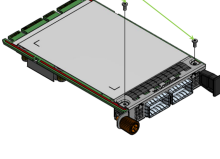
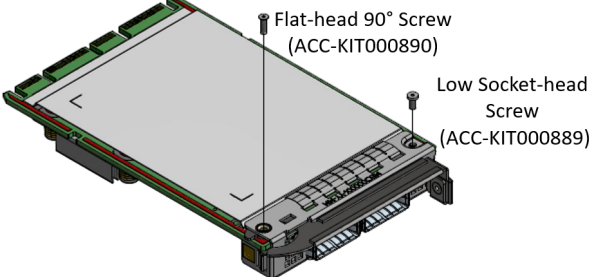
Do not force the bracket onto the adapter card.

2. Ensure that the insulator's front edge is beneath the bracket, as shown in the below figure.

Insulator front edge beneath the bracket



3. Screw on the OCP 3.0 bracket with the supplied screws that came with the new bracket kit. Use the specified torx tool type and apply the specified torque on the screws per bracket form factor.

Internal Lock Bracket	Pull-tab Bracket	Ejector-Latch Bracket
Use Torx #6 tool Closing torque = 0.26-0.3 Nm 	Use Torx #6 tool Closing torque = 0.26-0.3 Nm 	Note that one screw is flat-head 90° screw and the other is socket-head screw. Screw on the different types of screws as shown in the below illustration. Use Torx #6 tool Closing torque = 0.14-0.18 Nm 

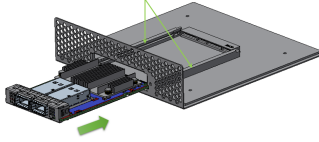
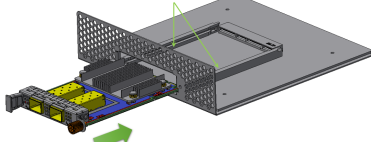
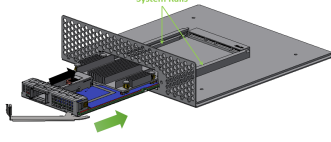
8.2.5 OCP 3.0 Adapter Card Installation Instructions

This section provides detailed instructions on how to install your adapter card in a system. The OCP 3.0 adapter card is shipped assembled either with an internal-lock, a pull-tab (thumbscrew), or an ejector-latch bracket. Follow the below instructions depending on the card you have purchased.

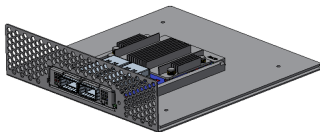
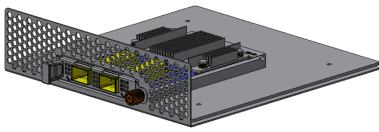
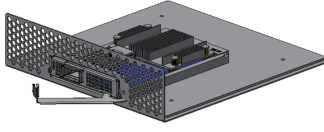


The following figures are for illustration purposes only.

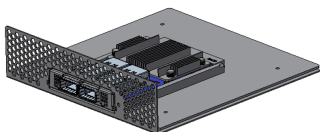
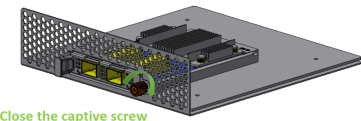
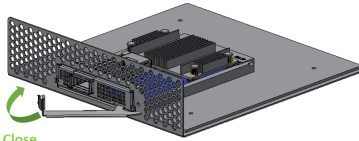
1. Before installing the card, make sure that the system is off and the power cord is not connected to the server. Please follow proper electrical grounding procedures.
2. Open the system case.
3. Align the card with the system rails.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
System Rails 	System Rails 	System Rails 

4. Push the card until connectors are in a full mate.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
		

5. Secure the card.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
A clicking sound is heard once the connectors are in a full mate. 	Turn the captive screw clockwise until firmly locked.  Close the captive screw	Close the ejector.  Close

8.2.6 Cables and Modules

To obtain the list of supported NVIDIA cables for your adapter, please refer to the Cables Reference Table at [Networking Configuration Tools](#).

Cable Installation

1. All cables can be inserted or removed with the unit powered on.
2. To insert a cable, press the connector into the port receptacle until the connector is firmly seated.
 - a. Support the weight of the cable before connecting the cable to the adapter card. Do this by using a cable holder or tying the cable to the rack.
 - b. Determine the correct orientation of the connector to the card before inserting the connector. Do not try and insert the connector upside down. This may damage the adapter card.
 - c. Insert the connector into the adapter card. Be careful to insert the connector straight into the cage. Do not apply any torque, up or down, to the connector cage in the adapter card.
 - d. Make sure that the connector locks in place.



When installing cables make sure that the latches engage.



Always install and remove cables by pushing or pulling the cable and connector in a straight line with the card.

3. After inserting a cable into a port, the Yellow or Green LED0 indicator will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). See [Adapter Card LED Operations](#).
4. After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made, Green LED1 will light. When data is being transferred, Green LED1 will blink.
5. Care should be taken as not to impede the air exhaust flow through the ventilation holes. Use cable lengths which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.
6. To remove a cable, disengage the locks and slowly pull the connector away from the port receptacle. LED indicator will turn off when the cable is unseated.

To uninstall the adapter card, see [Uninstalling the Card](#).

8.2.7 Identifying the Card in Your System

On Linux

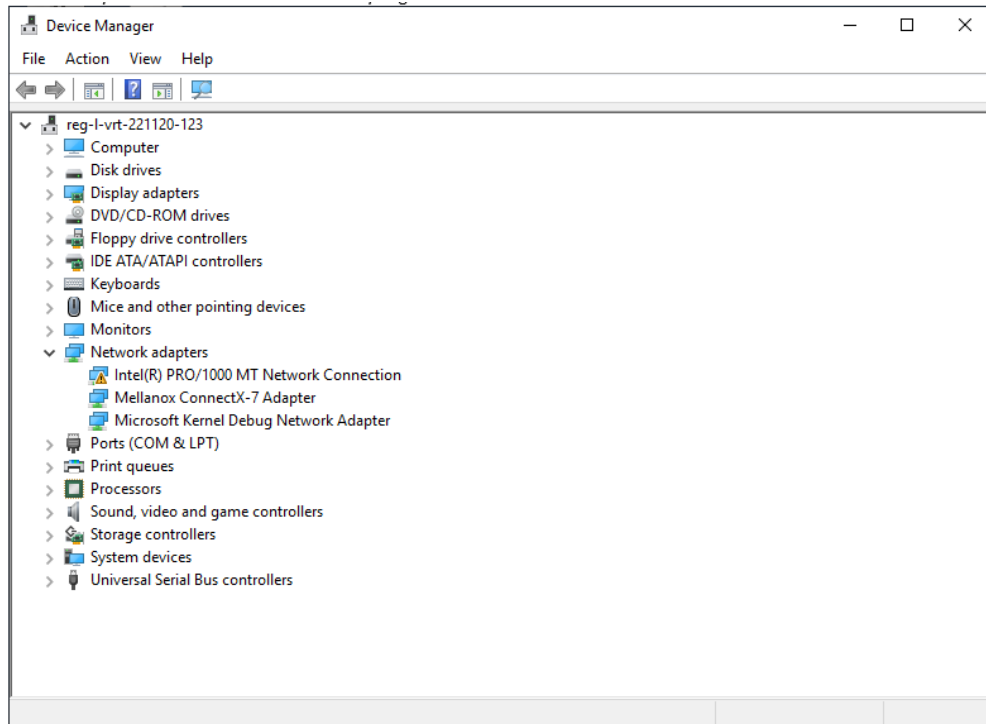
Get the device location on the PCI bus by running `lspci` and locating lines with the string “Mellanox Technologies”:

```
lspci |grep -i Mellanox
Network controller: Mellanox Technologies MT2910 Family [ConnectX-7]
```

On Windows

1. Open Device Manager on the server. Click **Start => Run**, and then enter `devmgmt.msc`.
2. Expand **System Devices** and locate your NVIDIA ConnectX-7 adapter card.
3. Right click the mouse on your adapter's row and select **Properties** to display the adapter card properties window.
4. Click the **Details** tab and select **Hardware Ids** (Windows 2022/2019/2016/2012 R2) from the **Property** pull-down menu.

PCI Device (Example)



5. In the **Value** display box, check the fields **VEN** and **DEV** (fields are separated by '&'). In the display example above, notice the sub-string "PCI\VEN_15B3&DEV_1021": **VEN** is equal to 0x15B3 – this is the Vendor ID of Mellanox Technologies; and **DEV** is equal to 1021 (for ConnectX-7) – this is a valid NVIDIA PCI Device ID.



If the PCI device does not have an NVIDIA adapter ID, return to Step 2 to check another device.



The list of NVIDIA PCI Device IDs can be found at the [PCI ID repository](#).

8.2.8 Extraction Instructions

Follow the below instructions depending on the card form-factor you have purchased.

8.2.8.1 Safety Precautions

The adapter is installed in a system that operates with voltages that can be lethal. Before uninstalling the adapter card, please observe the following precautions to avoid injury and prevent damage to system components.

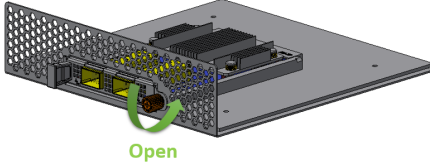
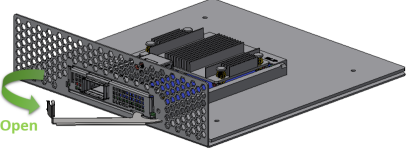
1. Remove any metallic objects from your hands and wrists.
2. It is strongly recommended to use an ESD strap or other antistatic devices.
3. Turn off the system and disconnect the power cord from the server.

8.2.8.2 Instructions

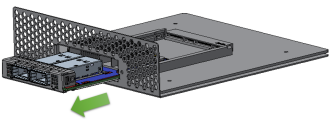
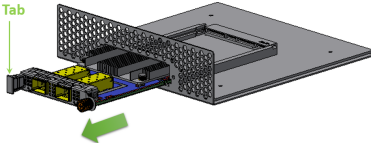
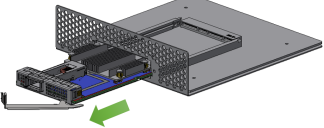


Please note that the following images are for illustration purposes only.

1. Verify that the system is powered off and unplugged.
2. Wait 30 seconds.
3. Unsecure the card.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
While holding the heatsink, gently push the card out of the server.   Careful, the heatsink might be hot.	Rotate the captive screw counterclockwise. 	Open the ejector latch. 

4. Gently pull out the adapter card.

Internal Lock Bracket	Pull-tab (Thumbscrew) Bracket	Ejector-Latch Bracket
Gently pull out the adapter card from the server. 	While holding the tab, pull out the adapter card. 	Open the ejector latch. 

9 Driver Installation

Please use the relevant driver installation section.

- [Windows Driver Installation](#)
- [Linux Driver Installation](#)
- [VMware Driver Installation](#)

9.1 Windows Driver Installation

For Windows, download and install the latest WinOF-2 for Windows software package available via the NVIDIA website at: [WinOF-2 webpage](#). Follow the installation instructions included in the download package (also available from the download page).

The snapshots in the following sections are presented for illustration purposes only. The installation interface may slightly vary, depending on the operating system in use.

9.1.1 Software Requirements

For the full list of supported operating systems, please refer to the [WinOF-2 Documentation](#) -> Release Notes.

9.1.2 Downloading WinOF-2 Driver



To download the .exe file according to your Operating System, please follow the steps below:

1. Obtain the machine architecture.
 - a. To go to the Start menu, position your mouse in the bottom-right corner of the Remote Desktop of your screen.
 - b. Open a CMD console (Click Task Manager-->File --> Run new task and enter CMD).
 - c. Enter the following command.

```
echo %PROCESSOR_ARCHITECTURE%
```



On an x64 (64-bit) machine, the output will be "AMD64".

2. Go to the WinOF-2 web page at: <https://www.nvidia.com/en-us/networking/> > Products > Software > InfiniBand Drivers (Learn More) > Nvidia WinOF-2.
3. Download the .exe image according to the architecture of your machine (see [Step 1](#)).
The name of the .exe is in the following format: MLNX_WinOF2-<version>_<arch>.exe.



Installing the incorrect .exe file is prohibited. If you do so, an error message will be displayed.

For example, if you install a 64-bit .exe on a 32-bit machine, the wizard will display the following (or a similar) error message: "The installation package is not supported by this processor type. Contact your vendor"

9.1.3 Installing WinOF-2 Driver

The snapshots in the following sections are for illustration purposes only. The installation interface may slightly vary, depending on the used operating system.

This section provides instructions for two types of installation procedures, and both require administrator privileges:

- [Attended Installation](#)

An installation procedure that requires frequent user intervention.

- [Unattended Installation](#)

An automated installation procedure that requires no user intervention.

9.1.3.1 Attended Installation

The following is an example of an installation session.

1. Double click the .exe and follow the GUI instructions to install MLNX_WinOF2.
2. [Optional] Manually configure your setup to contain the logs option (replace "LogFile" with the relevant directory).

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" /1*v* [LogFile]"
```

3. [Optional] If you do not want to upgrade your firmware version (i.e., MT_SKIPFWUPGRD default value is False).

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" MT_SKIPFWUPGRD=1"
```

4. [Optional] If you do not want to install the Rshim driver, run.

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" MT_DISABLE_RSHIM_INSTALL=1"
```



The Rshim driver installation will fail if a prior Rshim driver is already installed. The following fail message will be displayed in the log:

"ERROR!!! Installation failed due to following errors: MlxRshim drivers installation disabled and MlxRshim drivers Installed, Please remove the following oem inf files from driver store: <oem inf list>"

5. [Optional] If you want to skip the check for unsupported devices, run.

```
MLNX_WinOF2_<revision_version>_All_Arch.exe /v" SKIPUNSUPPORTEDDEVCHECK=1"
```

6. Click Next in the Welcome screen.



7. Read and accept the license agreement and click Next.

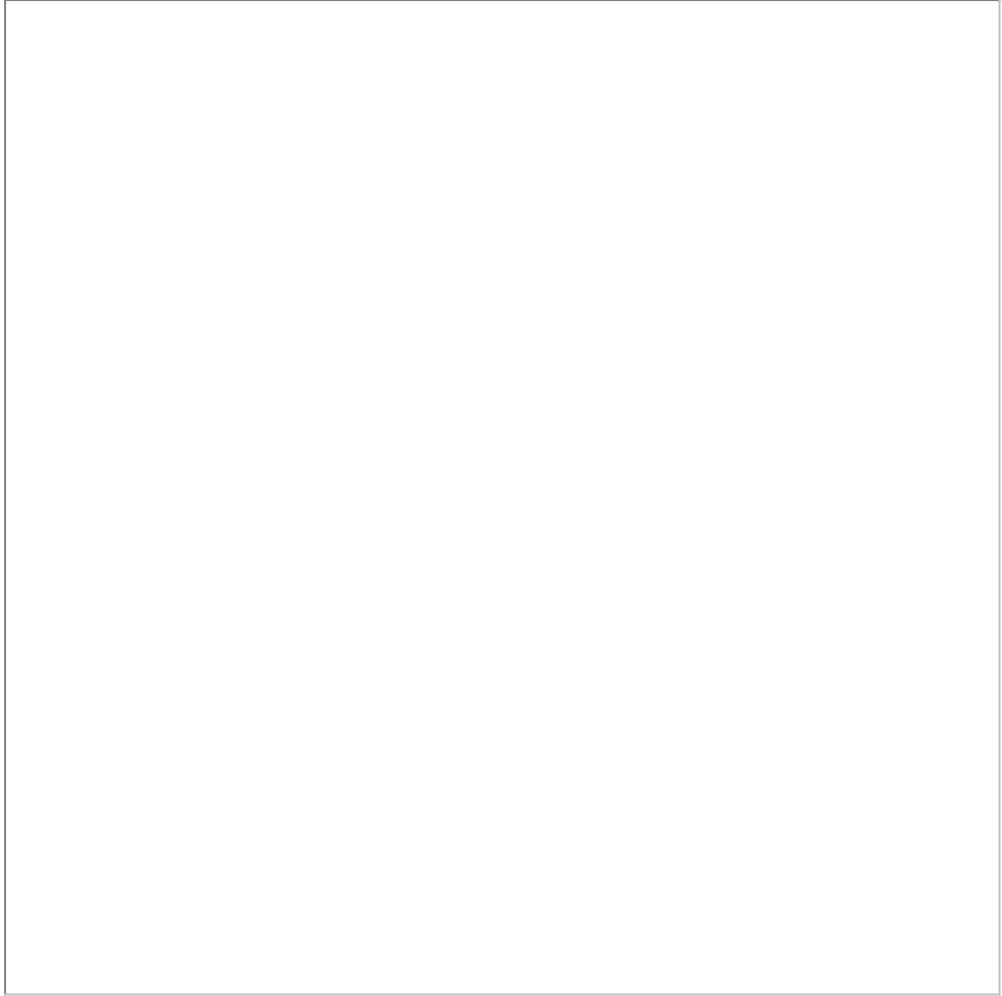


8. Select the target folder for the installation.

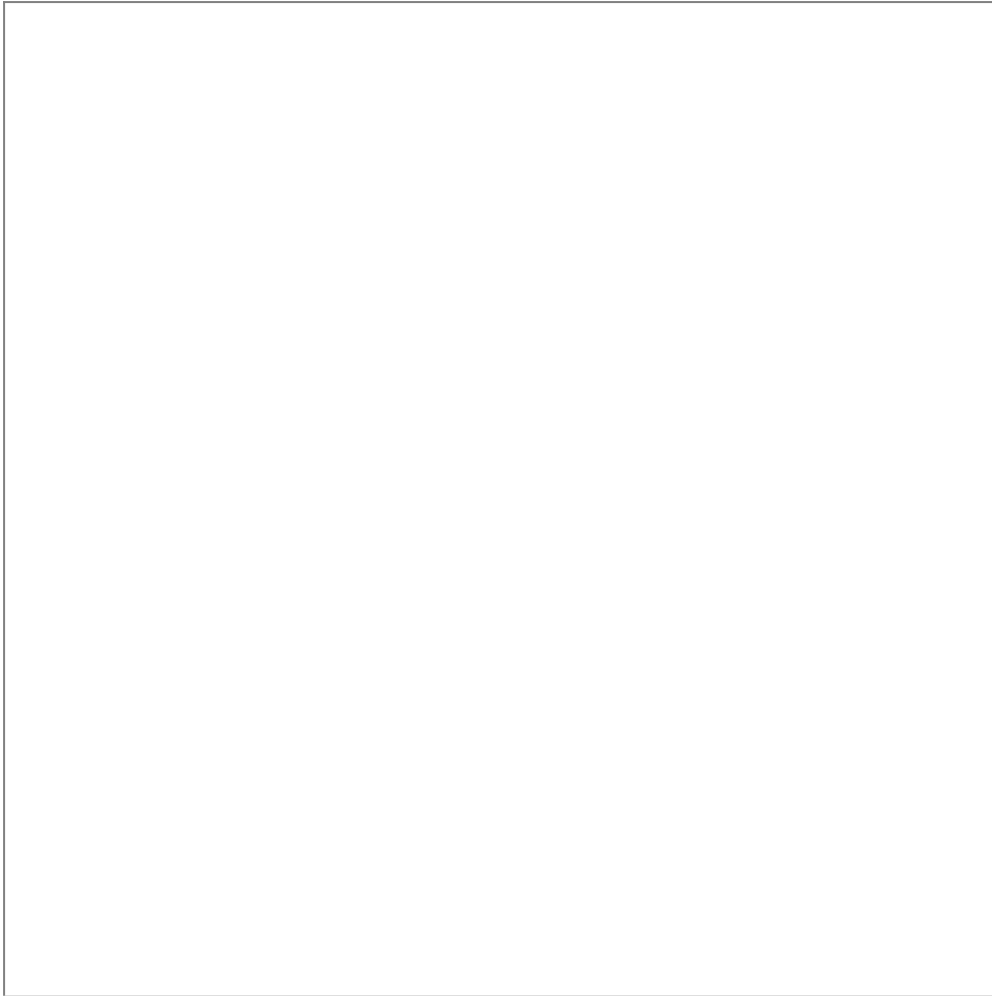


9. The firmware upgrade screen will be displayed in the following cases:

- If the user has an OEM card. In this case, the firmware will not be displayed.
- If the user has a standard NVIDIA® card with an older firmware version, the firmware will be updated accordingly. However, if the user has both an OEM card and a NVIDIA® card, only the NVIDIA® card will be updated.



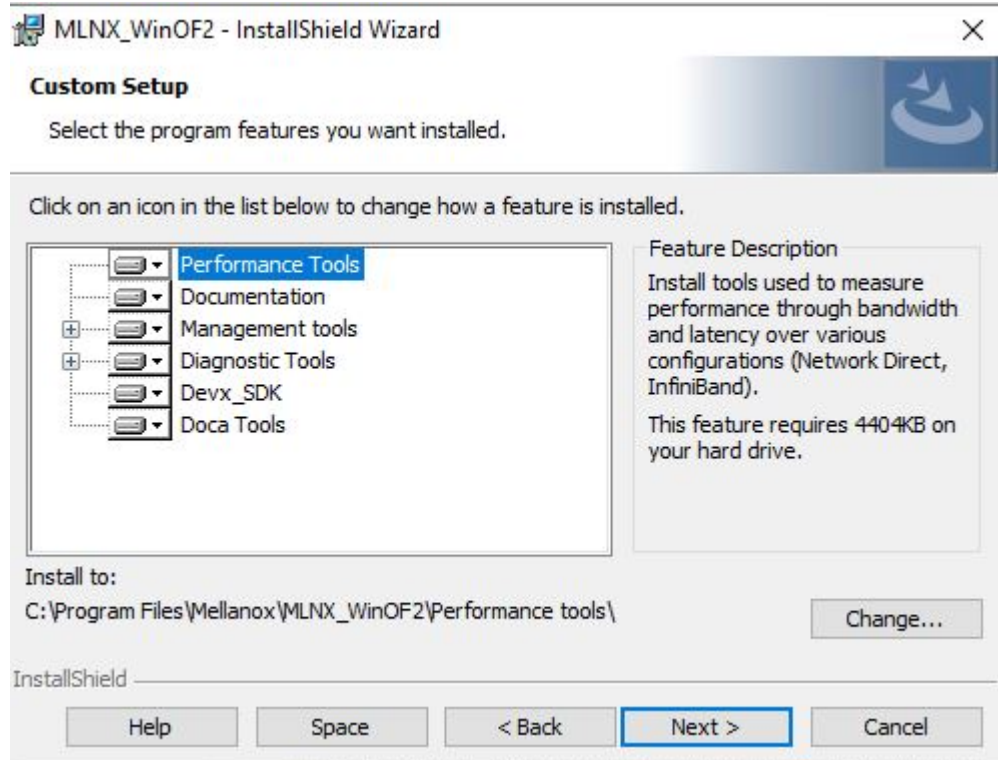
10. Select a Complete or Custom installation, follow [Step a](#) onward.



a. Select the desired feature to install:

- Performances tools - install the performance tools that are used to measure performance in user environment
- Documentation - contains the User Manual and Release Notes
- Management tools - installation tools used for management, such as mlxstat
- Diagnostic Tools - installation tools used for diagnostics, such as mlx5cmd

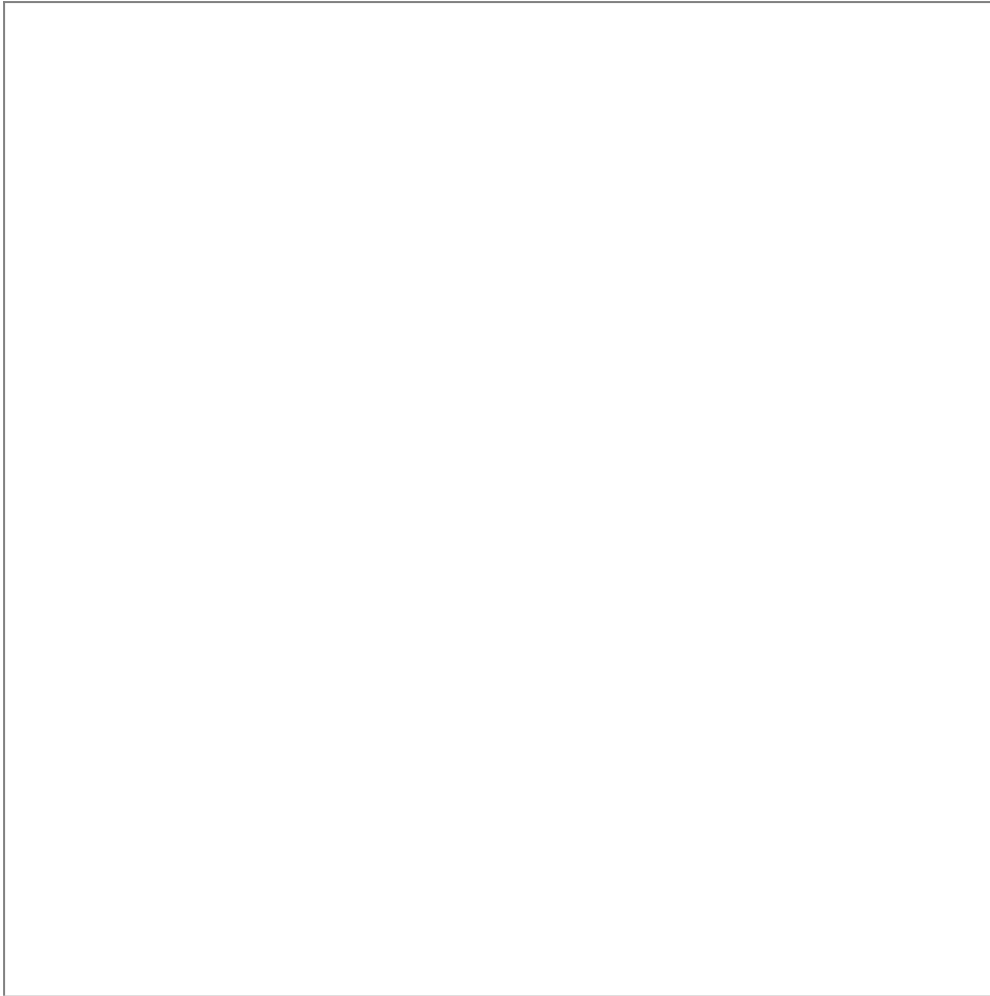
- b. Click Next to install the desired tools.



11. Click Install to start the installation.



12. In case firmware upgrade option was checked in [Step 7](#), you will be notified if a firmware upgrade is required (see ☐).



13. Click Finish to complete the installation.



9.1.3.2 Unattended Installation



If no reboot options are specified, the installer restarts the computer whenever necessary without displaying any prompt or warning to the user.
To control the reboots, use the */norestart* or */forcerestart* standard command-line options.

The following is an example of an unattended installation session.

1. Open a CMD console-> Click Start-> Task Manager File-> Run new task-> and enter CMD.
2. Install the driver. Run:

```
MLNX_WinOF2-[Driver/Version]_<revision_version>_All_-Arch.exe /S /v/qn
```

3. [Optional] Manually configure your setup to contain the logs option:

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /S /v/qn /v"/l*vx [LogFile]"
```

4. [Optional] If you wish to control whether to install ND provider or not (i.e., *MT_NDPROPERTY* default value is *True*).

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /vMT_NDPROPERTY=1
```

5. [Optional] If you do not wish to upgrade your firmware version (i.e., *MT_SKIPFWUPGRD* default value is *False*).

```
MLNX_WinOF2-[Driver/Version]<revision_version>_All_Arch.exe /vMT_SKIPFWUPGRD=1
```

6. [Optional] If you do not want to install the Rshim driver, run.

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v" MT_DISABLE_RSHIM_INSTALL=1"
```



The Rshim driver installation will fail if a prior Rshim driver is already installed. The following fail message will be displayed in the log:

"ERROR!!! Installation failed due to following errors: MlxRshim drivers installation disabled and MlxRshim drivers Installed, Please remove the following oem inf files from driver store: <oem inf list>"

7. [Optional] If you want to enable the default configuration for Rivermax, run.

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v"MT_RIVERMAX=1 /l*vx C:\Users\<user>\log.txt "
```

8. [Optional] If you want to skip the check for unsupported devices, run/

```
MLNX_WinOF2<revision_version>_All_Arch.exe /v" SKIPUNSUPPORTEDDEVCHECK=1"
```

9.1.4 Firmware Upgrade

If the machine has a standard NVIDIA® card with an older firmware version, the firmware will be automatically updated as part of the NVIDIA® WinOF-2 package installation. For information on how to upgrade firmware manually, please refer to [MFT User Manual](#).

If the machine has a DDA (pass through) facility, firmware update is supported only in the Host. Therefore, to update the firmware, the following must be performed:

1. Return the network adapters to the Host.
2. Update the firmware according to the steps in the [MFT User Manual](#).
3. Attach the adapters back to VM with the DDA tools.

9.2 Linux Driver Installation

This section describes how to install and test the MLNX_OFED for Linux package on a single server with a ConnectX-7 adapter card installed.

9.2.1 Prerequisites

Requirements	Description
Platforms	A server platform with a ConnectX-7 InfiniBand/Ethernet adapter card installed.
Required Disk Space for Installation	1GB
Operating System	Linux operating system. For the list of supported operating system distributions and kernels, please refer to the <i>MLNX_OFED Release Notes</i> .
Installer Privileges	The installation requires administrator (root) privileges on the target machine.

9.2.2 Downloading MLNX_OFED

1. Verify that the system has a network adapter installed by running `lspci` command. The below table provides output examples per ConnectX-7 card configuration.

ConnectX-7 Card Configuration	Output Examples
Single-port PCIe x16 Card	<pre>[root@mftga-009 ~]# lspci grep mellanox -ia 3:00.0 Infiniband controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>
Dual-port PCIe x16 Card	<pre>[root@mftga-009 ~]# lspci grep mellanox -ia 86:00.0 Network controller: Mellanox Technologies MT2910 Family [ConnectX-7] 86:00.1 Network controller: Mellanox Technologies MT2910 Family [ConnectX-7]</pre>

For Linux driver installation, please refer to [NVIDIA DOCA Installation Guide for Linux](#).

9.3 VMware Driver Installation

This section describes VMware Driver Installation.

9.3.1 Hardware and Software Requirements

Requirement	Description
Platforms	A server platform with an adapter card based on NVIDIA devices: ConnectX®-7 (InfiniBand/Ethernet) (firmware: fw-ConnectX7)
Operating System	ESXi 8.x
Installer Privileges	The installation requires administrator privileges on the target machine.

9.3.2 Installing NATIVE ESXi Driver for VMware vSphere



Please uninstall all previous driver packages prior to installing the new version.

To install the driver:

1. Log into the ESXi server with root permissions.
2. Install the driver.

```
#> esxcli software vib install -d <path>/<bundle_file>
```

Example:

```
#> esxcli software vib install -d /tmp/MLNX-NATIVE-ESX-ConnectX-4-5_4.16.8.8-10EM-650.0.0.4240417.zipesxcli
```

3. Reboot the machine.
4. Verify the driver was installed successfully.

```
esxcli software vib list | grep nmlx  
nmlx5-core      4.16.8.8-10EM.650.0.0.4240417  MEL  PartnerSupported 2017-01-31  
nmlx5-rdma      4.16.8.8-10EM.650.0.0.4240417  MEL  PartnerSupported 2017-01-31
```



After the installation process, all kernel modules are loaded automatically upon boot.

9.3.3 Removing Earlier NVIDIA Drivers



Please unload the previously installed drivers before removing them.

To remove all the drivers:

1. Log into the ESXi server with root permissions.
2. List all the existing NATIVE ESXi driver modules. (See Step 4 in [Installing NATIVE ESXi Driver for VMware vSphere.](#))
3. Remove each module:

```
#> esxcli software vib remove -n nmlx5-rdma  
#> esxcli software vib remove -n nmlx5-core
```



To remove the modules, you must run the command in the same order as shown in the example above.

4. Reboot the server.

9.3.4 Firmware Programming

1. Download the VMware bootable binary images v4.6.0 from the [Firmware Tools \(MFT\) site.](#)

- a. ESXi 6.5 File: mft-4.6.0.48-10EM-650.0.0.4598673.x86_64.vib
 - b. MD5SUM: 0804cffe30913a7b4017445a0f0adbe1
2. Install the image according to the steps described in the [MFT User Manual](#).



The following procedure requires custom boot image downloading, mounting and booting from a USB device.

10 Updating Adapter Firmware

Each adapter card is shipped with the latest version of qualified firmware at the manufacturing time. However, NVIDIA issues firmware updates occasionally that provide new features and bug fixes. To check that your card is programmed with the latest available firmware version, download the mlxup firmware update and query utility. The utility can query for available Mellanox adapters and indicate which adapters require a firmware update. If the user confirms, mlxup upgrades the firmware using embedded images. The latest mlxup executable and documentation are available in [mlxup - Update and Query Utility](#).

Firmware Update Example

```
[server1]# ./mlxup
Querying Mellanox devices firmware ...
Device Type:      ConnectX-7
Part Number:      MCX753436MC-HEAB
Description:      NVIDIA ConnectX-7 OCP3.0 SFF Adapter Card, 200GbE (default mode) / NDR200 IB, Dual-port QSFP112,
Multi-Host and Socket Direct capable, PCIe 5.0 x16, Crypto Enabled, Secure Boot Enabled, Thumbscrew (Pull Tab)
Bracket
PSID:             MT_2190110032
PCI Device Name:  0000:06:00.0
Base GUID:        e41d2d0300fd8b8a
Versions:         Current      Available
                  FW 16.00.0000  16.00.0000

Status:           Up to date
Device Type:      ConnectX-7 Part Number:      MCX753436MC-HEAB
Description:      NVIDIA ConnectX-7 OCP3.0 SFF Adapter Card, 200GbE (default mode) / NDR200 IB, Dual-port QSFP112,
Multi-Host and Socket Direct capable, PCIe 5.0 x16, Crypto Enabled, Secure Boot Enabled, Thumbscrew (Pull Tab)
Bracket
PCI Device Name:  0000:07:00.0
Base MAC:         0000e41d2da206d4
Versions:         Current      Available
                  FW 16.20.1000  16.24.1000

Status:           Update required

Perform FW update? [y/N]: y
Device #1: Up to date
Device #2: Updating FW ... Done

Restart needed for updates to take effect..
Log File: /var/log/mlxup/mlxup-yyyymmdd.log
```

11 Setting Link Type of High-Speed Ports

The default networking port configuration of ConnectX-7 InfiniBand/Ethernet adapter cards is listed in the below table.

OPN	Data Transmission Rate	Default Mode
MCX753436MC-HEAB	NDR200/HDR and 200GbE	200GbE
MCX753436MS-HEAB	NDR200/HDR and 200GbE	200GbE
MCX75343AMC-NEAC	NDR and 400GbE	400GbE
MCX75343AMS-NEAC	NDR and 400GbE	400GbE

To change the networking high-speed ports mode, you can either use the [mlnxconfig](#) or [UEFI](#) tools.

UEFI can be used to configure the adapter card device before the operating system is up while mlnxconfig can be used once the operating system is up.

According to your preference, use one of the below tools:

11.1 mlnxconfig

The mlnxconfig tool allows the user to change some of the device configurations without reburning the firmware. The configuration is also kept after reset. By default, mlnxconfig shows the configurations that will be loaded in the next boot. For more information and instructions, refer to [mlnxconfig](#).

11.2 UEFI

PreBoot drivers first initialize the adapter device, senses the port protocol – Ethernet or InfiniBand, and brings up the port. Then it connects to a DHCP server to obtain its assigned IP address and network parameters, and also to obtain the source location of the kernel/OS to boot from. The DHCP server instructs the PreBoot drivers to access the kernel/OS through a TFTP server, an iSCSI target, or some other service. For more information and instructions, refer to [UEFI](#).

12 Port Splitting Configurations



This section applies to the following OPN only:

MCX753436MS-HEBB: NVIDIA ConnectX-7 OCP3.0 SFF Adapter Card, 200GbE (default mode) / NDR200 IB, Dual-port QSFP112, Multi-Host and Port Split capable, PCIe 5.0 x16, Crypto Disabled, Secure Boot Enabled, Thumbscrew (Pull Tab) Bracket

ConnectX-7 SuperNICs offer a variety of network port configurations designed to meet the demands of different environments and deployments. This section outlines the available connectivity options for network ports per product model. While the configurations listed here are not exhaustive, they represent the tested and verified options. Customers seeking to support unlisted configurations should contact NVIDIA Support.

The Port Splitting feature allows a single physical networking module (QSFP112) to be split into multiple network ports. This provides flexibility in optimizing port configurations for various network topology use cases.

Key Features

- **Flexibility and Improved Traffic Segmentation:** Port splitting enables network administrators to align device ports with their network infrastructure, enabling traffic segmentation and isolation.
- **Increased Network Efficiency:** By optimizing traffic flow and reducing congestion, port splitting improves overall network efficiency. Specific physical ports can be assigned to handle certain traffic types or applications, allowing control and performance tuning.
- **Better Utilization of Resources:** Instead of needing separate SuperNICs for each logical connection or network interface, port splitting allows a single physical SuperNIC to handle multiple functions. This reduces hardware costs while maintaining high network flexibility.

Use Cases

- **Load Balancing:** Distributing traffic across multiple physical ports can improve network load distribution and balance.
- **Resiliency:** Multiple physical ports can be used for redundancy, ensuring stable network connections even if one port encounters an issue.

Each configuration in this section includes a diagram and instructions on splitting the network port using the [mlxconfig](#) or the [UEFI](#) tools. The UEFI tool configures the device before the operating system is up, while [mlxconfig](#) configures the device once the operating system is up. Select the tool based on your preference; the configuration is saved across reboots.

mlxconfig: The [mlxconfig](#) tool allows users to change configurations without burning the firmware. The configuration is also kept after reset. By default, [mlxconfig](#) shows the configurations that will be loaded in the next boot. For more information and instructions, refer to [mlxconfig](#).

UEFI: PreBoot drivers initialize the adapter device, check the port protocol type – Ethernet or InfiniBand – and bring up the port. Then it connects to a DHCP server to obtain its assigned IP address and network parameters and obtain the source location of the kernel/OS to boot from. The DHCP server instructs the PreBoot drivers to access the kernel/OS through a TFTP server, an iSCSI target, or some other service. For more information and instructions, refer to [UEFI](#).



Before setting the desired configuration, take note of the following warnings:

- Any new configuration set by the customer overwrites the previous configuration.
- Misconfiguration can potentially damage the system.
- It is recommended to establish out-of-band connectivity to the ConnectX-7 SuperNIC before setting any configuration for the first time. This allows resetting the NVConfig parameters to their default values in case of misconfiguration.
- When switching from one configuration to another (default or non-default), it is advised to first reset the device to its default configuration. This action deletes all current NVConfig settings. For the reset command and further details, refer to the [mlxconfig – Changing Device Configuration Tool](#).



Reboot or power-cycle the SuperNIC for the new configuration to take effect.

The following table summarizes the available port-splitting configurations.

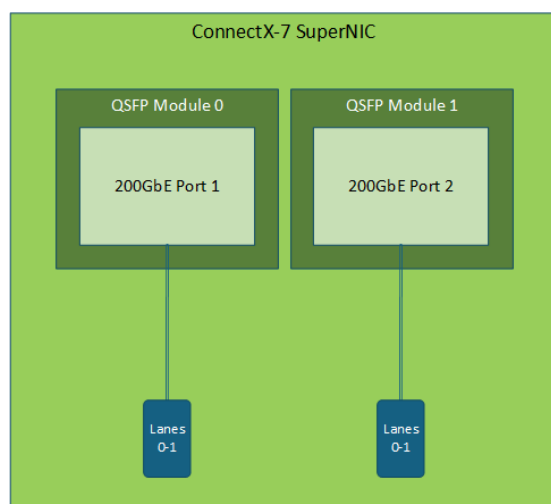
OPNs	Configuration	Configuration Description
MCX753436MS-HEBB	Configuration #1 (Default)	Two Ethernet ports, each supporting
	Configuration #2	Two Ethernet ports, each supporting

12.1 MCX753436MS-HEBB Port-Splitting Configurations

The MCX753436MS-HEBB ConnectX-7 SuperNIC, featuring a dual-port QSFP112 module, supports up to 200Gb/s. For the reconfiguration to take effect, please perform power cycle.

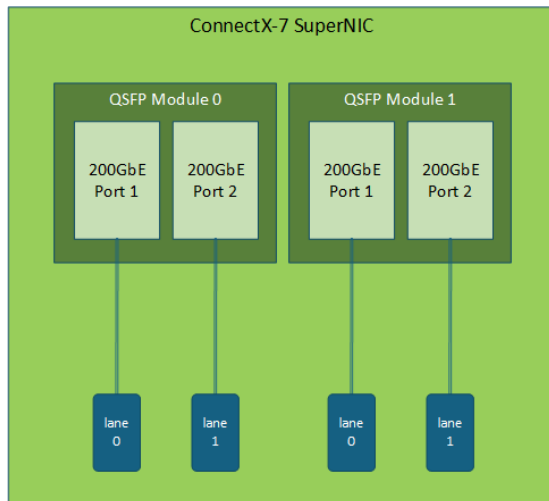
12.1.1 Configuration #1 (Default): Two Ethernet Ports, Each Supporting 100GbE

As the default configuration, the device is configured with two Ethernet ports, providing an Ethernet rate of 200Gb/s. The configuration is illustrated in the diagram below.



12.1.2 Configuration #2: Two Ethernet Ports, Each Supporting 100GbE

In this configuration, the device can be reconfigured to support two 100GbE Ethernet ports. The configuration is illustrated in the diagram below.



To apply this configuration, use the following mlxconfig commands:

```
mlxconfig -d <device> set MODULE_SPLIT_M0[0]=1 MODULE_SPLIT_M0[1]=2 MODULE_SPLIT_M0[2..15]=FF
mlxconfig -d <device> set MODULE_SPLIT_M1[0]=1 MODULE_SPLIT_M1[1]=2 MODULE_SPLIT_M1[2..15]=FF
```

13 Troubleshooting

13.1 General Troubleshooting

Server unable to find the adapter	• Ensure that the adapter is placed correctly • Make sure the adapter slot and the adapter are compatible Install the adapter in a different PCI Express slot • Use the drivers that came with the adapter or download the latest • Make sure your motherboard has the latest BIOS • Try to reboot the server
The adapter no longer works	• Reseat the adapter in its slot or a different slot, if necessary • Try using another cable • Reinstall the drivers for the network driver files may be damaged or deleted • Reboot the server
Adapters stopped working after installing another adapter	• Try removing and re-installing all adapters • Check that cables are connected properly • Make sure your motherboard has the latest BIOS
Link indicator light is off	• Try another port on the switch • Make sure the cable is securely attached • Check you are using the proper cables that do not exceed the recommended lengths • Verify that your switch and adapter port are compatible
Link light is on, but with no communication established	• Check that the latest driver is loaded • Check that both the adapter and its link are set to the same speed and duplex settings
Event message received of insufficient power	• When [adapter's current power consumption] > [PCIe slot advertised power limit] – a warning message appears in the server's system even logs (Eg. dmesg: "Detected insufficient power on the PCIe slot") • It's recommended to use a PCIe slot that can supply enough power. • If a message of the following format appears – "mlx5_core 0003:01:00:0: port_module:254:(pid 0): Port module event[error]: module 0, Cable error, One or more network ports have been powered down due to insufficient/unadvertised power on the PCIe slot" please upgrade your Adapter's firmware. • If the message remains – please consider switching from Active Optical Cable (AOC) or transceiver to Direct Attached Copper (DAC) connectivity.

13.2 Linux Troubleshooting

Environment Information	<pre>cat /etc/issue uname -a cat /proc/cupinfo grep 'model name' uniq ofed_info -s ifconfig -a ip link show ethtool <interface> ethtool -i <interface_of_Mellanox_port_num> ibdev2netdev</pre>
Card Detection	<pre>lspci grep -i Mellanox</pre>
Mellanox Firmware Tool (MFT)	Download and install MFT: MFT Documentation Refer to the User Manual for installation instructions. Once installed, run: <pre>mst start mst status flint -d <mst_device> q</pre>
Ports Information	<pre>ibstat ibv_devinfo</pre>
Firmware Version Upgrade	To download the latest firmware version, refer to the NVIDIA Update and Query Utility.
Collect Log File	<pre>cat /var/log/messages dmesg >> system.log journalctl (Applicable on new operating systems) cat /var/log/syslog</pre>

13.3 Windows Troubleshooting

Environment Information	From the Windows desktop choose the Start menu and run: msinfo32 To export system information to a text file, choose the Export option from the File menu. Assign a file name and save.
Mellanox Firmware Tool (MFT)	Download and install MFT: MFT Documentation Refer to the User Manual for installation instructions. Once installed, open a CMD window and run: <pre>WinMFT mst start mst status flint -d <mst_device> q</pre>
Ports Information	<pre>vstat</pre>
Firmware Version Upgrade	Download the latest firmware version using the PSID/board ID from here. <pre>flint -d <mst_device> -i <firmware_bin_file> b</pre>

Collect Log File

- Event log viewer
- MST device logs:
 - mst start
 - mst status
- flint -d <mst_device> dc > dump_configuration.log
- mstdump <mst_device> dc > mstdump.log

14 Specifications



Please make sure to install the ConnectX-7 card in a PCIe slot that is capable of supplying the required power and airflow, as stated in the below table.



In Standby mode only port0 is available.

14.1 MCX753436MS-HEBB Specifications

Interfaces	See Supported Interfaces		
	PCI Express Gen 5.0/4.0	SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)	
	Networking Port: Dual-Port QSFP112 InfiniBand and Ethernet, port split capable		
	Bracket Type: Thumbscrew (Pull Tab) Bracket		
Protocol Support	Data Rate	InfiniBand	NDR200/HDR/HDR100/EDR/FDR/SDR
		Ethernet	200/100/50/25/10 Gb/s
	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR200 (2 lanes x 100Gb/s per lane), HDR (4 lanes x 50Gb/s per lane), HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane), FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
	Ethernet: 200GAUI-4 C2M, 200GAUI-4 C2C, 200GBASE-CR4, 200GBASE-KR4, 200GBASE-CR4, 200GBASE-KR4, 100GBASE-CR4, 100GBASE-KR4, 100GBASE-SR4, 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2, 50GBASE-R2, 50GBASE-R4, 40GBASE-CR4, 40GBASE-KR4, 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER4, 40GBASE-R2, 25GBASE-R, 20GBASE-KR2, 10GBASE-LR,10GBASE-ER, 10GBASE-CX4, 10GBASE-CR, 10GBASE-KR, SGMII, 1000BASE-CX, 1000BASE-KX, 10GBASE-SR		
Capabilities	MCX753436MS-HEBB	Secure Boot Enabled, Crypto Disabled, Support for Multi-Host and Port Split capable	
Electrical and Thermal Specifications	Voltage: 12V_EDGE, +3.3V_EDGE		
	Maximum power available through QSFP112 port: 17W per port (Not thermally supported)		
	Typical power with passive cables in PCIe Gen 5.0 x16		24.5W
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Electrical and Thermal Specifications" document, which is available at NVOnline following login.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^b
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		

	EMC: CE / FCC / VCCI / ICES / RCM / KC
	RoHS: RoHS Compliant

Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.
b. The non-operational storage temperature specifications apply to the product without its package.

14.2 MCX75343AMC-NEAC / MCX75343AMS-NEAC Specifications

Physical	Adapter Card Size: Tall Small Form Factor (TSFF) OCP 3.0, 4.52 in. x 2.99 in (115.00mm x 76.00mm) Adapter Card Height: 0.7 in. (17.8mm)		
	Bracket Type: Thumbscrew (Pull Tab) Bracket		
Interfaces	See Supported Interfaces		
	PCI Express Gen 5.0/4.0	SERDES @ 16/32GT/s, x16 lanes (Gen 3.0 compatible)	
Protocol Support	Networking Port: Single-port OSFP InfiniBand and Ethernet		
	Data Rate	InfiniBand	NDR/NDR200/HDR/HDR100/EDR/FDR/SDR
		Ethernet	400/200/100/50/25/10 Gb/s
	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR (4 lanes x 100Gb/s per lane), NDR200 (2 lanes x 100Gb/s per lane), HDR (4 lanes x 50Gb/s per lane), HDR100 (2 lanes x 50Gb/s per lane), EDR (25Gb/s per lane), FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
	Ethernet: 400GAUI-4 C2M, 400GBASE-CR4, 200GAUI-4 C2M, 200GBASE-CR4, 100GAUI-2 C2M, 100GBASE-CR4, 100GBASE-CR2, 50GAUI-2 C2M, 50GAUI-1 C2M, 50GBASE-CR, 40GBASE-CR4, 25GBASE-R, 10GBASE-R, 10GBASE-CX4, 1000BASE-CX, CAUI-4 C2M, 25GAUI C2M, XLAUI C2M, XLPPi, SFI		
Capabilities	MCX75343AMC-NEAC	Secure Boot Enabled, Crypto Enabled, Support for Multi-Host and Socket Direct	
	MCX75343AMS-NEAC	Secure Boot Enabled, Crypto Disabled, Support for Multi-Host and Socket Direct	
Electrical and Thermal Specifications	Voltage: 12V_EDGE, +3.3V_EDGE		
	Typical power with passive cables in PCIe Gen 5.0 x16	MCX75343AMC-NEAC	25.9W
		MCX75343AMS-NEAC	24.4W
	Maximum power available through OSFP port: 17W per port (Not thermally supported)		
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Electrical and Thermal Specifications" document, which is available at NVOnline following login.		
Environmental	Temperature	Operational	0°C to 55°C

		Non-operational	-40°C to 70°C ^b
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		

Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.

b. The non-operational storage temperature specifications apply to the product without its package.

14.3 MCX753436MS-HEAB / MCX753436MC-HEAB Specifications

Physical	Adapter Card Size: Small Form Factor (SFF), 4.52 in. x 2.99 in (115.00mm x 76.00mm) Adapter Card Height: 0.59 in. (15.1mm)		
	Bracket Type: Thumbscrew (Pull Tab) Bracket		
Interfaces	See Supported Interfaces		
	PCI Express Gen 5.0/4.0	SERDES @ 16/32GT/s, x16 lanes (4.0 and 3.0 compatible)	
	Networking Port: Dual-Port QSFP112 InfiniBand and Ethernet		
Protocol Support	Data Rate	InfiniBand	NDR200/HDR/HDR100/EDR/FDR/SDR
		Ethernet	200/100/50/25/10 Gb/s
	InfiniBand: IBTA v1.5 ^a Auto-Negotiation: NDR200 (2 lanes x 100Gb/s per lane), HDR (4 lanes x 50Gb/s per lane), HDR100 (2 lane x 50Gb/s per lane), EDR (25Gb/s per lane), FDR (14.0625Gb/s per lane), 1X/2X/4X SDR (2.5Gb/s per lane)		
	Ethernet: 200GAUI-4 C2M, 200GAUI-4 C2C, 200GBASE-CR4, 200GBASE-KR4, 200GBASE-CR4, 200GBASE-KR4, 100GBASE-CR4, 100GBASE-KR4, 100GBASE-SR4, 100GBASE-CR2, 100GBASE-KR2, 100GBASE-SR2, 50GBASE-R2, 50GBASE-R4, 40GBASE-CR4, 40GBASE-KR4, 40GBASE-SR4, 40GBASE-LR4, 40GBASE-ER4, 40GBASE-R2, 25GBASE-R, 20GBASE-KR2, 10GBASE-LR,10GBASE-ER, 10GBASE-CX4, 10GBASE-CR, 10GBASE-KR, SGMII, 1000BASE-CX, 1000BASE-KX, 10GBASE-SR		
Capabilities	MCX753436MC-HEAB	Secure Boot Enabled, Crypto Enabled, Support for Multi-Host and Socket Direct	
	MCX753436MS-HEAB	Secure Boot Enabled, Crypto Disabled, Support for Multi-Host and Socket Direct	

Electrical and Thermal Specifications	Voltage: 12V_EDGE, +3.3V_EDGE		
	Maximum power available through QSFP112 port: 17W per port (Not thermally supported)		
	Typical power with passive cables in PCIe Gen 5.0 x16	MCX753436MC-HEAB	25.9W
		MCX753436MS-HEAB	24.5W
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Electrical and Thermal Specifications" document, which is available at NVOnline following login.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^b
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		

Notes: a. The ConnectX-7 adapters supplement the IBTA auto-negotiation specification to get better bit error rates and longer cable reaches. This supplemental feature only initiates when connected to another NVIDIA InfiniBand product.

b. The non-operational storage temperature specifications apply to the product without its package.

14.4 MCX713434AS-ADAI Specifications

Physical	Adapter Card Size: Small Form Factor (SFF), 4.52 in. x 2.99 in (115.00mm x 76.00mm) Adapter Card Height: 0.59 in. (15.1mm)		
	Bracket Type: Internal Bracket		
Interfaces	See Supported Interfaces		
	PCI Express Gen 4.0	SERDES @ 16GT/s, x16 lanes	
	Networking Port: Quad-Port SFP56 Ethernet		
Protocol Support	Data Rate	Ethernet	25/50 Gb/s
	Ethernet: 25GBASE-R, 20GBASE-KR2, 10GBASE-LR, 10GBASE-ER, 10GBASE-CX4, 10GBASE-CR, 10GBASE-KR, SGMII, 1000BASE-CX, 1000BASE-KX, 10GBASE-SR		
Capabilities	Secure Boot Enabled, Crypto Disabled		
Electrical and Thermal Specifications	Voltage: 12V_EDGE, +3.3V_EDGE		
	Maximum power available through Quad-Port SFP56 port: 1.5W per port (Not thermally supported)		
	50GbE: Passive only so there is no power 25GbE: Active option up to 1.5W per port		

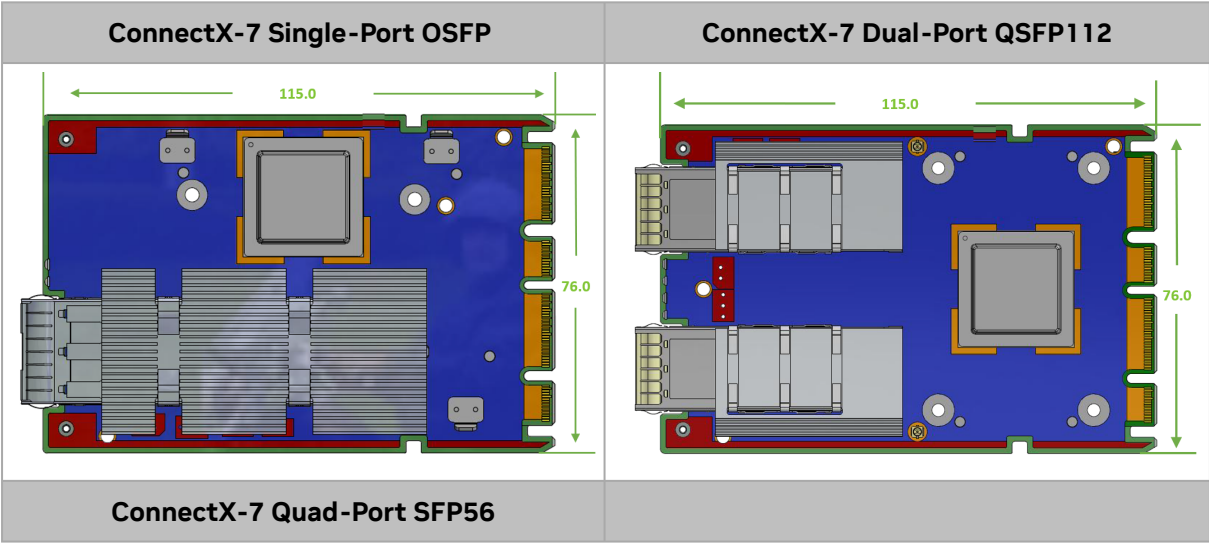
	Typical power with passive cables in PCIe Gen 4.0 x16		35W
	The complete electrical and thermal specifications are provided in "NVIDIA ConnectX-7 Electrical and Thermal Specifications" document, which is available at NVOnline following login.		
Environmental	Temperature	Operational	0°C to 55°C
		Non-operational	-40°C to 70°C ^a
	Humidity	Operational	10% to 85% relative humidity
		Non-operational	10% to 90% relative humidity
	Altitude (Operational)	3050m	
Regulatory	Safety: CB / cTUVus / CE		
	EMC: CE / FCC / VCCI / ICES / RCM / KC		
	RoHS: RoHS Compliant		
Notes: a. The non-operational storage temperature specifications apply to the product without its package.			

14.5 Mechanical Drawings and Dimensions

⚠ For the 3D Model of the card, please refer to the PID.

14.5.1 Board Drawings and Dimensions

⚠ All dimensions are in millimeters. The PCB mechanical tolerance is +/- 0.13mm.



ConnectX-7 Single-Port OSFP	ConnectX-7 Dual-Port QSFP112
115.0 +/- 0.13 76 +/- 0.13	

14.5.2 Bracket Drawings and Dimensions



All dimensions are in millimeters. The bracket's mechanical tolerance is +/- 0.25mm.

Single-Port OSFP Thumbscrew Bracket	Dual-Port QSFP112 Thumbscrew Bracket
82.50 17.80	82.50 15.1
ConnectX-7 Quad-Port SFP56 Internal Lock Bracket	
71.80 15.0	

15 Monitoring

15.1 Thermal Sensors

The adapter card incorporates the ConnectX IC, which operates in the range of temperatures between 0°C and 105°C.

Three thermal threshold definitions impact the overall system operation state:

- **Warning** – 105°C: On managed systems only: When the device crosses the 105°C threshold, a Warning Threshold message is issued by the management SW, indicating to system administration that the card has crossed the warning threshold. Note that this temperature threshold does not require nor lead to any action by hardware (such as adapter card shutdown).
- **Critical** – 115°C: When the device crosses this temperature, the firmware automatically shuts down the device.
- **Emergency** – 130°C: If the firmware fails to shut down the device upon crossing the critical threshold, the device automatically shuts down upon crossing the emergency (130°C) threshold.

The card's thermal sensors can be read through the system's SMBus. The user can read these thermal sensors and adapt the system airflow following the readouts and the needs of the above-mentioned IC thermal

15.2 Heatsink

A heatsink is attached to the ConnectX-7 IC to dissipate the heat. ConnectX-7 IC has a thermal shutdown safety mechanism that automatically shuts down the ConnectX-7 card in case of a high-temperature event, improper thermal coupling, or heatsink removal.

For the required airflow (LFM) per OPN, please refer to [Specifications](#).

The below table lists the heatsink proprieties per OPN.

OPN	Heatsink
MCX753436AS-HEAB and MCX753436MS-HEAB	Attached by using two spring-loaded push pins.
MCX75343AMC-NEAC and MCX75343AMS-NEAC	Attached by using two spring-loaded push pins and three L-shaped mechanical holders, as can be seen in the above mechanical drawing. These L-shaped mechanical holders connect the PCB to the heatsink to create a stiffener.

16 Finding the MAC and Serial Number on the Adapter Card

Each adapter card has a different identifier printed on the label: serial number and the card MAC for the Ethernet protocol and the card GUID for the InfiniBand protocol. VPI cards have both a GUID and a MAC (derived from the GUID). IB only cards have GUID for the InfiniBand protocol.



The product revisions indicated on the labels in the following figures do not necessarily represent the latest revisions of the cards.

Board Label Example

MCX753436MC-HEAB / MCX753436MS-HEAB	MCX75343AMC-NEAC / MCX75343AMS-NEAC
ConnectX-7 NDR200 / 200GbE Model: CX753436M P/N: MCX753436MC-HEAB   S/N: MT2112X13943 GUID: B8 CE F6 03 00 66 86 AC H1 P1: B8CEF66686AC H1 P2: B8CEF66686AD H2 P1: B8CEF66686B8 H2 P2: B8CEF66686B9 H3 P1: B8CEF66686C4 H3 P2: B8CEF66686C5 H4 P1: B8CEF66686D0 H4 P2: B8CEF66686D1 Made in Israel / Rev: A2 / 2023-08-21	NVIDIA ConnectX-7 400GbE / NDR IB Model: CX75343AM P/N: MCX75343AMC-NEAC   S/N: MT2112X13943 GUID: B8 CE F6 03 00 66 86 AC H1: B8CEF66686AC H2: B8CEF66686B8 H3: B8CEF66686C4 H4: B8CEF66686D0 Made in Israel / Rev: A2 / 2023-08-21
#1 S/N: MT2112X13943 P/N: MCX753436MC-HEAB Rev: A2  #2 GUID: B8CEF603006686AC HOST: B8CEF66686AC 	  S/N: MT2112X13943 P/N: MCX75343AMC-NEAC
CAN ICES-003(A) / NMB-003(A)        R-R-MLN-CX75343AM	CAN ICES-003(A) / NMB-003(A)        R-R-MLN-CX75343AM

17 Document Revision History

Date	Description of Changes
Jan. 2026	Added MCX713434AS-ADAI support across the document
Dec. 2025	Added Setting Link Type of High-Speed Ports
Dec. 2023	Updated regulatory label in Finding the MAC and Serial Number on the Adapter Card
Oct. 2023	• Updated Finding the MAC and Serial Number on the Adapter Card • Updated the bracket dimensions in Specifications
Aug. 2023	Updated Finding the MAC and Serial Number on the Adapter Card
Jun. 2023	Updated Specifications with typical power numbers
May. 2023	Updated Specifications to include non-operational storage temperature specifications
Jan. 2023	Updated 400Gb/s supported Ethernet protocols in Specifications
Dec. 2022	First release of this consolidated user manual for all ConnectX-7 adapter cards for OCP 3.0

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