



# Mellanox ConnectX<sup>®</sup>-4 Firmware Release Notes

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Rev 12.26.1040

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## Release Update History

*Table 1 - Release Update History*

Release	Date	Description
Rev 12.26.1040	September 29, 2019	Initial version of this firmware release. This version introduces New Features <a href="#">Section 2, “Changes and New Features in Rev 12.26.1040”</a> , on page 20 and Bug Fixes (see <a href="#">Section 4, “Bug Fixes History”</a> , on page 25).

# 1 Overview

These are the release notes for the ConnectX®-4 adapters firmware Rev 12.26.1040.

This firmware supports the following protocols:

- InfiniBand - SDR, QDR, FDR10, FDR, EDR
- Ethernet - 1GbE, 10GbE, 25GbE, 40GbE, 50GbE, 56GbE<sup>1</sup>, 100GbE
- PCI Express 3.0, supporting backwards compatibility for v2.0 and v1.1

## 1.1 Supported Devices

This firmware supports the devices and protocols listed in [Table 2](#)

**Table 2 - Supported Devices (Sheet 1 of 2)**

Device Part Number	PSID	Device Name	FlexBoot	UEFI x86	UEFI ARM	Enable/disable exprom Feature
MCX413A-BCAT	MT_2120110027	ConnectX®-4 EN network interface card, 40GbE single-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX413A-GCAT	MT_2600110035	ConnectX®-4 EN network interface card, 50GbE single-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX414A-BCAT	MT_2130110027	ConnectX®-4 EN network interface card, 40GbE dual-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX414A-GCAT	MT_2610110035	ConnectX®-4 EN network interface card, 50GbE single-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX415A-BCAT	MT_2120111027	ConnectX®-4 EN network interface card, 40GbE single-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX415A-CCAT	MT_2140110033	ConnectX®-4 EN network interface card, 100GbE single-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX415A-GCAT	MT_2120110035	ConnectX®-4 EN network interface card; 50GbE single-port QSFP28; PCIe3.0 x16; ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX416A-BCAT	MT_2130111027	ConnectX®-4 EN network interface card, 40GbE dual-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX416A-CCAT	MT_2150110033	ConnectX®-4 EN network interface card, 100GbE dual-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX416A-GCAT	MT_2130110035	ConnectX®-4 EN network interface card; 50GbE dual-port QSFP28; PCIe3.0 x16; ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists

1. 56GbE is a Mellanox propriety link speed and can be achieved while connecting a Mellanox adapter cards to Mellanox SX10XX switch series or connecting a Mellanox adapter card to another Mellanox adapter card.

**Table 2 - Supported Devices (Sheet 2 of 2)**

Device Part Number	PSID	Device Name	FlexBoot	UEFI x86	UEFI ARM	Enable/disable exprom Feature
MCX445A-ECAN	MT_2520110032	ConnectX-4 VPI network interface card for OCP; EDR IB (100Gb/s) and 100GbE single-port QSFP28; PCIe3.0 x16; ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX453A-FCAT	MT_2160110021	ConnectX®-4 VPI adapter card, FDR IB 40GbE, single-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX454A-FCAT	MT_2170110021	ConnectX®-4 VPI adapter card, FDR IB and 40GbE, dual-port QSFP28, PCIe3.0 x8, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX455A-ECAT	MT_2180110032	ConnectX®-4 VPI adapter card, EDR IB (100Gb/s) and 100GbE, single-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX455A-FCAT	MT_2160111021	ConnectX®-4 VPI adapter card, FDR IB and 40GbE, single-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX456A-ECAT	MT_2190110032	ConnectX®-4 VPI adapter card, EDR IB (100Gb/s) and 100GbE, dual-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists
MCX456A-FCAT	MT_2170111021	ConnectX®-4 VPI adapter card, FDR IB and 40GbE, dual-port QSFP28, PCIe3.0 x16, tall bracket, ROHS R6	Present (Enabled)	Present (Disabled)	Present (Disabled)	Exists

## 1.2 Supported Cables and Modules

Please refer to the LinkX® Cables and Transceivers web page

(<http://www.mellanox.com/products/interconnect/cables-configurator.php>) for the list of supported cables.

### 1.2.1 Validated and Supported 1GbE Cables

**Table 3 - Validated and Supported 1GbE Cables**

Speed	Cable OPN #	Description
1GB/S	MC3208411-T	Mellanox® module, ETH 1GbE, 1Gb/s, SFP, Base-T, up to 100m

### 1.2.2 Validated and Supported 10GbE Cables

**Table 4 - Validated and Supported 10GbE Cables**

Speed	Cable OPN #	Description
10GbE	1-2053783-2	SFP-H10GB-SU3M



**Table 4 - Validated and Supported 10GbE Cables**

Speed	Cable OPN #	Description
10GbE	44X1371-N31295E	10G Amphenol Copper 7m cable
10GbE	BN-QS-SP-CBL-5M	40G QSFP+ to 4xSFP+ DAC Breakout Direct Attach Cable 5m
10GbE	BN-QS-SP-CBL-5M	40G QSFP+ to 4xSFP+ DAC Breakout Direct Attach Cable 5m
10GbE	CAB-SFP-SFP-1M	Arista 10GBASE-CR SFP+ Cable 1 Meter
10GbE	CAB-SFP-SFP-3M	Arista 10GBASE-CR SFP+ Cable 3 Meter
10GbE	CAB-SFP-SFP-3M	Arista Compatible 10G SFP+ Passive Cable 3m
10GbE	CAB-SFP-SFP-5M	Arista 10GBASE-CR SFP+ Cable 5 Meter
10GbE	FTLX1471D3BCL-ME	10GBASE-LR SFP+ 1310nm 10km DOM Transceiver Module
10GbE	L45593-D178-B50	QSFP-4SFP10G-CU5M
10GbE	SFP-10GB-SR	Cisco SFP+ 10GB SR optic module
10GbE	MC2309124-004	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 4M
10GbE	MC2309124-005	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 5M
10GbE	MC2309130-001	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 1M
10GbE	MC2309130-002	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 2M
10GbE	MC2309130-003	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 3M
10GbE	MC2309130-00A	Mellanox Passive Copper Cable ETH 10GBE 10GB/S QSFP TO SFP+ 0.5M
10GbE	MC2609125-004	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 4M
10GbE	MC2609125-005	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 5M
10GbE	MC2609130-001	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 1M
10GbE	MC2609130-002	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 2M
10GbE	MC2609130-003	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 3M
10GbE	MC2609130-0A1	Mellanox Passive Copper Hybrid Cable ETH 40GbE TO 4X10GBE QSFP TO 4X SFP+ 1.5M
10GbE	MC3309124-004	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 4M
10GbE	MC3309124-005	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 5M
10GbE	MC3309124-006	Mellanox® Passive Copper Cable, ETH 10GbE, 10Gb/s, SFP+, 6m
10GbE	MC3309124-007	Mellanox® Passive Copper Cable, ETH 10GbE, 10Gb/s, SFP+, 7m
10GbE	MC3309130-001	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 1M
10GbE	MC3309130-002	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 2M
10GbE	MC3309130-003	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 3M
10GbE	MC3309130-004	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 4M
10GbE	MC3309130-005	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 5M
10GbE	MC3309130-006	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 6M
10GbE	MC3309130-007	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 7M
10GbE	MC3309130-00A	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 0.5M
10GbE	MC3309130-0A1	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 1.5M

**Table 4 - Validated and Supported 10GbE Cables**

Speed	Cable OPN #	Description
10GbE	MC3309130-0A2	Mellanox Passive Copper Cable ETH 10GBE 10GB/S SFP+ 2.5M
10GbE	SFP-10G-SR	Cisco 10GBASE-SR SFP+ transceiver module for MMF, 850-nm wavelength, LC duplex connector
10GbE	SFP-H10GB-CU1M	Cisco 1-m 10G SFP+ Twinax cable assembly, passive
10GbE	SFP-H10GB-CU3M	Cisco 3-m 10G SFP+ Twinax cable assembly, passive
10GbE	SFP-H10GB-CU5M	Cisco 5-m 10G SFP+ Twinax cable assembly, passive
10GbE	1-2053783-3	038-003-697, QSFP/QSFP, 100 OHM

### 1.2.3 Validated and Supported 25GbE Cables



The 25GbE cables can be supported in ConnectX-4 adapter cards only when connected to the MAM1Q00A-QSA28 module.

**Table 5 - Validated and Supported 25GbE Cables**

Speed	Cable OPN #	Description
25GbE	MCP7F00-A001	Mellanox Passive Copper Hybrid cable ETH 100GbE to 4X25GBS QSFP28 to 4XSFP28 1M
25GbE	MCP7F00-A002	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 4X25GBS QSFP28 TO 4XSFP28 2M
25GbE	MCP7F00-A003	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 4X25GBS QSFP28 TO 4XSFP28 3M
25GbE	MCP7F00-A003-AM	Mellanox® passive copper hybrid cable, ETH 100GbE to 4x25GbE, QSFP28 to 4xSFP28, 3M 30AWG
25GbE	MCP7F00-A005AM	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 4X25GBS QSFP28 to 4XSFP28 5M
25GbE	MCP7F00-A01A	Mellanox Passive Copper Hybrid Cable ETH 100GbE to 4X25GBS QSFP28 to 4XSFP28 1.5M
25GbE	MCP7F00-A02A	Mellanox Passive Copper Hybrid Cable ETH 100GbE to 4X25GBS QSFP28 to 4XSFP28 2.5M
25GbE	MFM1T02A-SR-P	Mellanox® Optical Module ETH 10GbE 10GB/S SFP+ LC-LC 850NM SR up to 300M
25GbE	SFP-H25G-CU1M	25GBASE-CR1 Copper Cable 1-meter
25GbE	SFP-H25G-CU2M	25GBASE-CR1 Copper Cable 2-meter

### 1.2.4 Validated and Supported 40GbE Cables

**Table 6 - Validated and Supported 40GbE Cables**

Speed	Cable OPN #	Description
40GbE	QAOC-40G4F1A25-C	CISCO-DELTA 25m 40GbE AOC
40GbE	AFBR-79EBPZ-CS2	QSFP-40G-SR-BD

**Table 6 - Validated and Supported 40GbE Cables**

Speed	Cable OPN #	Description
40GbE	BN-QS-QS-CBL-5M	40G QSFP+ DAC Direct Attach Cable 5m
NA	MAM1Q00A-QSA	Mellanox® cable module, ETH 10GbE, 40Gb/s to 10Gb/s, QSFP to SFP+
NA	MAM1Q00A-QSA28	Mellanox® cable module, ETH 25GbE, 100Gb/s to 25Gb/s, QSFP28 to SFP28
40GbE	MC2210126-004	Mellanox® Passive Copper Cable, ETH 40GbE, 40GbE, QSFP, 4m
40GbE	MC2210126-005	Mellanox® Passive Copper Cable, ETH 40GbE, 40GbE, QSFP, 5m
40GbE	MC2210128-003	Mellanox Passive Copper Cable ETH 40GbE 40GbE QSFP 3M
40GbE	MC2210130-001	Mellanox Passive Copper Cable ETH 40GbE 40GbE QSFP 1M
40GbE	MC2210130-002	Mellanox Passive Copper Cable ETH 40GbE 40GbE QSFP 2M
40GbE	MC2210130-00A	Mellanox® Passive Copper Cable, ETH 40GbE, 40GbE, QSFP, 0.5m
40GbE	MC2210130-00B	Mellanox® Passive Copper Cable, ETH 40GbE, 40GbE, QSFP, 0.75m
40GbE	MC2210310-XXX	Mellanox Active Fiber Cable ETH 40GbE 40GbE QSFP from 3M up to 100M
40GbE	MC2210411-SR4	Mellanox Optical Module 40GbE QSFP MPO 850NM UP TO 100M
40GbE	MC2210411-SR4E	Mellanox Optical Module 40GbE QSFP MPO 850NM UP TO 300M
40GbE	MC2210411-SR4L	Mellanox Optical Module 40GbE QSFP MPO 850NM UP TO 30M
40GbE	MC2210511-LR4	Mellanox® optical module, IB FDR10, 40GbE, QSFP, LC-LC, 1310nm, LR4 up to 10km
40GbE	QSFP-40G-SR-BD	Cisco 40GBASE-SR-BiDi, duplex MMF
40GbE	QSFP-40G-SR4	Cisco 40GBASE-SR4, 4 lanes, 850 nm MMF
40GbE	QSFP-H40G-ACU10M	Cisco 40GBASE-CR4 QSFP direct-attach copper cable, 10-meter, active
40GbE	QSFP-H40G-AOC10M	Cisco 40GBase-AOC QSFP direct-attach Active Optical Cable, 10-meter

## 1.2.5 Validated and Supported 50GbE Cables

**Table 7 - Validated and Supported 50GbE Cables**

Speed	Cable OPN #	Description
50GbE	MCP7H00-G001	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 2X50GBS QSFP28 TO 2XQSFP28 1M
50GbE	MCP7H00-G002	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 2X50GBS QSFP28 TO 2XQSFP28 2M
50GbE	MCP7H00-G003	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 2X50GBS QSFP28 TO 2XQSFP28 3M
50GbE	MCP7H00-G01A	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 2X50GBS QSFP28 TO 2XQSFP28 1.5M
50GbE	MCP7H00-G02A	Mellanox Passive Copper Hybrid Cable ETH 100GbE TO 2X50GBS QSFP28 TO 2XQSFP28 2.5M

## 1.2.6 Validated and Supported 100GbE Cables

**Table 8 - Validated and Supported 100GbE Cables**

Speed	Cable OPN #	Description
100GbE	10137498-2005LF	HPE 100GbE 2m copper cable
100GbE	10137498-2010LF	HPE 100GbE 4m copper cable
100GbE	AFBR-89CDDZ	QSFP28 Pluggable, Parallel Fiber-Optics Module 100 Gigabit Ethernet 850nm SR4, MMF, MPO Connector
100GbE	CAB-Q-Q-100GbE-3M	Passive 3 meter , QSFP+ to QSFP+ QSFP100 TWINAX 103.125Gbps-CR4
100GbE	FCBN425QE1C10-C1	100GbE Quadwire® QSFP28 Active Optical Cable 10M
100GbE	MCP1600-C001	Mellanox Passive Copper Cable ETH 100GbE 100GBS QSFP LSZH 1M
100GbE	MCP1600-C002	Mellanox Passive Copper Cable ETH 100GbE 100GBS QSFP LSZH 2M
100GbE	MCP1600-C003	Mellanox Passive Copper Cable ETH 100GbE 100GBS QSFP LSZH 3M
100GbE	MCP1600-C005AM	Mellanox® Passive Copper cable, ETH 100GbE, 100GbE, QSFP, 5m, 26AWG
100GbE	MCP1600-C005E26L	Mellanox® Passive Copper cable, ETH 100GbE, 100GbE, QSFP28, 5m, Black, 26AWG, CA-L
100GbE	MCP1600-C00A	Mellanox Passive Copper Cable ETH 100GbE 100GBS QSFP LSZH 0.5M
100GbE	MCP1600-C01A	Mellanox® Passive Copper cable, ETH 100GbE, 100GbE, QSFP, LSZH, 1.5m
100GbE	MCP1600-C02A	Mellanox® Passive Copper cable, ETH 100GbE, 100GbE, QSFP, LSZH, 2.5m
100GbE	MCP1600-C03A	Mellanox® Passive Copper cable, ETH 100GbE, 100GbE, QSFP, PVC, 3.5m 26AWG
100GbE	MCP7F00-A005R26L	Mellanox® passive copper hybrid cable, ETH 100GbE to 4x25GbE, QSFP28 to 4xSFP28, 5m, Colored, 26AWG, CA-L
100GbE	MCP7H00-G005R26L	Mellanox® passive copper hybrid cable, ETH 100GbE to 2x50GbE, QSFP28 to 2xQSFP28, 5m, Colored, 26AWG, CA-L
100GbE	MFA1A00-C003	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 3m
100GbE	MFA1A00-C005	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 5m
100GbE	MFA1A00-C010	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 10m
100GbE	MFA1A00-C015	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 15m
100GbE	MFA1A00-C020	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 20m
100GbE	MFA1A00-C030	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 30m
100GbE	MFA1A00-C050	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 50m
100GbE	MFA1A00-C100	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 100m
100GbE	MFA7A20-C020	Mellanox® active fiber hybrid solution, ETH 100GbE to 2x50GbE, QSFP28 to 2xQSFP28, 20m
100GbE	MFS1200-C005	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 5m
100GbE	MFS1200-C010	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 10m
100GbE	MFS1200-C015	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 15m
100GbE	MFS1200-C020	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 20m
100GbE	MFS1200-C030	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 30m
100GbE	MFS1200-C050	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 50m
100GbE	MFS1200-C100	Mellanox® Active Fiber Cable, ETH 100GbE, 100GbE, QSFP, LSZH, 100m
100GbE	MMA1B00-C100_B	Mellanox® transceiver, up to 100GbE, QSFP28, MPO, 850nm, up to 100m OM3

**Table 8 - Validated and Supported 100GbE Cables**

Speed	Cable OPN #	Description
100GbE	MMA1B00-C100D	Mellanox® Transceiver, 100GbE, QSFP28, MPO, 850nm, up to 100m
100GbE	MMA1L30-CM	Mellanox® optical module, 100GbE, 100Gb/s, QSFP28, LC-LC, 1310nm, CWDM4, up to 2km
100GbE	MMS1C00-C500	Mellanox® transceiver, 100GbE, QSFP28, MPO, 1550nm PSM4, up to 2km
100GbE	MMS1C00-C500	Mellanox® transceiver, 100GbE, QSFP28, MPO, 1550nm PSM4, up to 2km
100GbE	MMS1C00-CM	Mellanox® transceiver, 100GbE, QSFP28, MPO, 1550nm PSM4, up to 2km for internal use only
100GbE	MMS1C00-CM	Mellanox® transceiver, 100GbE, QSFP28, MPO, 1550nm PSM4, up to 2km
100GbE	MMS1C10-CM	Mellanox® active optical module, 100GbE, QSFP, MPO, 1310nm, PSM4
100GbE	MMS1C10-CM	Mellanox® active optical module, 100Gb/s, QSFP, MPO, 1310nm, PSM4

## 1.2.7 Validated and Supported 200GbE Cables

**Table 9 - Validated and Supported 200GbE Cables**

Speed	Cable OPN #	Description
200GbE	MCP1650-V001E30	Mellanox® Passive Copper cable, 200GbE, 200Gb/s, QSFP56, LSZH, 1m, black pultab, 30AWG
200GbE	MCP1650-V002E26	Mellanox® Passive Copper cable, 200GbE, 200Gb/s, QSFP56, LSZH, 2m, black pultab, 26AWG
200GbE	MCP1650-V003E26	Mellanox® Passive Copper cable, 200GbE, 200Gb/s, QSFP56, LSZH, 3m, black pultab, 26AWG
200GbE	MCP1650-V00AE30	Mellanox® Passive Copper cable, 200GbE, 200Gb/s, QSFP56, LSZH, 0.5m, black pultab, 30AWG
200GbE	MCP1650-V02AE26	Mellanox® Passive Copper cable, 200GbE, 200Gb/s, QSFP56, LSZH, 2.5m, black pultab, 26AWG
200GbE	MCP7H50-V003R26	Mellanox® Passive Copper hybrid cable, 200GbE 200Gb/s to 2x100Gb/s, QSFP56 to 2xQSFP56, colored, 3m, 26AWG

## 1.2.8 Validated and Supported QDR Cables

**Table 10 - Validated and Supported QDR Cables**

Speed	Cable OPN #	Description
QDR	MC2206125-007	Mellanox Passive Copper Cable IB QDR 40GB/S QSFP 7M
QDR	MC2206126-006	Mellanox Passive Copper Cable IB QDR 40GB/S QSFP 6M

## 1.2.9 Validated and Supported FDR10 Cables

**Table 11 - Validated and Supported FDR10 Cables**

Speed	Cable OPN #	Description
FDR10	MC2206128-004	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 4M

**Table 11 - Validated and Supported FDR10 Cables**

Speed	Cable OPN #	Description
FDR10	MC2206128-005	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 5M
FDR10	MC2206130-001	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 1M
FDR10	MC2206130-002	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 2M
FDR10	MC2206130-003	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 3M
FDR10	MC2206130-00A	Mellanox Passive Copper Cable VPI UP TO 40GB/S QSFP 0.5M
FDR10	MC2206310-XXX	Mellanox Active Fiber Cable IB QDR/FDR10 40GB/S QSFP from 3M up to 100M
FDR10	MFS4R12CB-XXX	Mellanox Active Fiber Cable VPI UP TO 40GB/S QSFP from 3M up to 100M

## 1.2.10 Validated and Supported FDR Cables

**Table 12 - Validated and Supported FDR Cables**

Speed	Cable OPN #	Description
FDR	MC2207126-004	Mellanox® Passive Copper Cable, VPI, up to 56Gb/s, QSFP, 4m
FDR	MC2207128-003	Mellanox® Passive Copper Cable, VPI, up to 56Gb/s, QSFP, 3m
FDR	MC2207130-001	Mellanox® Passive Copper Cable, VPI, up to 56Gb/s, QSFP, 1m
FDR	MC2207130-00A	Mellanox® Passive Copper Cable, VPI, up to 56Gb/s, QSFP, 0.5m
FDR	MC2207310-003	Mellanox® Active Fiber Cable, VPI, up to 56Gb/s, QSFP, 3m
FDR	MC2207310-010	Mellanox® Active Fiber Cable, VPI, up to 56Gb/s, QSFP, 10m
FDR	MC2207310-015	Mellanox® Active Fiber Cable, VPI, up to 56Gb/s, QSFP, 15m
FDR	MC2207310-100	Mellanox® Active Fiber Cable, VPI, up to 56Gb/s, QSFP, 100m
FDR	MC2207312-XXX	Mellanox® Active Fiber Cable, VPI, up to 56Gb/s, QSFP, up to 100m
FDR	MC220731V-XXX	Mellanox® Active Fiber cable, VPI, up to 56Gb/s, QSFP, up to 100m
FDR	MC2207411-SR4L	Mellanox® Optical Module, VPI, up to 56Gb/s, QSFP, MPO, 850nm, up to 30m

## 1.2.11 Validated and Supported EDR / 100Gb/s Cables

**Table 13 - Validated and Supported EDR / 100Gb/s Cables**

Speed	Cable OPN #	Description
EDR	MCP1600-E001	Mellanox Passive Copper Cable VPI 100Gb/s QSFP LSZH 1M
EDR	MCP1600-E002	Mellanox Passive Copper Cable VPI 100Gb/s QSFP LSZH 2M
EDR	MCP1600-E003	Mellanox Passive Copper Cable VPI 100GB/S QSFP LSZH 3M
EDR	MCP1600-E004A26	Mellanox® Passive Copper cable, IB EDR, up to 100Gb/s, QSFP28, 4m, Blue, 26AWG
EDR	MCP1600-E005	Mellanox Passive Copper Cable VPI 100GB/S QSFP LSZH 5M
EDR	MCP1600-E00A	Mellanox Passive Copper Cable VPI 100Gb/s QSFP LSZH 0.5M
EDR	MCP1600-E01A	Mellanox® Passive Copper cable, VPI, up to 100Gb/s, QSFP, LSZH, 1.5m
EDR	MCP1600-E02A	Mellanox® Passive Copper cable, VPI, up to 100Gb/s, QSFP, LSZH, 2.5m
EDR	MCP1OPT-E002	Mellanox® Passive Copper cable, VPI, up to 100Gb/s, QSFP, LSZH, 2m

**Table 13 - Validated and Supported EDR / 100Gb/s Cables**

Speed	Cable OPN #	Description
EDR	MFA1A00-E005	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 5m
EDR	MFA1A00-E006	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 6m
EDR	MFA1A00-E010	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 10m
EDR	MFA1A00-E015	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 15m
EDR	MFA1A00-E020	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 20m
EDR	MFA1A00-E030	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 30m
EDR	MFA1A00-E050	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 50m
EDR	MFA1A00-E100	Mellanox Active Fiber Cable, VPI, up to 100Gb/s, QSFP, 100m
EDR	MMA1B00-E100	Mellanox® Transceiver, IB EDR, up to 100Gb/s, QSFP28, MPO, 850nm, up to 100m
EDR	MMA1L30-CM	Mellanox® optical module, 100Gb/s, QSFP28, LC-LC, 1310nm, CWDM4, up to 2km

## 1.2.12 Validated and Supported HDR / 200Gb/s Cables

**Table 14 - Validated and Supported HDR Cables**

Speed	OPN # / Name	Description
HDR	MCP1650-H001E30	Mellanox® Passive Copper cable, IB HDR, up to 200Gb/s, QSFP28, PVC, 1m, white pultab, 30AWG
HDR	MCP1650-H002E26	Mellanox Passive Copper Cable, IB HDR, up to 200Gb/s, QSFP56, LSZH, 2M, black pultab, 26AWG
HDR	MCP1650-H003E26 / P06149-B26	Mellanox® Passive Copper cable, IB HDR, up to 200Gb/s, QSFP56, LSZH, 3m, black pulltab, 26AWG
HDR	MCP1650-H00AE30	Mellanox Passive Copper Cable, IB HDR, up to 200Gb/s, QSFP56, LSZH, 0.5M, black pultab, 30AWG
HDR	MCP1650-H01AE30	Mellanox® Passive Copper cable, IB HDR, up to 200Gb/s, QSFP28, PVC, 1.5m, white pultab, 30AWG
HDR	MCP1650-H01AE30	Mellanox Passive Copper Cable, IB HDR, up to 200Gb/s, QSFP56, LSZH, 1.5M, black pultab, 30AWG
HDR	MCP1650-H02AE26	Mellanox® Passive Copper cable, IB HDR, up to 200Gb/s, QSFP28, PVC, 2.5m, white pultab, 26AWG
HDR	MCP7H50-H003R26	Mellanox® passive copper hybrid cable, IB HDR 200Gb/s to 2x100Gb/s, QSFP56 to 2xQSFP56, LSZH, colored, 3m, 26AWG
HDR	MCP7H50-H01AR30	Mellanox® passive copper hybrid cable, IB HDR 200Gb/s to 2x100Gb/s, QSFP56 to 2xQSFP56, LSZH, colored, 1.5m, 30AWG



HDR links raise with RS-FEC.

## 1.3 Tested Switches

### 1.3.1 Tested 10GbE Switches

**Table 15 - Tested 10GbE Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
10/40GbE	N/A	3064	48-port 10Gb/40Gb Switch	Cisco
10/40GbE	N/A	7050Q	16-port 40Gb Switch	Arista
10/40GbE	N/A	7050S	48-port 10Gb/40Gb Switch	Arista
10GbE	N/A	5548	Cisco 10GB ETH switch	Cisco
10GbE	N/A	G8264	BNT 10/40GB ETH switch	BNT
10GbE	N/A	QFX3500	Juniper 10/40GB ETH switch	Juniper
10GbE	N/A	S4810P-AC	48-port 10Gb/40Gb Switch	Force10
10GbE	SwitchX®	SX1016X-1BFR	64-Port 10GbE Switch System	Mellanox

### 1.3.2 Tested 40GbE Switches

**Table 16 - Tested 40GbE Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
10/40GbE	N/A	3064	48-port 10Gb/40Gb Switch	Cisco
10/40GbE	N/A	7050Q	16-port 40Gb Switch	Arista
10/40GbE	N/A	7050S	48-port 10Gb/40Gb Switch	Arista
40GbE	N/A	3132Q	Cisco 40GB ETH switch	Cisco
40GbE	N/A	7050QX	32-port 40Gb Switch	Arista
40GbE	N/A	G8316	BNT 40GB RackSwitch G8316	BNT
40GbE	N/A	S6000	32-port 40Gb Switch	Dell
40GbE	SwitchX®	SX1036B-1BFR	36-Port 40/56GbE Switch System	Mellanox

### 1.3.3 Tested 100GbE Switches

**Table 17 - Tested 100GbE Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
100GbE	N/A	7060CX	32-port 100Gb Switch	Arista
100GbE	N/A	93180YC-EX	48 x 10/25-Gbps fiber ports and 6 x 40/100-Gbps Quad Small Form-Factor Pluggable 28 (QSFP28) ports	Cisco
100GbE	N/A	C3232C	High-Density, 100 Gigabit Ethernet Switch	Cisco
100GbE	N/A	CE8860-4C-EI	24x10GE (SFP+) or 25GE (SFP28) and 2x100GE switch	Huawei



**Table 17 - Tested 100GbE Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
100GbE	Spectrum	SN2410-CB2F	48-port 25GbE + 8-port 100GbE Open Ethernet ToR Switch System	Mellanox
100GbE	Spectrum	SN2700-CS2R	32-port Non-blocking 100GbE Open Ethernet Spine Switch System	Mellanox
100GbE	Spectrum	SN2740-CB2F1	32-port Non-blocking 100GbE Open Ethernet Spine Switch System	Mellanox
100GbE	N/A	Wedge 100-32X R04	32-port 100GbE QSFP28 - Leaf/Spine Switch, power-to-port airflow, DC Power	Edgecore
100GbE	N/A	QFX5200-32C-32	32-port 100GbE Ethernet Switch System	Juniper
100GbE	N/A	S6820-56HF	48 SFP+ + 8 QSFP Ports 100GbE Switch Ethernet	H3C

### 1.3.4 Tested QDR Switches

**Table 18 - Tested QDR Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
QDR	N/A	12300	36-Port 40Gb QDR InfiniBand Switch, Management Module, Dual Power	QLogic
QDR	InfiniScale® IV	IS5025Q-1SFC	36-port 40Gb/s InfiniBand Switch Systems	Mellanox
QDR	InfiniScale® IV	Switch 4036	Grid Director™ 4036E	Mellanox

### 1.3.5 Tested FDR Switches

**Table 19 - Tested FDR Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
FDR	SwitchX®	SX6018F-1SFR	18-port 56Gb/s InfiniBand/VPI Switch Systems	Mellanox
FDR	SwitchX®	SX6036F-1BFR	36-port 56Gb/s InfiniBand/VPI Switch Systems	Mellanox
FDR	SwitchX®	SX6506	108-Port 56Gb/s InfiniBand Director Switch	Mellanox
FDR	SwitchX®-2	SX6710-FB2F2	36-port 56Gb/s InfiniBand/VPI Switch Systems	Mellanox

### 1.3.6 Tested EDR / 100Gb/s Switches

**Table 20 - Tested EDR Switches**

Speed	Switch Silicon	OPN # / Name	Description	Vendor
EDR	Switch-IB	MSB7790-EB2F	36-port EDR 100Gb/s InfiniBand Switch Systems	Mellanox
EDR	Switch-IB 2	MSB7800-ES2R	36-port Non-blocking Managed EDR 100Gb/s InfiniBand Smart Switch	Mellanox

## 1.4 Tools, Switch Firmware and Driver Software

The following are the drivers' software, tools, switch/HCA firmware versions tested that you can upgrade from or downgrade to when using firmware Rev 12.26.1040:

**Table 21 - Tools, Switch Firmware and Driver Software**

	Supported Version
MLNX_OFED	4.7-x.0.0.0 / 4.6-1.0.1.1
MLNX_EN (MLNX_OFED based code)	4.7-x.0.0.0 / 4.6-1.0.1.1
WinOF-2	2.30 / 2.20
MFT	4.13.0 / 4.12.0
MLNX-OS	3.8.2004
Onyx	3.8.2004
ConnectX-4 Firmware	12.25.1020 / 12.24.1000
SwitchX-IB™ Firmware	11.2000.2046
SwitchX-IB 2 Firmware	15.2000.2046
Linux Inbox Drivers	<ul style="list-style-type: none"> <li>• RH7.6</li> <li>• Ubuntu 16.04.05</li> </ul>
Windows Inbox Drivers	<ul style="list-style-type: none"> <li>• Windows 2012</li> <li>• Windows 2012 R2</li> <li>• Windows 2016</li> </ul>

## 1.5 Supported FlexBoot, UEFI



Please be aware that not all firmware binaries contain FlexBoot or UEFI, support may vary between cards (see [Section 1.1, “Supported Devices”, on page 7.](#))

Firmware Rev 12.26.1040 supports the following FlexBoot:

**Table 22 - Supported FlexBoot, UEFI**

Expansion ROM	Supported Version
FlexBoot	3.5.803
UEFI	14.19.14

## 1.6 Revision Compatibility

Firmware Rev 12.26.1040 complies with the following programmer’s reference manual:

- *Mellanox Adapters Programmer’s Reference Manual (PRM), Rev 0.47 or later*, which has Command Interface Revision 0x5. The command interface revision can be retrieved by means of the QUERY\_FW command and is indicated by the field `cmd_interface_rev`.

## 2 Changes and New Features in Rev 12.26.1040

**Table 23 - Changes and New Features in Rev 12.26.1040**

Feature/Change	Description
<b>Rev. 12.26.1040</b>	
<b>ICMD and Diagnostic Counters</b>	Enabled the firmware by using the ICMD commands to deal with diagnostic counters similar to cmdif. They can be called via the vsec space. The counters' values are returned only via the tracer. The ICMD Query Caps indicate support and expose the list of the supported counters.
<b>User Context Object (DEVX)</b>	This is a containerized sandbox per user, to access PRM command securely by using General Object commands, UMEM and UCTX contexts. The allowed functionalities of this capability depend on the user permissions. The following functionalities are still managed by the Kernel: <ul style="list-style-type: none"> <li>• Resource cleaning</li> <li>• UCTX stamping</li> <li>• Blocking the physical address and IRQ from these UCTX</li> </ul>
<b>DEVX Support for Asynchronous Events</b>	Added support for reporting the supported affiliated and unaffiliated asynchronous events to DEVX users through the command interface.
<b>Zero-Touch-RoCE Counters</b>	Zero-Touch-RoCE counters are now available to the user for debuggability purposes when using the Zero-Touch-RoCE feature.
<b>Security Hardening Enhancements</b>	This release contains important reliability improvements and security hardening enhancements. Mellanox recommends upgrading your device firmware to this release to improve the device firmware security and reliability.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>

### 3 Known Issues

The following table describes known issues in this firmware release and possible workarounds.

For a list of old firmware Know Issues, please see ConnectX-4 Firmware Archived Known Issues file ([http://www.mellanox.com/pdf/firmware/ConnectX4-Firmware\\_Archived\\_Known\\_Issues.pdf](http://www.mellanox.com/pdf/firmware/ConnectX4-Firmware_Archived_Known_Issues.pdf))

**Table 24 - Ethernet Rate Limit per VF in RoCE Mode Limitations**

Adapter Card	Dual Port Device				Single Port Device	
	w/o LAG (TOTAL_VFS>32)		With LAG (TOTAL_VFS<32)		w/o LAG	
	w/o QoS	Full QoS	w/o QoS	Full QoS	w/o QoS	Full QoS
ConnectX-4	127	45	32	20	127	100

**Table 25 - Ethernet Rate Limit per VF in InfiniBand Mode Limitations**

Adapter Card	Dual Port Device		Single Port Device	
	w/o LAG		w/o LAG	
	w/o QoS	Full QoS	w/o QoS	Full QoS
ConnectX-4	127	26	127	55

**Table 26 - Known Issues (Sheet 1 of 4)**

Internal Ref.	Issue
1840289	<b>Description:</b> Since Packet Pacing enforce max_tc value is “1”, features that require multiple TCs will not be active when this mode is available.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> Packet Pacing
	<b>Discovered in Version:</b> 12.26.1040
1796628	<b>Description:</b> Due to performance considerations, unicast loopback traffic will go through the NIC SX tables, and multicast loopback traffic will skip the NIC SX tables.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> Performance, unicast loopback traffic, multicast loopback traffic
	<b>Discovered in Version:</b> 12.26.1040
1754253	<b>Description:</b> Firmware downgrade followed by mlxfwreset/mstfwreset action may cause sideband management connection issues.
	<b>Workaround:</b> Reset the BMC
	<b>Keywords:</b> mlxfwreset/mstfwreset
	<b>Discovered in Version:</b> 12.25.
1699214	<b>Description:</b> NODNIC VF is partially tested. It is fully tested only in ConnectX-5 adapter cards.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> NODNIC VF
	<b>Discovered in Version:</b> 12.25.1020

**Table 26 - Known Issues (Sheet 2 of 4)**

Internal Ref.	Issue
1689186	<b>Description:</b> Changing priority to TC map during traffic might cause packet drops.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> QoS
	<b>Discovered in Version:</b> 12.25.1020
1604699	<b>Description:</b> Ethernet RFC 2819 counter ether_stats_oversize_pkts and Ethernet IEEE 802.3 counter a_frame_too_long_errors share the same resource. Clearing each of them will affect the other.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> Counters
	<b>Discovered in Version:</b> 12.25.1020
-	<b>Description:</b> In Ethernet mode, at 10/40GbE speeds, only NO-FEC in Force mode is supported. Other user configurations are overridden.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> Ethernet, 10GbE, 40GbE, RS-FEC
	<b>Discovered in Version:</b> 12.25.1020
1498399	<b>Description:</b> If the XRC switches between SRQ/RMPs while there is an outstanding ODP on the responder XRC QP, a CQE with an error might be generated (that is not a PFAULT abort).
	<b>Workaround:</b> N/A
	<b>Keywords:</b> XRC SRQ/RMP ODP
	<b>Discovered in Version:</b> 12.25.1020
1546401	<b>Description:</b> vport_tc and para_vport_tc are not supported in this version.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> SR-IOV vport_tc and para_vport_tc
	<b>Discovered in Version:</b> 12.24.1000
1546492	<b>Description:</b> Executing the update_lid command while the IB port sniffer utility is active can stop the utility.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> IB Sniffer
	<b>Discovered in Version:</b> 12.24.1000
1537898	<b>Description:</b> Initializing a function while the IB port sniffer utility is active can stop the utility.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> IB Sniffer
	<b>Discovered in Version:</b> 12.24.1000
1332714	<b>Description:</b> The maximum "read" size of MTRC_STDB is limited to 272 Bytes.
	<b>Workaround:</b> Set the MTRC_STDB.read_size to the maximum value of 0x110=272 Bytes
	<b>Keywords:</b> Access register, MTRC_STDB, tracer to dmesg, fwtrace to dmesg
	<b>Discovered in Version:</b> 12.23.1020
1408994	<b>Description:</b> FTE with both forward (FWD) and encapsulation (ENCAP) actions is not supported in the SX NIC Flow Table.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> SX NIC Flow Table
	<b>Discovered in Version:</b> 12.23.1020

**Table 26 - Known Issues (Sheet 3 of 4)**

Internal Ref.	Issue																																			
1350794	<p><b>Description:</b> Encapsulation / Decapsulation support in steering has the following limitations:</p> <ul style="list-style-type: none"> <li>Encapsulation / Decapsulation can be open on the FDB only if all VFs are non active.</li> <li>Encapsulation / Decapsulation supports single mode only: FDB / NIC. Opening tables of both types is not supported.</li> <li>Encapsulation / Decapsulation per device support:</li> </ul> <table border="1" data-bbox="517 436 979 625"> <thead> <tr> <th></th> <th></th> <th>NIC</th> <th>FDB</th> <th></th> </tr> </thead> <tbody> <tr> <td>ConnectX-4</td> <td>encap</td> <td>NO</td> <td>YES</td> <td>non MH</td> </tr> <tr> <td></td> <td>decap</td> <td>NO</td> <td>NO</td> <td></td> </tr> <tr> <td>ConnectX-4 Lx</td> <td>encap</td> <td>NO</td> <td>YES</td> <td>non MH</td> </tr> <tr> <td></td> <td>decap</td> <td>NO</td> <td>YES</td> <td></td> </tr> <tr> <td>ConnectX-5</td> <td>encap</td> <td>YES</td> <td>YES</td> <td></td> </tr> <tr> <td></td> <td>decap</td> <td>YES</td> <td>YES</td> <td></td> </tr> </tbody> </table> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> Steering Encapsulation / Decapsulation</p> <p><b>Discovered in Version:</b> 12.23.1020</p>			NIC	FDB		ConnectX-4	encap	NO	YES	non MH		decap	NO	NO		ConnectX-4 Lx	encap	NO	YES	non MH		decap	NO	YES		ConnectX-5	encap	YES	YES			decap	YES	YES	
		NIC	FDB																																	
ConnectX-4	encap	NO	YES	non MH																																
	decap	NO	NO																																	
ConnectX-4 Lx	encap	NO	YES	non MH																																
	decap	NO	YES																																	
ConnectX-5	encap	YES	YES																																	
	decap	YES	YES																																	
1027553	<p><b>Description:</b> While using e-switch vport sVLAN stripping, the RX steering values on the sVLAN might not be accurate.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> e-sw vport sVLAN stripping, RX steering</p> <p><b>Discovered in Version:</b> 12.24.1000</p>																																			
1799917	<p><b>Description:</b> Untagged CVLAN packets in the Steering Flow Tables do not match the sVLAN tagged packets.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> Steering Flow Tables, CVLAN/sVLAN packets</p> <p><b>Discovered in Version:</b> 12.23.1020</p>																																			
1355883	<p><b>Description:</b> Running the QUERY_VPORT_COUNTER command with clear bit results in discard counters being reset.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> Discard counters</p> <p><b>Discovered in Version:</b> 12.22.1002</p>																																			
1277762	<p><b>Description:</b> An Ethernet multicast loopback packet is not counted (even if it is not a local loopback packet) when running the nic_receive_steering_discard command.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> Ethernet multicast loopback packet</p> <p><b>Discovered in Version:</b> 12.22.1002</p>																																			
1114610	<p><b>Description:</b> During DC CNAK stress tests, DC CNAK timeout (CNAK drops) might occur.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> DC CNAK</p> <p><b>Discovered in Version:</b> 12.22.1002</p>																																			
1047184	<p><b>Description:</b> RDMA resq_local_length_error and resp_remote_invalid_request counters do not function properly.</p> <p><b>Workaround:</b> N/A</p> <p><b>Keywords:</b> RDMA counters</p> <p><b>Discovered in Version:</b> 12.21.1000</p>																																			

**Table 26 - Known Issues (Sheet 4 of 4)**

Internal Ref.	Issue
1168594	<b>Description:</b> RoCE Dual Port Mode (a.k.a Multi-Port vHCA: MPV) is not supported in Multi-Host setups.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> Multi-Port vHCA, Multi-Host
	<b>Discovered in Version:</b> 12.21.1000
1072337	<b>Description:</b> If a packet is modified in e-sw flow steering, the SX sniffer Flow Table (of the VF) will see the sniffed packet after the modification.
	<b>Workaround:</b> N/A
	<b>Keywords:</b> SX sniffer Flow Table
	<b>Discovered in Version:</b> 12.21.1000



## 4 Bug Fixes History

Table 27 lists the bugs fixed in this release. For a list of old firmware Bug Fixes, please see ConnectX-4 Firmware Archived Bug Fixes file

([http://www.mellanox.com/pdf/firmware/ConnectX4-Firmware\\_Archived\\_Bug\\_Fixes.pdf](http://www.mellanox.com/pdf/firmware/ConnectX4-Firmware_Archived_Bug_Fixes.pdf))

**Table 27 - Bug Fixes History (Sheet 1 of 3)**

Internal Ref.	Issue
1778343	<b>Description:</b> Fixed an issue that caused IPoIB not to function when there were DC CNAK QPs active.
	<b>Keywords:</b> IPoIB
	<b>Discovered in Version:</b> 12.25.
	<b>Fixed in Release:</b> 12.26.1040
1803791	<b>Description:</b> On rare occasions, when firmware coalesce Host stuck events occur, a async event might be delayed to be reported, and not be triggered until the next time the PCIe hangs on one of the hosts.
	<b>Keywords:</b> PCIe Error Notification
	<b>Discovered in Version:</b> 12.25.
	<b>Fixed in Release:</b> 12.26.1040
1824111	<b>Description:</b> Renamed the GMP Mellanox Vendor Specific External Capability mask enum from <code>IsDiagnosticCountersSupported</code> to <code>IsDiagnosticDataSupported</code> .
	<b>Keywords:</b> GMP Mellanox Vendor Specific External Capability mask DiagnosticData
	<b>Discovered in Version:</b> 12.25.
	<b>Fixed in Release:</b> 12.26.1040
1822787	<b>Description:</b> Fixed an issue that caused a function to misbehave when a PCIe TLP was set with a poisoned indication.
	<b>Keywords:</b> PCIe TLP
	<b>Discovered in Version:</b> 12.25.1020
	<b>Fixed in Release:</b> 12.26.1040
1771921	<b>Description:</b> Fixed an issue that prevented users with non-port owner privilege from using the “read DCBX access registry key” <code>REGID_DCBX_APP/REGID_DCBX_PARAM</code> .
	<b>Keywords:</b> DCBX
	<b>Discovered in Version:</b> 12.24.1000
	<b>Fixed in Release:</b> 12..25.1020
1615586	<b>Description:</b> Fixed a rare issue that caused the QP to falsely transition into the error state as a result of handling duplicate read/atomic request followed by memory key invalidation.
	<b>Keywords:</b> CQE
	<b>Discovered in Version:</b> 12.24.1000
	<b>Fixed in Release:</b> 12.25.1020
1678824	<b>Description:</b> Fixed an issue that prevented the user to enable the port after disabling it in the VF NODNIC.
	<b>Keywords:</b> VF NODNIC
	<b>Discovered in Version:</b> 12.24.1000
	<b>Fixed in Release:</b> 12.25.1020
1606289	<b>Description:</b> Enlarged the number of modify fields to 16 to avoid IPv6 header rewrite failure.
	<b>Keywords:</b> IPv6 header rewrite
	<b>Discovered in Version:</b> 12.24.1000
	<b>Fixed in Release:</b> 12.25.1020

**Table 27 - Bug Fixes History (Sheet 2 of 3)**

Internal Ref.	Issue
1627973	<b>Description:</b> Fixed an issue that prevented IB QP counters for Acks/Responses from working as a results the NACK/OOS counters showed as zero.
	<b>Keywords:</b> IB QP counters for Acks/Responses
	<b>Discovered in Version:</b> 12.24.1000
	<b>Fixed in Release:</b> 12.25.1020
1501744	<b>Description:</b> Fixed a false signature error reported by the firmware during retransmissions.
	<b>Keywords:</b> False signature error
	<b>Discovered in Version:</b> 12.18.1000
	<b>Fixed in Release:</b> 12.24.1000
1547318	<b>Description:</b> Fixed an issue that prevented the system from counting multicast/broadcast traffic on the ETH unicast vport counter when the driver did not specify the MAC address in the FTE match criteria of the Flow Table Entry in the eswitch's FDB table.
	<b>Keywords:</b> Multicast/broadcast traffic
	<b>Discovered in Version:</b> 12.23.1020
	<b>Fixed in Release:</b> 12.24.1000
1284452/ 1282926	<b>Description:</b> Fixed an issue that caused the mlxconfig tool to present all possible expansion ROM images, instead of presenting only the existing images.
	<b>Keywords:</b> mlxconfig
	<b>Discovered in Version:</b> 12.22.1002
	<b>Fixed in Release:</b> 12.24.1000
1424873	<b>Description:</b> Modifying VMQoS rate limiter parameters during traffic might cause transmission failure.
	<b>Keywords:</b> VMQoS, rate limiter
	<b>Discovered in Version:</b> 12.22.1002
	<b>Fixed in Release:</b> 12..24.1000
1475993	<b>Description:</b> Aligned the default tuning type in PHY TEST MODE to the device protocol.
	<b>Keywords:</b> PHY
	<b>Discovered in Version:</b> 12.23.1020
	<b>Fixed in Release:</b> 12..24.1000
1403211	<b>Description:</b> When a device is operating in Safe Mode state, and the user issues the mlxfwreset command, the device might fail to come-up correctly after the reset. <b>Note:</b> Do not run mlxfwreset when operating in a Safe Mode state.
	<b>Keywords:</b> mlxfwreset
	<b>Discovered in Version:</b> 12.23.1020
	<b>Fixed in Release:</b> 12..24.1000
1431772	<b>Description:</b> Fixed an issue that caused the max_qp_retry_freq_exceeded counter (including a CQE with error syndrome 0x97, and the QP moving to error state) to be activated only after exceeding the NIC Vport context max_qp_retry_limit, and not when reaching it.
	<b>Keywords:</b> max_qp_retry_freq_exceeded
	<b>Discovered in Version:</b> 12.22.1002
	<b>Fixed in Release:</b> 12.24.1000

**Table 27 - Bug Fixes History (Sheet 3 of 3)**

Internal Ref.	Issue
1295606	<p><b>Description:</b> Fixed an issue related to PCIe "Surprise link down" event reporting capability.</p> <p><b>Keywords:</b> PCIe</p> <p><b>Discovered in Version:</b> 12.22.1002</p> <p><b>Fixed in Release:</b> 12.24.1000</p>
1434863	<p><b>Description:</b> Fixed an issue that resulted in the link partner experiencing false active linkup when plugging in a base-T cable to a closed port.</p> <p><b>Keywords:</b> Interfaces</p> <p><b>Discovered in Version:</b> 12.22.1002</p> <p><b>Fixed in Release:</b> 12.24.1000</p>
1424873	<p><b>Description:</b> Modifying VMQoS rate limiter parameters during traffic might cause transmission failure.</p> <p><b>Keywords:</b> VMQoS, rate limiter</p> <p><b>Discovered in Version:</b> 12.22.1002</p> <p><b>Fixed in Release:</b> 12.24.1000</p>

## 5 Firmware Changes and New Feature History

**Table 28 - Firmware Changes and New Feature History (Sheet 1 of 12)**

Feature/Change	Description
<b>Rev. 12.25.1020</b>	
<b>VSC Security</b>	VSC security includes the mechanisms which will prevent a reasonable host from affecting other hosts from using VSC.
<b>ODP support for SRQ &amp; XRC</b>	Added support for send opcode operations targeting a SRQ/RMP with the receive WQEs using ODP memory. In case the receive WQE receives an ODP, the device will generate ODP notifications (EQE) and PFAULT will abort CQEs. <b>Note:</b> It is recommended to prefetch the memory used by the receive WQEs to reduce ODP occurrence as these have significant latencies and will cause a performance degradation.
<b>Auto-Sensing when using 25/10GbE Optical Modules</b>	This new capability accelerates the network to auto-sense the port speed and use it when using a 25/10GbE optical module. Meaning, if the used module is 25GbE but the port is a 10GbE port, the speed used for that network will be 10GbE.
<b>Package ID</b>	Enabled Package ID configuration using server strap according OCP 3.0.
<b>DPDK UIO</b>	This capability provides a solution for improving user space drivers development, generic user space IO device services.
<b>mlxconfig</b>	Renamed the BOOT_RETRY_CNT1 parameter to BOOT_RETRY_CNT.
<b>Reduced Firmware Upgrade Time</b>	Reduced firmware upgrade time using mlxfwreset tool to ~3 seconds. Using this capability requires enabling PARTIAL_RESET_EN in mlxconfig and using MFT version 4.12.0 and up. The “PARTIAL” refers to not resetting the port modules (which is not mandatory for firmware upgrades). <b>Note:</b> Currently this capability only supports firmware upgrade and downgrades to firmware versions newer than XX.25.1020.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.24.1000</b>	
<b>Layer 3 Encapsulation</b>	Added support for an additional layer (Layer 3) of packet processing at the hypervisor level that enables adding and removing protocol headers (e.g., the MAC address is removed during encapsulation, and added during decapsulation) for the encapsulated traffic.
<b>e-switch Steering Rule</b>	Enabled e-switch steering rule in the NIC without matching it with the Directional MACs (DMAC) protocol. Now the rule is only according to the MC/UC bit.
<b>IB Sniffer Tool</b>	The IB Sniffer utility provides the user the ability to capture the e-switch traffic directly to a hypervisor queue.
<b>Transmission Histogram Counters</b>	Added support for the transmission histogram counter set as part of the Ethernet extended group counters.
<b>Events Generation by the Hardware upon Counter Incrementation</b>	Enabled the hardware to generate an event upon counter incrementation, in order to reduce an overhead from the software from reading rarely updated counters such as error counters.
<b>NODNIC Connectivity</b>	Enables NOIDNIC connectivity to the network through the e-switch and not directly to the physical port.
<b>QP and Mkey Values</b>	Enabled setting the QP and the Mkey values by the software upon these resources creation.

**Table 28 - Firmware Changes and New Feature History (Sheet 2 of 12)**

Feature/Change	Description
<b>PCIe Atomic</b>	Enabled advanced PCIe atomic operations. The HCA will perform PCIe atomic operations as a requestor towards the host memory when receiving compatible atomic messages from the network, and according to the configuration of NV_SW_OFFLOAD_CONFIG pci_atomic_mode field and the PCI AtomicOp Requester Enable bit in the Device Control 2 register.
<b>TIR Destination from the FDB</b>	Enabled a single TIR destination from the FDB.
<b>WRED</b>	Changed the WRED default mode to OFF for Multi-Host adapter cards.
<b>TX Steering Rule on in WQE Ethernet Segment</b>	Added support for TX steering rule on flow_table_metadata in WQE Ethernet segment.
<b>L3 Encapsulation/Decapsulation in the Reformat Context Allocation</b>	Added L3 encapsulation/decapsulation support in the reformat context allocation. <ul style="list-style-type: none"> <li>L3 encapsulation removes L2 headers and adds generic L3 tunnel encapsulation.</li> <li>L3 decapsulation removes the generic L3 tunnel decapsulation and L2 header.</li> </ul>
<b>Flow Steering Header Modification</b>	Added support for flow steering header modification (header rewrite) for IPv4 TTL header for loopback traffic (VF-VF/VF-PF). <b>Note:</b> TTL modification for traffic from the network is currently not supported.
<b>Teardown: Fast Mode</b>	<b>[Developers only]</b> Moved the fast teardown HCA cap bit to offset 0x1c.4:1.
<b>Virtual Functions/QoS</b>	Enabled Virtual Functions to read QPDPM/QPDP/QPTS.
<b>Message vs. Payload based flow control QP Configuration</b>	Added support for requester QP packet based on E2E credits mode. The new flow control supports HCA-to-switch RDMA traffic packet-based End-2-End.
<b>Multi PCI RDMA IB</b>	This capability enables the user to expose two PCI/IB devices per network port.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Steering</b>	Enabled a single TIR destination from the FDB.
<b>Rev. 12.23.1020</b>	
<b>Virtual Functions (VF)</b>	Increased the number of VFs that can work with full VMQoS (8 TC) per PFs as follow: <ul style="list-style-type: none"> <li>in dual port devices to: 0-21, 33-45 VFs (22-32 VFs has single TC)</li> <li>in single port devices to: 0-64 VFs</li> </ul>
<b>InfiniBand</b>	Added support for IPoIB non-default Partition Keys (PKeys). Now the PKey values can be modified in the PKey table without the need of recreating the IPoIB (underlay) QPs.
<b>SR-IOV in Multi-Host/Socket-Direct</b>	<b>[Beta]</b> Added support for SR-IOV (up to 63 VFs) in Multi-Host/Socket-Direct.
<b>Virtualization</b>	Reduced firmware’s memory consumption to increase the supported number of VFs per PF to up to 100.
<b>Tools/Driver Version</b>	Added support for QUERY_DRIVER_VERSION command. This command allows the PF driver to query its VFs driver version which was set by the SET_DRIVER_VERSION command.
<b>Resiliency</b>	Shutting Down RDMA QPs with Excessive Retransmissions is a mechanism used to detect excessive retransmissions for an RC connection, and to close the connection in response to it. If the number of retransmissions due to a Local Ack Timeout, NAK-Sequence Error, or Implied NAK, during a specified period, exceeds the specified threshold, the QP will be handled as if the IB spec defined Retry Count was exceeded.
<b>Diagnostic Counters</b>	Added new diagnostic counters to evaluate the number of ICMC hits and misses for particular resources.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.22.1002</b>	

**Table 28 - Firmware Changes and New Feature History (Sheet 3 of 12)**

Feature/Change	Description
<b>Disable SL/diff Flow</b>	Added support for disable SL/diff flow to avoid performance degradation for single queue using multiple priorities. This functionality should not be used when DCB (PFC, ETS) is enabled.
<b>Software Reset Flow</b>	Software Reset Flow enables the device to recover from fatal errors. The flow includes software detection of a fatal error, automatic creations of an mstdump file for future debug by the software, and resetting of the device. The feature is enabled using an mlxconfig command.  <b>Note:</b> The flow is currently not supported on Multi host devices, Socket Direct devices and devices running management traffic (NCSI, MCTP).
<b>Steering Discard Packet Counters</b>	Any received packet which is dropped by the device is accounted for. To enable this functionality, the following counters were added to count the discard packets (per vport): <ul style="list-style-type: none"> <li>• <code>nic_receive_steering_discard</code>: Number of packets that completed the NIC Receive Flow Table steering, and were discarded because they did not match any flow in the final Flow Table.</li> <li>• <code>receive_discard_vport_down</code>: Number of packets that were steered to a VPort, and discarded because the VPort was not in a state to receive packets.</li> <li>• <code>transmit_discard_vport_down</code>: Number of packets that were transmitted by a vNIC, and discarded because the VPort was not in a state to transmit packets.</li> </ul>
<b>Virtual Functions (VF)</b>	Increased the number of VFs that can work with full VMQoS (8 TC) per PFs as follow: <ul style="list-style-type: none"> <li>• in dual port devices to 20 VFs</li> <li>• in single port devices to 58 VFs</li> </ul>
<b>Pause Frame Duration and XOFF Resend Time</b>	Increased the Pause Frame Duration and the XOFF Resend Time to the maximum value defined by the specification.
<b>PCI Relax Ordering</b>	mlxconfig configuration can now enable or disable forced PCI relaxed ordering in <code>mkey_context</code> . If this feature is enabled, the software per mkey configuration is ignored.
<b>vport Mirroring</b>	Packets are mirrored based on certain mirroring policy. The policy is set using the "set FTE command" that supports forward action in the ACL tables (ingress/egress). The firmware support the following destination list format: <ol style="list-style-type: none"> <li>1. new destination vport (analyzer)</li> <li>2. another Flow Table</li> </ol> this way, the driver can forward the SX/RX packet related to the vport once it reaches the ACL table (forward it to the analyzer vport).
<b>Resiliency: Special Error Event</b>	Firmware uses error events to monitor the health of core transport engines, both Rx and Tx, and to detect if a system hang occurred and was not cured by other error mechanisms. Upon such detection, events are sent to the driver to perform any required action (e.g., software reset).
<b>10GBaseT module</b>	Added support for 10GBaseT modules connected to a QSFP cage. <b>Note:</b> This connectivity supported was only tested with eNet's E10GSFPT-ENC 10GBase-T SFP+ device, and 10Gtek's ASF-10G-T when using firmware v12.22.1002
<b>QP's Creation Time</b>	Accelerated QP's creation time.
<b>SR-IOV LID based Routing Mode</b>	SR-IOV default routing mode is now LID based. The configuration change is available via mlxconfig tool. Note that in such mode, the VF will get its own LID, hence the GRH is not required.  <b>Note:</b> LID based routing support for vports is supported using SM v4.8.1

**Table 28 - Firmware Changes and New Feature History (Sheet 4 of 12)**

Feature/Change	Description
<b>Expansion ROM</b>	Added PXE and UEFI to additional ConnectX-4 adapter cards. ConnectX-4 now holds PXE, x86-UEFI and Arm-UEFI
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.21.2010</b>	
<b>Query vPort Environments (Debug Counters)</b>	Debug counters are a group of counters that handle traffic performance issue related to firmware overhead in transport flow. The following are the additional counters added to this firmware version: <ul style="list-style-type: none"> <li>• current_q_under_processor_handle</li> <li>• total_q_under_processor_handle</li> <li>• qp_priority_update_flow</li> </ul>
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.21.1000</b>	
<b>Single PF for InfiniBand Dual Port Device</b>	Added support for InfiniBand native (No SR-IOV) dual port device (Function per port is disabled). In this mode virtualization is not supported and ISSI = 0.
<b>PTP Packets Time Stamping</b>	Enables PTP packets time stamping upon packet’s arrival to the port.
<b>Explicit Congestion Notification (ECN)</b>	Enabled ECN by default.
<b>10G/40G Support on 100GbE AOC/ transceivers</b>	Added support for 10G/40G on 100GbE AOC/transceivers vs. non Mellanox devices
<b>DC Connection Negative-Acknowledgment (CNAK) Enhancement</b>	DC CNAK improves sent CNAK performance and avoids back pressure in ConnectX-4 adapter cards.
<b>Receiver Signal Integrity Improvements</b>	Raised the network link only with phase greater than 15 ticks to improve signal integrity.
	Extended measurement test between 2 similar RX configurations.
	Moved the data path to use the second input buffer to improve signal integrity.
<b>RoCE Dual Port Mode (a.k.a Multi-Port vHCA: MPV)</b>	Enables the usage of a dual port Virtual HCA (vHCA) to share RDMA resources (e.g., MR, CQ, SRQ, PDs) across the two Ethernet (RoCE) NIC network ports and display the NIC as a dual port device. For this feature to function properly, the following requirements must be met: <ul style="list-style-type: none"> <li>• Either the LAG or the Dual Port mode is enabled by the driver</li> <li>• Dual port device: both ports must be set as ETH</li> <li>• In ConnectX-4/ConnectX-4 Lx adapter cards, the maximum allowed number of VFs per PF is 32.</li> <li>• Function per port is enabled</li> </ul> <b>Note:</b> This feature is only supported in single host device
<b>DSCP</b>	Added QPDP register to support dynamic mapping between DSCP and priority.
	Added trust level for QoS prioritization according to the DSCP or PCP.
	Added ingress buffer management for: <ul style="list-style-type: none"> <li>• ingress traffic mapping to a buffer according to priority</li> <li>• buffers sizes and lossless parameters</li> </ul>
<b>Steering Rules Rate Improvement</b>	Improved steering rules update rate to up to 50K rules per sec.
<b>Windows SR-IOV Enhanced eIPoIB</b>	Enabled Windows SR-IOV Enhanced eIPoIB (without Secure Connection) for Windows-over-Windows setups.
<b>Driver CR Dump</b>	crdump operation takes a snapshot of the device’s crspace dword-by-dword. It enables the driver to collect debug information upon firmware failure.

**Table 28 - Firmware Changes and New Feature History (Sheet 5 of 12)**

Feature/Change	Description
<b>Secured Firmware Update</b>	Secure Firmware Updates provides devices with the ability to verify digital signatures of new firmware binaries, in order to ensure that only officially approved versions are installed on the devices. <b>Note:</b> This feature is only available in adapter cards that support this feature.
<b>Cables</b>	Changed the default FEC mode for cables with attenuation 16 and below from RS to FC.
<b>ECN</b>	Enabled ECN (CongestionControl) by default for all priorities on Ethernet ports.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.20.1010</b>	
<b>DSCP</b>	Added trust level for QoS prioritization according to the DSCP or PCP. <b>[Beta]</b> Added ingress buffer management for: <ul style="list-style-type: none"> <li>• ingress traffic mapping to a buffer according to priority</li> <li>• buffers sizes and lossless parameters</li> </ul>
<b>Secured Firmware Updates</b>	<b>[Beta]</b> Secure Firmware Updates provides devices with the ability to verify digital signatures of new firmware binaries, in order to ensure that only officially approved versions are installed on the devices. <b>Note:</b> This feature is only available in adapter cards that support this feature.
<b>Multi-Host/Socket Direct Routing to be LID based</b>	<b>[InfiniBand only]</b> Changed the Multi-Host/Socket Direct routing to be LID based instead of GID based. Thus, GRH/GID index is not required. <b>Note:</b> This feature requires SM 4.8.1 and above.
<b>Relaxed Ordering</b>	<b>[Beta]</b> Added support for relaxed ordering write in memory keys.
<b>RDMA Counters</b>	Enhanced RDMA counter
<b>TLV for PCI class code</b>	Added 2 new per Host TLVs (see <a href="#">Table 30, “Supported Non-Volatile Configurations,” on page 42</a> )
<b>Fast Teardown</b>	Enables fast unloading driver by using Teardown HCA with op_mode=1 (force_close). For further information, refer to the PRM.
<b>IPoIB Virtualization</b>	Added support for enhanced IPoIB (QP.ulp == 2) in virtualized system (SR-IOV / Multi-Host / Socket Direct)
<b>SFP Power Flow Improvement (level 2,1)</b>	Added support for SFP power class.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.18.2000</b>	
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.18.1000</b>	
<b>RX Loss (BaseT link down indication)</b>	Added logical link indication in SFP to BaseT modules and disabled logical link when peer port is down.
<b>SFP Rate</b>	Added support for 10GbE in 25GbE SFP optical modules
<b>PDDR</b>	Enables mlxlink tool to collect data on the PHY link status and provides link down reasons and additional link related information.
<b>KR Tx Response</b>	Enabled TX configuration response and movement during Link Training in Ethernet.



**Table 28 - Firmware Changes and New Feature History (Sheet 6 of 12)**

Feature/Change	Description
<b>Phy Test mode</b>	Added support at lane rate of 12.89Gb.
<b>Head of Queue (HoQ) per TC</b>	Limits the amount of time a packet may head a Traffic Class (TC) transmission queue, without being transmitted. Stale packets are discarded. Active by default for TCs adhering to link level flow control
<b>User Access Region (UAR) 4KB Granularity Allocation</b>	UAR page size currently is set to 4KB and not according to what the system page size determines.
<b>No Driver NIC (NODNIC) Performance Improvement</b>	Improved performance of: <ul style="list-style-type: none"> <li>• Doorbell from User Access Region (UAR)</li> <li>• Clear interrupt from User Access Region (UAR)</li> </ul>
<b>Counters</b>	Added support for additional transport counters.
<b>On Demand Paging (ODP) DC</b>	Added ODP support for DC.
<b>Scatter to CQE on Sender for DC</b>	Enabled scatter-to-CQE for sent packets for DC.
<b>CQ modify</b>	Enabled moderation period modification in CQ modify command.
<b>VMQ: Rate limit per Function</b>	<b>[Beta]</b> Added support for minimum/maximum rate limit per vport in SR-IOV.
<b>Network traffic between UEFI-Shell and OS</b>	Enabled network traffic between UEFI-Shell and OS.
<b>non-RDMA capable VFs</b>	Enabled the PF to force disable RoCE for its VFs.
<b>PRM: Access Registers</b>	Added 2 new access registers: <ul style="list-style-type: none"> <li>• Management Capabilities Mask Register</li> <li>• Ports Capabilities Mask Register Fields</li> </ul> For further information, please refer to the PRM.
<b>Loopback Enabled/Disabled</b>	Enabled VNIC the control to enable/disable its local loopback traffic.
<b>RDMA RX Flow Table</b>	Added the option to open a receive RDMA Flow Table and to forward RoCE traffic to some destination QP.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.17.2020</b>	
<b>GENEVE &amp; IP-in-IP Stateless Offload</b>	<b>[Beta]</b> Added support for IP-in-IP and GENEVE network protocols encapsulated into IP frame (L2 tunneling). Encapsulation is suggested as a means to alter the normal IP routing for datagrams, by delivering them to an intermediate destination that would otherwise not be selected based on the (network part of the) IP Destination Address field in the original IP header. <b>Note:</b> For driver support, please see the Release Notes/User Manual of the relevant OS driver.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.17.1010</b>	
<b>Multi-Host LID Base Routing</b>	Added support for Multi-Host LID base routing. This feature requires a new OpenSM (v4.7.1 and above which comes with MLNX_OFED 3.3-2.0.0.0) with the following attributes: <ul style="list-style-type: none"> <li>• qos TRUE</li> <li>• lmc 2 (if there is no quad host in the fabric, you can set the lmc to 1)</li> <li>• virt_enabled 2</li> </ul> <b>Note:</b> Multi-Host LID base routing can be configured by the INI only. The default is 0

**Table 28 - Firmware Changes and New Feature History (Sheet 7 of 12)**

Feature/Change	Description
<b>Resilient RoCE</b>	Resilient RoCE is the ability to send RoCE traffic over a lossy network (a network without flow control enabled), without the need to enable flow control on the network. The ability is accomplished by enabling ECN on both the Switch and the Host.
<b>Multi-Host L3/L4 Classification</b>	Enables load balancing in the Multi PF Switch layer (MPFS) based on the L3/L4 headers
<b>InfiniBand Multi-Host Isolation</b>	Enabled isolation between separate Hosts using the same HCA. All the Hosts can be rebooted, the driver can be stopped and the FLR signal can be sent independently.
<b>Virtual Functions (VF) per Port</b>	Increased the number of VFs from 64 to 95 per Physical Function (PF). <b>Note:</b> When increasing the number of VFs, the following limitations must be taken into consideration: <code>server_total_bar_size &gt;= (num_pfs)*(2log_pf_uar_bar_size + 2log_vf_uar_bar_size*total_vfs)</code> <code>server_total_msix &gt;= (num_pfs)*(num_pf_msix + num_vfs_msix *total_vfs)</code> <b>Note:</b> For the maximum number of VFs supported by your driver, please refer to your drivers' Release Notes or User Manual.
<b>QoS per VFs</b>	<b>[InfiniBand Only]</b> Added support for multiple VLs in SR-IOV/mutlihost environments. <b>Note:</b> The number of VLs can be configured by the NVCONFIG. The default VL number is 4 VLs.
<b>InfiniBand Rate Limit per QP (static rate)</b>	Added support for QP Rate Limit in InfiniBand.
<b>HCA Port Flap Counter</b>	Added support for Port Flap Counter.
<b>Fixed Buffer Size (KSM)</b>	Limits the buffer size for all entries to improve performance. KSM is used when associating Key Length My Virtual Address (KLMs) with fixed memory size.
<b>NULL Mkey</b>	This entry (null_mkey) is use to indicate non-present KLM/KSM entries. When accessing is, it causes the device to generate page fault event.
<b>Out-of-Band Online Firmware Update: Firmware Update over PLDM</b>	PLDM firmware burning is based on the DMTF spec DSP0267 (draft 9). The feature enables upgrading firmware and expansion ROM images using the PLDM protocol over MCTP (over PCIe). By doing so, a supporting BMC can query and upgrade the firmware without using OS based tools.
<b>New Group in Ports Performance Counters (PPCNT)</b>	Added a new physical layer statistics counters group. The new group includes BER counters, FEC error correction, clear time, and additional physical layer counters. For further information, please refer to the <a href="#">Ethernet Adapters Programming Manual (PRM)</a> .
<b>Permanent Link Up Mode</b>	Enables the user to set a certain link up state for an unlimited period of time. This mode has 3 states: <ul style="list-style-type: none"> <li>Aux power (standby)</li> <li>Reboot/boot/driver unloaded - the server is active and no driver is up</li> <li>Driver is up - at least one driver is up (the time between init HCA and teardown or FLR)</li> </ul>
<b>No Driver NIC (NODNIC) Performance Improvement</b>	Added support for Doorbell from User Access Region (UAR).
<b>SR-IOV: Rate Limit Per Function</b>	<b>[Beta]</b> Added support for maximum rate limit per function in SR-IOV.
<b>Firmware Resiliency: Suppress Pauses</b>	Allows the user to configure the adapter card to stop sending pauses after x when the receive port is unavailable (in a hang state).
<b>Performance Back-pressure Counters</b>	<b>[Beta]</b> Added support for new performance counters.

**Table 28 - Firmware Changes and New Feature History (Sheet 8 of 12)**

Feature/Change	Description
<b>Data Center Bridging Exchange (DCBX)</b>	DCBX is used by DCB devices to exchange configuration information with directly connected peers. DCBX uses Link Layer Discovery Protocol (LLDP) to exchange parameters between two link peers. For further information, please refer to the PRM.
<b>Access Register: Default Values Revert</b>	Allows network port registers to revert to their default values when the driver is restarted or the host is rebooted.
<b>Link up Modes</b>	Added additional network link up modes. The new modes decide when to keep the network link up. The new modes are: <ul style="list-style-type: none"> <li>• keep_eth_link_up</li> <li>• keep_ib_link_up</li> <li>• keep_link_up_on_boot</li> <li>• keep_link_up_on_standby</li> </ul>
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.16.1020</b>	
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.16.1006</b>	
<b>Explicit Congestion Notification (ECN)</b>	<b>[Beta]</b> Explicit Congestion Notification (ECN) is an extension to the Internet Protocol and to the Transmission Control Protocol. ECN allows end-to-end notification of network congestion without dropping packets.
<b>64 VFs per port</b>	Increased the number of VFs from 32 to 64 per PF. <b>Note:</b> When increasing the number of VFs, the following limitations must be taken into consideration: <pre>server_total_bar_size &gt;= (num_pfs)*(2log_pf_uar_bar_size + 2log_vf_uar_bar_size*total_vfs) server_total_msix &gt;= (num_pfs)*(num_pf_msix + num_vfs_msix *total_vfs)</pre>
<b>RoCE Link Aggregation (RoCE LAG)</b>	<b>[Beta]</b> RoCE Link Aggregation provides failover and link aggregation capabilities. In this mode, only one IB port, that represents the two physical ports, is exposed to the application layer. For further information, please refer to the PRM.
<b>OVS Offload</b>	Mellanox Accelerated Switching And Packet Processing (ASAP <sup>2</sup> ) Direct technology allows to offload OVS by handling OVS data-plain in Mellanox ConnectX-4 / ConnectX-4 Lx NIC hardware (Mellanox Embedded Switch or eSwitch) while maintaining OVS control-plain unmodified. The current actions supported by ASAP <sup>2</sup> Direct include packet parsing and matching, forward, drop along with VLAN push/pop or VXLAN encap/decap and HW based packet/byte flow statistics.
<b>Virtual Extensible LAN (VXLAN) encapsulation/decapsulation</b>	Virtual Extensible LAN (VXLAN) is a network virtualization technology that improves scalability problems associated with large cloud computing deployments. It tunnels Ethernet frames within Ethernet + IP + UDP frames. Mellanox implements VXLAN encapsulation and decapsulation in the hardware.
<b>Data Center Bridging Exchange (DCBX)</b>	<b>[Beta]</b> DCBX is used by DCB devices to exchange configuration information with directly connected peers. DCBX uses Link Layer Discovery Protocol (LLDP) to exchange parameters between two link peers. For further information, please refer to the PRM.

**Table 28 - Firmware Changes and New Feature History (Sheet 9 of 12)**

Feature/Change	Description
<b>FCS no scatter / FCS check</b>	Enables the user to control whether or not to scatter Frame Check Sequence (FCS) or to check FCS functionality.
<b>Packet Pacing</b>	<b>[Beta]</b> Send Queues (SQ/ Send queue of QP) may be individually rate limited, thus, allowing granular rate control over specific SW-defined flows. A rate-limited flow is allowed to transmit a few packets before its transmission rate is evaluated, and the next packet is scheduled for transmission accordingly.
<b>PRBS Patterns Generation and Tuning</b>	A new PHY test mode in which the device can generate different PRBS patterns for SerDes tuning purpose. For further information, please refer to PRM registers: PPAOS, PPTT, PPRT.
<b>Management Controller Transport Protocol (MCTP) over PCI</b>	Added support for MCTP host management over PCI
<b>OCBB / OCSD support after mlxfwreset</b>	Added support for OCBB/OCSD memory pointers restoration after mlxfwreset
<b>MCTP media migration</b>	Added support for MCTP media migration between SMBUS and PCI
<b>Cables</b>	Removed the RX amplitude configuration on some cable types
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.14.2036</b>	
<b>IPoIB checksum and LSO offload</b>	Added IPoIB checksum and LSO offload support
<b>Scatter FCS in RQ</b>	Enables software to scatter or strip FCS in RQ.
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.14.1100</b>	
<b>CQE Time Stamping</b>	Keeps track of the creation of a packet. A time-stamping service supports assertions of proof that a datum existed before a particular time.
<b>Priority Flow Control (PFC)</b>	Applies pause functionality to specific classes of traffic on the Ethernet link.
<b>RDMA retransmission counters</b>	Custom port counters provide the user a clear indication about RDMA send/receive statistics and errors.
<b>Link Layer Discovery Protocol (LLDP)</b>	The Link Layer Discovery Protocol (LLDP) is a vendor-neutral Link Layer protocol in the Internet Protocol Suite used by network devices for advertising their identity, capabilities, and neighbors on a IEEE 802 LAN. The protocol is formally defined in IEEE 802.1AB.
<b>1GbE and 56GbE Link Speed</b>	ConnectX-4adapters now support 1Gb/s and 56GbE Ethernet connectivity in addition to 10GigE, 25GigE, 40GigE, 50GigE, and 100GigE
<b>Flow Steering Counters</b>	Provides a clear indication of Flow Steering statistics and errors.
<b>WQE Inline Header</b>	The minimal amount of packet headers inlined in the WQE's Eth Segment.
<b>table-miss Flow</b>	A flow table may include a table-miss flow entry, which renders all Match Fields wildcards. If a packet does not match a flow entry in a flow table, this is a table miss. The behavior on a table miss depends on the table configuration. A table-miss flow entry in the flow table may specify how to process unmatched packets.
<b>Multi-Host InfiniBand</b>	Enables connecting multiple compute or storage hosts into a single interconnect adapter by separating the adapter PCIe interface into multiple and independent PCIe interfaces.
<b>SR-IOV (EN eSwitch &amp; RoCE)</b>	Single Root IO Virtualization (SR-IOV) is a technology that allows a physical PCIe device to present itself multiple times through the PCIe bus.
<b>Vector Calculation/ Erasure Coding Offload</b>	Uses the HCA for offloading erasure coding calculations.

**Table 28 - Firmware Changes and New Feature History (Sheet 10 of 12)**

Feature/Change	Description
<b>Firmware Image Time Stamping for Multi-Host Environment</b>	Enables the administrator to add a timestamp to the firmware they want to upgrade to avoid situations where one host tries to upgrade the firmware and another tries to downgrade; which may lead to two or more unnecessary server reboots. For further information, please refer to <a href="#">MFT User Manual</a> .
<b>Link params modification via access registers</b>	The change includes the following: 1. Changed port configuration which required link re-training (such as speed) 2. PAOS down 3. PAOS up This change, will cause the link to toggle and new configurations to take effect.
<b>Checksum Calculation on Image/Device</b>	Flint utility allows performing an MD5 checksum on the non-persistent sections of the firmware image. For further information, please refer to <a href="#">MFT User Manual</a> .
<b>Rev. 12.12.1240</b>	
<b>Bug Fixes</b>	See <a href="#">Section 4, “Bug Fixes History”, on page 25</a>
<b>Rev. 12.12.1100</b>	
<b>Port Link</b>	Reduced the port link-up time when negotiating according to Clause 73 (DME)
<b>Rev. 12.12.0780</b>	
<b>PCI</b>	<ul style="list-style-type: none"> <li>• PCIe Function Level Reset (FLR)</li> <li>• Power Management L2/L3 flow support</li> </ul>
<b>Ethernet Network</b>	<ul style="list-style-type: none"> <li>• Large Receive Offload (LRO)</li> <li>• Large Send Offload (LSO)</li> <li>• Receive Side Scaling (RSS)</li> <li>• Global Pause</li> <li>• RoCEv1.0/RoCEv2.0</li> <li>• Flow Steering</li> <li>• Sniffer Ethernet</li> <li>• Rate Limiter (at Beta level)</li> <li>• Multi packet WQE</li> <li>• Minimal Bandwidth Guarantee (ETS)</li> <li>• Explicit Congestion Notification (ECN)</li> <li>• Priority Flow Control (PFC)</li> </ul>
<b>PRM</b>	<ul style="list-style-type: none"> <li>• Self Loopback support</li> <li>• Transport Domain support</li> <li>• CQ2EQ remapping</li> <li>• Added support for the following commands:               <ul style="list-style-type: none"> <li>• MODIFY/QUERY_ESW_VPORT_CONTEXT</li> <li>• QUERY/MODIFY_CONG_STATUS</li> <li>• QUERY/MODIFY_CONG_PARAMS</li> <li>• QUERY_CONG_STATISTICS</li> <li>• ADD/DELETE_VXLAN_UDP_DPORT</li> </ul> </li> </ul>
<b>Virtualization</b>	<ul style="list-style-type: none"> <li>• VXLAN/NVGRE Stateless offload In this release, this feature is supported through Windows ONLY</li> <li>• SR-IOV EN (at Beta level)</li> </ul>
<b>Performance</b>	<ul style="list-style-type: none"> <li>• CQE zipping</li> </ul>
<b>InfiniBand Network</b>	<ul style="list-style-type: none"> <li>• Dynamically Connected (DC) transport</li> </ul>
<b>Misc</b>	<ul style="list-style-type: none"> <li>• Wake-on-Lane/Standby</li> <li>• FlexBoot/UEFI support</li> </ul>

**Table 28 - Firmware Changes and New Feature History (Sheet 11 of 12)**

Feature/Change	Description
<b>Non-Volatile Configuration</b>	<ul style="list-style-type: none"> <li>Non-Volatile Configuration (NVConfig). For the complete list, please refer to <a href="#">Section 8, on page 42</a>.</li> </ul>
<b>Port management</b>	<ul style="list-style-type: none"> <li>Enabled port management. Now one port can be set as Ethernet and one as InfiniBand.</li> </ul>
<b>Rev. 12.1100.6630</b>	
<b>Virtualization</b>	<ul style="list-style-type: none"> <li>Added support for SR-IOV</li> <li>Added support for MADs Virtualization Attributes according to <code>ib_virt_annex_v17</code></li> </ul>
<b>PRM</b>	<ul style="list-style-type: none"> <li>Updated virtualization command set according to PRM 0.26</li> </ul>
<b>Configuration tools</b>	<ul style="list-style-type: none"> <li>Enabled SR-IOV, <code>NUM_VFS</code> and <code>INT_LOG_MAX_PAYLOAD_SIZE</code> configuration via the <code>mlxconfig</code> tool</li> </ul>
<b>Rev. 12.0100.6440</b>	
<b>All</b>	<ul style="list-style-type: none"> <li>Initial Release of ConnectX®-4 adapter cards</li> </ul>
<b>Port Speed</b>	<ul style="list-style-type: none"> <li>InfiniBand port speed up to EDR</li> <li>Ethernet port speed up to 100GigE</li> </ul>
<b>Virtualization</b>	<ul style="list-style-type: none"> <li>Function per port</li> </ul>
<b>InfiniBand Network</b>	<ul style="list-style-type: none"> <li>Dynamically Connected transport</li> <li>Unreliable Datagram Connection transport</li> <li>Atomic Operation</li> <li>CORE-Direct® <ul style="list-style-type: none"> <li>Provides Collective Off-loading in HCA</li> <li>Frees CPU to perform computation in parallel with collective operations</li> </ul> </li> <li>T10 DIF pipeline Data Integrity Signature off-loading (at beta level)</li> <li>User Memory Registration (UMR)</li> <li>Automatic Path Migration</li> <li>On Demand Paging (ODP) - Memory can now be used without pinning memory beforehand.</li> <li>Congestion Control</li> <li>Shrink Address Vectors for RC and UD</li> <li>Programmable Port/Node GUID</li> </ul>
<b>Ethernet Network</b>	<p><b>Note:</b> All the Ethernet features listed below are at Beta level.</p> <ul style="list-style-type: none"> <li>Large Receive Offload (LRO)</li> <li>Large Send Offload (LSO)</li> <li>Receive Side Scaling (RSS)</li> <li>Global Pause</li> <li>RoCEv1/RoCEv2. RoCE is supported only in Reliable Connection (RC) transport</li> <li>Flow Steering</li> </ul>
<b>General</b>	<ul style="list-style-type: none"> <li>Thermal monitoring and protection</li> <li>Port LEDs indications</li> <li>NVConfig Tool</li> <li>Suspend to RAM (S3) support</li> <li>Diagnostic counters vendor-specific MAD support, as defined by VS-MAD spec version 1.2</li> <li>Physical Port Counter - Beta level</li> <li>Q Counter - Beta level</li> <li>Firmware burning (using <code>mstflint</code>) when the driver is down</li> <li>CPLD field upgrade</li> <li>V Port commands</li> </ul>
<b>Host management</b>	<ul style="list-style-type: none"> <li>NC-SI over RMIi support</li> </ul>

**Table 28 - Firmware Changes and New Feature History (Sheet 12 of 12)**

Feature/Change	Description
<b>MAD</b>	<ul style="list-style-type: none"><li>• Config space address in MAD management class 0x09</li></ul>

## **6 PreBoot Drivers (FlexBoot/UEFI)**

### **6.1 FlexBoot Changes and New Features**

For further information, please refer to FlexBoot Release Notes

<https://docs.mellanox.com> --> Software --> Firmware Management --> PreBoot Drivers (FlexBoot/UEFI)

### **6.2 UEFI Changes and Major New Features**

For further information, please refer to UEFI Release Notes

<https://docs.mellanox.com> --> Software > Firmware Management --> PreBoot Drivers (FlexBoot/UEFI)



## 7 Unsupported Features and Commands

### 7.1 Unsupported Features

The following advanced feature are unsupported in the current firmware version:

**Table 29 - Unsupported Features**

Feature	ConnectX-4
The following service types: <ul style="list-style-type: none"> <li>• SyncUMR</li> <li>• Mellanox transport</li> <li>• RAW IPv6</li> </ul>	No
INT-A not supported for EQs only MSI-X	No
PCI VPD write flow (RO flow supported)	No
Streaming Receive Queue (STRQ) and collapsed CQ	No
Subnet Manager (SM) on VFs	No
DC in Multi-Host, SR-IOV, and Ethernet (RoCE)	No
RoCE LAG for VFs	No
RoCE LAG in Multi-Host/Socket-Direct	No
Mutlihost Ethernet	No

### 7.2 Unsupported Commands

- QUERY\_MAD\_DEMUX
- SET\_MAD\_DEMUX
- CREATE\_RQ - MEMORY\_RQ\_RMP
- MODIFY\_LAG\_ASYNC\_EVENT

## 8 Supported Non-Volatile Configurations

**Table 30 - Supported Non-Volatile Configurations**

Configuration	mlxconfig Parameter Name	Class	TLV ID
NV_MEMIC_CONF	MEMIC_BAR_SIZE	GLOBAL (0)	0x6
	MEMIC_SIZE_LIMIT		
NV_HOST_CHAINING_CONF	HOST_CHAINING_MODE		0x8
	HOST_CHAINING_DESCRIPTOR		
	HOST_CHAINING_TOTAL_BUFFER_SIZE		
NV_FLEX_PARS_CONF	FLEX_PARSER_PROFILE_ENABLE		0xe
	FLEX_IPV4_OVER_VXLAN_PORT		
NV_ROCE_1_5_CONF	ROCE_NEXT_PROTOCOL		0x10
NV_INTERNAL_RESOURCE_CONF	ESWITCH_HAIRPIN_DESCRIPTOR		0x13
	ESWITCH_HAIRPIN_TOT_BUFFER_SIZE		
NV_GLOBAL_PCI_CONF	NON_PREFETCHABLE_PF_BAR		0x80
	NUM_OF_VFS		
	SRIOV_EN		
	PF_LOG_BAR_SIZE		
	VF_LOG_BAR_SIZE		
	NUM_PF_MSIX		
	NUM_VF_MSIX		
NV_TPT_CONF	INT_LOG_MAX_PAYLOAD_SIZE		0x82
NV_POWER_CONF	SW_RECOVERY_ON_ERRORS	0x88	
	RESET_WITH_HOST_ON_ERRORS		
	ADVANCED_POWER_SETTINGS		
NV_SW_OFFLOAD_CONFIG	CQE_COMPRESSION	0x10a	
	IP_OVER_VXLAN_EN		
	PCI_ATOMIC_MODE		
	LRO_LOG_TIMEOUT0		
	LRO_LOG_TIMEOUT1		
	LRO_LOG_TIMEOUT2		
	LRO_LOG_TIMEOUT3		
NV_IB_DC_CONF	LOG_DCR_HASH_TABLE_SIZE	0x190	
	DCR_LIFO_SIZE		
NV_VPI_LINK_TYPE	LINK_TYPE	PHYSICAL_PORT (2)	0x12

**Table 30 - Supported Non-Volatile Configurations**

Configuration	mlxconfig Parameter Name	Class	TLV ID
NV_ROCE_CC	ROCE_CC_PRIO_MASK	PHYSICAL_PORT (2)	0x107
	ROCE_CC_ALGORITHM		
NV_ROCE_CC_ECN	CLAMP_TGT_RATE_AFTER_TIME_INC	PHYSICAL_PORT (2)	0x108
	CLAMP_TGT_RATE		
	RPG_TIME_RESET		
	RPG_BYTE_RESET		
	RPG_THRESHOLD		
	RPG_MAX_RATE		
	RPG_AI_RATE		
	RPG_HAI_RATE		
	RPG_GD		
	RPG_MIN_DEC_FAC		
	RPG_MIN_RATE		
	RATE_TO_SET_ON_FIRST_CNP		
	DCE_TCP_G		
	DCE_TCP_RTT		
	RATE_REDUCE_MONITOR_PERIOD		
	INITIAL_ALPHA_VALUE		
	MIN_TIME_BETWEEN_CNPS		
	CNP_802P_PRIO		
CNP_DSCP			
NV_LLDP_NB_CONF	LLDP_NB_DCBX	PHYSICAL_PORT (2)	0x10a
	LLDP_NB_RX_MODE		
	LLDP_NB_TX_MODE		
NV_LLDP_NB_DCBX	DCBX_IEEE	PHYSICAL_PORT (2)	0x18e
	DCBX_CEE		
	DCBX_WILLING		
NV_KEEP_LINK_UP	KEEP_ETH_LINK_UP	PHYSICAL_PORT (2)	0x190
	KEEP_IB_LINK_UP		
	KEEP_LINK_UP_ON_BOOT		
	KEEP_LINK_UP_ON_STANDBY		
NV_QOS_CONF	NUM_OF_VL	PHYSICAL_PORT (2)	0x192
	NUM_OF_TC		
	NUM_OF_PFC		
NV_MPFS_CONF	DUP_MAC_ACTION	PHYSICAL_PORT (2)	0x196
	SRIOV_IB_ROUTING_MODE		
	IB_ROUTING_MODE		

**Table 30 - Supported Non-Volatile Configurations**

Configuration	mlxconfig Parameter Name	Class	TLV ID
NV_HCA_CONF	PCI_WR_ORDERING	HOST-FUNCTION (3)	0x112
	MULTI_PORT_VHCA_EN		
NV_EXTERNAL_PORT_CTRL	PORT_OWNER		0x192
	ALLOW_RD_COUNTERS		
	RENEG_ON_CHANGE		
	TRACER_ENABLE		
NV_ROM_BOOT_CONF2	IP_VER		0x195
	BOOT_UNDI_NETWORK_WAIT		
NV_ROM_UEFI_CONF	UEFI_HII_EN		0x196
NV_ROM_UEFI_DEBUG_LEVEL	BOOT_DBG_LOG		0x206
	UEFI_LOGS		
NV_ROM_BOOT_CONF1	BOOT_VLAN		0x221
	LEGACY_BOOT_PROTOCOL		
	BOOT_RETRY_CNT		
	BOOT_LACP_DIS		
	BOOT_VLAN_EN		
NV_ROM_IB_BOOT_CONF	BOOT_PKEY	0x222	
NV_PCI_CONF	ADVANCED_PCI_SETTINGS	HOST (7)	0x80
SAFE_MODE_CONF	SAFE_MODE_THRESHOLD		0x82
	SAFE_MODE_ENABLE		