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# ConnectX<sup>®</sup> Dual-Port InfiniBand Mezzanine I/O cards for Dell PowerEdge M1000e-series Blade Servers User Manual

P/N: ConnectX MDI, MCQH29-XCC

Rev 1.3

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ConnectX Dual-Port InfiniBand Mezzanine I/O cards for Dell PowerEdge M1000e-series Blade Servers

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# Revision History

This document was first printed on 12/21/07.

Table 1 - Revision History Table

<b>Date</b>	<b>Rev</b>	<b>Comments/Changes</b>
Mar. 2009	1.3	Added Dell Logo Removed Watermark
Feb. 2009	1.2	Changed IO Card to mezzanine I/O card Replaced pic in Table 3
Dec. 2008	1.1	Added MCQH29-XXC QDR InfiniBand mezzanine I/O card Fixed links
Dec. 2007	1.0	Initial Release

# About this Manual

This *User's Manual* describes ConnectX Dual Port InfiniBand mezzanine I/O cards for Dell PowerEdge M1000e-series Blade Servers.

It provides details as to the interfaces of the board, specifications, required software and firmware for operating the cards, and relevant documentation.

## Intended Audience

This manual is intended for the installer and user of the mezzanine I/O cards listed in “Overview” on page 7.

The manual assumes basic familiarity with the Infiniband<sup>®</sup> architecture specifications.

## Related Documentation

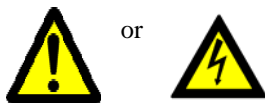
Table 2 - Documents List

<i>InfiniBand<sup>®</sup> Architecture Specification Volume 1 Release 1.2 and Volume 2 release 1.2.1– Infini-band Architecture Specifications Descriptions</i>
<i>PCI Express Base 2.0 Specification (1.1 compatible)</i>
<i>PCI Local Bus Specification Rev 2.3</i>

## Online Resources

- Mellanox Technologies Web pages: <http://www.mellanox.com>
- Dell Support Web pages: <http://support.dell.com>

## Document Conventions



These symbols indicate a situation, status, or condition that may cause harm to people or damage to the equipment.

When discussing memory sizes, MB and MByte are used in this document to mean size in mega bytes. The use of Mb or Mbits (small b) indicates size in mega bits.


# 1 Overview

This document is a *User's Manual* for the Mellanox ConnectX 20 and 40Gb/s InfiniBand dual port Mezzanine I/O cards for Dell PowerEdge M1000e-series Blade Servers. The cards described in this manual (see Table 3, on page 7) have the following main features:

- 1 $\mu$ s MPI ping latency
- 20 or 40Gb/s InfiniBand ports
- CPU offload of transport operations
- End-to-end QoS and congestion control
- Hardware-based I/O virtualization

## 1.1 Mezzanine I/O card

Table 3- ConnectX InfiniBand Mezzanine I/O card details

Ordering Part Number (OPN)	Infiniband Link Speed	RoHS Compliance	Mezzanine I/O card Photo
ConnectX MCQH29-XCC	40 Gb/s QDR	RoHS-R5 (with exemption)	
ConnectX MDI	20 Gb/s DDR	RoHS-R5 (with exemption)	

# 2 I/O Card Installation

## 2.1 Hardware and Software Requirements

Before installing the InfiniBand Mezzanine I/O card, please make sure that the system meets the hardware and software requirements listed in Table 4.

Table 4 - Hardware and Software Requirements

Requirement	Description
Hardware	Used with Dell PowerEdge M1000e-series
Software Operating Systems/Distributions	Refer to the PowerEdge M1000e-series Manuals
Software Stacks	Mellanox OpenFabric software package (either MLNX_OFED for Linux or MLNX_WinOF for Microsoft Windows)

## 2.2 Installation Instructions

Follow the instructions in the *Installation Guide for ConnectX InfiniBand Mezzanine I/O Adapter Card for Dell PowerEdge M1000e-series Blade Servers*.

### 2.2.1 Safety Warnings

#### 1. Installation Instructions



Read all installation instructions before connecting the equipment to the power source.

#### 2. Over Temperature



This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 40°C (104°F).

To guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

#### 3. Stacking the Chassis



The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.



#### 4. Lightning – Electrical Hazard



During periods of lightning activity, do not work on the equipment.

#### 5. Rack Mounting and Servicing



When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

#### 6. Installation of Equipment



This equipment should be installed, replaced, or serviced only by trained and qualified personnel.

#### 7. Disposal of Equipment



Disposal of this equipment should be in accordance to all national laws and regulations.

#### 8. Compliance with Local and National Codes



This equipment should be installed in compliance with local and national electrical codes.

---

# **3 Driver Software and Firmware**

## **3.1 Drivers and Clustering Software**

Download and install on all nodes of the Mellanox OpenFabric software package for Linux, Windows, or other operating systems from the Mellanox software website. Go to [www.mellanox.com](http://www.mellanox.com) > Products > InfiniBand SW/drivers.

This software package provides server drivers enabling connectivity for server and storage systems utilizing High Performance Computing (HPC) or enterprise data center (EDC) applications across an InfiniBand fabric. It also provides a Subnet Manager for simple network configuration and network administration and diagnostic tools for network management.

## **3.2 Updating the Mezzanine I/O card Firmware**

The Mezzanine I/O card is shipped with the latest version of qualified firmware at the time of manufacturing. New firmware versions will be posted on the Mellanox web site. Go to <http://www.mellanox.com> > Support > Dell.

You will need the Mellanox Firmware Tools package available in the Mellanox OpenFabrics software package, to update firmware for this switch. It can also be downloaded from the Management Tools section from the Mellanox Download web site. In the directory that holds the latest firmware, run the following commands:

```
lspci | grep Mellanox ;identifies PCI ID to be used in next command
```

```
mstflint -d <PCI ID, for example 05:00.0> -i <.bin file>b
```

# **4 Mezzanine I/O card Interfaces**

The Mezzanine I/O card attaches to the blade using a press feed connector which connects both the InfiniBand and PCI Express interfaces.

## **4.1 InfiniBand Interface**

The ConnectX® (MT25408) device is compliant with the *InfiniBand Architecture Specification, Release 1.2*. It has two compliant 4X InfiniBand ports, ports 1 and 2, each having four Tx/Rx pairs of SerDes. The Mezzanine I/O card based on this device provides access to these ports through a board to board press feed connector.

## **4.2 PCI Express Interface**

The Mezzanine I/O card has eight Tx/Rx pairs of SerDes providing for a PCI Express x8 interface, version 2.0 compliant and compatible with base 1.1 chipsets. The device can be either a master initiating the PCI Express bus operations or a slave responding to PCI bus operations.

## **4.3 Flash Jumper Configuration**

There is a jumper on each Mezzanine I/O card that indicates to the device whether an on-board Flash device exists (or is to be used). See Figure 1 on page 15 for the jumper location.

## **4.4 Memory**

The Mezzanine I/O card supports multiple memory devices through the PCI Express, Flash, and I2C-compatible interfaces.

### **4.4.1 System Memory**

The Mezzanine I/O card utilizes the PCI Express interface to store and access InfiniBand fabric connection information on the system memory.

### **4.4.2 Flash**

The Mezzanine I/O card includes two 2MB SPI Flash devices (P/N M25P16-VME6G by ST Microelectronics) accessible via the Flash interface of the MT25408 ConnectX device.

### 4.4.3 ConnectX MDI EEPROM VPD

Each board incorporates an EEPROM that is accessible through the I2C-compatible interface. The EEPROM is used for storing the Vital Product Data (VPD) and FRU. The VPD format adheres to the *PCI Local Bus specification rev 2.3 VPD definition*. The EEPROM capacity is 512 bytes.

Table 5 - MDI VPD

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x7		
3	Data	"IB Mezz"	Alphanumeric	Short description / ID
10	Large Resource Type VPD-R Tag (0x10)	0x90		Read Only Area
11	Length	0x3F		
13	VPD Keyword	"PN"	Numbers	Add in Card Part Number
15	Length	0x6		
16	Data	"0H288M"		
22	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
24	Length	0x3		
25	Data	"X01"		PCB revision
28	VPD Keyword	"SN"	Alphanumeric	Serial Number
30	Length	0x14		
31	Data	"000HX271MM MMMYPDSSSS"		according to the board label
51	VPD Keyword	"V0"		Misc Information
53	Length	0x12		
54	Data	"20G I/O card"		
72	VPD Keyword	"RV"		
74	Length	0x1		
75	Data	Checksum		
76	Large Resource Type VPD-W Tag (0x11)	0x91		Read / Write Area
77	Length	0xB0		
79	VPD Keyword	"V1"		Driver version
81	Length	0x6		
82	Data	"N/A"	Number	
88	VPD Keyword	"YA"		Asset Tag
90	Length	0x20		
91	Data	"N/A"	Alphanumeric	
123	VPD Keyword	"RW"		Remaining read/write area
125	Length	0x81		
126	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0...0	Numbers	
335	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

## 4.4.4 MCQH29-XCC EEPROM VPD

Table 6- MCQH29-XCC VPD

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0xB		
3	Data	"IB QDR Mezz"	Alphanumeric	Short description / ID
14	Large Resource Type VPD-R Tag (0x10)	0x90		Read Only Area
15	Length	0x43		
17	VPD Keyword	"PN"	Numbers	Add in Card Part Number
19	Length	0x6		
20	Data	"0Y773M"		
26	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
28	Length	0x3		
29	Data	"A00"		PCB revision
32	VPD Keyword	"SN"	Alphanumeric	Serial Number
34	Length	0x14		
35	Data	"OO0Y773MMM MMMYYMDSSSS "		according to the board label
55	VPD Keyword	"V0"		Misc Information
57	Length	0x16		
58	Data	"40G IO card"		
80	VPD Keyword	"RV"		
82	Length	0x1		
83	Data	Checksum		
84	Large Resource Type VPD-W Tag (0x11)	0x91		Read / Write Area
85	Length	0xA8		
87	VPD Keyword	"V1"		Driver version
89	Length	0x6		
90	Data	"N/A"	Number	
96	VPD Keyword	"YA"		Asset Tag
98	Length	0x20		
99	Data	"N/A"	Alphanumeric	
131	VPD Keyword	"RW"		Remaining read/write area
133	Length	0x79		
134	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0...0	Numbers	
343	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

#### **4.4.5 FRU (Field Replacement Unit) ConnectX MDI and MCQH29-XCC EEPROM**

The FRU is used by chassis management for identifying the Mezzanine I/O card. Each board incorporates an EEPROM that is accessible through the I2C-compatible interface. The EEPROM is used for storing the Vital Product Data (VPD) and FRU.

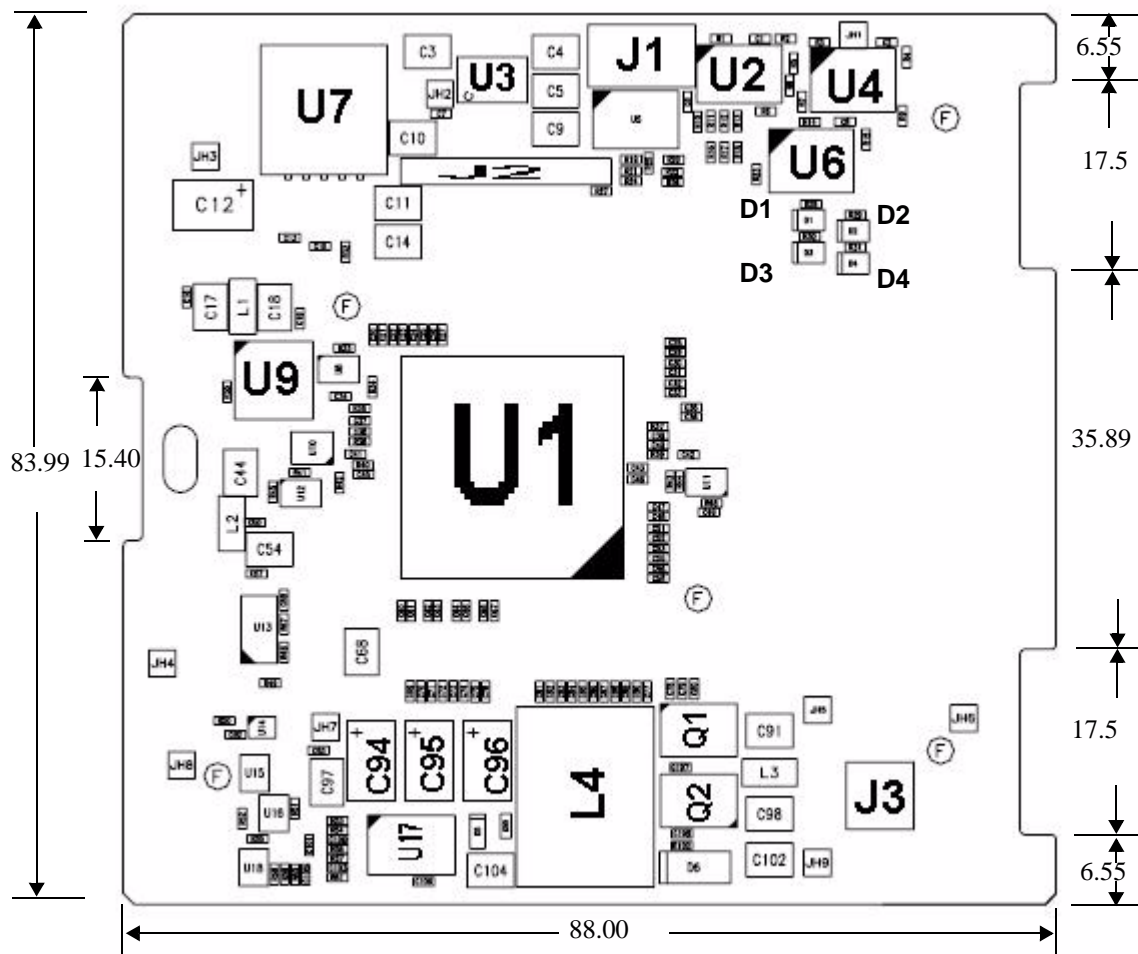
# Appendix A: Specifications

## A.1 Board Mechanical Drawing and Dimensions

The ConnectX InfiniBand Mezzanine I/O card mechanical drawing is depicted in Figure 1.

Note: All dimensions are in millimeters.

Figure 1: ConnectX Mezzanine I/O card



J1 is the I2C Connector.

## A.2 EMC Certification Statements

### A.2.1 FCC Statements (USA)

#### Class A Statements:

##### § 15.21

#### **Statement**

**Warning!** Changes or modifications to this equipment not expressly approved by the party responsible for compliance (Mellanox Technologies) could void the user's authority to operate the equipment.

##### §15.105(a)

#### **Statement**

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### A.2.2 EN Statements (Europe)

#### EN55022 Class A Statement:

##### **Warning**

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

### A.2.3 ICES Statements (Canada)

#### Class A Statement:

"This Class A digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada."

### A.2.4 VCCI Statements (Japan)

#### Class A Statement:

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。



(Translation - "This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.")

### A.2.5 MIC Notice (Republic of Korea Only)

The MIC label may be located separately from the other regulatory markings applied to your product.

Class A devices are for business purposes.

Class A Device

기종별	사용자안내문
A급 기기 (업무용 정보통신기기)	이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

MIC Class A Regulatory Label

If the regulatory label includes the following marking, your device is a Class A product:



1. 기기의 명칭(모델명):
2. 인증번호:(A)
3. 인증받은 자의 상호:
4. 제조년월일:
5. 제조자/제조국가:

## A.3 Specifications

Table 7 - ConnectX MDI Specifications

Physical		Power and Environmental	
Size:	88.00mm X 83.99 mm	Voltage:	12V, 3.3V
		Typ Power:	11.05W
		Maximum Power:	13.09W
		Temperature:	0°C to 40°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation 10 or 20Gb/s per port	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB
QoS:	8 InfiniBand Virtual Lanes for each port		
RDMA Support:	Yes, All Ports	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: CE Mark (EN55022 Class A, EN50024, EN61000-3-2, EN61000-3-3) Japan: VCCI, Class A Korea: MIC Class A Australia/ New Zealand: C-Tick Class A
Data Rate:	DDR		
PCI Express	Base 2.0 compliant, backwards compatible with 1.1		

Table 8 - ConnectX MCQH29-XCC Specifications

Physical		Power and Environmental	
Size:	88.00mm X 83.99 mm	Voltage:	12V, 3.3V
		Typ Power:	12.23W
		Maximum Power:	14.32W
		Temperature:	0°C to 40°C
Protocol Support		Regulatory	
InfiniBand:	IBTA v1.2, Auto-Negotiation 10, 20, or 40Gb/s per port	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB
QoS:	8 InfiniBand Virtual Lanes for each port		
RDMA Support:	Yes, All Ports	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: CE Mark (EN55022 Class A, EN50024, EN61000-3-2, EN61000-3-3) Japan: VCCI, Class A Korea: MIC Class A Australia/ New Zealand: C-Tick Class A
Data Rate:	QDR		
PCI Express	Base 2.0 compliant, backwards compatible with 1.1		

# Appendix A: Avertissements de sécurité d'installation (French)

## 1. Instructions d'installation



Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

## 2. Température excessive



Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 40°C (104°F). Un flux d'air de 200LFM à cette température ambiante maximale est nécessaire. En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

## 3. Empilage du châssis



Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

## 4. Orages – dangers électriques



Pendant un orage, il ne faut pas utiliser le matériel.

## 5. Montage et entretien sur baie



Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

## 6. Installation du matériel



Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

## 7. Élimination du matériel



L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

## 8. Codes électriques locaux et nationaux



Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

# Appendix A: Installation - Sicherheitshinweise (German)

## 1. Installationsanleitungen



Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

## 2. Übertemperatur



Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 40°C (104°F) betrieben werden. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

## 3. Stapeln des Chassis



Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

## 4. Bei Gewitter - Elektrische Gefahr



Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät.

## 5. Rack-Montage und Wartung



Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

## 6. Geräteinstallation



Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

## 7. Geräteentsorgung



Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

## 8. Regionale und nationale elektrische Bestimmungen



Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.