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ConnectX[®]-2 Dual-Port VPI Mezzanine I/O Cards for Dell PowerEdge M1000e-series Blade Servers User Manual

P/N: ConnectX-2 MCGH29B-XCC, MCQH29B-XCC

Rev 1.2

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ConnectX-2 Adapter Card User Manual

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Revision History

This document was first printed on 14/11/2010.

Table 1 - Revision History Table

Date	Rev	Comments/Changes
June 2010	1.2	Changed Dell logo to blue badge
June 2010	1.1	Formatting
April 2010	1.0	Initial Release

About this Manual

This *User Manual* describes ConnectX-2 Dual Port 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 “ConnectX-2 Mezzanine I/O Card Details” on page 10.

The manual assumes basic familiarity with the Infiniband[®] architecture specifications.

Related Documentation

Table 2 - Documents List

<i>InfiniBand[®] Architecture Specification Volume 1 Release 1.2 and Volume 2 release 1.2.1– Infiniband Architecture Specifications Descriptions</i>
<i>PCI Local Bus Specification Rev 2.3</i>
<i>IEEE Std 802.3This is the IEEE Ethernet specification http://standards.ieee.org/getieee802</i>
<i>PCI Express 2.0 Specifications Industry Standard PCI Express 2.0 Card Electromechanical Specification, Rev 1.3.</i>
<i>Mellanox Firmware Tools (MFT) User’s Manual Document Number: 2204UG</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 MBytes 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 Manual* for the Mellanox ConnectX-2 Mezzanine I/O cards for Dell PowerEdge M1000e-series Blade Servers with Virtual Protocol Interconnect (VPI) supporting InfiniBand and Ethernet connectivity.

VPI-supported adapters make it possible for Dell PowerEdge M1000e-series Blade Servers to operate with either InfiniBand or Ethernet switches. With auto-sensing capability, each ConnectX-2 port can identify the attached switch and bring up the link automatically. ConnectX-2 with VPI makes it easier for IT managers to deploy infrastructure that meets the challenges of a dynamic data center.

ConnectX-2 with VPI can accommodate the following port configurations:

- Both ports InfiniBand
- Both ports Ethernet
- Port 1 InfiniBand, port 2 Ethernet

The cards described in this manual (see Table 3, “ConnectX-2 Mezzanine I/O Card Details,”) have the following main features:

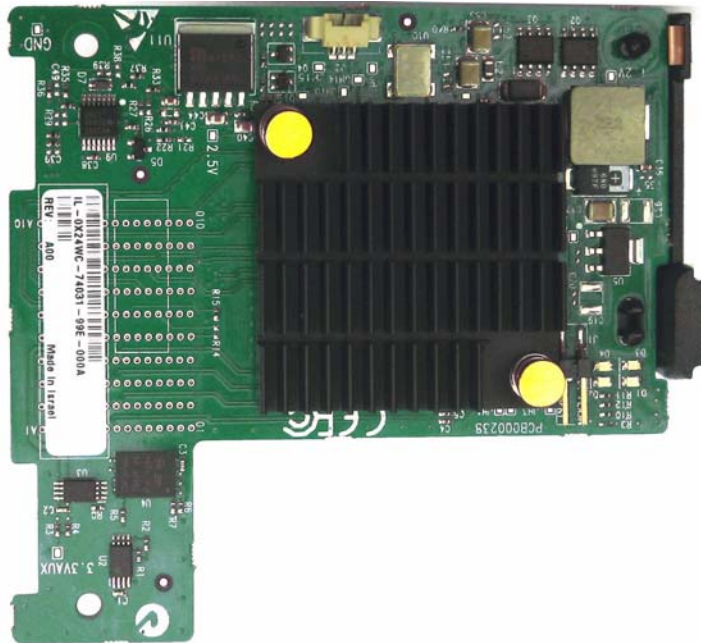
- 1 μ s MPI ping latency
- Selectable InfiniBand or Ethernet per port
- CPU offload of transport operations
- End-to-end QoS and congestion control
- Hardware-based I/O virtualization

1.1 Mezzanine I/O Card

Table 3 - ConnectX-2 Mezzanine I/O Card Details

Ordering Part Number (OPN)	Link Speed	RoHS Compliance
MCGH29B-XCC	InfiniBand 20 Gb/s DDR or 10 GigE	RoHS-R6 (with exemption)
MCQH29B-XCC	InfiniBand 40 Gb/s QDR or 10 GigE	RoHS-R6 (with exemption)

Figure 1: Dell SFF Mezzanine Card



2 Mezzanine I/O Card Interfaces

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

2.1 InfiniBand Interface

The ConnectX[®]-2 (MT25408) device is compliant with the *InfiniBand Architecture Specification, Release 1.2.1*. 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 fit connector.

2.2 Ethernet Interface

The ConnectX[®]-2 (MT25408) device is compliant with the *IEEE Std 802.3 Specification*. It has two compliant ports, each having a one Tx/Rx pair of SerDes. The Mezzanine I/O card based on this device provides access to these ports through a board to board press fit connector.

2.3 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.

2.4 Flash

The I/O card includes one SPI Flash device accessible via the Flash interface of the MT25408B0 ConnectX-2 device.

There is a jumper on the card that indicates to the device whether an on-board Flash device exists or is to be used. Table 4 provides information on this jumper. See the schematic in Figure 12 on [page 35](#) for the jumper location.

Table 4 - Jumper Configuration

Description	Option	Card Default Configuration	Comments
Flash present/ not present	connection open – Flash present connection shorted – Flash not present Figure 2: Flash Jumper 	connection open – Flash present	Header 1x2

2.5 Memory

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

2.5.1 System Memory

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

2.5.2 Flash

The Mezzanine I/O card includes one 16MB SPI Flash device (P/N M25P16-VME6G by ST Microelectronics) accessible via the Flash interface of the MT25408 ConnectX-2 device.

2.5.3 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 4Kbytes.

Table 5 - MCQH29B-XCC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x16		
3	Data	"DELL SFF MEZZ VPI QDR "	Alphanumeric	Short description / ID
25	Large Resource Type VPD-R Tag (0x10)	0x90		Read Only Area
26	Length	0x43		
28	VPD Keyword	"PN"	Numbers	Add in Card Part Number
30	Length	0x6		
31	Data	"OX24WC"		
37	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
39	Length	0x3		
40	Data	"X01"		Customer revision
43	VPD Keyword	"SN"	Alphanumeric	Serial Number
45	Length	0x14		
46	Data	"OOX24WC MMM- MMYMDSSSS "		according to the board label
66	VPD Keyword	"V0"		Misc Information
68	Length	0x16		

Table 5 - MCQH29B-XCC

Offset (Decimal)	Item	Value	Format	Description
69	Data	"10G QDR Mezzanine card"		
91	VPD Keyword	"RV"		
93	Length	0x1		
94	Data	Checksum		
95	Large Resource Type VPD-W Tag (0x11)	0x91		Read / Write Area
96	Length	0x9D		
98	VPD Keyword	"V1"		Driver version
100	Length	0x6		
101	Data	"N/A"	Number	
107	VPD Keyword	"YA"		Asset Tag
109	Length	0x20		
110	Data	"N/A"	Alphanumeric	
142	VPD Keyword	"RW"		Remaining read/write area
144	Length	0x6E		
145	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0...0	Numbers	
354	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

Table 6 - MCGH29B-XCC

Offset (Decimal)	Item	Value	Format	Description
0	Large Resource Type ID String Tag (0x02)	0x82		
1	Length	0x15		
3	Data	"DELL SFF MEZZ VPI DDR"	Alphanumeric	Short description / ID
24	Large Resource Type VPD-R Tag (0x10)	0x90		Read Only Area
25	Length	0x3F		
27	VPD Keyword	"PN"	Numbers	Add in Card Part Number
29	Length	0x6		
30	Data	"09DCC6"		
36	VPD Keyword	"EC"	Alphanumeric	Engineering Change Level of the card (rev)
38	Length	0x3		
39	Data	"X01"		Customer revision

Table 6 - MCGH29B-XCC

Offset (Decimal)	Item	Value	Format	Description
42	VPD Keyword	“SN”	Alphanumeric	Serial Number
44	Length	0x14		
45	Data	“OO09DCC6M MMMMYMDS SSS”		according to the board label
65	VPD Keyword	“V0”		Misc Information
67	Length	0x12		
68	Data	"10G Mezza- nine card"		
86	VPD Keyword	“RV”		
88	Length	0x1		
89	Data	Checksum		
90	Large Resource Type VPD-W Tag (0x11)	0x91		Read / Write Area
91	Length	0xA2		
93	VPD Keyword	“V1”		Driver version
95	Length	0x6		
96	Data	“N/A”	Number	
102	VPD Keyword	“YA”		Asset Tag
104	Length	0x20		
105	Data	“N/A”	Alphanumeric	
137	VPD Keyword	“RW”		Remaining read/write area
139	Length	0x73		
140	Data	Reserved (0x00)		
255	Small Resource Type END Tag (0x11)	0x78		
256	Mellanox Read Only Mask	0x0...0	Numbers	
349	Mellanox Read/Write Mask	0x1...1	Numbers	
511	Mellanox Read Only Mask	0x0	Numbers	

3 Driver Software and Firmware

3.1 Drivers and Clustering Software

Download and install the Mellanox OpenFabric software package, for Linux, Windows, or other operating systems from the Mellanox software website, on all nodes of the cluster. Go to <http://www.mellanox.com> > Products > InfiniBand/VPI 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 InfiniBand and Ethernet fabrics. It also provides a Subnet Manager for simple InfiniBand 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. Make sure that you download the FW according to the part number.

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
```

3.3 FlexBoot

FlexBoot enables remote boot over Ethernet or InfiniBand using Boot over InfiniBand (BoIB), Boot over Ethernet (BoE), or Boot over iSCSI (Bo-iSCSI). This technology is based on the Pre-boot Execution Environment (PXE) standard specification, and FlexBoot software is based on the open source EtherBoot/gPXE project (see www.etherboot.org). For more information go to <http://www.mellanox.com> > Products > InfiniBand/VPI SW/Drivers > FlexBoot.

4 I/O Card Installation

4.1 Hardware and Software Requirements

Before installing the VPI Mezzanine I/O card, please make sure that the system meets the hardware and software requirements listed in Table 7, “Hardware and Software Requirements”.

Table 7 - 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)

4.2 Installation Instructions

Installation of this mezzanine I/O card should only be done by a properly qualified technician or engineer. Installation or service not authorized by Dell or performed by unqualified personnel may void guarantees and warranties.

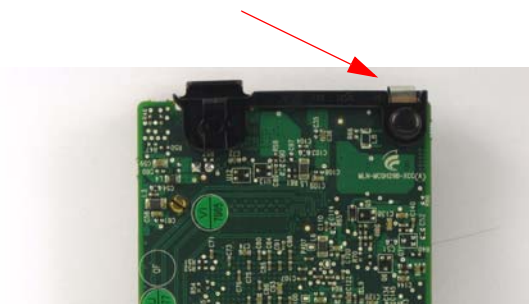
Read and follow all safety precautions specified in this document and in the Power Edge documentation.

Use the documentation supplied with the PowerEdge M1000e-series Blade Servers to remove and replace the blade from the chassis.

The card shown below has grounding clips that must come in contact with the chassis after the card is installed.

Figure 3: Grounding Clips

Grounding Clip

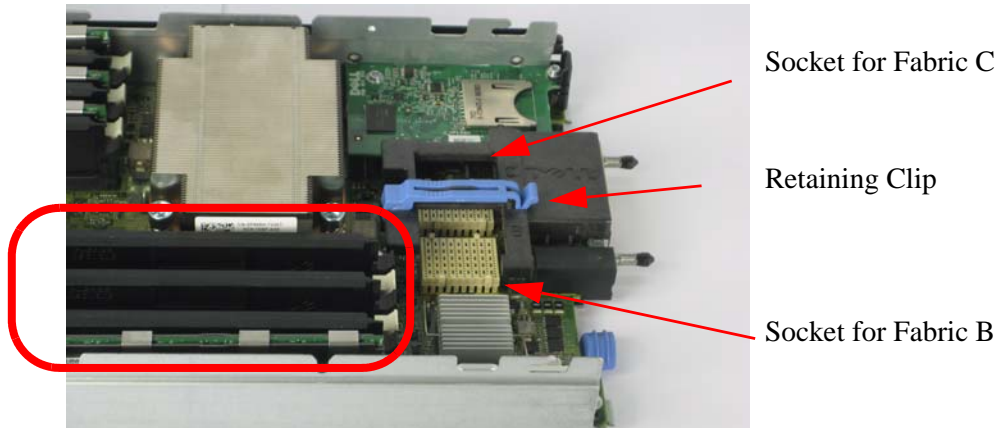




Make sure that you are properly grounded.

Make sure that the equipment, both while in the chassis and while removed from the chassis, is properly grounded to prevent ESD.

Figure 4: DIMMS can be hot!



DIMMS can be hot!

Allow sufficient time for the blade components to cool before starting this procedure.

The card can be placed in either of two available slots.

1. Remove the blade from the chassis.
2. Remove the cover from the blade.
 - a. With the blade sitting on the work table swing the clip up and back until the stop. This action moves the cover back from the blade body.
 - b. Grasp the latch and lift the cover from the blade.

Figure 5: Lift Off Cover





Avoid touching the DIMM components.

Allow sufficient time for the blade components to cool before starting this procedure.

3. Open the retaining clip.

Figure 6: Open the Clip



The card can be placed in either of two available slots.

4. Expose the socket to be used for the new card.
 - a. When replacing an existing card, remove the card from the socket. Grab the card on the edge on the side with UPC number and pull up while gently rocking the card back and forth.
 - b. For a new installation remove the protective cover enclosing the socket for the card.

Figure 7: Protective Cover in Place



Figure 8: Remove the Cover

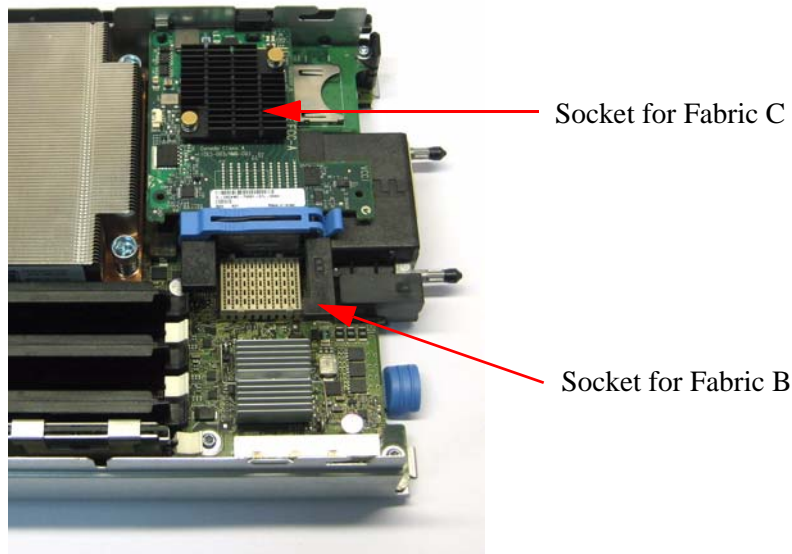
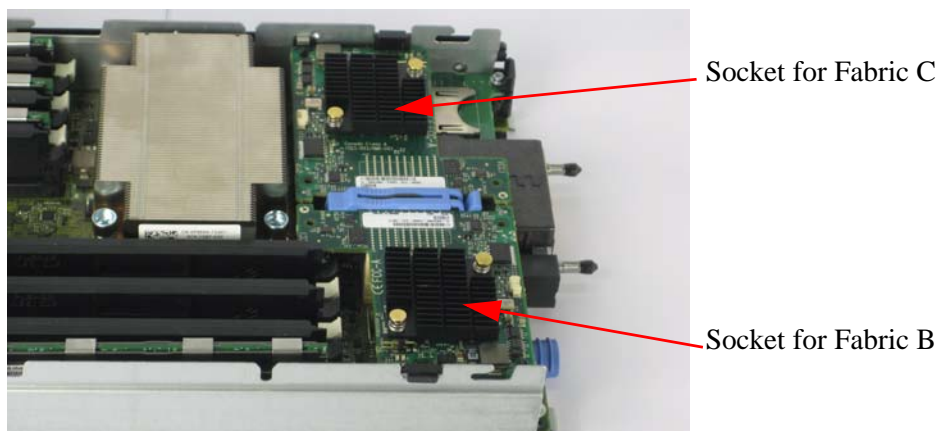
Hold the mezzanine I/O card by the edges only.

Line up the adapter card so that the pins of the adapter card are over the sockets in the blade server.

5. Plug the card into the socket by placing your thumb over the UPC symbol (see sample UPC below) and pressing down until the card reaches the bottom.

Figure 9: Press on the Card

6. Close the retaining clip.

Figure 10: Single Card in Slot C**Figure 11: Two Cards Installed**

7. Replace the blade server cover.
8. Replace the blade server into the chassis.

4.3 Fabric and Slot Connections

The Chassis can connect to 16 Servers, each server is connected to Fabric B and Fabric C through the switch and out to external fabric connections.

These cards can be used as:

- DDR IB
- QDR IB
- 10 Gb/s Ethernet switches

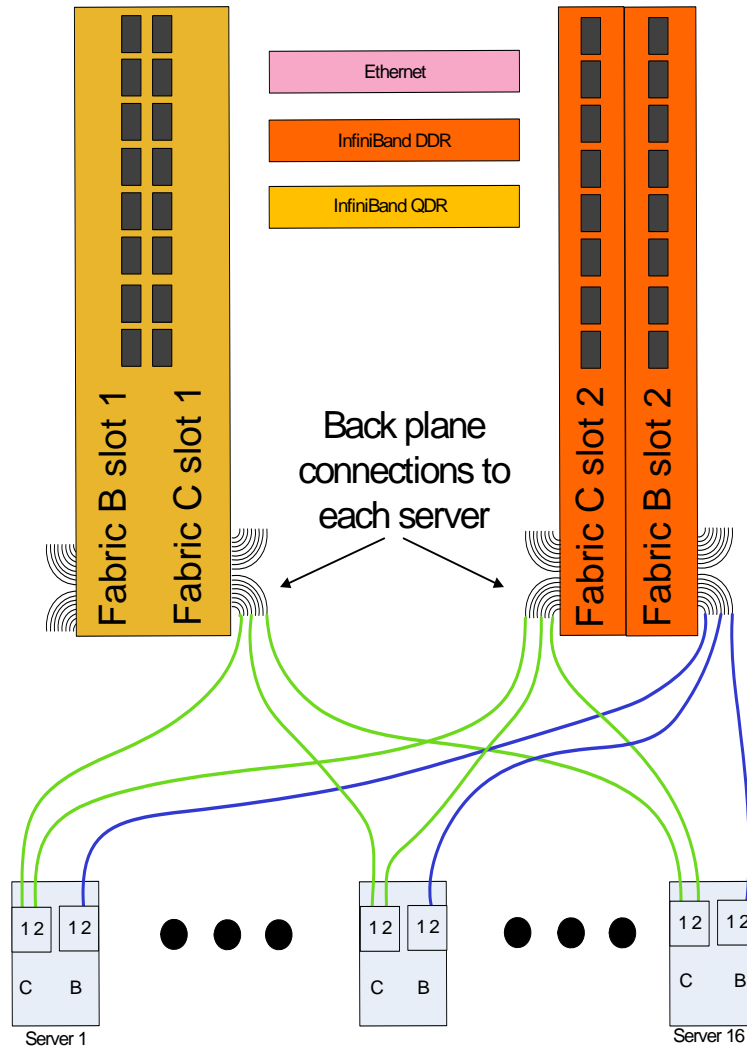
With DDR switches in slots B1, C1, C2, B2 the cards will work as 20 Gb/s IB HCA cards.

With Ethernet switches in slots B1, C1, C2, B2 the cards will work as 10 Gb/s NIC cards.

With QDR switches in slots B1 and C1, C2 and B2 the cards will work as 40 Gb/s IB HCA cards. In this configuration only one port for each card will be active.

This section has diagrams that show the possibilities regarding fabric and slot combinations that are allowed. This is especially important when using an M3601Q QDR switch. The M3601Q QDR switch physically takes up two slots. The two possible places for locating the M3601Q switch is in slots B1 and C1 or in slots C2 and B2. Even though the QDR switch takes up two slots physically, it is only connected to the fabric on the right side slot of the two slots. The implications of this are that the left side fabric of the two slots wherein the QDR switch is inserted, is not connected to any of the servers. The diagrams below show possible configurations of switches, fabrics and servers. The view is of the back of the chassis.

Configuration for QDR IB switch in slots B1 and C1 and 2 IB switches in Slots C2 and B2.



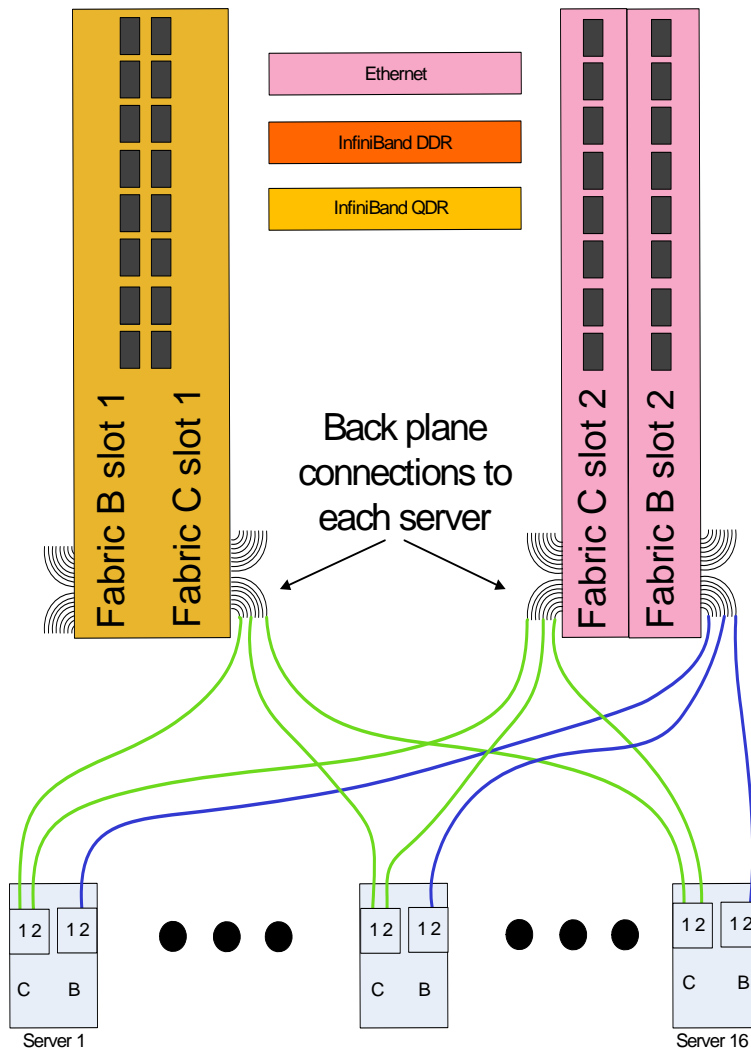
When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

The M3601Q switch physically takes up two slots but is only connected to the right side slot.

With an M3601Q in slots B1C1 Fabric B is unavailable in slot 1.

An IB DDR Switch is in slot C2
An IB DDR Switch is in slot B2

Configuration for QDR IB switch in slots C1 and B1 and 2 EN switches in slots C2 and B2.



When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

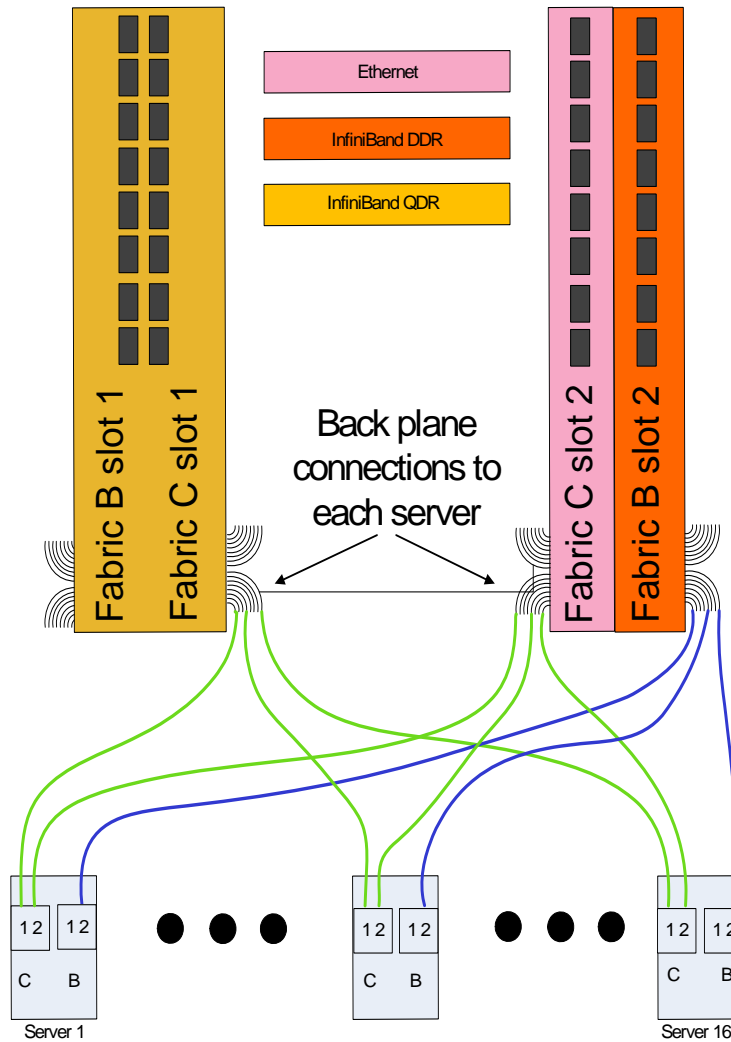
The M3601Q switch physically takes up two slots but is only connected to the right side slot.

With an M3601Q in slots B1C1 Fabric B is unavailable in slot 1.

An Ethernet DDR Switch is in slot C2

An Ethernet DDR Switch is in slot B2

Configuration for QDR IB switch in slots C1 and B1 and 1 EN switch in slot C2 and 1 IB switch in slot B2.



When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

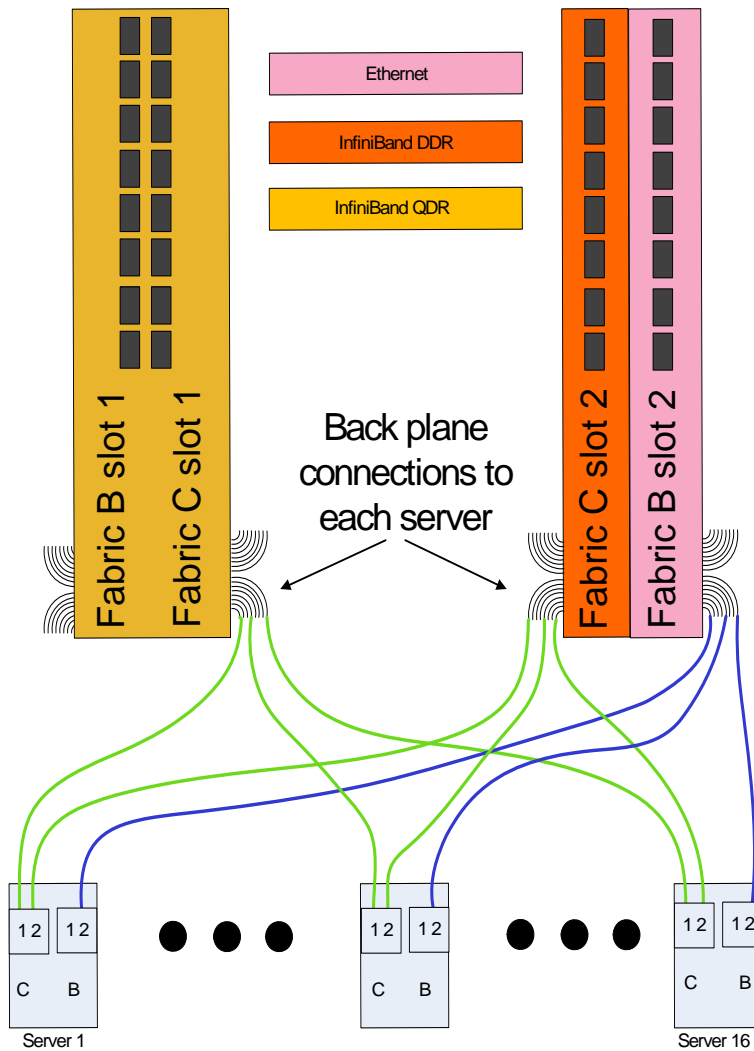
The M3601Q switch physically takes up two slots but is only connected to the right side slot.

With an M3601Q in slots B1C1 Fabric B is unavailable in slot 1.

An Ethernet DDR Switch is in slot C2

An IB DDR Switch is in slot B2

Configuration for QDR IB switch in slots C1 and B1 and 1 IB switch in slot C2 and 1 EN switch in slot B2.



When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

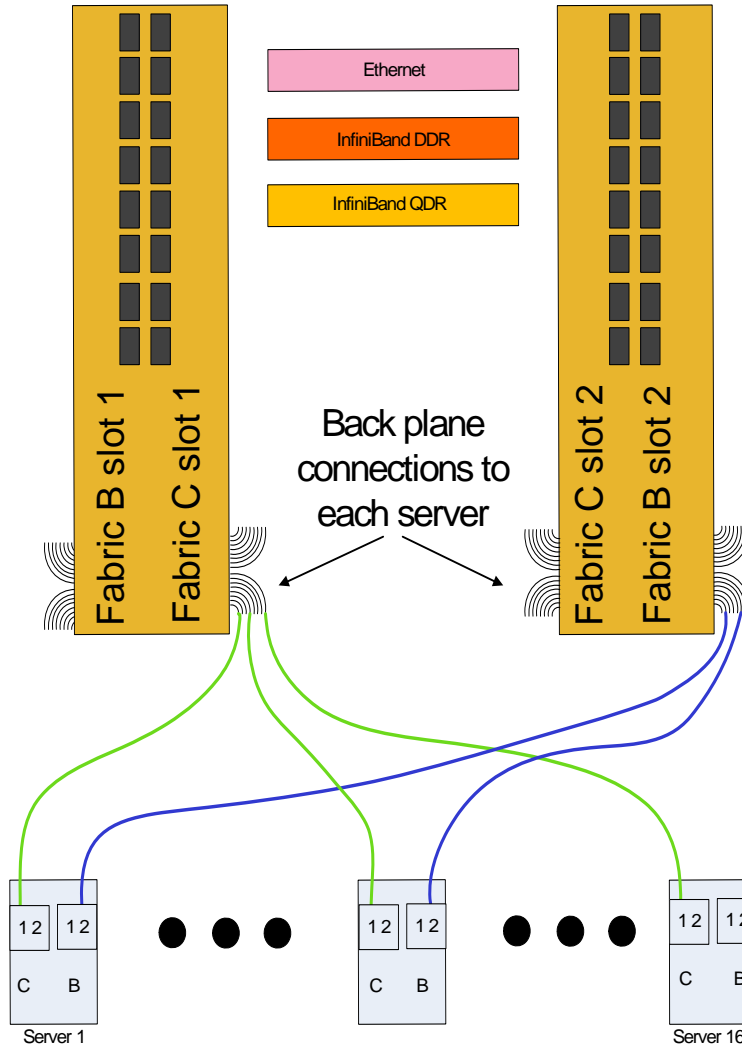
The M3601Q switch physically takes up two slots but is only connected to the right side slot.

With an M3601Q in slots B1C1 Fabric B is unavailable in slot 1.

An IB DDR Switch is in slot C2

An Ethernet Switch is in slot B2

Configuration for QDR IB switch in slots C1 and B1 and another QDR IB switch in slots C2 and B2.



When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

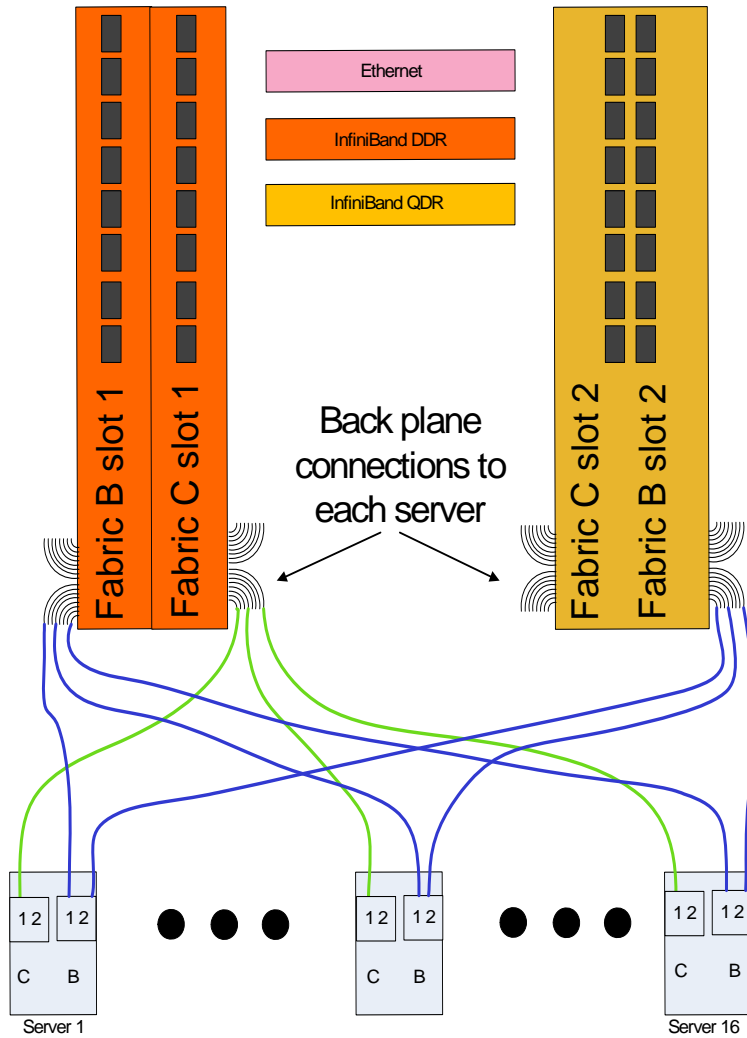
The M3601Q switch physically takes up two slots but is only connected to the right side.

With an M3601Q in slots B1C1 Fabric B is unavail-

An IB QDR Switch is in Slots C2 B2

With an M3601Q in slots C2 B2 Fabric C is unavailable in slot 2.

Configuration for 1 IB switch in slot C1, 1 IB switch in slot B1 and an IB QDR switch in slots C2 and B2.



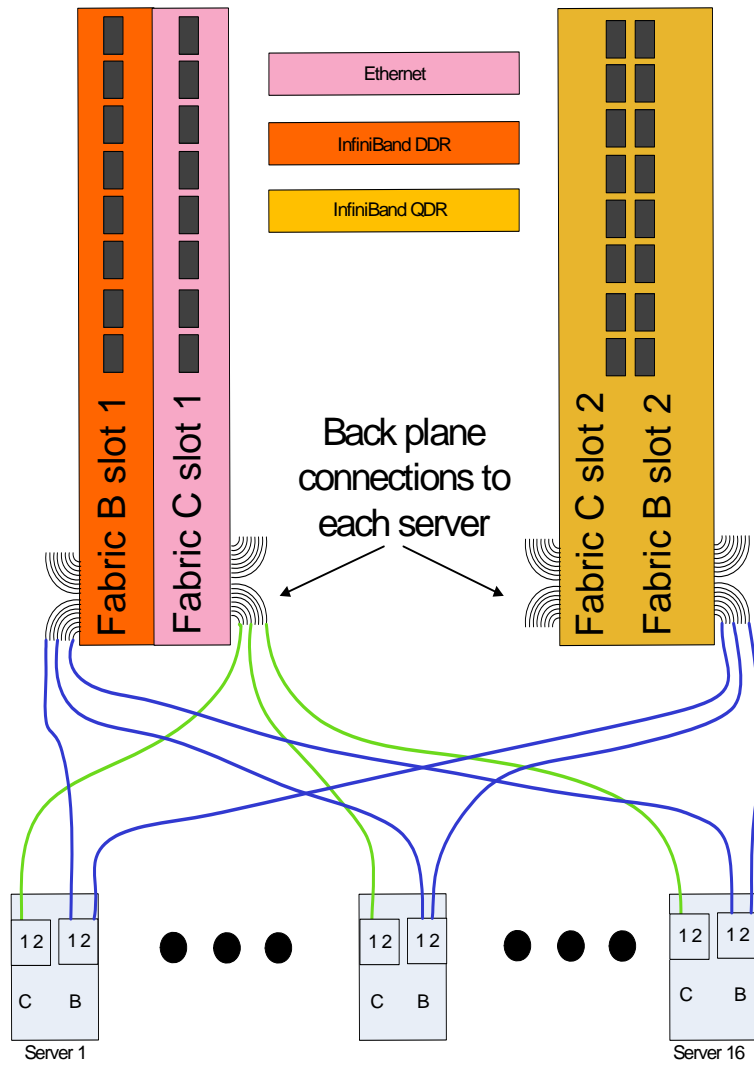
An IB DDR Switch is in slot B1
 An IB DDR Switch is in slot C1

When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.

The M3601Q switch physically takes up two slots but is only connected to the right side slot.

With an M3601Q in slots C2 B2 Fabric C is unavailable in slot 2.

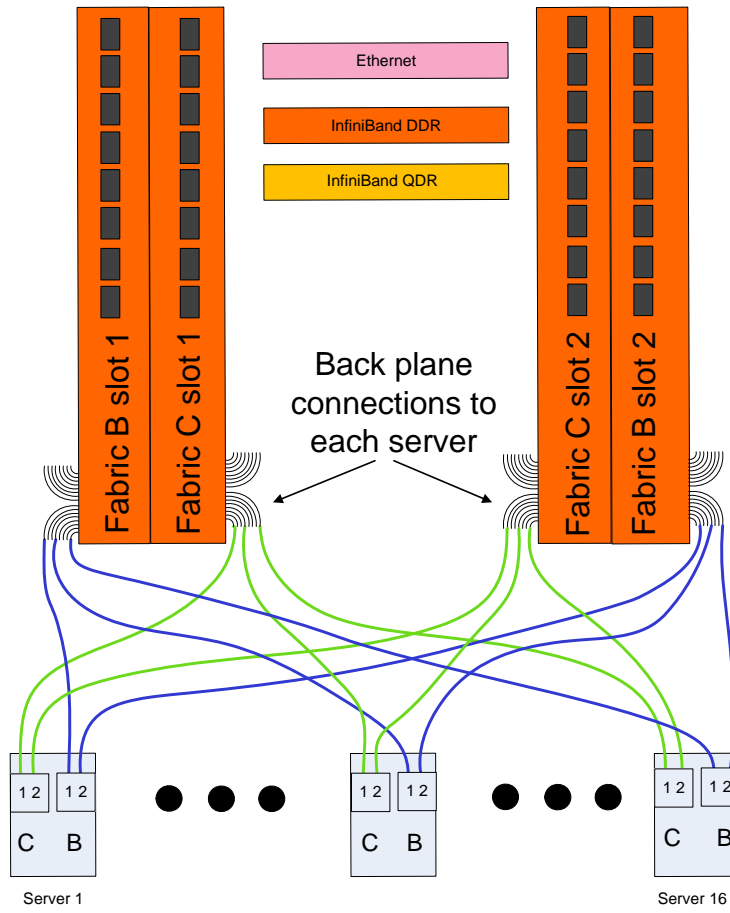
Configuration for 1 IB switch in slot B1, 1 EN switch in slot C1 and an IB QDR switch in slots C2 and B2.



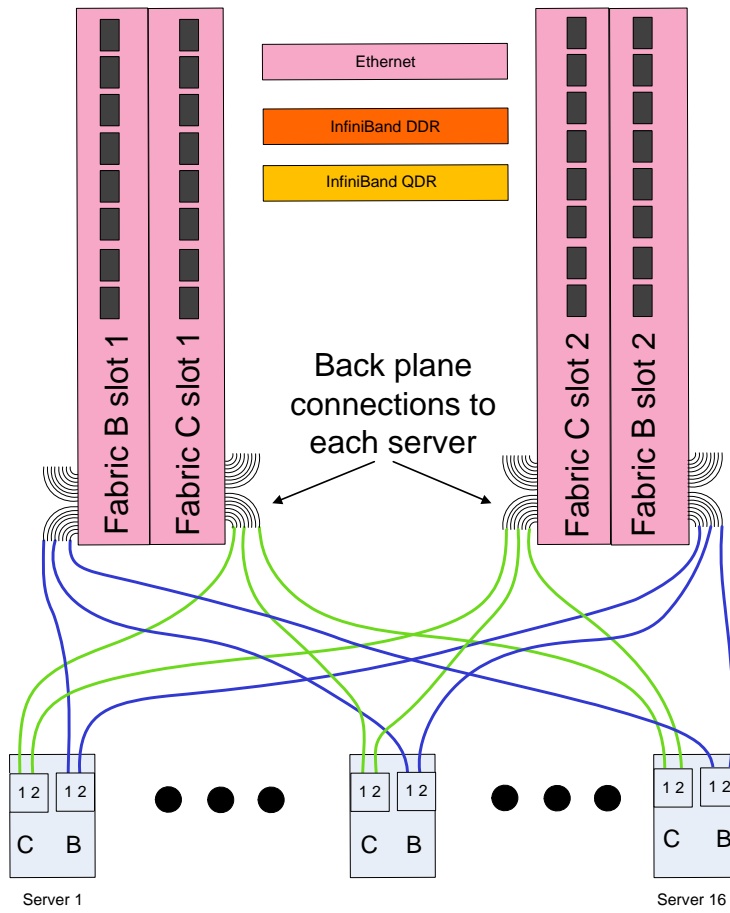
An IB DDR Switch is in slot B1
 An Ethernet Switch is in slot C1
 When Slot 2 Contains an IB switch, the corresponding Slot 1 for the same Fabric Must be IB.

When using an M3601Q- QDR switch there is no connection to the left side fabric of the slot.
 The M3601Q switch physically takes up two slots but is only connected to the right side slot.
 With an M3601Q in slots C2 B2 Fabric C is unavailable in slot 2.

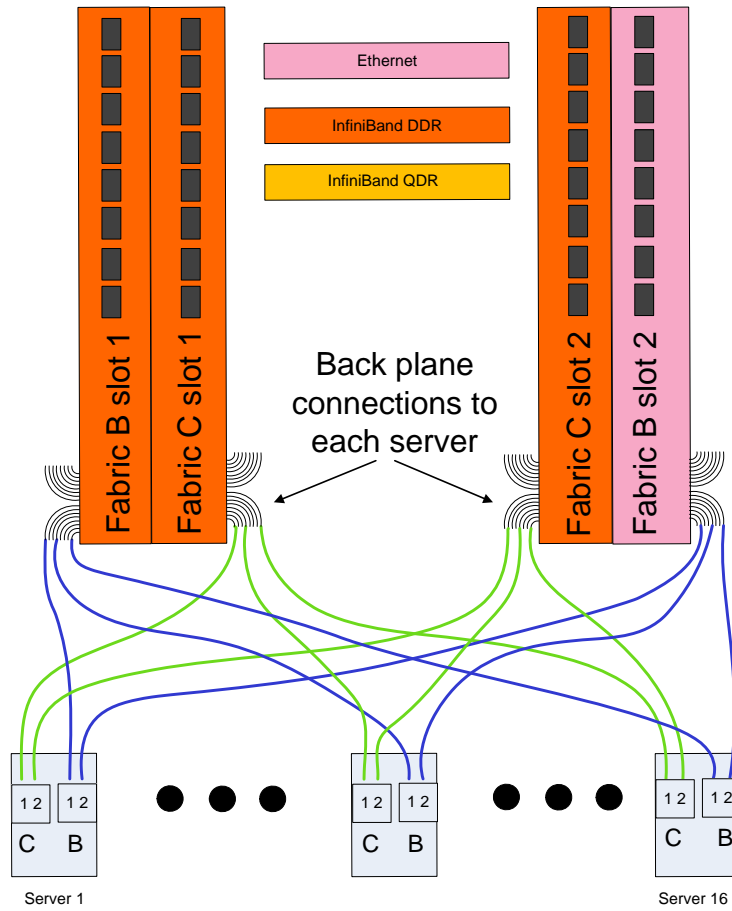
Configuration for 4 IB switches one in each slot C1, B1, C2 and B2.



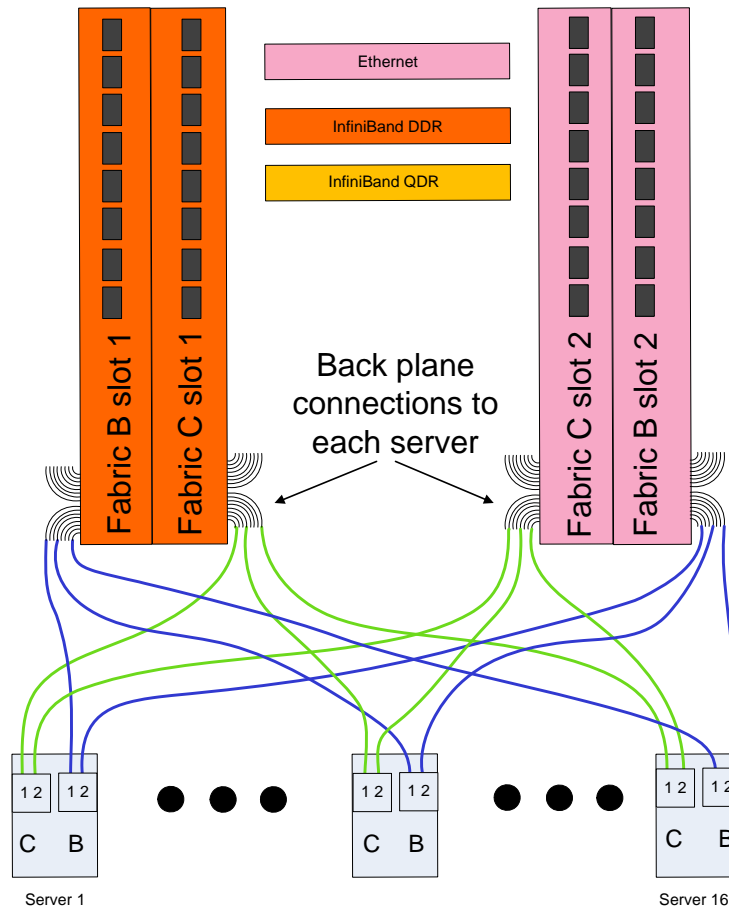
Configuration for 4 EN switches one in each slot C1, B1, C2 and B2.



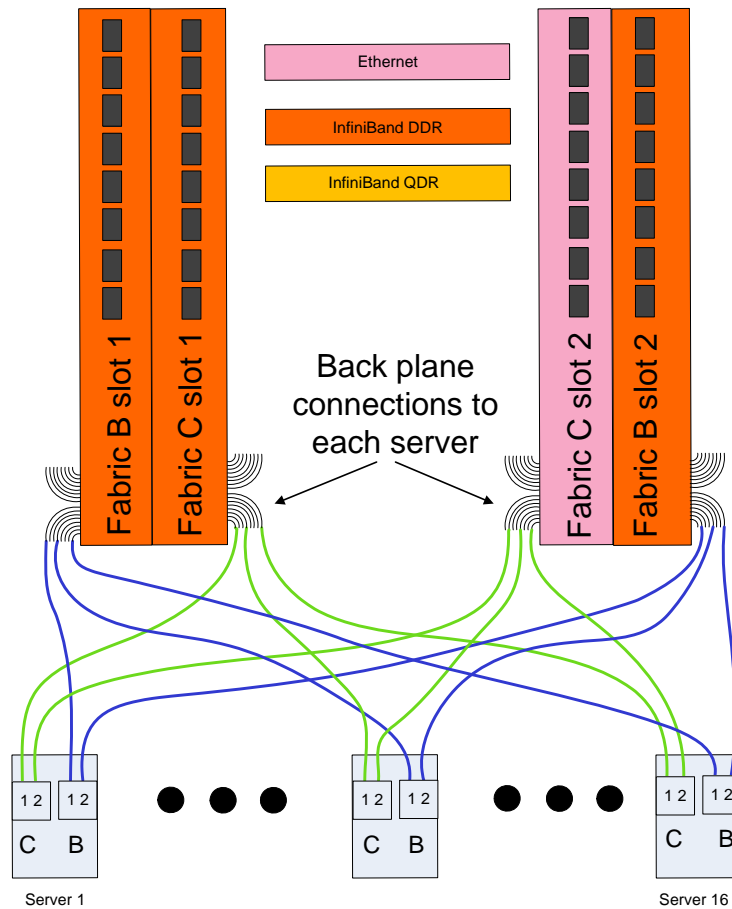
Configuration for 3 IB switches in slots C1, B1, C2 and 1 EN switch in slot B2.



Configuration for 2 IB switches in slots C1, B1, and 2 EN switches in slots B2 and C2.



Configuration for 3 IB switches in slots C1, B1, and B2 and 1 EN switch in slot C2.



4.4 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: 55°C (131°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. Lightening – 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.

Appendix A: Specifications

A.1 Board Mechanical Drawing and Dimensions

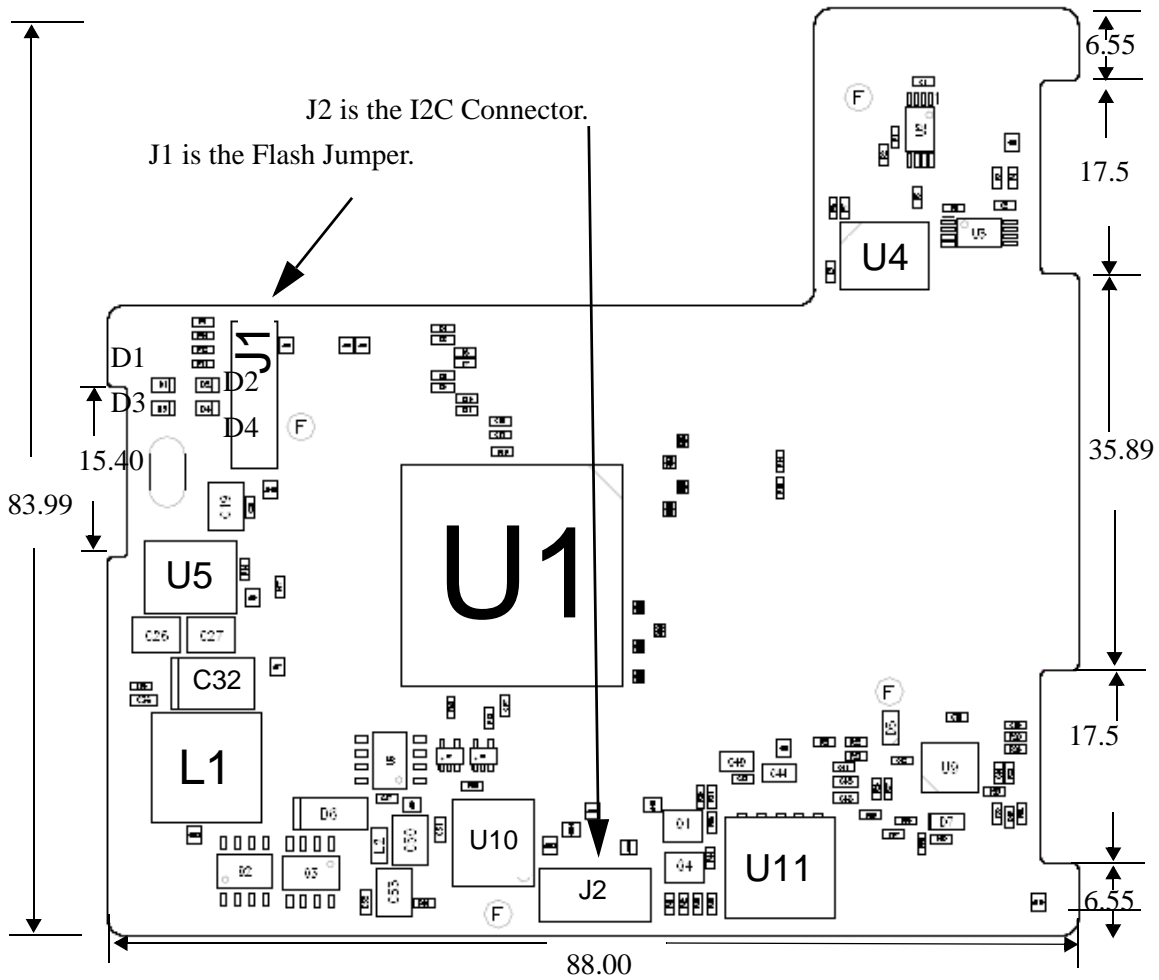
The ConnectX-2 VPI Mezzanine I/O card mechanical drawing is depicted in Figure .

Note: All dimensions are in millimeters.

J1 is the I2C Connector.

J2 is the flash jumper.

Figure 12: ConnectX-2 MCQH29B-XCC SFF Mezzanine I/O card



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

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 KCC Notice (Republic of Korea Only)

The KCC 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.

KCC 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 8 - ConnectX-2 MCQH29B-XCC Specifications

Physical		Power and Environmental	
Size:	88.00mm X 83.99 mm	Voltage:	12V, 3.3V
		Typ Power:	10.704 W
		Maximum Power:	12.276 W
		Temperature:	0°C to 55°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
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ap Backplanes, including FEC	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: KCC Class A Australia/ New Zealand: C-Tick Class A
QoS:	Multicast and Jumbo Frame Support		
RDMA Support:	8 InfiniBand Virtual Lanes for each port		
Data Rate:	Yes, All Ports		
PCI Express	QDR Base 2.0 compliant, backwards compatible with 1.1		

Table 9 - ConnectX-2 MCGH29B-XCC Specifications

Physical		Power and Environmental	
Size:	88.00mm X 83.99 mm	Voltage:	12V, 3.3V
		Typ Power:	TBD W
		Maximum Power:	TBD W
		Temperature:	0°C to 55°C
Protocol Support		Regulatory	

Table 9 - ConnectX-2 MCGH29B-XCC Specifications

Physical		Power and Environmental	
InfiniBand:	IBTA v1.2, Auto-Negotiation 10, 20, or 40Gb/s per port	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB
Ethernet:	IEEE Std 802.3ae 10 Gigabit Ethernet IEEE Std 802.3ap Backplanes, including FEC	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: KCC Class A Australia/ New Zealand: C-Tick Class A
QoS:	8 InfiniBand Virtual Lanes for each port		
RDMA Support:	Yes, All Ports		
Data Rate:	DDR		
PCI Express	Base 2.0 compliant, backwards compatible with 1.1		

Appendix B: 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 55°C (131°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. Elimination 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 C: 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 55°C (131°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.