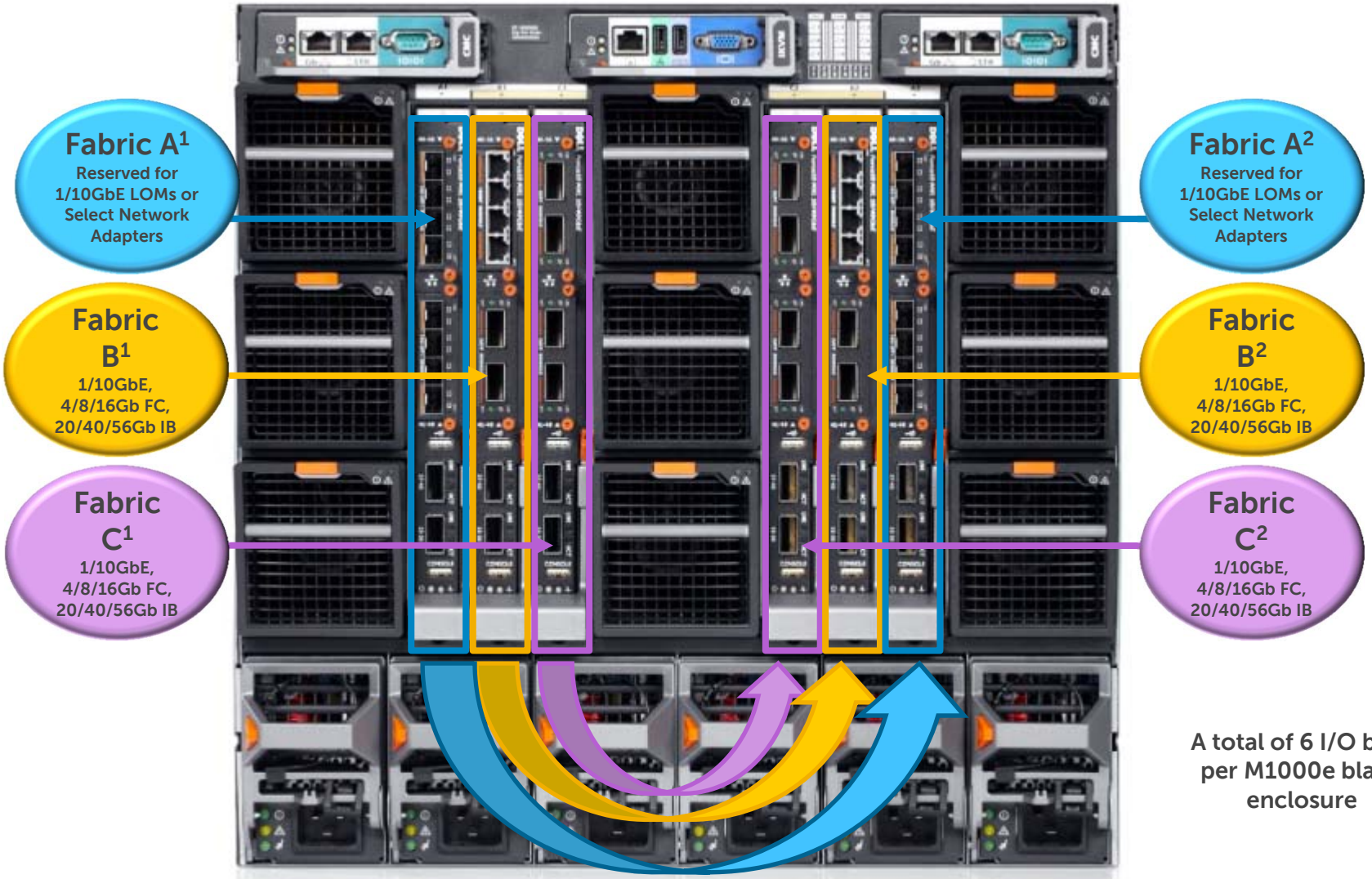
M-Series I/O Guide

I/O Connectivity Options for M1000e and M-Series Blades

January 2013

PowerEdge M1000e
Redundant I/O Modules View



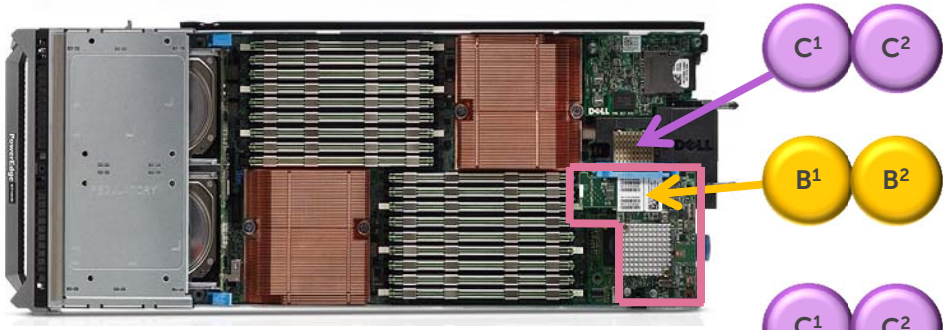
A total of 6 I/O bays per M1000e blade enclosure

Redundant I/O modules provide high-availability

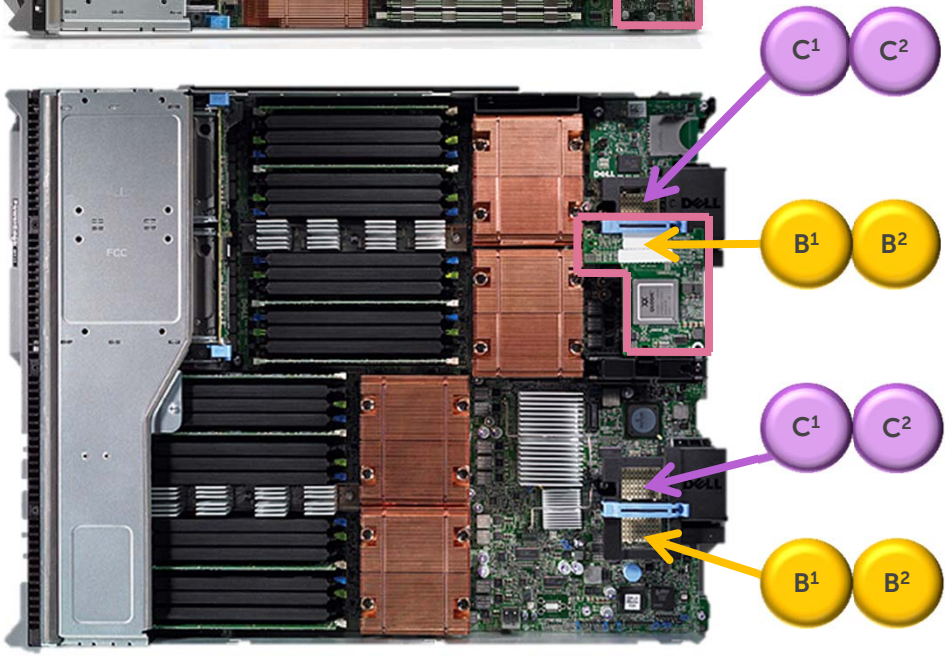
M-Series Blade I/O Fabrics

Quarter Height

Half Height



Full Height



Quarter Height Blades

One dual port LOM

- IOM with 32 internal ports (M6348 or Dell Force10 MXL) is needed to connect all LOM ports on all blades
- 2 x 32 port IOMs needed to connect the 2 LOM ports on each blade

One fabric B OR fabric C mezzanine card

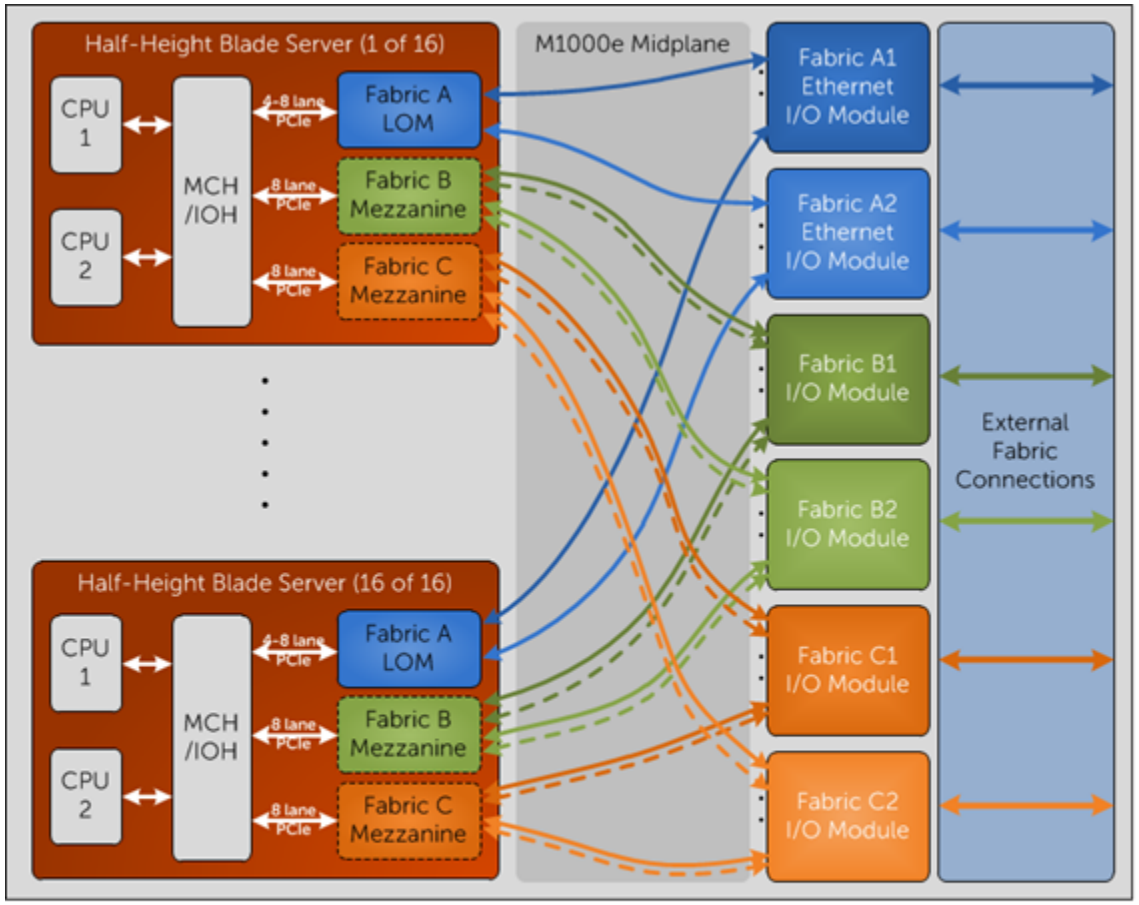
Half Height Blades

One Select Network Adapter or LOM
One fabric B mezzanine card
One fabric C mezzanine card

Full Height Blades

Two Select Network Adapters or LOMs
Two fabric B mezzanine cards
Two fabric C mezzanine cards

I/O Fabric Architecture for Half-Height Blades



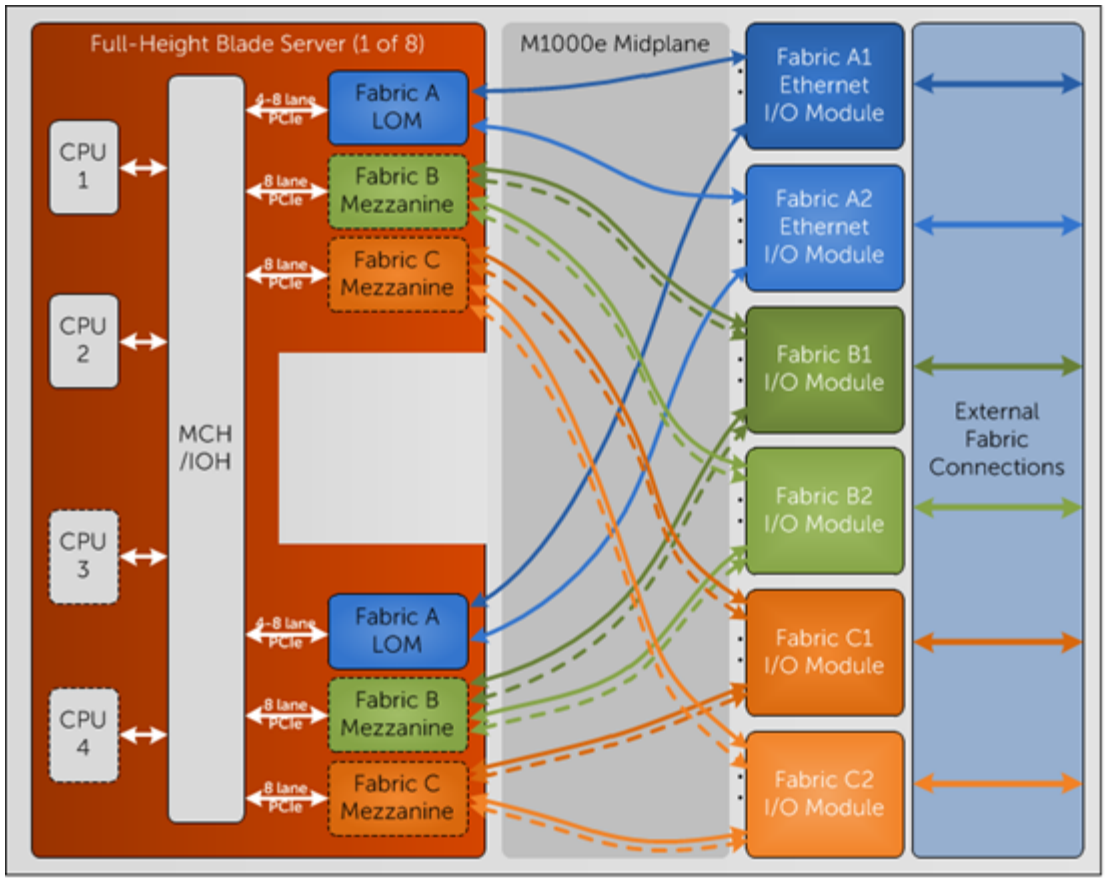
Fabric A:

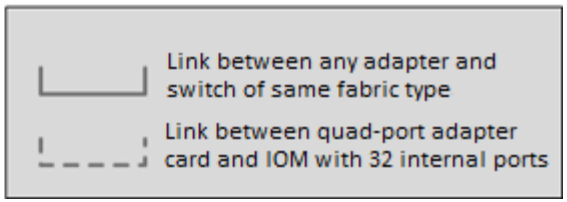
- Dedicated to LOMs (2 ports/blade) or Select Network Adapters (2-4 ports/blade)
- Each port links to separate I/O modules for redundancy
- Reserved for 1/10Gb Ethernet (including iSCSI &/or FCoE)

Fabrics B and C:

- Customizable for Ethernet (including iSCSI &/or FCoE), Fibre Channel, &/or InfiniBand
- Two I/O Mezzanine cards per half height blade
- 2 or 4 ports per I/O mezzanine card
- Each card has ports links to separate I/O modules for redundancy

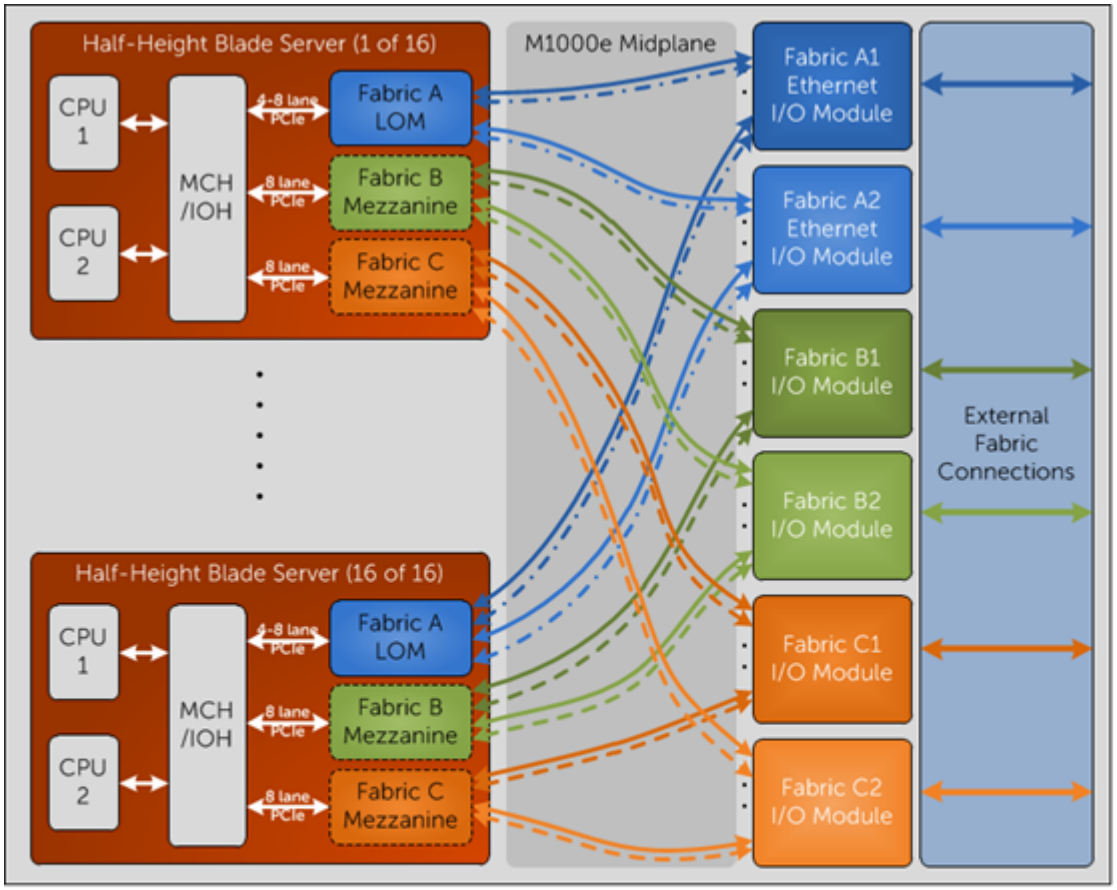
I/O Fabric Architecture for Full-Height Blades

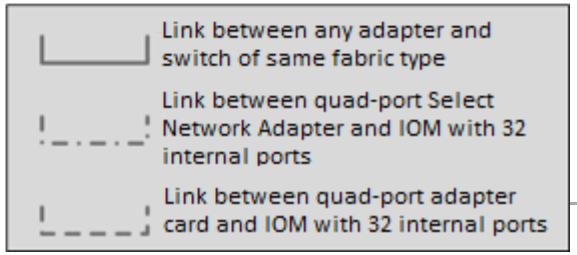




- Same fundamental architecture as half-height blades, but twice the mezz slots, twice the ports, and twice the bandwidth
- Each full height blade can have two physical connections to each I/O module
- I/O not dependent on number of processors

I/O Fabric Architecture with Quad-Port Mezz Cards for Maximized Port Count

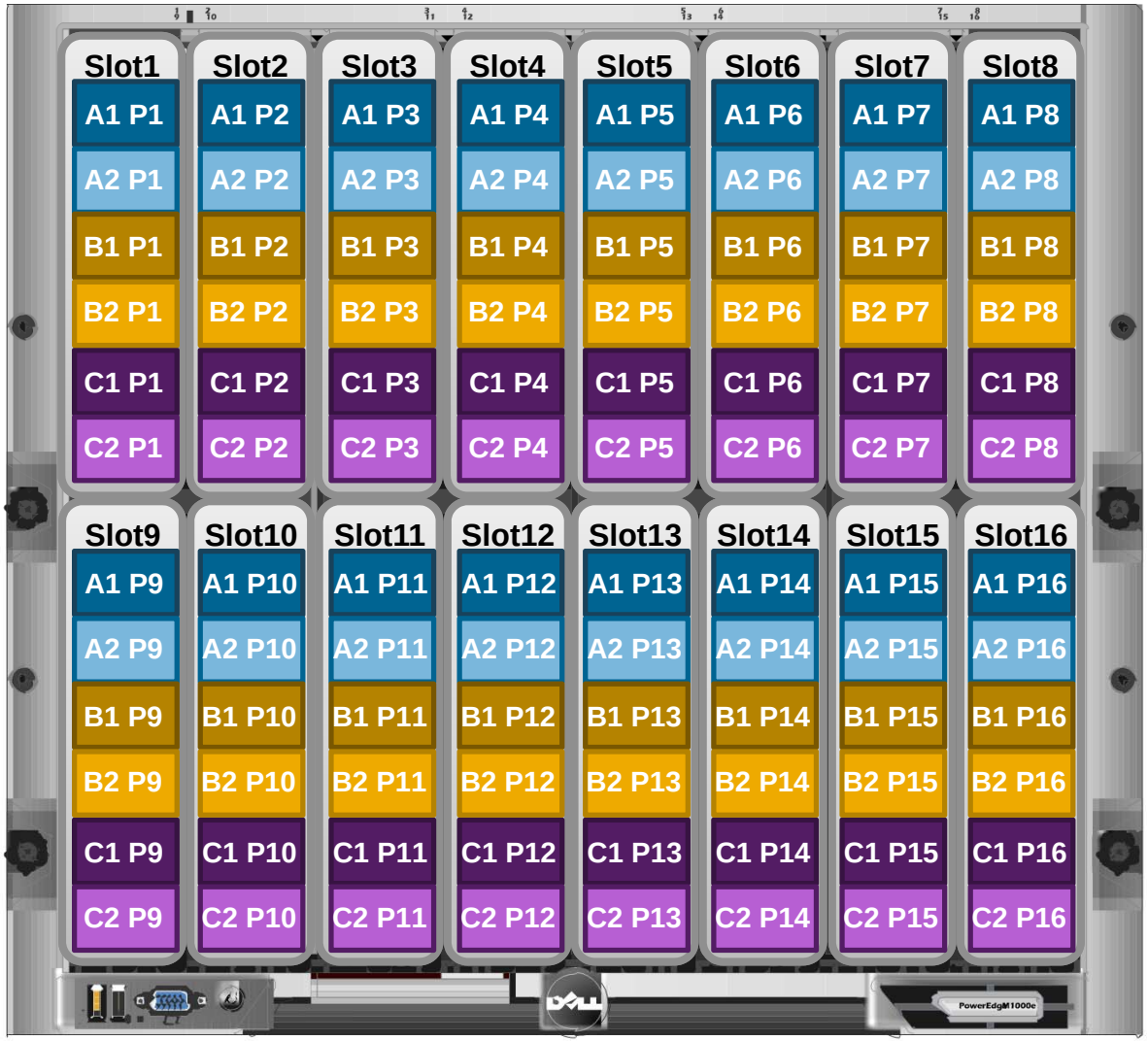




- Up to 12x 1GbE ports out of each half-height blade
- Up to 20x 1GbE ports out of each full-height blade
- Excellent for virtualization solutions built on physical GbE ports
- Unmatched port count in the industry
- Utilize Broadcom or Intel quad-port adapters with M6348 high port-count I/O Modules

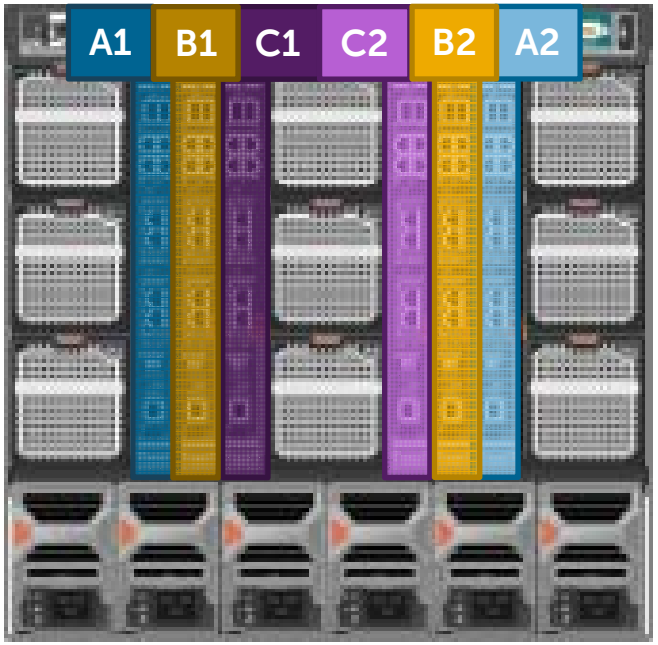
Port Mapping of Half Height blades to six IOMs with 16 or 32 Internal Ports

IOM ports mapped to half height blade slots



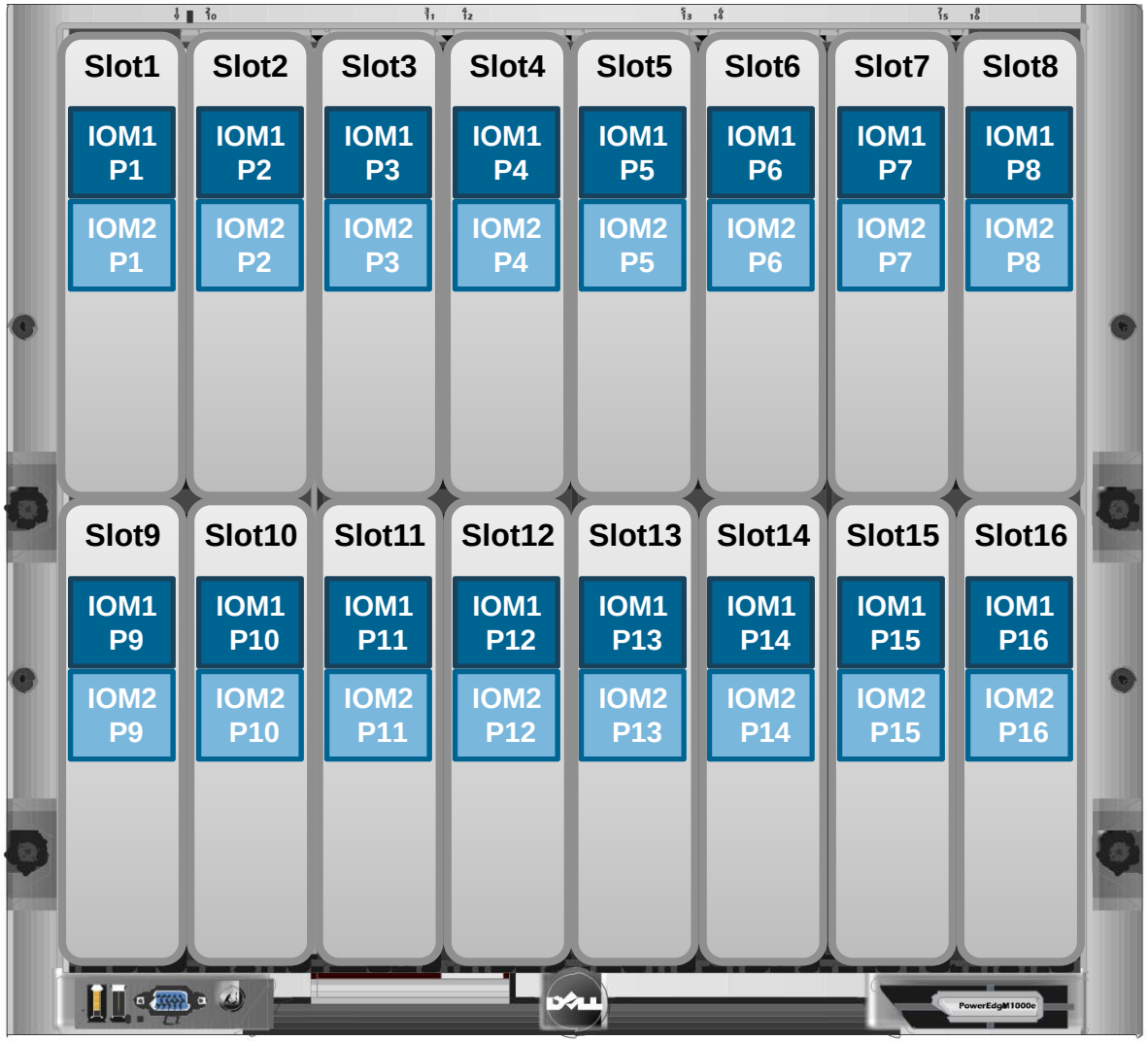
- Six IOMs with 16 or 32 internal ports provide redundant connectivity all LOM and mezzanine cards

IOM A1,A2,B1,B2,C1,C2

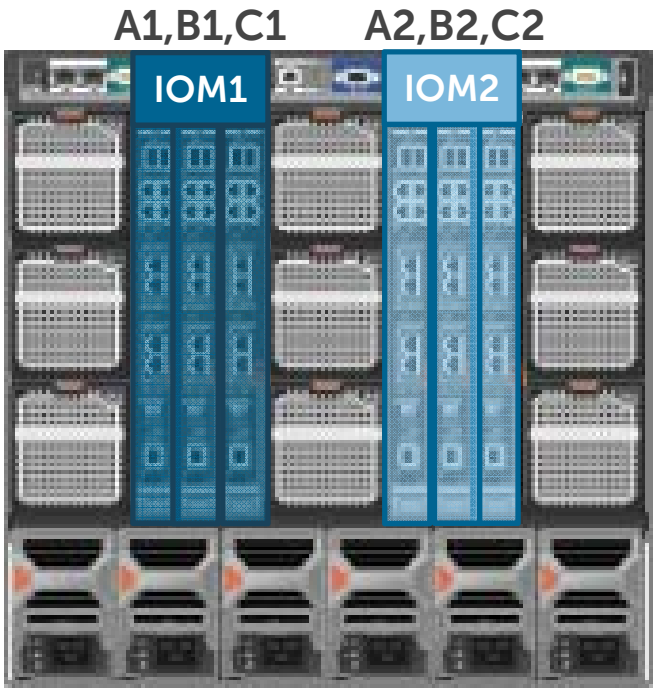


Port Mapping of Half Height blades with Dual Port Adapters to IOMs with 16 or 32 Internal Ports

IOM ports mapped to half height blade slots

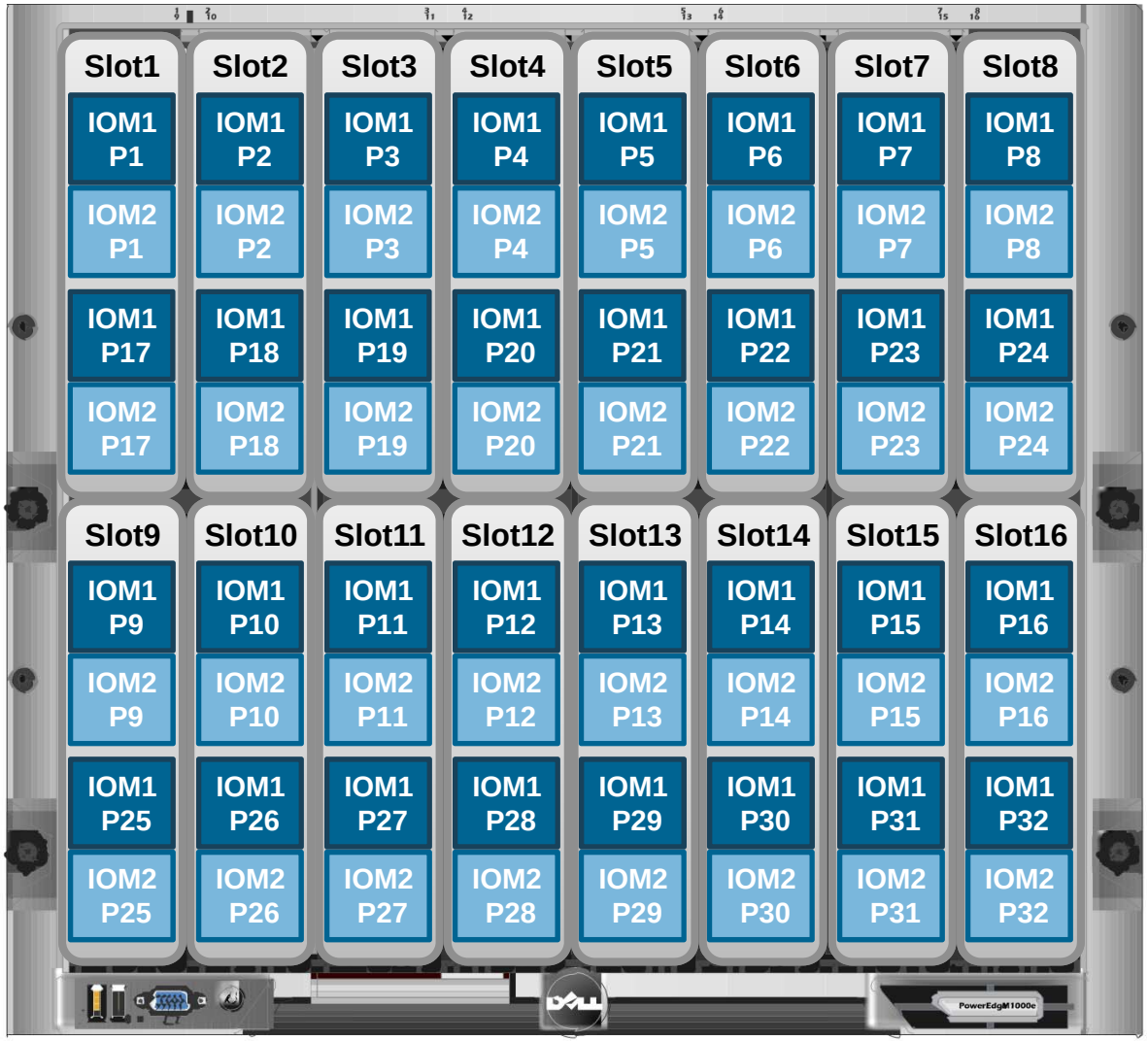


- All six IOMs have the same port mapping for half height blades
- Full Height blades have similar port mapping as half height blades

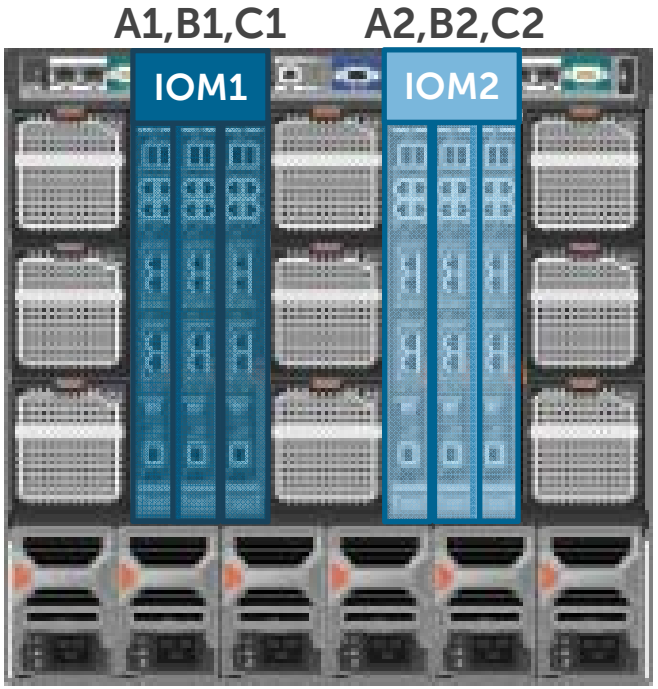


Port Mapping of Half Height blades with Quad Port Adapters to IOMs with 32 Internal Ports

IOM ports mapped to half height blade slots

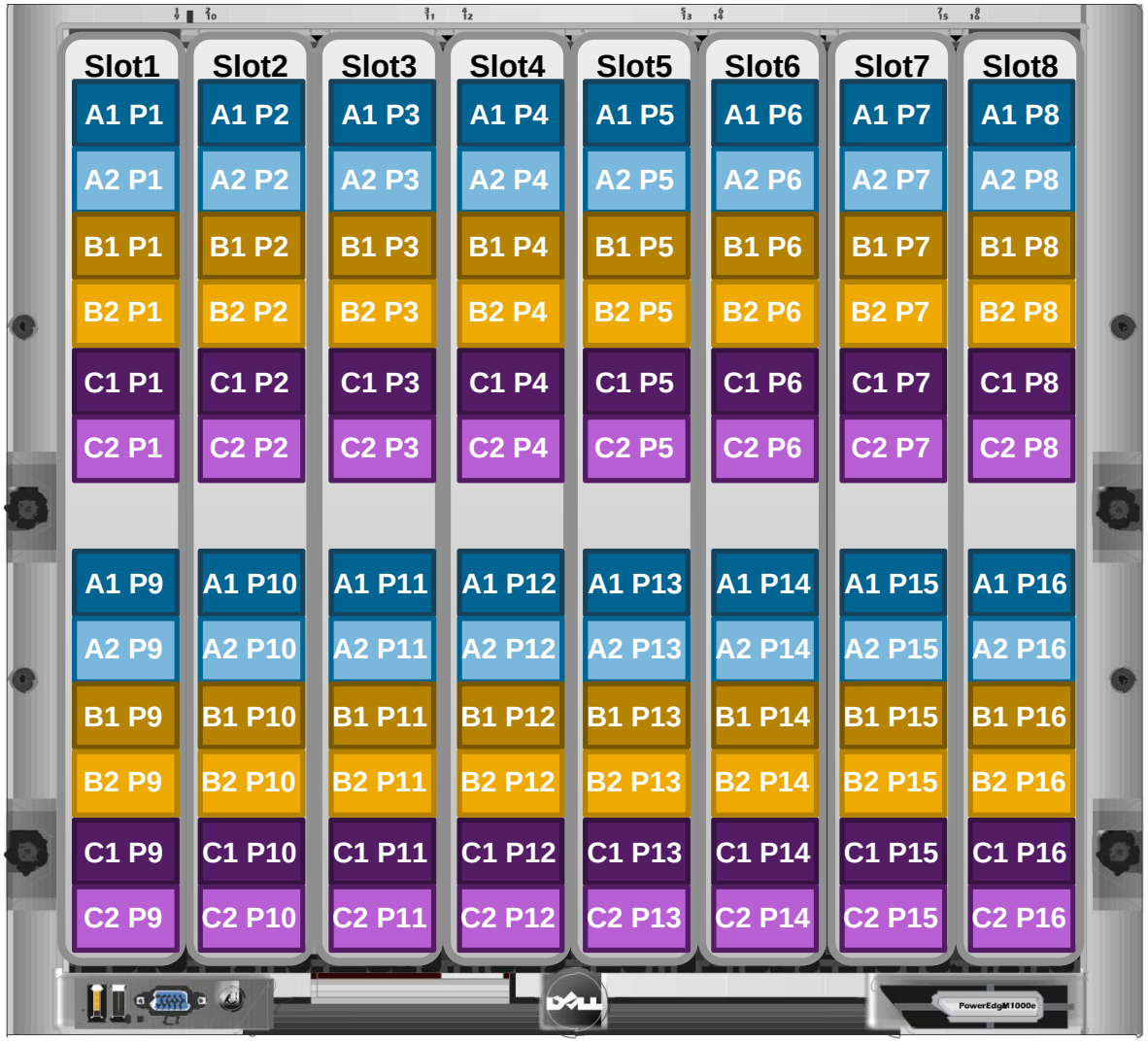


- An IOM with 32 internal ports is required to connect to all quad port adapters
- All six IOMs have the same port mapping for half height blades
- Full Height blades have similar port mapping as half height blades



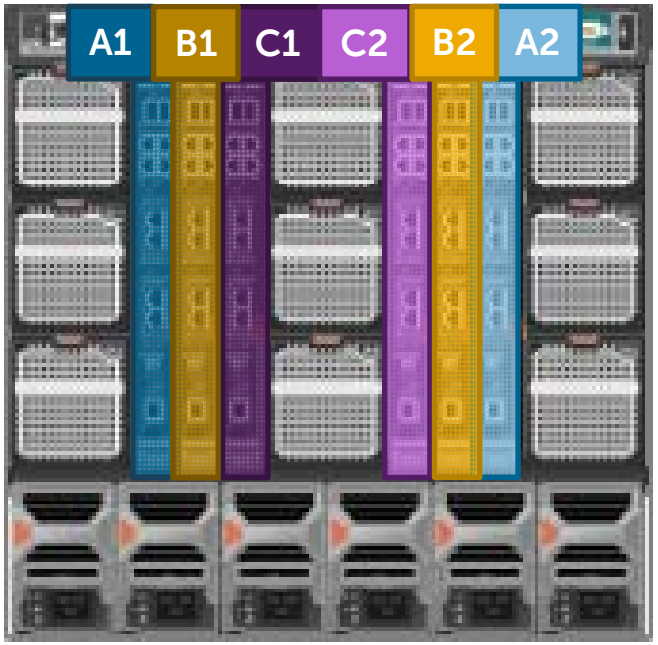
Port Mapping of Full Height blades to six IOMs with 16 or 32 Internal Ports

IOM ports mapped to half height blade slots



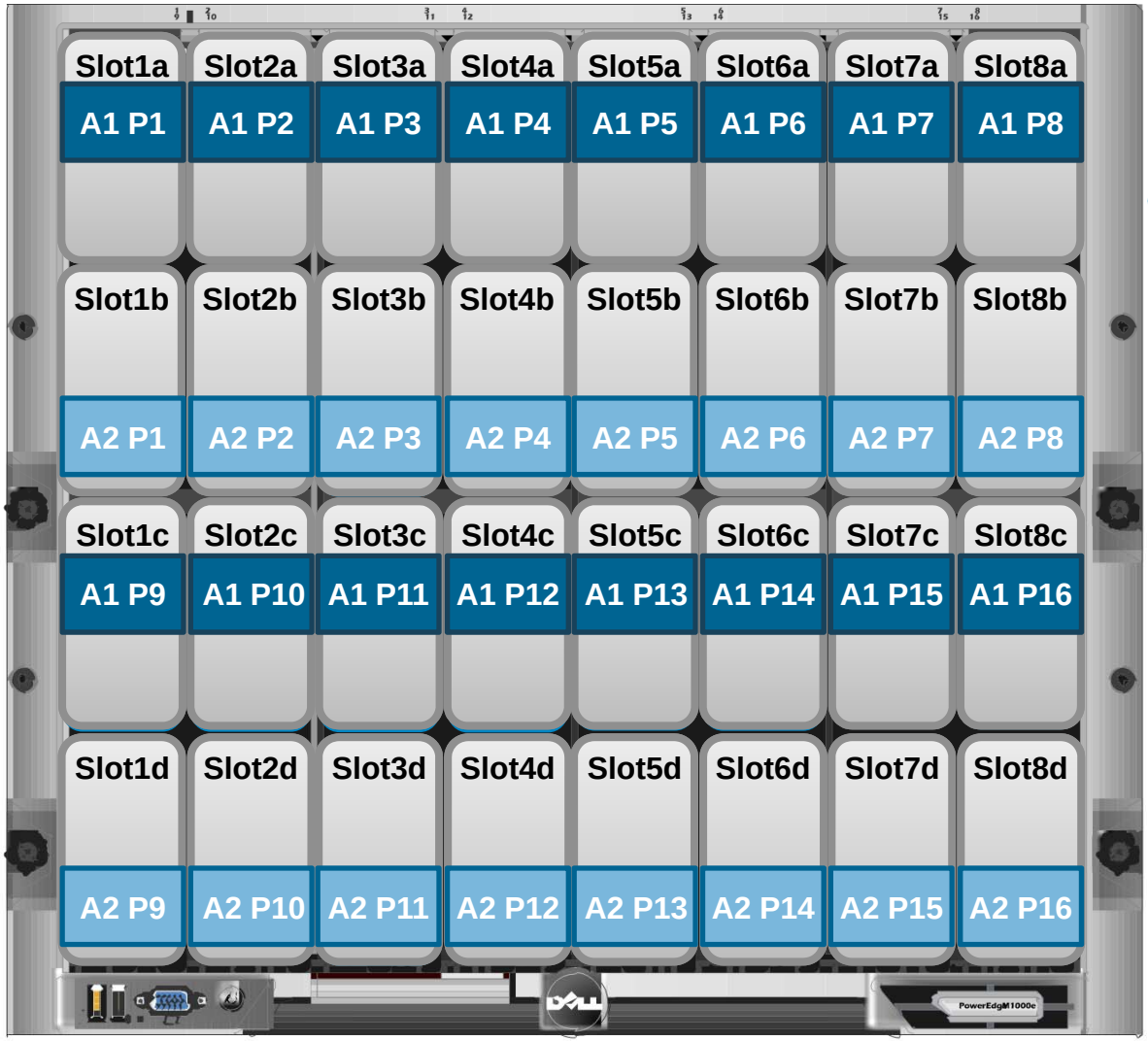
- Six IOMs with 16 or 32 internal ports provide redundant connectivity all LOM and mezzanine cards

IOM A1,A2,B1,B2,C1,C2



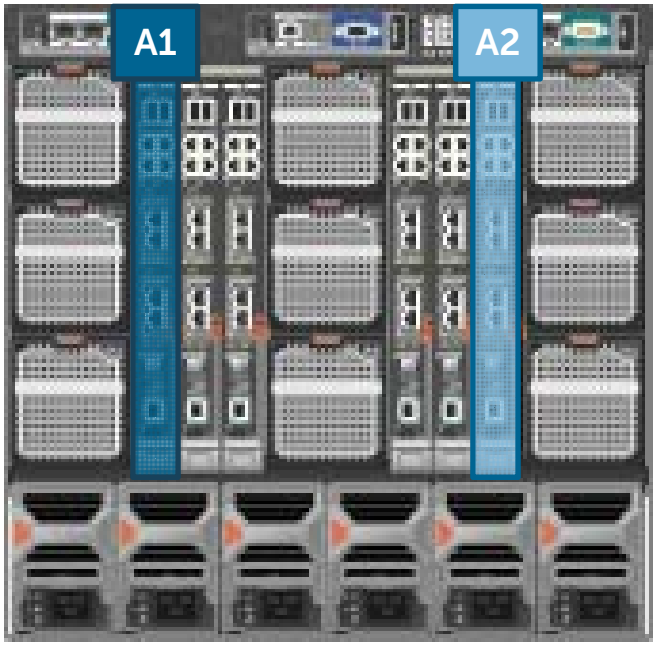
Port Mapping of Quarter Height blades to two IOMs with 16 Internal Ports on Fabric A:
No LOM Port Redundancy

IOM ports mapped to quarter height blade slots



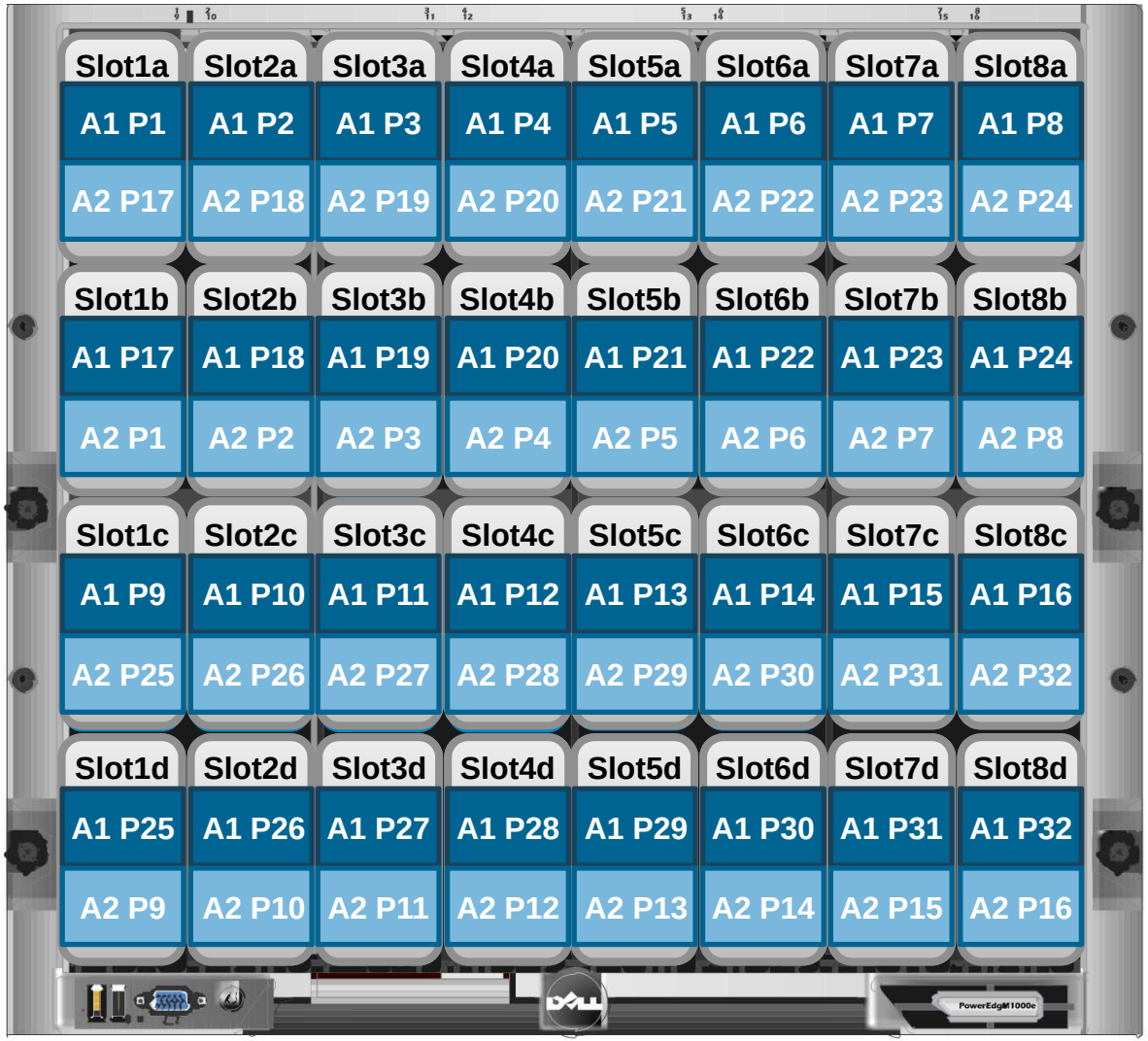
- On fabric A, two IOMs with 16 internal ports provide connectivity to one port of the LOM on each quarter height blade.
- Connectivity but not redundancy (only 1 LOM port per blade is connected)

IOM A1 and A2



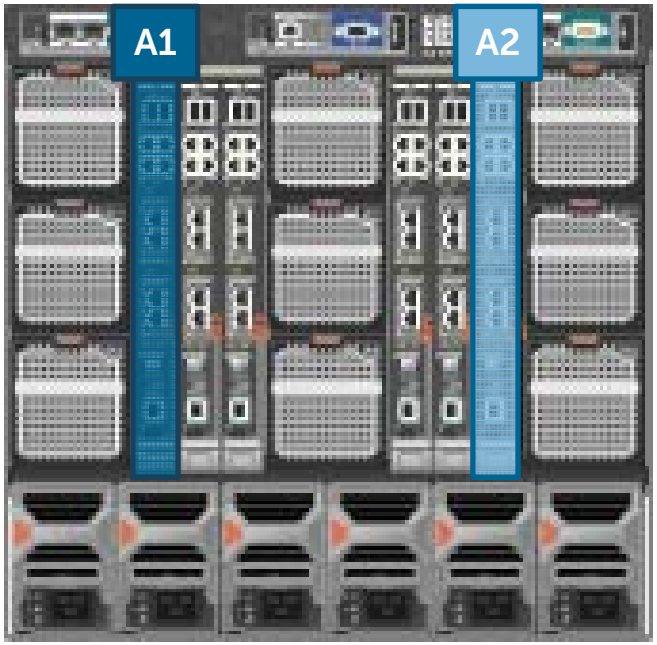
Port Mapping of Quarter Height blades to two IOMs with 32 Internal Ports on Fabric A:
Full LOM Port Redundancy

IOM ports mapped to quarter height blade slots



- On fabric A, two IOMs with 32 internal ports provide connectivity to two ports of the LOM on each quarter height blade.
- Full LOM port redundancy

IOM A1 and A2



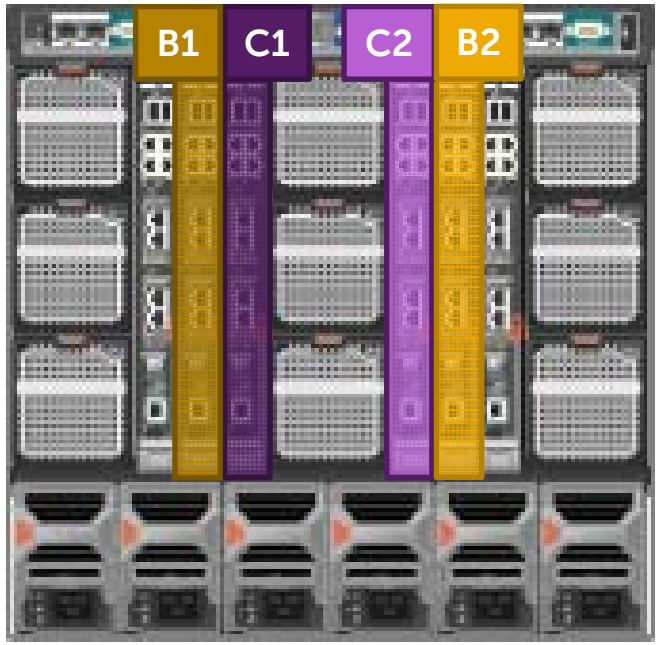
Port Mapping of Quarter Height blades to four IOMs on Fabric B&C:

Full Mezz Card Port Redundancy

IOM ports mapped to quarter height blade slots

- On fabric B&C, four IOMs provide full redundancy (connect all ports) to all mezzanine cards.

IOM B1,B2, C1 and C2



FlexAddress Plus

- **Cost Effective & Intelligent Network Addressing**
- CMC offers simple interface for enabling FlexAddress by chassis, by slot, or by fabric, assigning WWN/MAC values in place of factory-assigned WWN/MAC
- User-configurable enablement of iSCSI MAC, Ethernet MAC, and/or WWN Persistence which allows blades to be swapped without affecting SAN Zoning, iSCSI zoning, or any MAC-dependent functions
- FlexAddress Plus SD card provisioned with unique pool of 3136 MACs/WWNs

WWN/MAC Addresses — Slot 1: SLOT-01 ▲ Back to top

Location	Fabric	Server-Assigned	Chassis-Assigned
Note:	• This server is present • FlexAddress is enabled for this slot.		
iDRAC	Management	00:26:B9:FF:C3:A9	✔ 00:23:AE:59:70:0B
A1	Gigabit Ethernet	00:26:B9:FF:B4:88	✔ 00:23:AE:59:70:0C
	iSCSI	00:26:B9:FF:B4:89	✔ 00:23:AE:59:70:0D
	Gigabit Ethernet	00:26:B9:FF:B4:8C	✔ 00:23:AE:59:70:DE
	iSCSI	00:26:B9:FF:B4:8D	✔ 00:23:AE:59:70:DF
A2	Gigabit Ethernet	00:26:B9:FF:B4:8A	✔ 00:23:AE:59:70:0E
	iSCSI	00:26:B9:FF:B4:8B	✔ 00:23:AE:59:70:0F
	Gigabit Ethernet	00:26:B9:FF:B4:8E	✔ 00:23:AE:59:70:E0
	iSCSI	00:26:B9:FF:B4:8F	✔ 00:23:AE:59:70:E1
B1	None		
B2	None		
C1	None		
C2	None		

Original hardware-assigned MACs

FlexAddress-assigned MACs

M-Series I/O Modules

10/40GbE Converged

Dell Force10 MXL 10/40GE
PowerEdge M I/O Aggregator
PowerConnect M8024-k
Dell M8428-k
Pass Through-k
Cisco B22DELL FEX

4/8/16 Gb Fibre Channel

FC SAN Module
Brocade M5424
Pass Through FC8/4

1Gb & 1/10Gb Ethernet

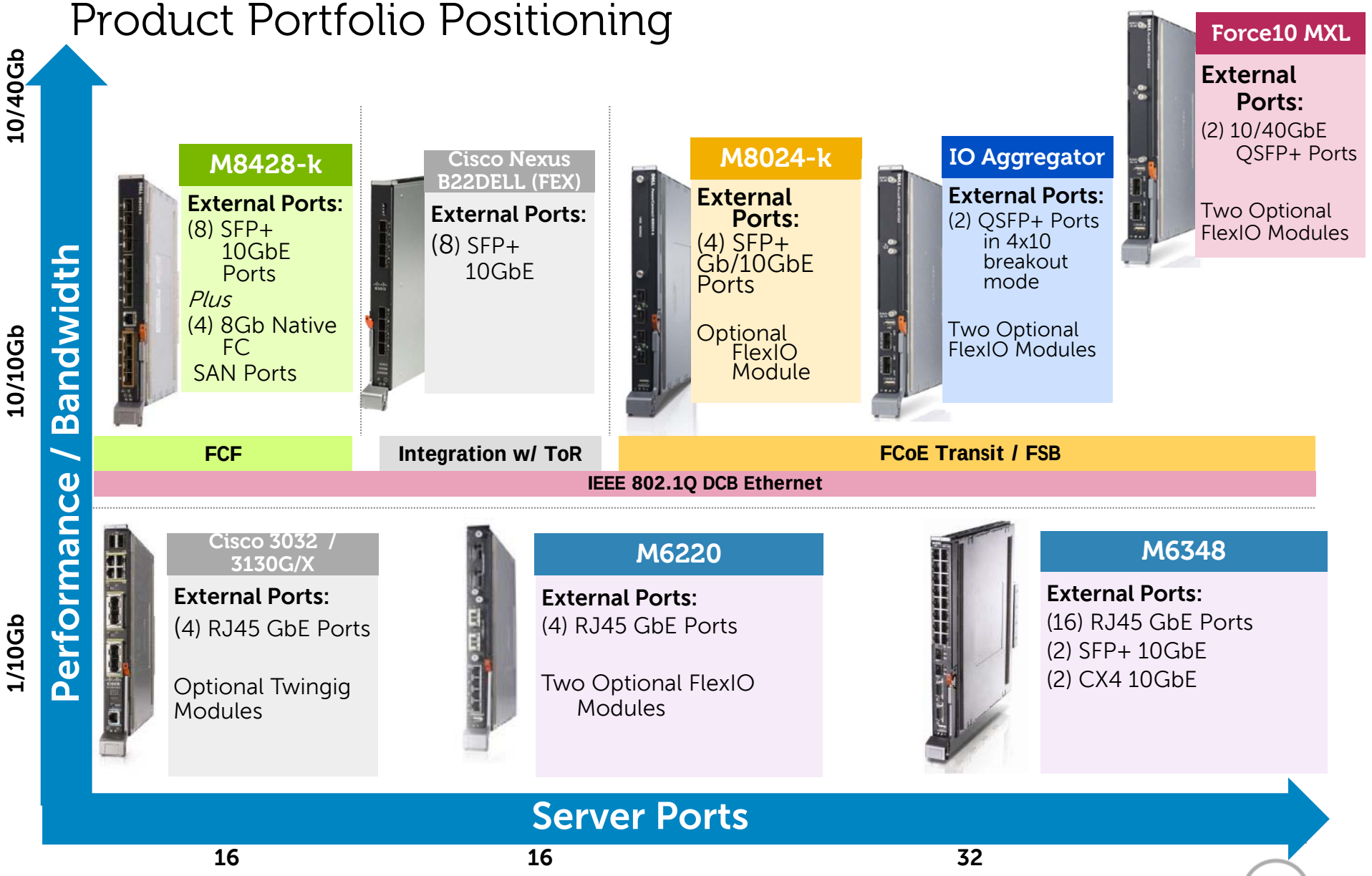
PowerConnect M6348
PowerConnect M6220
Pass Through 1/10GbE
Cisco Catalyst

FDR/QDR InfiniBand

Mellanox M4001F
Mellanox M4001T
Mellanox M4001Q

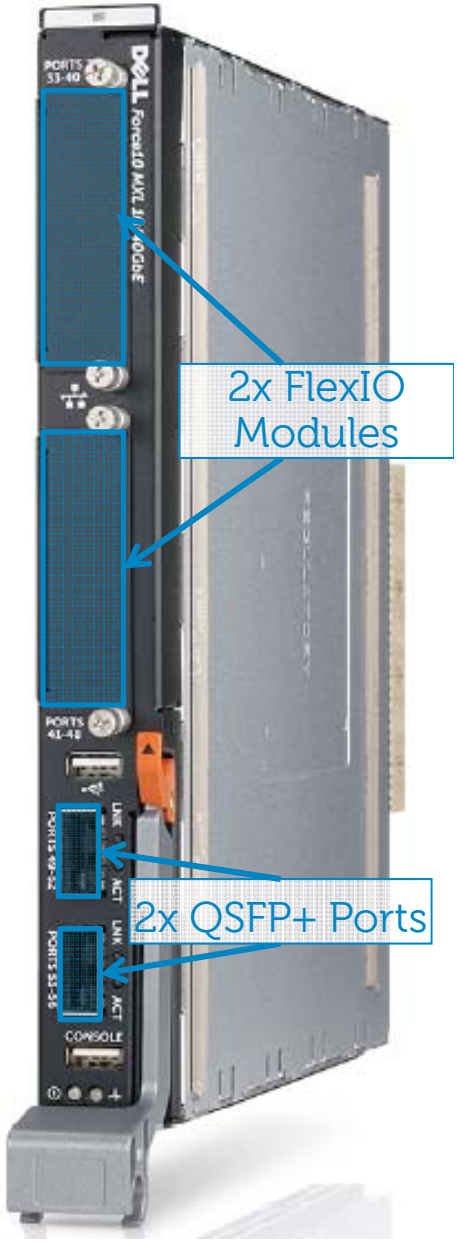
M-Series Ethernet Blade IOMs

Product Portfolio Positioning



Dell Force10 MXL 10/40GbE

- Industry leading 56 port design:
  - 32x 10Gb internal server ports
  - Up to 6 external 40Gb ports
  - Up to 24 external 10Gb ports (6 QSFP+ ports with breakout cables)
  - 4x 10GBASE-T external ports (support for only one 10GBASE-T module per switch)
- Two FlexIO bays enables connectivity choices including
  - 2-port 40GbE QSFP+ module (8-port 10GbE SFP+ using breakout cables)
  - 4-port 10GbE SFP+ module
  - 4-port 10GBASE-T module
- Stacking, up to 6 IOMs
- PVST+ protocol for easy integration into Cisco environments
- Converged
  - Supports DCB (protocols PFC, ETC and DCBx)
  - Converged iSCSI with EqualLogic and Compellent (supports iSCSI TLV)
  - FCoE Transit Switch via FIP Snooping Bridge
- Industry standard CLI
- Enterprise class OS (FTOS)
- Open Automation (Bare Metal provisioning)



Dell Force10 MXL 10/40GE

10Gb Ethernet (DCB/FCoE)

10GE Mezzanine cards & Select Network Adapters

11th Generation 10GE Select Network Adapter and Mezzanine Cards
- Broadcom 57712-k Select Network Adapter
- Brocade BR1741M-k (Mezzanine)
- QLogic QME8242-k (Mezzanine)
- Intel X520-x/k (Mezzanine)

12th Generation 10GE Select Network Adapter or Mezzanine Cards
- Broadcom 57810S-k
- Intel X520-x/k
- Qlogic QME8262-k

10 GbE Fabric A | Mezz Card Fabric B | Mezz Card Fabric C

Note: switch works with all 1GE cards
Note2: switch is 10Gb-KR and will not work with XAUI only mezzanine cards

USB Port

FlexIO modules do not have to be the same

4port SFP+ Module

- **Optical Transceivers** **SFP+ 10GE:** SR, LR
- **SFP+ Direct Attach (copper)** 0.5m, 1m, passive copper 10GE but can downtrain to 1GE

4port 10GBASE-T Module
Limited to only one 10GBASE-T module . The other module bay can be populated

- **RJ45 / Cat6a Copper** 10GE/1GE (supports auto-negotiation to 100Mb/1Gb)

2port QSFP+ Module

- **QSFP+ to 4xSFP+ Breakout Cables** 5m passive copper 40GBASE-CR4 10GE
- **QSFP+ to QSFP+ Direct Attach** 1m, and 5m, passive copper 40GBASE-CR4 40GE
- **Optical Transceivers** **SFP+ 40GE:** SR only
- **QSFP+ to QSFP+ Fiber Cables**
  QSFP+ to 4xSFP+ Fiber Breakout Cables

Two Integrated QSFP+ ports
Ports are defaulted to stacking mode but mode can be changed

Management Port
Cable included

I/O bays
- A1/A2
- B1/B2
- C1/C2

PowerEdge M I/O Aggregator

- Easy Deployment
  - Simplified layer 2 connectivity (no spanning tree)
  - Faster Deployment: All VLANs on all ports with the option to set VLANs
  - No touch DCB and no touch FCoE
    - DCB and FCoE settings downloaded from top of rack switch through DCBx protocol
- Simple GUI Integrated into CMC
- High Port Count:
  - 32x 10GbE internal server ports
  - Up to 16 external 10GbE ports (4 QSFP+ ports with breakout cables)
  - 4x 10GBASE-T external ports (only support for one 10GBASE-T module and both FlexIO modules have to be the same)
- Two FlexIO bays enables connectivity choices including
  - 2-port 40GbE QSFP+ module (8-port 10GbE SFP+ using breakout cables)
  - 4-port 10GbE SFP+ module
  - 4-port 10GBASE-T module
- Converged
  - Supports DCB (protocols PFC, ETC and DCBx)
  - Converged iSCSI with EqualLogic and Compellent (supports iSCSI TLV)
  - FCoE Transit Switch via FIP Snooping Bridge
- Industry standard CLI. Standard troubleshooting commands via CLI

PowerEdge M I/O Aggregator

10Gb Ethernet (DCB/FCoE)

10GE Mezzanine cards & Select Network Adapters

11th Generation Select Network Adapter and Mezzanine Cards
- Broadcom 57712-k Select Network Adapter
- Brocade BR1741M-k (Mezzanine)
- QLogic QME8242-k (Mezzanine)
- Intel X520-x/k (Mezzanine)

12th Generation Select Network Adapters or Mezzanine Cards
- Broadcom 57810S-k
- Intel X520-x/k
- Qlogic QME8262-k

Note: switch works with all 1GE cards
Note: switch is 10Gb-KR and will not work with XAUI-only mezzanine cards

10GbE Fab A

Mezz Card Slot B

Mezz Card Slot C

USB Port

FlexIO modules have to be the same

4port SFP+ Module

Optical Transceivers
SFP+ 10GE: SR, LRM, LR

SFP+ Direct Attach (copper)
1m, 5m, passive copper
10GE but can downtrain to 1GE

4port 10GBASE-T Module
Limited to only one 10GBASE-T module . The other module bay CANNOT be populated

RJ45 / Cat6a Copper
10GE/1GE
(supports auto-negotiation to 100Mb/1Gb)

2port QSFP+ Module

QSFP+ to 4xSFP+ Breakout Cables
5m passive copper 40GBASE-CR4
10GE

QSFP+ to QSFP+ Direct Attach
1m, and 5m, passive copper
40GBASE-CR4
40GE

Optical Transceivers
SFP+ 40GE: SR only

QSFP+ to QSFP+ Fibre Cables

QSFP+ to 4xSFP+ Fibre Breakout Cables

Two Integrated QSFP+ ports
Defaulted to 4x10Gb (use with breakout cables)

Management Port

Cable included

I/O bays

A1/A2

B1/B2

C1/C2

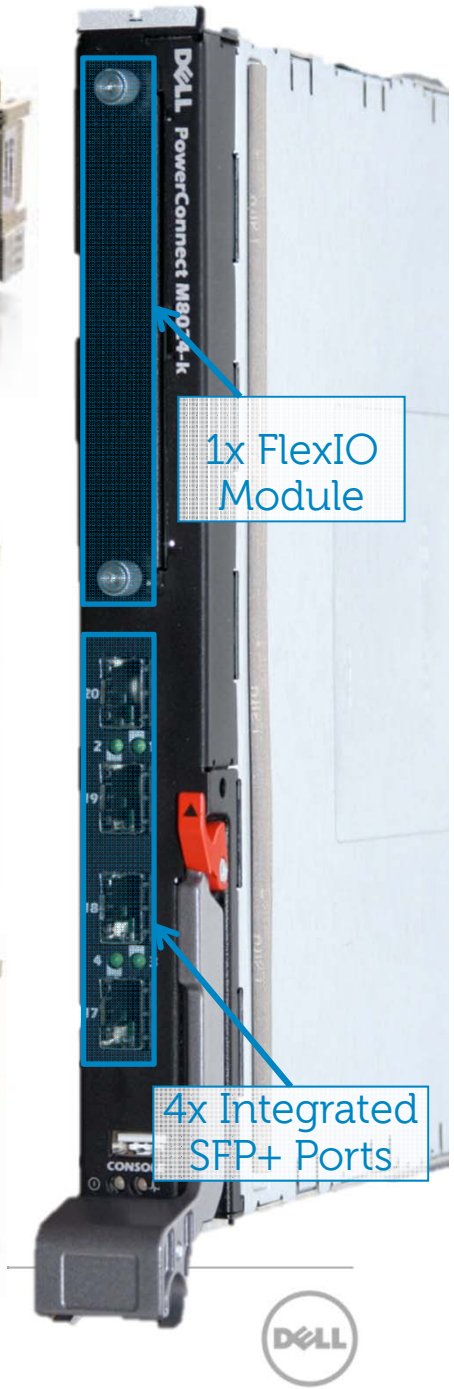
PowerConnect M8024-k

- Fully modular full wire-speed all 10GbE managed Layer 2/3 Ethernet switching
- Converged
  - Supports DCB (protocols PFC and DCBx)
  - FCoE Transit Switch via FIP Snooping Bridge (not supported in Simple Switch Mode)
- Stacking, up to 6 IOMs (not supported in Simple Switch Mode)
- Industry leading 24 port design features:
  - 16 internal server ports
  - 4 integrated external SFP+ ports
  - Up to 4 *additional* external ports via FlexIO modules
- FlexIO fully modular design enables connectivity choices including SFP+, CX4, and 10GBASE-T
- Default mode of operation is Simple Switch Mode (port aggregator); user-configurable to full switch mode
- Provides connectivity for the latest 10Gb-KR NICs and CNAs, including those supporting Switch Independent Partitioning

2-port 10GBASE-T

3-port CX4

4-port SFP+



PowerConnect M8024-k

10Gb
Ethernet
(DCB/FCoE)

Mezzanine cards & Select Network Adapters

Combine the M8024-k **10GbE** switch with the 11G **Broadcom 57712-k Select Network Adapter, Brocade BR1741M-k, QLogic QME8242-k, Intel X520-x/k** or 12G **Broadcom 57810S-k, Intel X520-x/k, and Qlogic QME8262-k** dual-port 10Gb-k Ethernet mezzanine cards in PE blade servers for 10Gb from server to LAN

10 GbE Fabric A

Mezz Card Fabric B

Mezz Card Fabric C

The M8024-k switch supports connectivity to 10Gb-KR adapters, all of which are notated with "-k." It does not provide connectivity to legacy 10Gb-XAUI NICs/CNAs

If connected to 1Gb Ethernet mezz cards, M8024-k will auto-negotiate individual internal ports to 1Gb.

Uplinks

10GbE **CX4 Copper** Module

Cables

CX4 cables for 10GbE Uplink

Uplinks

10GBASE-T **Copper** Module

(supports auto-negotiation to 100Mb/1Gb)

Cables

RJ45 / Cat6a

Uplinks

10GbE SFP+ Module

Optical Transceivers (SFP+)

PCT 6XXX Short Range, Multi-Mode
PCT 6XXX Long Range, Multi-Mode
PCT 6XXX Long Range, Single-Mode

Cables

SFP+ Direct Attach (copper)
twin-ax cable with SFP+ connector
(0.5m, 1m, 3m, 5m, 7m available)

Management Port

Cable included

I/O bays

A¹/A²

B¹/B²

C¹/C²

Dell M8428-k
10Gb Converged Network Switch

10Gb
Ethernet
(DCB/FCoE)

- Dell 10GbE Converged Network Switch
  - DCB compliant design accommodates both NIC and Fibre Channel Over Ethernet I/O
- Single wide blade I/O module supporting all 10GbE capable M1000e fabric bays
- Robust I/O bandwidth solution with 28 active fixed ports
  - 16 internal server ports
  - 8 external 10GbE SFP+ Ethernet uplinks
    - Short-wave optical transceivers / fiber
    - Long-wave optical transceivers / fiber
    - Direct-Attach copper (TwinAx) transceiver+cable (1m, 3m, and 5m)
  - 4 external 8Gbps SFP+ native Fibre Channel uplinks
    - Pre-installed 8Gbps short-wave SFP+ optical transceivers enable quick and easy cable-and-go connections
    - Long-wave SFP+ optical transceivers also available

Dell M8428-k Converged Network Switch

10Gb Ethernet (DCB/FCoE)

Combine the Dell M8428-k converged network switch with the 11G **Broadcom 57712-k Select Network Adapter, Brocade BR1741M-k, QLogic QME8242-k, Intel X520-x/k** or 12G **Broadcom 57810S-k, Intel X520-x/k, and Qlogic QME8262-k** for end-to-end convergence within M1000e

1GbE Adapter Fabric A

Mezz Card Fabric B

Mezz Card Fabric C

10Gb Ethernet (DCB)

Optical Transceivers

Short Wave, Multi-Mode SFP+ Optics
Long Wave, Multi-Mode SFP+ Optics

Cables

SFP+ Direct Attach (copper)
twin-ax cable with SFP+ connector
(1m, 3m, 5m available)

Management Port

8Gbps Fibre Channel

Optical Transceivers

Short Wave, Multi-Mode SFP+ Optics
(qty 4 included with every M8248-k)

Long Wave, Multi-Mode SFP+ Optics

Cables

I/O bays

A¹/A²

B¹/B²

C¹/C²

PowerConnect M6348

- Managed Layer 2/3 Gigabit Ethernet switch for M1000e blade enclosure
- Industry leading port availability
  - 32 internal (server) GbE ports; offering support of up to two ports per blade mezz card or Select Network Adapter (i.e. with quad-port 1GbE NICs)
  - 16 external fixed 10/100/1000Mb Ethernet RJ-45 ports
  - Up to four 10Gb uplink ports
    - 2x 10Gb Optical SFP+ (SR/LR) and/or SFP+ DAC
    - 2x 10Gb Copper CX4 or 32Gb stacking for M6348
  - Management console port
- Supports Dell Simple Switch Mode
- Stackable with rack-mount PowerConnect 7000 Series
- For optimized use (full internal-port utilization), pair with:
  - Quad-port GbE mezz cards
  - Quad-port Fabric A adapters

PowerConnect M6348

Gb / 10Gb Ethernet

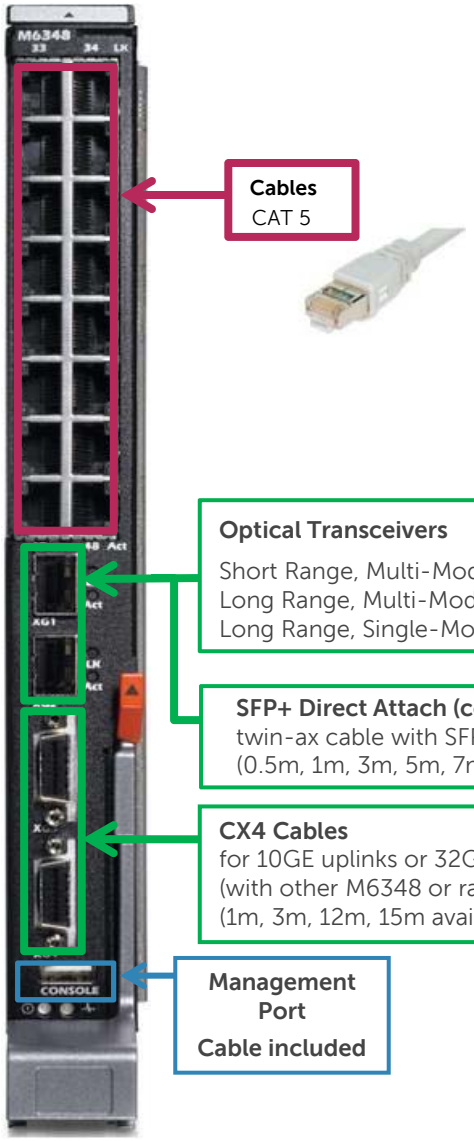
Optimal use is with quad-port 1Gb adapters from Broadcom or Intel for additional ports of 1Gb Ethernet connectivity, although can be used with any 1Gb adapter

1 GbE Fabric A

Mezz Card Fabric B

Mezz Card Fabric C

*Dual port GbE mezz cards or LOMs/ Select network Adapters will function and are fully supported with this IO module. In such configurations, only half of the switch's internal ports will be used since the dual port mezz card only has one port out to each IO module.



Cables
CAT 5

Optical Transceivers

Short Range, Multi-Mode SFP+ Optics
Long Range, Multi-Mode SFP+ Optics
Long Range, Single-Mode SFP+ Optics

Cables

SFP+ Direct Attach (copper)
twin-ax cable with SFP+ connector
(0.5m, 1m, 3m, 5m, 7m available)

CX4 Cables
for 10GE uplinks or 32Gb M6348 stacking
(with other M6348 or rack-mount PC 7000 series switches)
(1m, 3m, 12m, 15m available)

Management Port
Cable included

I/O bays

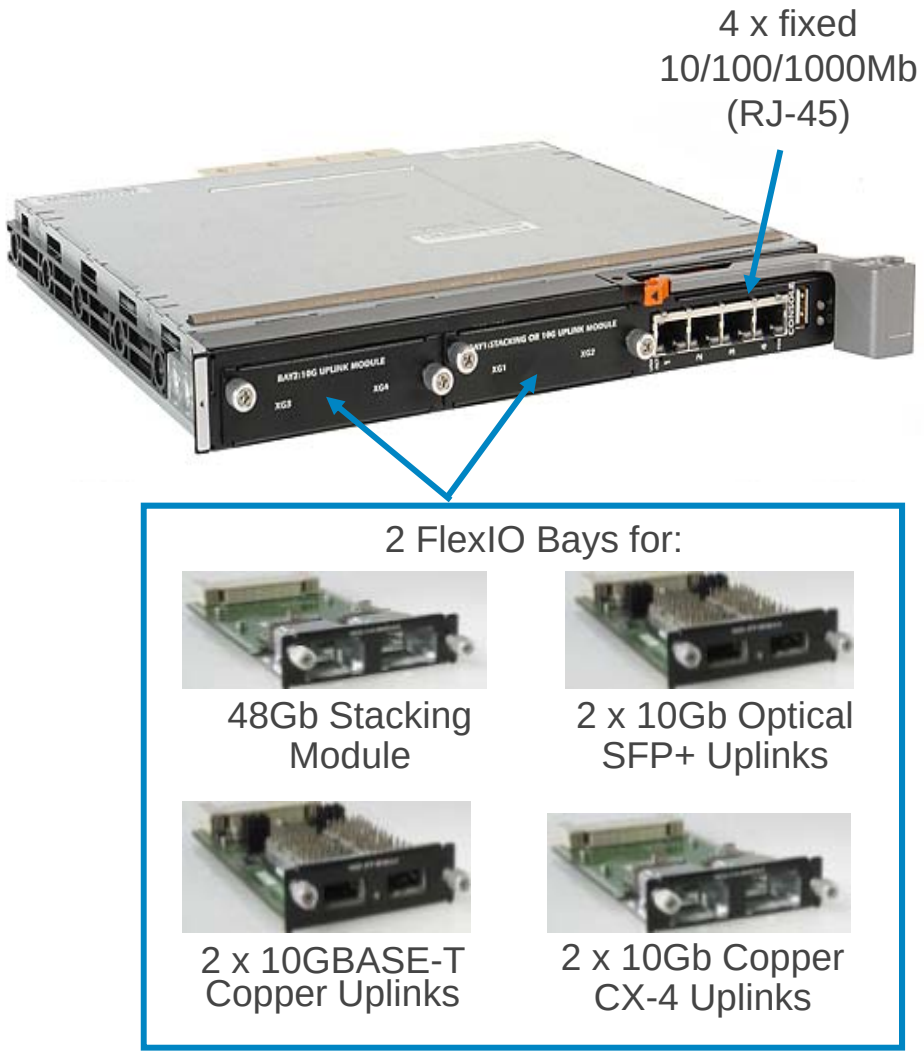
A^1/A^2

B^1/B^2

C^1/C^2

PowerConnect M6220

- Gigabit Ethernet Layer 2/3 Switch
- Optional 10GE uplinks & resilient stacking
- IPv6 support
- 24 port switch
  - 16 internal ports corresponding to 16 blade servers (1Gbps)
  - 4 external fixed RJ-45 connections (10/100/1000Mbps)
  - 2 FlexIO bays for:
    4 external 10Gbps uplink ports
    – or –
    2 external 10Gbps uplink ports and 2 external stacking ports
- Same software image features as PowerConnect 6224/6248 switches
  - Routing protocols
  - Multicast routing protocols
  - Advanced QoS
  - Advanced Security
  - IPv6
- Supports Dell Simple Switch Mode



PowerConnect M6220

Use Broadcom or Intel Gigabit Ethernet mezzanine cards or Fabric A adapters in blade servers for Gigabit Ethernet I/O connectivity

1 GbE Fabric A

Mezz Card Fabric B

Mezz Card Fabric C

*Quad port GbE mezzanine cards or Select Network Adapters (Broadcom or Intel) will function and are fully supported with this IO module. In such configurations, only half of the card's ports will be used since the switch only has one internal port per mezz connection.

Uplinks

Stacking Module, 48Gbps

Cables

Stacking Cable (1m included; 3m available)

Uplinks

PowerConnect 6xxx **SFP+** Module

Optical Transceivers

Short Range, Multi-Mode SFP+ Optics
Long Range, Multi-Mode SFP+ Optics
Long Range, Single-Mode SFP+ Optics
Short Range, Single-Mode SFP+ Optics

Cables

SFP+ Direct Attach (copper)
twin-ax cable with SFP+ connector
(0.5m, 1m, 3m, 5m, 7m available)

Uplinks

10GBase-T (Copper)
Uplink Module

(10Gb speed only)

Cables
RJ45 / Cat6a

Uplinks

10GbE Uplink Module for **CX4 Copper**

Cables
CX4 Cable for 10GbE Uplink, 12m

Cables

CAT 5

Management Port
Cable included

Gb / 10Gb Ethernet

I/O bays

A1/A2

B1/B2

C1/C2

SimpleConnect for LAN
PowerConnect Blade Switches

What is SimpleConnect?

- Feature included on all PowerConnect blade switches (M8024-k/M6348/M6220); "SimpleConnect" (locked) models also available (M8024S/M6348S/M6220S)
- Aggregate traffic from multiple downlinks to one or more uplinks by mapping internal (server) NIC ports to external (top-of-rack) switch ports
- Based on port aggregation industry standards

Benefits of Simple Switch Mode?

- Ease of deployment/management for in-chassis blade switches
- Ease of integration of PowerConnect blade switches with 3rd party networking H/W (Cisco, etc.)
- Provide cable aggregation benefit offered by integrated blade switches
- Reduce involvement of network admin in blade deployments by eliminating the need to understand STP (Spanning Tree Protocol), VLANs (Virtual Local Area Networks), & LACP (Link Aggregation Control Protocol) groups

For an overview demo of Simple Switch mode, visit:
http://www.delltechcenter.com/page/PowerEdge+Blade+Demos

10Gb Ethernet Pass Through -k

- 16 ports correspond to 16 server blades
  - Only supports –k mezz cards
- 16 external 10GbE SFP+ ports
  - Supports 10Gb connections ONLY
- Supports DCB/CEE and FCoE
  - Connect to top-of-rack FCoE switches and Converged Network Adapters (CNA's) in individual blades
- Transparent connection between blade servers and external LAN

10Gb Ethernet Pass Through -k

10Gb
Ethernet
(DCB/FCoE)

Mezzanine cards

Choose from two available models based on your Ethernet NICs or Converged Network Adapters:

Dell 10Gb Ethernet Pass Through-k
(for connectivity to next-generation KR-based 10Gb adapters, notated by *-k*):
11G:

- Brocade BR1741M-k mezz
- Broadcom 57712-k Select Network Adapter
- Intel X520-x/k

12G:

- Broadcom 57810S-k
- Intel X520-x/k
- Qlogic QME8262-k

Optical Transceivers

PCT 6XXX Short Range, Multi-Mode SFP+ Optics
PCT 6XXX Long Range, Single-Mode SFP+ Optics

Cables

SFP+ Direct Attach (copper)
twin-ax cable with SFP+ connector
(0.5m, 1m, 3m, 5m, 7m available)

I/O bays

- A¹/A²
- B¹/B²
- C¹/C²

Gb Ethernet Pass Through

1Gb
Ethernet

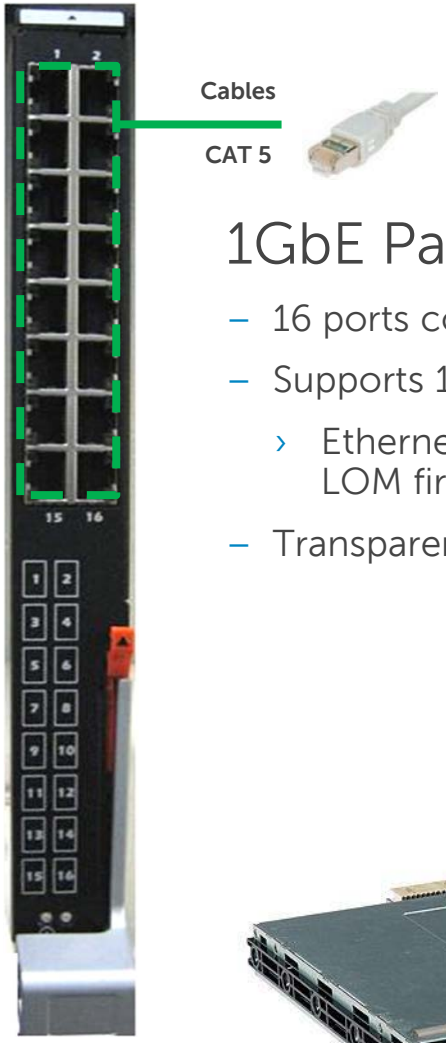
Use Broadcom or Intel Gigabit Ethernet mezzanine cards or Fabric A adapters in blade servers for Gigabit Ethernet I/O connectivity

1GbE Adapter Fabric A

Mezz Card Fabric B

Mezz Card Fabric C

*Quad port GbE mezz cards (Broadcom or Intel) will function and are fully supported with this IO module. In such configurations, only half of the card's ports will be used since the Pass Through only has one internal port per mezz connection.



1GbE Pass Through Module

- 16 ports correspond to 16 server blades
- Supports 10/100/1000Mb connections
  - Ethernet media speed is configured through the blade LOM firmware or by the operating system
- Transparent connection between LAN and server blades

I/O bays

A^1/A^2

B^1/B^2

C^1/C^2

Cisco Nexus B22DELL Fabric Extender (FEX)

- Cisco 10GbE offering for the Dell M1000e Blade System
  - The 16 internal 10GbE ports and 8 external 10GbE ports enables customers to connect via 10GbE to a Cisco Nexus 5500 series Top of Rack switch

- The B22DELL FEX is only supported with these specific Cisco Nexus models:
  - Cisco Nexus 5548P
  - Cisco Nexus 5548UP
  - Cisco Nexus 5596P

  It cannot directly connect to Cisco Nexus 5010, 5020, 2000 or 7000 series switches.

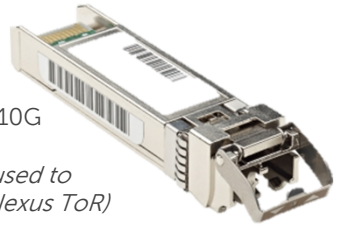
- Managed from the Nexus Top of Rack
  - B22DELL FEX is managed at the Top of Rack and not managed at the M1000e nor the FEX device itself
  - Acts as a line card to Nexus 5500 Series switches

Cisco Nexus B22DELL Fabric Extender (FEX)

Feature	Specification
Internal Ports	16
External Port	8
Oversubscription	2:1
Communication over midplane	10GE KR or 1GE
Supported Fabrics	A, B, C
Cable & Optics Brand	Cisco cables and optics only
Cables	Twinax 1m, 3m, 5m, 7m, 10m
SFP+ Optics	FET-10G SFP-10G-SR SFP 10G-LR SFP-10G-ER
FET-10G	100m with OM3 fiber (SFP+SR is 300m with OM3)

Cisco FET-10G

(can only be used to connect FEX to Nexus ToR)



Cisco Catalyst Blade Switches

Cisco Catalyst 3130X – 10G Switch

- 2x10GE uplinks (X2 – CX4, SR, LRM optics)
- Fixed 4xGE uplinks - 4xRJ45
- Virtual Blade Switch interconnect enabled

Cisco Catalyst 3130G – GE Switch

- Up to 8xGE uplinks – fixed 4xRJ45 + up to 4 optional 1GE SFPs (copper or optical)
- Virtual Blade Switch interconnect enabled

Cisco Catalyst 3032 -- Entry Level GE Switch

- Up to 8xGE uplinks - 4xRJ45 & up to 4 SFPs (copper or optical)

Virtual Blade Switch

- Interconnect up to 9 CBS 3130 switches to create a single logical switch
- Simplifies manageability & consolidates uplinks to lower TCO

Software

- IP Base software stack included in each SKU
  - Advanced L2 switching + basic IP routing features
- Optional IP Services available ONLY for CBS 3130
  - Adds advanced IP routing and IPv6 compatibility

Cisco Catalyst Blade Switches

1Gb / 10Gb Ethernet

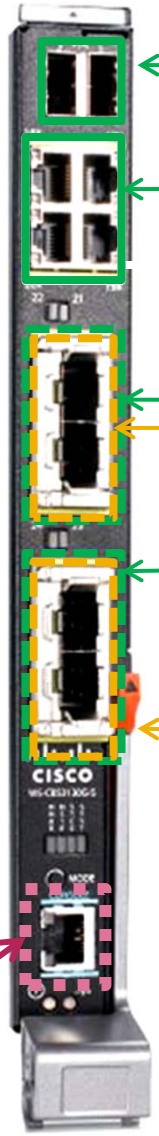
Use Broadcom or Intel Gigabit Ethernet mezzanine cards or Fabric A adapters in blade servers for Gigabit Ethernet I/O connectivity

1GbE Adapter Fabric A

Mezz Card Fabric B

Mezz Card FabricC

*Quad port GbE mezz cards (Broadcom or Intel) will function and are fully supported with this IO module. In such configurations, only half of the card's ports will be used since the switch only has one internal port per mezz connection.



Stacking Ports (supported on 3130G & 3130X models ONLY)
2x 64Gb StackWise Ports
(0.5m, 1m, 3m cables purchased separately for factory-installed blade switch)

GbE ports (all models)

Software Upgrades
IP Services Upgrade Available

CAT 5 Cables

TwinGig Converter (supports 2 x 1Gb SFP)

Note: 1 TwinGig connector ships by default in each switch module

Cisco SFP Modules

•GbE SFP RJ45 converter, Copper

CAT5 Cable

•GbE SFP, LC connector, SWL (multimode)
•GbE SFP, LC connector, LWL (single mode)

Fibre

10GBASE-CX4 X2 Module

(for 3130X)

CX4 cable, IB 4x connector

10GBASE-SR X2 Module or 10GBASE-LRM X2 Module

(3130X only)

MMF, dual SC connector

OneX SFP+ Converter Module CVR-X2-SFP10G

(3130X only; via Dell S&P)

SFP+

Copper

Cisco Direct Attach (twin-ax copper)
1m: SFP-H10GB-CU1M=
3m: SFP-H10GB-CU3M=
5m: SFP-H10GB-CU5M=

SFP+ Optical:

Cisco SR SFP+ (SFP-10G-SR=)

Fibre

Management Port

3130X 10GbE Modules

I/O bays

A1/A2

B1/B2

C1/C2

Fibre Channel

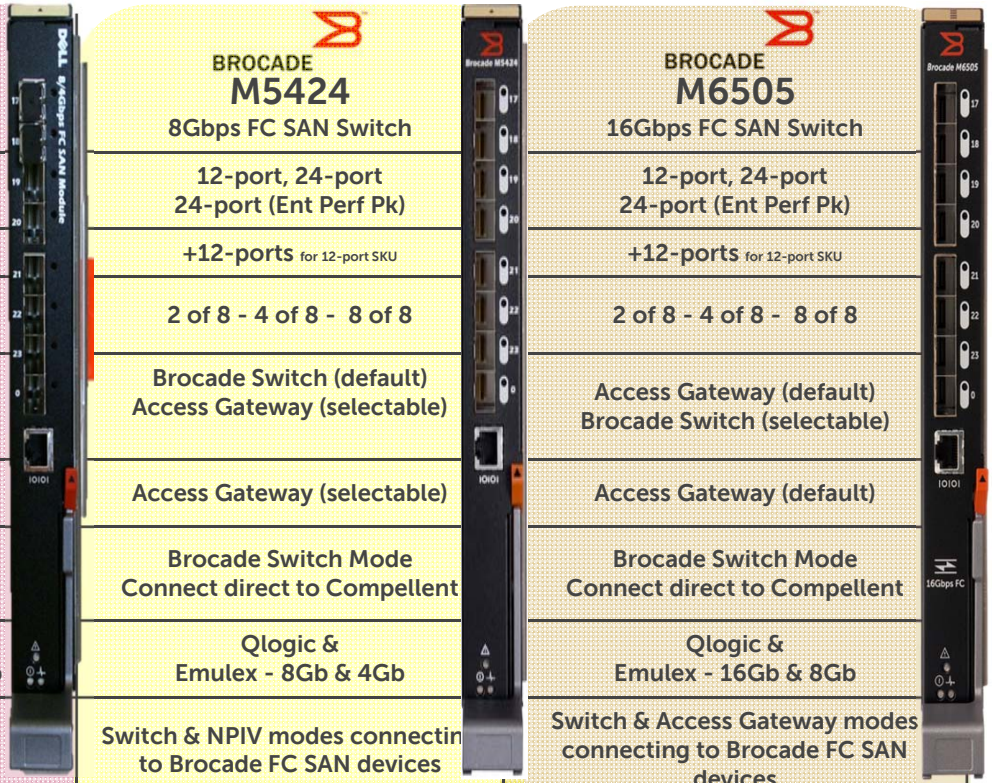
See also M8428-k in 10/40GbE Converged section

FIBRE CHANNEL

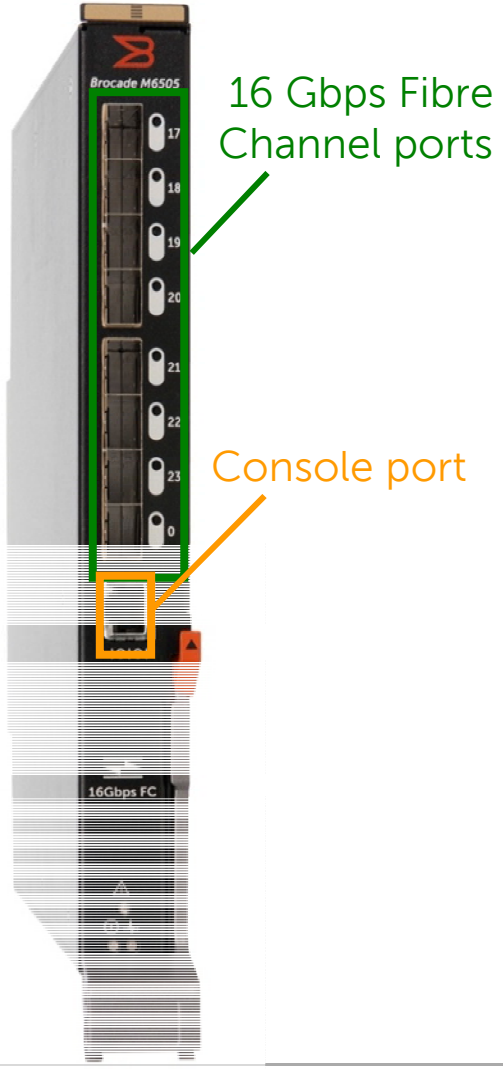
FC16/8 M6505 | FC8/4 M5424 | FC8/4 SAN Module | FC8/4 Pass Through

Dell M-Series FC SAN IOM Portfolio Products

	8/4Gbps FC SAN Module	BROCADE M5424 8Gbps FC SAN Switch	BROCADE M6505 16Gbps FC SAN Switch
Model Choices	12-port	12-port, 24-port 24-port (Ent Perf Pk)	12-port, 24-port 24-port (Ent Perf Pk)
Scalable Ports Upgrade	+12-ports	+12-ports for 12-port SKU	+12-ports for 12-port SKU
Factory pre-installed SFP+ Transceivers	2 of 8	2 of 8 - 4 of 8 - 8 of 8	2 of 8 - 4 of 8 - 8 of 8
Connect to Brocade FC SAN	NPIV	Brocade Switch (default) Access Gateway (selectable)	Access Gateway (default) Brocade Switch (selectable)
Connect to Cisco MDS FC SAN	NPIV	Access Gateway (selectable)	Access Gateway (default)
Direct connect to SAN disk/tape controller	Not Supported	Brocade Switch Mode Connect direct to Compellent	Brocade Switch Mode Connect direct to Compellent
FC Blade Mezzanine Cards	Qlogic & Emulex - 8Gb & 4Gb	Qlogic & Emulex - 8Gb & 4Gb	Qlogic & Emulex - 16Gb & 8Gb
Brocade ISL-Trunking (License option)	Not Supported	Switch & NPIV modes connectin to Brocade FC SAN devices 64Gb/s	Switch & Access Gateway modes connecting to Brocade FC SAN devices 128Gb/s
Brocade Advanced Performance Monitoring & Brocade Fabric Watch	Not Supported	Optional Available a-la-carte	Switch & NPIV modes connecting to Brocade FC SAN devices only
Brocade Enterprise Performance Pack (license option bundle)	Not Supported	Optional	Included
Diagnostic Ports, Hardware Buffer Credit Loss Detection/Recovery, Forward Error Correction	Not Supported	Not Supported	Included



Brocade M6505



- 24x16/8/4 Gbps Fibre Channel ports
  - Up to 16 internal 16/8Gb server ports
  - Up to 8 external 16/8/4 SAN ports
- Zero footprint, hot-pluggable design with no additional fans or power supplies
- Complete redundancy, with up to four switches per chassis
- Dynamic Ports on Demand (PoD) and "pay-as-you-grow" port upgrades for 12-port configurations
- Heterogeneous SAN fabric interoperability
- Access Gateway (NPIV) or fabric switch connectivity
- Auto-sensing and speed-matching connections to 16/8/4 Gbps to Fibre Channel devices

Brocade M6505

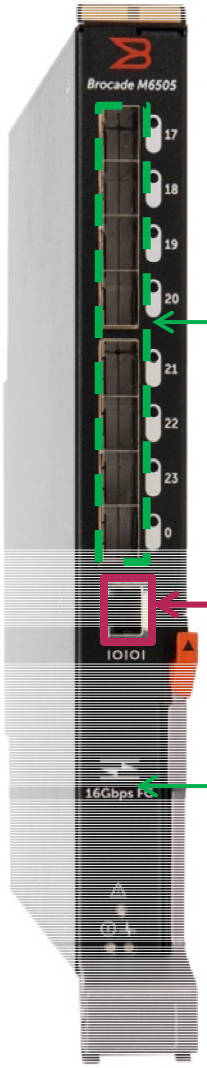
16/8/4Gb Fibre Channel

Mezzanine cards

Combine the M6505 with Qlogic & Emulex - 16Gb & 8Gb Server Blade I/O Mezzanine Cards in PE blade servers for end-to-end 16/8Gbps I/O.

Mezz Card Fabric B

Mezz Card Fabric C



Transceivers
Brocade SWL 16Gb SFP+ Optics
Brocade SWL 8Gb SFP+ Optics
Brocade SWL 4Gb SFP+ Optics

Cables

Console Port

Models
Brocade M6505
- 12-port, 24-port
- 24-port (Ent Perf Pk)

Scalable port upgrade: +12-ports for 12-port SKU

I/O bays

B^1/B^2

C^1/C^2

Brocade M5424

- 8/4 Gbps Fibre Channel SAN solution
- Provides up to 24 8/4Gb FC ports
  - Up to 16 internal 8/4Gb server ports
  - Up to 8 external 8/4Gb SAN ports
- One management console port
- Configurable as Brocade full fabric switch or Access Gateway Mode (NPIV) for multi-vendor interoperability
- Auto-negotiates between 4Gbps and 8Gbps based on linked mezzanine cards and top-of-rack switches
- Supports future FOS features and upgrades

Brocade M5424

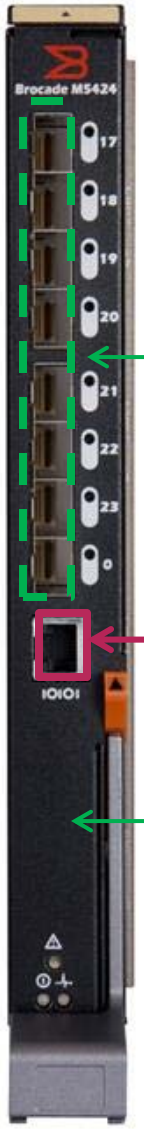
8/4Gb
Fibre
Channel

Mezzanine cards

Combine the M5424 with the 11G **Qlogic QME2572, Emulex LPe1205** or 12G **Qlogic QME25722, and Emulex LPe1205-M** Server Blade I/O Mezzanine Card in PE blade servers for end-to-end 8Gbps I/O. FC4 mezz cards are also supported with this switch at 4Gbps.

Mezz Card Fabric B

Mezz Card Fabric C



Transceivers
Brocade SWL 8Gb SFP+ Optics
Brocade SWL 4Gb SFP+ Optics

Cables

Management Port

Models
Brocade M5424 24port w/ eight 8Gb SFPs plus Enterprise Performance Pack Software

Brocade M5424 24port w/ four 8Gb SFPs
Brocade M5424 12port w/two 8Gb SFPs

I/O bays

B^1/B^2

C^1/C^2

Dell 8/4Gbps FC SAN Module

- Base model provides 12 active ports with two external SAN 8Gb SWL optical transceivers
- Scalable to 24 active ports using 12-port *pay-as-you-grow* option kit (includes two additional 8Gb SWL SFP+ transceivers)
- Add additional 8Gb SWL SFP+ transceivers for up to 8 external SAN ports
- Ideal scalability for data centers deploying increasingly more blade enclosures while requiring FC connectivity
- Utilizes standards-based technology connecting to NPIV-enabled FC SANs
- Ideal for Dell blade enclosure connectivity to any FC SAN
- Supports 8-4-2Gbps I/O

Dell 8/4Gbps FC SAN Module

8/4Gb Fibre Channel

Mezzanine cards

Combine the M5424 with the with the 11G **Qlogic QME2572, Emulex LPe1205** or 12G **Qlogic QME25722, and Emulex LPe1205-M Server Blade I/O Mezzanine Card** in PE blade servers for end-to-end 8Gbps I/O. FC4 mezz cards are also supported with this switch at 4Gbps.

Mezz Card Fabric B

Mezz Card Fabric C

Optical Transceivers
SWL 8Gb SFP+ Optics
LWL 8Gb SFP+ Optics

Cables

Management Port

Base Model
Base Model includes dynamic 12-port license with **two** 8Gb SFP+ optical transceivers.

Options
Port upgrade license available to scale up to full 24 ports.
Single SFP+ optics available for use of additional external ports.

I/O bays

B¹/B²

C¹/C²

Dell 8/4Gbps Fibre Channel Pass-Through

- 16 ports correspond to 16 server blades
- 8, 4, or 2 Gbps connections
- Transparent connection between SAN and server blades
- As an alternative to this FC8 Pass-Through, the *Dell 8/4Gbps FC SAN Module* (NPIV aggregator) provides the simplicity of a pass-through with the aggregation/redundancy benefits of a switch

Dell 8/4Gbps FC Pass-Through

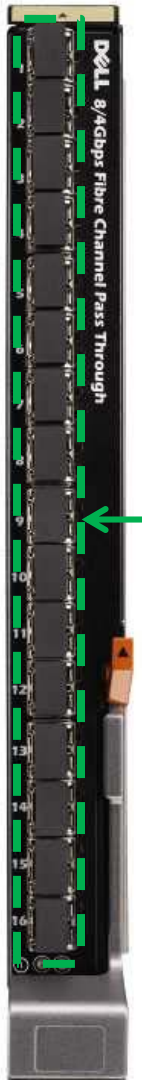
8/4Gb Fibre Channel

Mezzanine cards

Combine the FC Pass-Through with the with the 11G **Qlogic QME2572, Emulex LPe1205** or 12G **Qlogic QME25722, and Emulex LPe1205-M Mezzanine Card** for end-to-end 8Gbps FC connectivity

Mezz Card Fabric B

Mezz Card Fabric C



Transceivers
16 pre-installed 8Gbps SWL SFP+ transceivers (one per port)

Cables

I/O bays

B¹/B²

C¹/C²

*FC4 mezz cards will function with this pass-through. Doing so will cause the pass-through to run at 4Gbps rather than the full-capability 8Gbps

SimpleConnect for SAN

Dell 8/4Gbps FC SAN Module

Best solution for modular SAN connectivity

- Based on industry-standard NPIV (N-port ID Virtualization)
- Combines pass-through simplicity for connecting each server to any SAN fabric with beneficial I/O and cable aggregation
- Helps solve interoperability issues with heterogeneous fabrics, i.e. mixed Brocade, Cisco, etc.
- Enables scalable data center modular growth without disruption
  - Lessens RSCN traffic, addresses FCP Domain limits
- No management required
- Standard feature / mode available on M5424

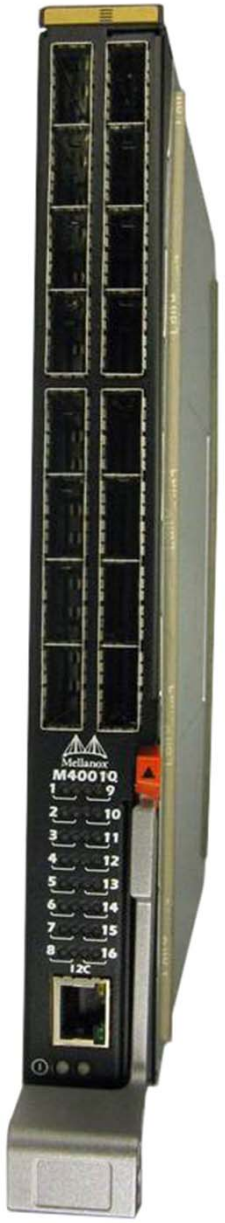
InfiniBand

Mellanox 4001Q

QDR InfiniBand Switch

- For high performance computing (HPC) and low latency applications
- Available in redundant switch configuration for fully non-blocking InfiniBand solution
- Links with Mellanox ConnectX3, ConnectX2 or ConnectX mezz cards

Internal Ports	16
External Ports	16
Bit Rate	40Gb/s
Data Rate	32Gb/s
Speed	QDR
Form Factor	Single Wide IOM



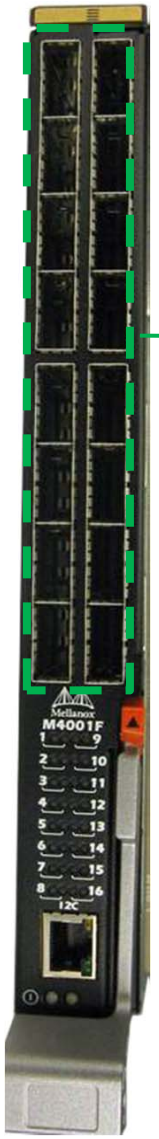
Mellanox M4001Q

40 Gbps
InfiniBand

Mezzanine cards

ConnectX3 QDR
(SFF)

Combine the M4001Q with **Mellanox ConnectX3** or **ConnectX2 QDR InfiniBand Mezzanine Cards** for end-to-end 40Gbps.



Cables

QSFP Active Optical
OR
QSFP Passive Copper

Mezz Card Fabric B

Mezz Card Fabric C

QDR /DDR IB mezz cards (ConnectX or ConnectX2) will function and are fully supported with this switch.

I/O bays

B¹/B²

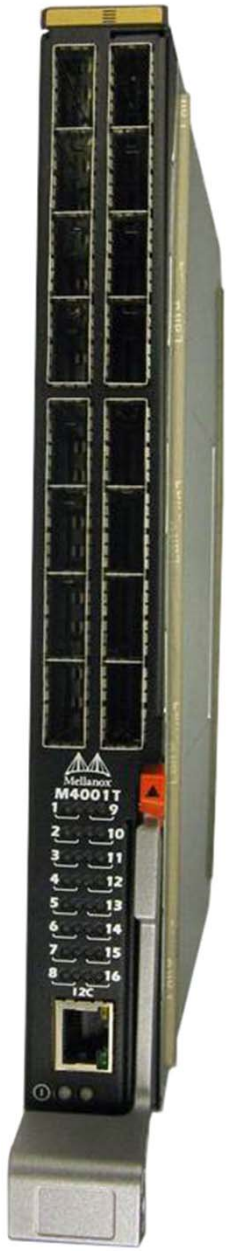
C¹/C²

Mellanox 4001T

FDR10 InfiniBand Switch

- Same data rate as QDR 40Gb/s but there is less overhead in FDR10 so the data rate is 40Gb/s where for QDR it is 32Gb/s
- For high performance computing (HPC) and low latency applications
- Available in redundant switch configuration for fully non-blocking InfiniBand solution
- Links with Mellanox ConnectX3, ConnectX2 or ConnectX mezz cards

Internal Ports	16
External Ports	16
Bit Rate	40Gbp/s
Data Rate	40Gbp/s
Speed	FDR10
Form Factor	Single Wide IOM



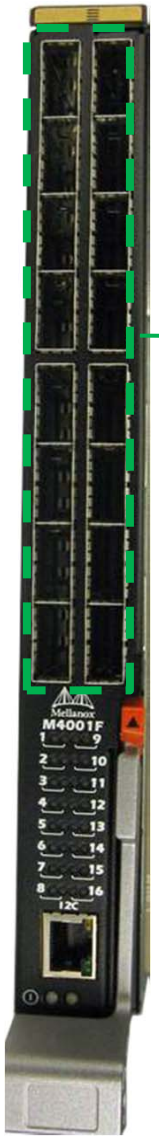
Mellanox M4001T

40 Gbps
InfiniBand

Mezzanine cards

ConnectX3 QDR
(SFF)

Combine the M4001Q with **Mellanox ConnectX3** or **ConnectX2 QDR InfiniBand Mezzanine Cards** for end-to-end 40Gbps.



Cables

QSFP Active Optical
OR
QSFP Passive Copper

Mezz Card Fabric B

Mezz Card Fabric C

QDR /DDR IB mezz cards (ConnectX or ConnectX2) will function and are fully supported with this switch.

I/O bays

B¹/B²

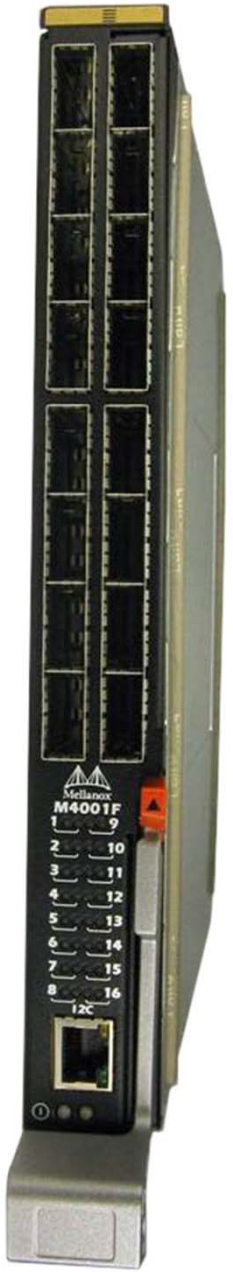
C¹/C²

Mellanox 4001F

FDR InfiniBand Switch

- For high performance computing (HPC) and low latency applications
- Available in redundant switch configuration for fully non-blocking InfiniBand solution
- Links with Mellanox ConnectX3, ConnectX2 or ConnectX mezz cards

Internal Ports	16
External Ports	16
Bit Rate	56Gb/s
Data Rate	56Gb/s
Speed	FDR
Form Factor	Single Wide IOM



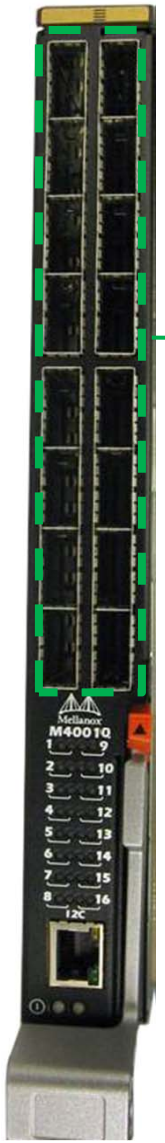
Mellanox M4001F

56 Gbps
InfiniBand

Mezzanine cards

ConnectX3 FDR
(SFF)

Combine the M4001F with **Mellanox ConnectX3 FDR InfiniBand Mezzanine Card** for end-to-end 56Gbps.



Cables

QSFP Active Optical
OR
QSFP Passive Copper

Mezz Card Fabric B

Mezz Card Fabric C

QDR/DDR IB mezz cards (ConnectX, ConnectX2, or ConnectX3) will function and are fully supported with this switch.

I/O bays

B¹/B²

C¹/C²