PowerEdge MX I/O Guide

I/O Connectivity Options for the PowerEdge MX Platform

The content in this guide applies to all versions of PowerEdge MX up to and including 2.20.00

January 2024; v1.15

DELL Technologies

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PowerEdge MX Ethernet I/O Modules

	MX9116n	**MX5108n**	**MX7116n**	**25Gb Pass-Through**	**10GBT Pass-Through**
	Fabric Switching Engine High-performance, scalable L2/L3 25GbE fabric switch with multi-chassis fabric scaling capabilities	**Basic Ethernet Switch** Entry level, high-performance 25G Ethernet blade switch for single chassis configurations	**Fabric Expander Module** Low latency 25GbE fabric expander that helps scale fabric bandwidth across multiple chassis	**Direct connection** Transparently connect 8 MX compute sleds to the LAN of your choice at 25G or 10Gb speeds.	**Direct connection** Transparently connect 8 MX compute sleds to the LAN of your choice using 10G-BaseT
Performance					
Uplink Speeds	10/25/40/50/100GbE	10/25/40/50/100GbE	25GbE	10/25GbE	10G-BaseT
Switch fabric capacity	6.4Tbps	960Gbps	-	-	-
Forwarding capacity (Mpps)	2380Mpps	363Mpps	-	-	-
Latency (Microseconds)	<450ns	<800ns	<75ns	<100ns	<100ns
Ports					
Internal server ports (Speed)	16 (25GbE)	8 (25GbE)	16 (10/25GbE)	16 (10/25GbE)	16 (10GbE)
External QSFP28-DD Ports	12	0	2	0	0
External QSFP28 Ports	4	2	0	0	0
External QSFP+ Ports	0	1	0	0	0
External SFP28 Ports	0	0	0	16	0
External 10G-BaseT Ports	0	4	0	0	16
Features					
Native Fibre Channel support	Yes	No	Yes (via MX9116n)	-	-
FCoE/FC	FCoE transit, 8/16/32G Native FC	FCoE Transit	Yes (via MX9116n)	-	-
FC fabric services	Zoning, F_Port, NPIV	No	Yes (via MX9116n)	-	-
Converged iSCSI (LAN and SAN)	Yes	Yes	Yes (via MX9116n)	-	-
Optical transceivers supported	QSFP28–DD (DAC, AOC, SR) QSFP28 (DAC, AOC, SR, LR) QSFP+ (DAC, AOC, SR, LR)	QSFP28 (DAC, AOC, SR, LR) QSFP+ (DAC, AOC, SR, LR)	QSFP28 –DD (DAC, AOC, SR)	SFP28 (SR) SFP+ (SR)	-
Max VLANs (L2/L3) Full Switch Mode	180K/30K P*V	45K/10K P*V	-	-	-
Link Aggregation (Groups/Members)	128/16	128/16	-	-	-
Jumbo frames (Bytes)	9216	9216	-	-	-
Max Routes (IPv4/IPv6)	16K/8K	16K/8K	-	-	-
MAC Table	136K	272K	-	-	-
PVST Total Instances	128	128	-	-	-
Fresh Air Compliant	No	Yes	Yes	Yes	Yes

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PowerEdge MX 100GbE I/O Module

	MX8116n
	Fabric Expander Module Low latency 100GbE fabric expander that helps scale fabric bandwidth across multiple chassis
Performance	
Uplink Speeds	25/100GbE
Switch fabric capacity	-
Forwarding capacity (Bpps)	-
Latency (Microseconds)	-
Ports	
Internal server ports (Speed)	8 (100GbE), 16(25GbE)
External QSFP56-DD Ports	2
External SFP+ Ports	0
Features	
Native Fibre Channel support	No
FCoE/FC	No
FC fabric services	No
Converged iSCSI (LAN and SAN)	Yes (via Z9432F-ON)
Optical transceivers supported	QSFP56 –DD (DAC, AOC, SR) QSFP28 –DD (DAC, AOC, SR)
Max VLANs (L2/L3) Full Switch Mode	-
Link Aggregation (Groups/Members)	-
Jumbo frames (Bytes)	-
Max Routes (IPv4/IPv6)	-
MAC Table	-
PVST Total Instances	-
Fresh Air Compliant	Yes

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PowerEdge MX Fibre Channel I/O Module

	MXG610s
	32Gb FC Switch **Designed for mission-critical applications and optimized for flash storage and highly virtualized server environments**
Performance	
Speeds	32Gbps (multi-speed 8, 16, or 32Gbps)
Switch capacity (Gbps)	1024 Gbps (32 * 32 Gbps) in Full Fabric Switch mode
Credit Buffers	2K, providing >50 credits/port average
Latency (Microseconds)	< 0.9 µs
Maximum frame size	2112-byte payload
Ports	
Total ports	16 internal ports (16, or 32Gbps) 8 external SFP+ ports (8, 16, or 32Gbps) 2 external QSFP ports - 4 ports each (16, or 32Gbps)
Port model options	16 ports included w/4 SFP+ transceivers 16 ports included w/8 SFP+ transceivers, Enterprise Software License (port count can be increased with on-demand license)
Port types	D_Port (Diagnostic Port), E_Port, F_Port, M_Port (Mirror Port); optional port type control in Brocade Access Gateway mode: NPIV-enabled N_Port
Features	
Security	DH-CHAP (between switches and end devices), FCAP switch authentication; HTTPS, IPsec, IP filtering, LDAP with IPv6, OpenLDAP, Port Binding, RADIUS, TACACS+, User-defined Role-Based Access Control (RBAC), Secure Copy (SCP), Secure RPC, Secure Syslog, SFTP, SSH v2, SSL, Switch Binding, Trusted Switch
Management	HTTP, SNMP v1/v2/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools; Command Line Interface (CLI); SMI-S compliant; Administrative Domains; trial licenses for add-on capabilities; Integrated management through Dell OpenManage Enterprise-Modular
Enterprise Bundle (Optional)	ISL Trunking, Fabric Vision, and Extended Fabric
Classes of service	Class 2, Class 3, and Class F (inter-switch frames)
Brocade optical transceivers	16 and 32Gbps: SWL, LWL SFP+ 16 and 32Gbps: SWL, QSFP+ (supports 4x1 Breakout)

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PowerEdge MX Ethernet Mezzanine Cards

	QL41262	QL41232	XXV710	ConnectX-4 LX	57504
Vendor	Marvell/Qlogic	Marvell/Qlogic	Intel	Mellanox	Broadcom
Max Speed	10/25GbE	10/25GbE	10/25GbE	10/25GbE	10/25GbE
Ports	2	2	2	2	4
NIC Type	CNA	CNA	NIC	NIC	NIC
Dell PN	51G0W	H9GFX	H9NTY	VCHFY	DCWFP
SKU	543-BBDI	543-BBDJ	543-BBDH	543-BBDK	555-BGGB
General					
NPAR (# Partitions)	Yes (8/port - 16 total)	Yes (8/port – 16 total)	No	No	Yes (4/port – 16 total)
Secure Firmware Updates	Yes	Yes	Yes	Yes	Yes
PTP: IEEE 1588	Yes	Yes	Yes	Yes	Yes
DPDK	Yes	Yes	Yes	Yes	Yes
Network Boot					
UEFI iSCSI Offload Boot	Yes	No	No	Yes (boot, no offload)	No
UEFI FCoE Boot	Yes	No	No	No	No
Legacy iSCSI iBFT Boot	No	No	Yes	Yes	Yes (UEFI & PXE only)
RDMA					
RoCE v1	Yes	Yes	No	Yes	Yes
RoCE v2	Yes	Yes	No	Yes	Yes
iWarp	Yes	Yes	No	No	No
Offloads					
iSCSI HW Offload	Yes	No	No	No	No
FCoE HW Offload	Yes (1 FCoE partition/port)	No	No	No	No
Large Receive Offload (LRO)	Yes	Yes	No	Yes	Yes
TCP Segmentation Offload (TSO)	Yes	Yes	No	Yes	Yes
Transmit-Side Scaling (TSS)	Yes	Yes	No	Yes	Yes
Network Virtualization Overlay					
GENEVE	Yes	Yes	Yes	Yes	Yes
VxLAN-GPE	No	No	Yes	Yes	Yes
MPLS	Yes	Yes	Yes	Yes	Yes
NVMe-oF					
NVMe-oF: TCP	Yes	Yes	Yes	Yes	Yes
NVMe-oF: RDMA (RoCE v2)	Yes	Yes	No	Yes	Yes

EOL

EOL

All NICs support the following:

- iDRAC Connection View
- Wake On LAN
- SR-IOV
- UEFI iSCSI iBFT Boot
- UEFI PXE Boot
- Legacy PXE Boot
- NVGRE
- VxLAN
- IP, TCP, UDP checksum offloads
- Large Send Offload (LSO)
- Receive-Side Scaling (RSS)
- Giant Send Offload (GSO)

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PowerEdge MX Ethernet Mezzanine Cards (cont.)

	57508	XXV810			
Vendor	Broadcom	Intel			
Max Speed	25/100GbE	10/25GbE			
Ports	2	2			
NIC Type	NIC	NIC			
Dell PN	K9JTN	MR0H8			
SKU	540-BDTV	540-BDMF			
General					
NPAR (# Partitions)	Yes (8/port – 16 total)	No			
Secure Firmware Updates	Yes	Yes			
PTP: IEEE 1588	Yes	Yes			
DPDK	Yes	Yes			
Network Boot					
UEFI iSCSI Offload Boot	No	No			
UEFI FCoE Boot	No	No			
Legacy iSCSI iBFT Boot	Yes (UEFI & PXE only)	No			
RDMA					
RoCE v1	No	No			
RoCE v2	Yes	Yes			
iWarp	No	Yes			
Offloads					
iSCSI HW Offload	No	No			
FCoE HW Offload	No	No			
Large Receive Offload (LRO)	Yes	No			
TCP Segmentation Offload (TSO)	Yes	No			
Transmit-Side Scaling (TSS)	Yes	No			
Network Virtualization Overlay					
GENEVE	Yes	Yes			
VxLAN-GPE	Yes	Yes			
MPLS	Yes	Yes			
NVMe-oF: TCP	Yes	Yes			
NVMe-oF: RDMA (RoCE v2)	Yes	No			

All NICs support the following:

- iDRAC Connection View
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- UEFI PXE Boot
- Legacy PXE Boot
- NVGRE
- VxLAN
- IP, TCP, UDP checksum offloads
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PowerEdge MX Fibre Channel Mezzanine Cards

	LPm31002-D	LPm32002-D	QME2692	QME2742
Vendor	Broadcom (Emulex)	Broadcom (Emulex)	Marvell (QLogic)	Marvell (QLogic)
Max Speed	16GF	32GFC	16GF	32GFC
Ports	2	2	2	2
NIC Type	HBA	HBA	HBA	HBA
Dell PN	[illegible]N63	31KFT	[illegible]620Y	PD8ND
SKU	544-BBCM	544-BBCN	544-BBCO	544-BBCP
General				
Configuration through F10 and F2 consoles	Yes	Yes	Yes	Yes
Out-of-band Firmware Updates	Yes	Yes	Yes	Yes
Inventory and Configuration through iDRAC	Yes	Yes	Yes	Yes
Secure Firmware Updates	Yes	Yes	No	No
NVMe-oF: FC	Yes	Yes	Yes	Yes

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MX7000 Overview

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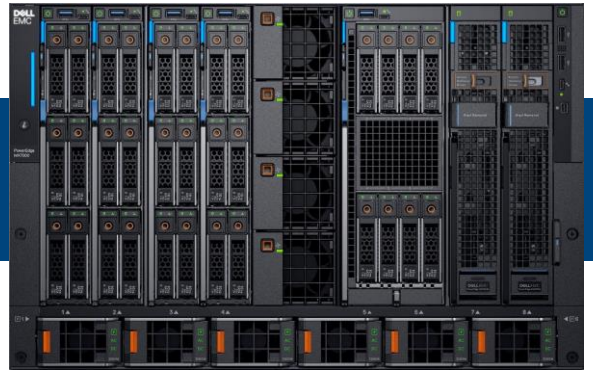
PowerEdge MX7000 chassis

Modular foundation to scale across multiple racks to suit a range of demanding use cases



Hosts flexible blocks of server and storage resources while providing outstanding efficiencies through shared power, cooling, networking, I/O and management within the chassis itself

Key Capabilities

- 7U modular enclosure has 8 front-accessible, single-width bays that accommodates variety of compute and storage sleds
- Support for 3 I/O fabrics, each with redundant modules
- QuickSync2 (wireless), Touchscreen LCD and traditional crash cart at-the-box management options

HIGHLIGHTS

- Support for at least three server processor microarchitecture generations and ready for 400Gb Ethernet and beyond
- Non-disruptive upgrades; unique no mid-plane design makes for easier future technology upgrades

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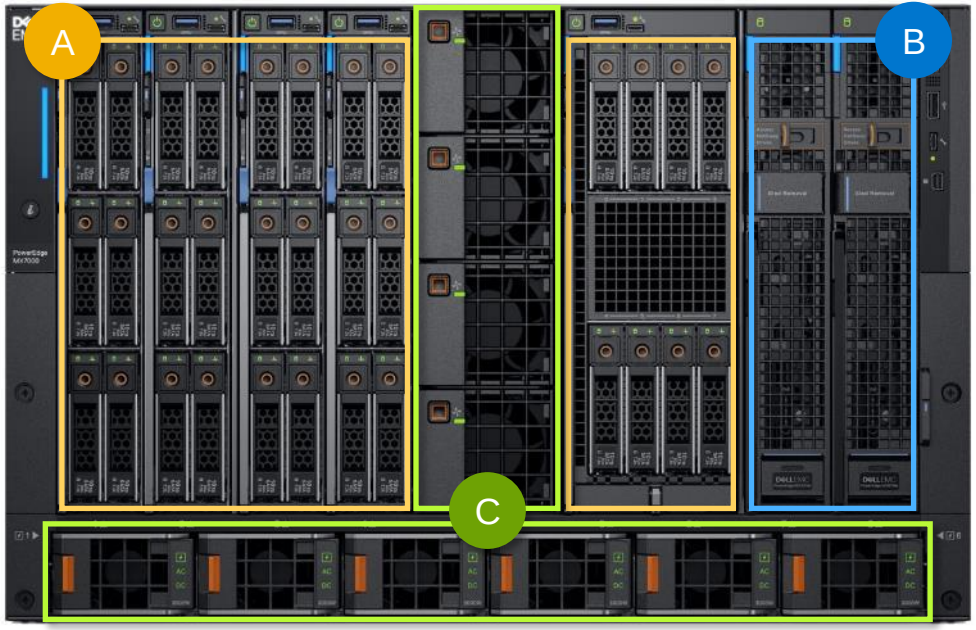
PowerEdge MX7000 chassis (front view)

7U chassis designed to support at least three future generations of server technologies

A

Compute Sleds

- No compromise design with up to eight 2-socket or four 4-socket options
- Up to eight drives plus M.2 boot option for greater storage options than ever before in large chassis



B

Storage Sleds

- Flexible, granular drive-level assignment; drives can be mapped to a server or shared
- Up to 16 SAS HDDs/SSDs
- 12 Gb/s direct attached SAS

C

Power and Cooling

- High efficiency 3 KW power supplies
- Grid and N+N redundancy
- Evenly distribute chassis-wide cooling

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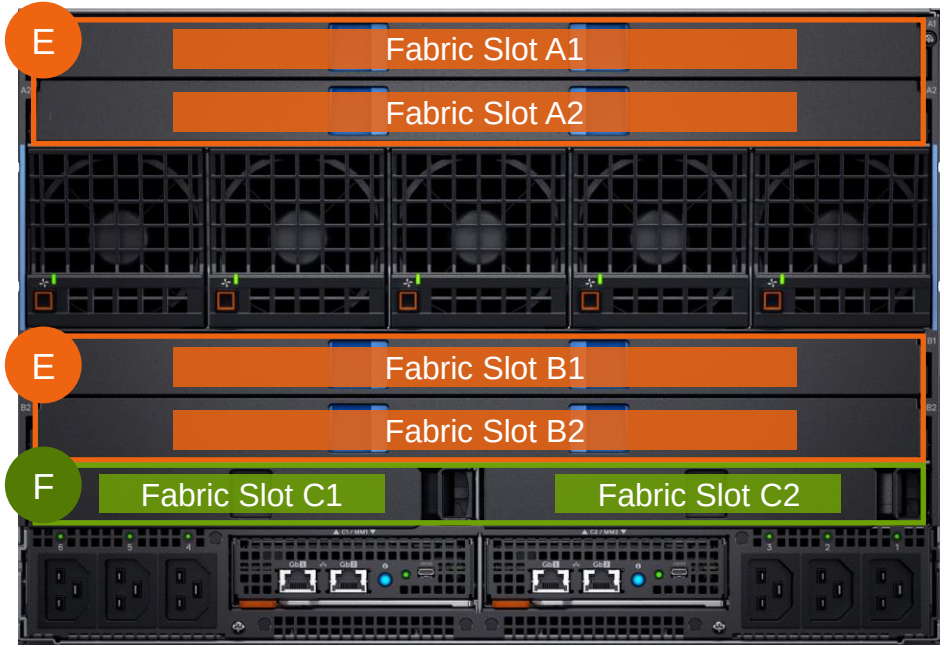
PowerEdge MX7000 chassis (rear view)

E

Scalable Networking
- Two redundant general-purpose fabrics
- MX Scalable Fabric Architecture for multi-chassis networking
- Future forward design



F

Storage Networking
- Redundant, highly available
- 32G Fibre Channel or 12G SAS storage fabric

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PowerEdge MX7000 generational comparison

Feature	MX7000	M1000e
RTS	September 2018	Shipping since PowerEdge 10G (~ CY2008)
Rack Height	7U	10U
Sled Orientation	Vertical	Vertical
Sled Support	MX740c 2S standard-height, single-wide MX750c 2S standard-height, single-wide MX760c 2S standard-height, single-wide MX840c 4S standard-height, double-wide MX5016s SAS storage sled (16 drives)	M600/M605/M805/M905 M610/M610X/M710/M710HD/M910/M915 M420/M520/M620/M820 M630/M830 M640
No. of Blades	Up to 8 standard height (2S or storage sleds) Up to 4 double-wide (4S)	Up to 32 quarter-height (M420) Up to 16 half-height Up to 8 full-height
I/O Module Bays	6	6
Fabric Types Supported	2 general purpose (Ethernet, future technologies) 1 storage specific (Fibre Channel, SAS)	3 general purpose (Ethernet, Fibre Channel, InfiniBand)
Power Supplies	Up to 6 3000W PSUs	Up to 6 2360W, 2700W, or 3000W PSUs
System Management	OpenManage Enterprise - Modular (Redfish API)	CMC (CLI-RACADM)
Quick Sync	Supported	Not supported
KVM	Integrated with Management Module	Discrete design

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Network I/O Modules

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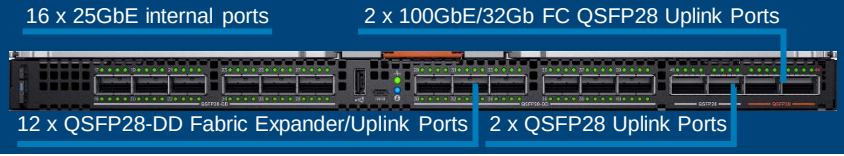
PowerEdge MX9116n Fabric Switching Engine

High-performance, scalable 25G fabric switch

A comprehensive high-end L2/L3 switch with multi-chassis fabric scaling capabilities



Key Capabilities

- 16 x 25GbE server-facing ports, 2 x 100GbE Uplink ports, 2 x 100GbE/8 x 32G FC uplink ports, and 12 x Fabric Expansion/Uplink ports
- Each Fabric Expansion port can operate as 2 x 100GbE, 2 x 40GbE, 8 x 25GbE, 8 x 10GbE
- Supported in Fabrics A & B
- Supports all PowerEdge MX Ethernet Cards
- Supports Open Networking, Full Switch and SmartFabric operating modes
- < 450ns latency, 6.4 Tbps switching fabric
- NVMe over Fabric Ready

HIGHLIGHTS

- Optimum performance fabric switch providing high scalability at a low TCO
- Highly efficient embedded ToR functionality that reduces cost and improves performance & latency
- Industry's first Open Networking fabric switch with ONIE and a choice of OS10 Enterprise Edition or select 3rd party OS

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PowerEdge MX9116n Fabric Switching Engine

Typical Cable & Optic Options

- When implementing a SmartFabric, two QSFP28-DD cables are **REQUIRED** for the VLTi connection
- A QSFP28-DD cable between the MX9116n and MX7116n is **REQUIRED**. Using a QSFP28 cable is not supported

QSFP28-DD ports are backwards compatible and support QSFP28 and QSFP+ Optics and cables

QSFP28 ports are backwards compatible and support QSFP+ Optics and cables

DAC-Q28DD-8S28-25G-xM
OR
AOC-QDD-8SFP-10G-xM
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
Corning Edge8 Cabling

DAC-Q28DD-200G-xM
OR
AOC-Q28DD-200G-xM
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
CBL-MPO12DD-OM4-xM

DAC-Q28DD-2Q28-100G-xM
OR
AOC-Q28DD-2Q28-100G-xM
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
CBL-MPO12DD-2MPO12-OM4-xM

DAC-QSFP-4SFP-10G-xM
OR
AOC-QSFP-4SFP-10G-xM
OR
QSFP-40G-SR4 (Optic)
AND
CBL-MPO12-4LC-OM4-xM

DAC-Q28-100G-xM
OR
AOC-Q28-100G-xM
OR
Q28-100G-SR4-NOF (Optic)
AND
CBL-MPO12-OM4-xM

Breakout 8x10GbE

MX7116n/VLTi**

Breakout 2x100GbE

Breakout 4x 10GbE

100GbE Uplink

Breakout 2x40GbE

Breakout 8x25GbE

Breakout 4x25GbE

Breakout 4x8/16/32 GFC

1GbE and 10G-BaseT are supported via the QSA28 adapter

DAC-Q28DD-2Q28-100G-xM
OR
AOC-Q28DD-2Q-40G-7M
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
CBL-MPO12DD-2MPO12-OM4-xM

DAC-Q28DD-8S28-25G-xM
OR
AOC-Q28DD-8S28-25G-xM
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
Corning Edge8 Cabling

DAC-Q28-4S28-25G-xM
OR
AOC-Q28-4S28-25G-xM
OR
Q28-100G-SR4-NOF (Optic)
AND
CBL-MPO12-4LC-OM4-xM

Q28-128GFC-SW4 (4x32GFC Optic)*
AND
CBL-MPO12-4LC-OM4-xM

NOTE: Not every option is presented on this page. Please contact your account team for additional options

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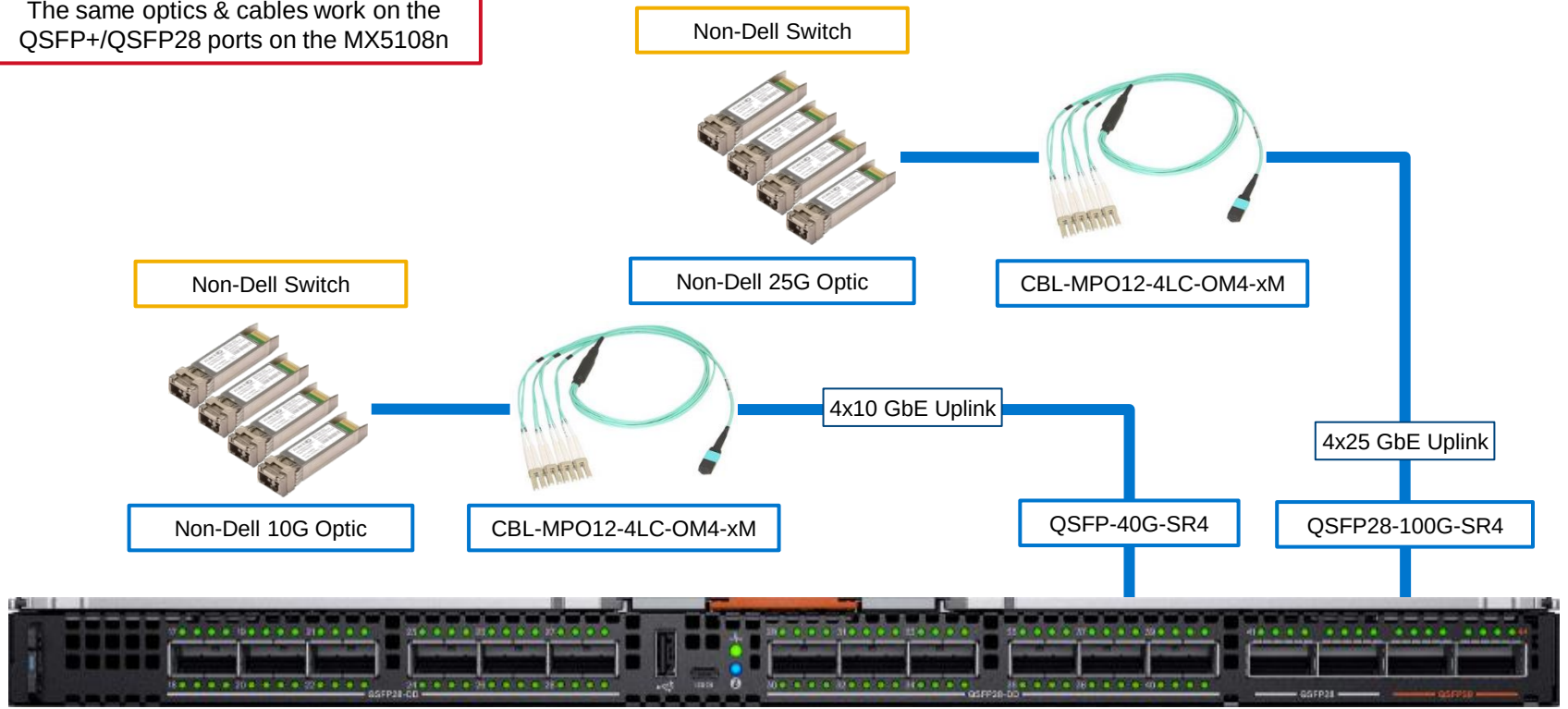
Connecting to Non-Dell 10GbE or 25GbE uplink ports

For example: Cisco, Arista, Juniper

The same optics & cables work on the QSFP+/QSFP28 ports on the MX5108n



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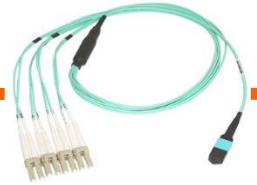
Connecting MX9116n to Fibre Channel Switch

Fibre Channel Switch

Use this when connecting to SFP FC ports

8/16/32G FC Optic
(Vendor Specific)



CBL-MPO12-4LC-OM4-xM

Fibre Channel Switch

Use this when connecting to QSFP FC ports

16/32G QSFP FC Optic
(Vendor Specific)

CBL-MPO12-OM4-xM

Q28-128GFC-SW4 (8/16/32G)

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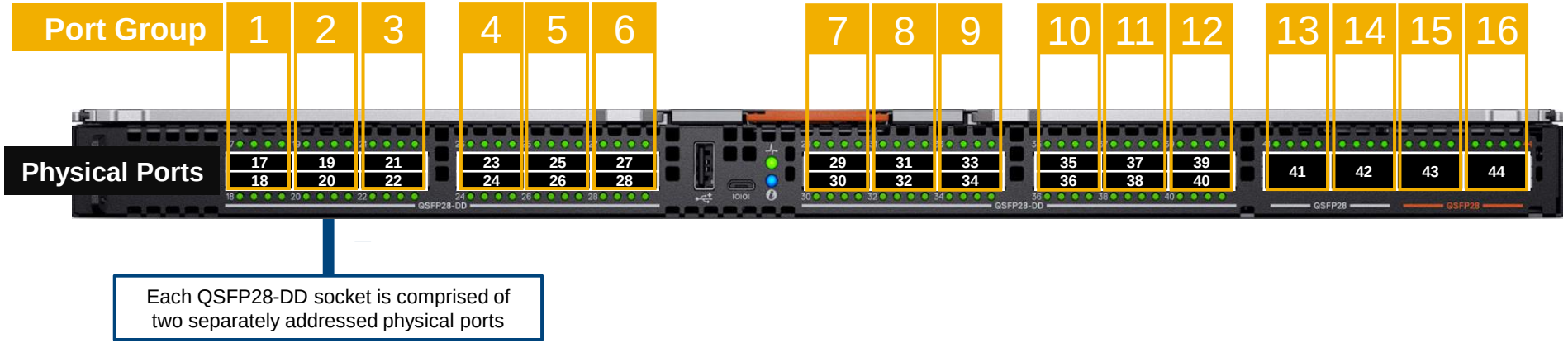
Physical Port ⟺ Port Group Mapping

Each QSFP28-DD & QSFP28 socket is logically addressed as a port group

A port group is a logical descriptor given to one or more physical ports that supports one or more logical configurations.

For example, **port group 12** represents physical ports **39** and **40**



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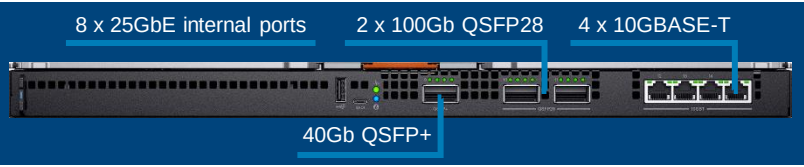
PowerEdge MX5108n Ethernet switch

Entry level, high performance, 25G Ethernet switch

Economical solution for single chassis configurations



Key Capabilities

- 8 x 25GbE server-facing ports, 2 x 100GbE uplink ports, 1 x 40GbE port and 4 x 10GBase-T ports
- Supported in Fabrics A & B
- Supports all PowerEdge MX Ethernet Cards except Broadcom 57504
- Supports Open Networking, Full Switch and SmartFabric operating modes
- < 800ns latency, 960Gbps switching fabric
- NVMe over Fabric Ready

HIGHLIGHTS

- High-performance, low-latency Ethernet switch for single chassis deployments
- Option of Dell Networking Linux-based OS10 Enterprise Edition OS
- Industry's first Open Networking blade switch with ONIE and a choice of select 3rd party OS

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PowerEdge MX5108n Ethernet switch

Typical Cable & Optic Options

When implementing a SmartFabric, a VLTi connection using ports 9 & 10 is **required** with both ports running at **40GE**.

Because port 10 defaults to 100GE, use a **40GE QSFP+** optic/cable, not a 100GE QSFP28 optic/cable

DAC-QSFP-40G-xM
OR
AOC-QSFP-40G-xM
OR
QSFP-40G-SR4 (Optic)
AND
CBL-MPO12-OM4-xM

40GbE Uplink

DAC-Q28-100G-xM
OR
AOC-Q28-100G-xM
OR
Q28-100G-SR4-NOF (Optic)
AND
CBL-MPO12-OM4-xM

100GbE Uplink

RJ45/Cat 6a Copper

1/10GbE Uplink

QSFP28 ports are backwards compatible and support QSFP+ Optics and cables

Breakout 4x10GbE

DAC-QSFP-4SFP-10G-xM
OR
AOC-QSFP-4SFP-10G-xM
OR
QSFP-40G-SR4
AND
CBL-MPO12-4LC-OM4-xM

Breakout 4x25GbE

DAC-Q28-4S28-25G-xM
OR
AOC-Q28-4S28-25G-xM
OR
Q28-100G-SR4-NOF (Optic)
AND
CBL-MPO12-4LC-OM4-xM

NOTE: Not every option is presented on this page.
Contact your account team for additional options

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PowerEdge MX7116n Fabric Expander Module

Low latency 25G fabric expander

Scales fabric bandwidth across multiple chassis

Key Capabilities

- 16 x 25GbE server-facing ports, 2x Fabric Expansion ports back to FSE
- Supported in Fabrics A & B
- Supports all PowerEdge MX Ethernet Cards
- No switching ASIC and no OS
- Sub ~75ns latency
- All switching done at FSE
- No port-to-port oversubscription
- Serves as a Pass-Through Module to select Dell Networking Ethernet switches (10GbE & 25GbE*)

HIGHLIGHTS

- Low latency fabric expander module for efficiently scaling fabric bandwidth across a multi-chassis environment
- One cable supports 8 x 25GbE connections back to the FSE
- Nothing to manage, no firmware to update

***Requires OpenManage Enterprise – Modular v1.20.00 or later

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PowerEdge MX7116n Fabric Expander Module

Cable & Optic Options

To 2x QSFP28	To 8x SFP28	To 2x QSFP+	To 8x SFP+
DAC-Q28DD-2Q28-100G-xM OR AOC-Q28DD-2Q28-100G-xM OR Q28DD-80G/200G-2SR4 (Optic) AND CBL-MPO12DD-2MPO12-OM4-xM	DAC-Q28DD-8S28-25G-xM OR AOC-Q28DD-8S28-25G-xM OR Q28DD-80G/200G-2SR4 (Optic) AND Corning Edge8 Cabling	DAC-Q28DD-2Q28-100G-xM OR AOC-Q28DD-2Q-40G-xM OR Q28DD-80G/200G-2SR4 (Optic) AND CBL-MPO12DD-2MPO12-OM4-xM	DAC-Q28DD-8S28-25G-xM OR AOC-Q28DD-8SFP-10G-xM OR Q28DD-80G/200G-2SR4 (Optic) AND Corning Edge8 Cabling
Breakout 8x25GbE	Breakout 8x25GbE	Breakout 8x10GbE	Breakout 8x10GbE

Only used with Quad Port NIC

To MX9116n

DAC-Q28DD-200G-xM
OR
AOC-Q28DD-200G-xM
OR
Q28DD-80G/200G-2SR4 (Optic)
AND
CBL-MPO12DD-OM4-xM

NOTE:
- A QSFP28-DD cable between the MX7116n and MX9116n is **REQUIRED**. Using a QSFP28 cable is not supported
- Breakout is supported only to Dell PowerSwitches
- 10GbE Breakout requires OpenManage Enterprise Modular version 1.20.00 or higher

NOTE:
- When using quad port NICs, both FEM ports must be connected to the same MX9116n FSE
- If using the FEM as a Pass Through Module, the FEM ports can be connected to different ToR switches

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Popular Ethernet SKUs

Ethernet I/O Modules

Factory SKU	After Sale SKU	Description
210-AODD	210-AODC	Dell MX9116n 25GbE Fabric Switching Engine, 12x QSFP28-DD, 2x QSFP28 100GbE, 2 x QSFP28 100GbE/32GFC
210-ANZJ	210-ANZI	Dell MX5108n 25GbE Ethernet Switch, 4x10G-BaseT, 1x40GbE QSFP+, 2x100GbE QSFP28
210-ANUK	210-ANUJ	Dell MX7116n 25GbE Fabric Expander Module

Fibre Channel Optics for MX9116n*

Factory SKU	After Sale SKU	Description
407-BBZE	407-BBZG	Dell Networking Transceiver, 32G QSFP28 SWL Fibre Channel QSFP (4x32GFC Supports 8/16/32 GFC)

***NOTE**: These optics are NOT supported in the MXG610s FC switch*

4x Breakout Cables for Ethernet & FC QSFP to 4x LC connectors

Factory SKU	After Sale SKU	Description
470-ABOF	470-ABPH	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 1M
470-ABOG	470-ABPE	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 3M
470-ABOH	470-ABPG	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 5M
470-ABOI	470-ABPK	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 7M

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QSFP28-DD Cables for FSE/FEM and FSE/FSE VLT Connections

DAC & AOC Cables

Factory SKU	After Sale SKU	Description
470-ACTP	470-ACUI	Dell Networking 2x100GbE QSFP28-DD Passive Direct Attach Cable, No FEC, 0.5 Meter
470-ACTR	470-ACUL	Dell Networking 2x100GbE QSFP28-DD Passive Direct Attach Cable, No FEC, 1 Meter
470-ACTS	470-ACUN	Dell Networking 2x100GbE QSFP28-DD Passive Direct Attach Cable, No FEC, 2 Meter
470-ACYY	470-ACYV	Dell Networking 2x100GbE QSFP28-DD Passive Direct Attach Cable, No FEC, 3 Meter
470-ACTI	470-ACUB	Dell Networking 2x100GbE QSFP28-DD Active Optical Cable, No FEC, 5 Meter
470-ACTF	470-ACTX	Dell Networking 2x100GbE QSFP28-DD Active Optical Cable, No FEC, 10 Meter
470-ACTG	470-ACTY	Dell Networking 2x100GbE QSFP28-DD Active Optical Cable, No FEC, 20 Meter

Optical Transceiver + MMF Fiber*

Factory SKU	After Sale SKU	Description
407-BCKE	407-BCKF	Dell Networking Transceiver, 2x100GbE/2x40GbE Dual Rate, QSFP28-DD, 2SR4, No FEC Capable, MPO, MMF
470-ADBF	470-ADCE	Dell Networking Cable, MPO12-DD to MPO12-DD, Fiber Cable, MMF, OM4, Optics Required, 1M
470-ADBK	470-ADBH	Dell Networking Cable, MPO12-DD to MPO12-DD, Fiber Cable, MMF, OM4, Optics Required, 3M
470-ADBI	470-ADCH	Dell Networking Cable, MPO12-DD to MPO12-DD, Fiber Cable, MMF, OM4, Optics Required, 5M
470-ADCI	470-ADBJ	Dell Networking Cable, MPO12-DD to MPO12-DD, Fiber Cable, MMF, OM4, Optics Required, 7M
N/A	N/A	Corning Edge8 Structured Cabling

NOTE: *These optics & cables are NOT supported in QSFP28 or QSFP+ ports*

*OS10.5.0.1 or higher is required to use optics & passive fiber for FSE/FEM connections

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Speed Compatibility for Cables/Optics

- When configuring a port for a specific speed or breakout, a compatible cable/optic must be used
- DAC cables are generally multi-speed
  - For example, a QSFP28 DAC cable can run at 100G, 4x25G, 40G, 4x10G
- AOC cables and optical transceivers are generally single speed
  - For example, a QSFP28 optic can run at 100G or 4x25G. It cannot run at 40G or 4x10G
- Use the table below to ensure that the correct cable/optic is being used

Description	Type	Primary Speed	Port Type	2x100G	100G	2x40G	40G	8x25G	4x25G	8x10G	4X10G
40G DAC	DAC	40G	QSFP+				X				X
100G DAC	DAC	100G	QSFP28		X		X		X		X
4x25G breakout DAC	DAC	100G	QSFP28						X		X
8x25G breakout DAC	DAC	100G	QSFP28-DD					X		X	
2x100G QSFP28-DD DAC	DAC	100G	QSFP28-DD	X	X	X	X	X	X	X	X
40G AOC or Transceiver	Optical	40G	QSFP+				X				X
100G AOC or Transceiver	Optical	100G	QSFP28		X				X		
2x100G/2x40G QSFP28-DD Transceiver	Optical	100G	QSFP28-DD	X	X	X	X	X	X	X	X
2x100G QSFP28-DD AOC or Transceiver	Optical	100G	QSFP28-DD	X	X			X	X		
2x40G QSFP-DD AOC or Transceiver	Optical	40G	QSFP28-DD			X	X			X	X

The QSA28 Adapter is a QSFP form factor carrier that allows a SFP, SFP+, or SFP28 optic/cable to be inserted into a QSFP+, QSFP28, or QSFP28-DD port. This provides the ability to support a single 1G, 10G, or 25G cable/optic

DELL Technologies

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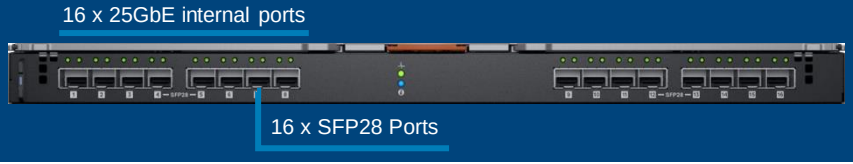
PowerEdge MX Ethernet Pass-through Modules

25GbE Pass-through Module



10G-BaseT Pass-though Module

Key Capabilities

- 16 x 25GbE server-facing ports
- 16 x SFP28 or 10G-BaseT external ports
- Supported in Fabrics A & B
- Supports all PowerEdge MX Ethernet Cards

HIGHLIGHTS

- Simple Ethernet pass through from compute sled to external switch
- One cable per compute sled
- Nothing to manage, no firmware to update

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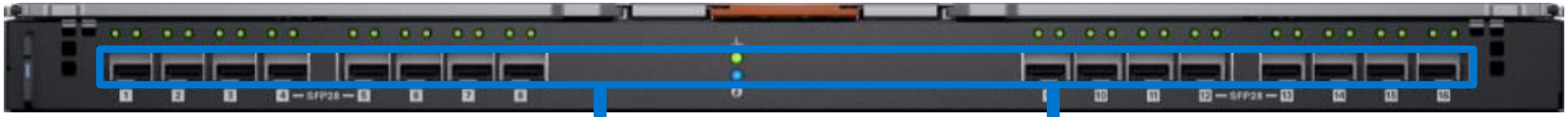
PowerEdge 25GbE Pass-Through Module
Cable & Optic Options



25G Uplink

DAC-SFP28-25G-xM
OR
AOC-SFP28-25G-xM
OR
SFP28-25G-SR-NOF
AND
CBL-LC-OM4-xM

10G Uplink

DAC-SFP-10G-xM
OR
DAC-SFP28-25G-xM*
OR
AOC-SFP-10G-xM
OR
SFP-10G-SR
AND
CBL-LC-OM4-xM

*DAC-SFP28-25G-xM supports 10GbE and 25GbE

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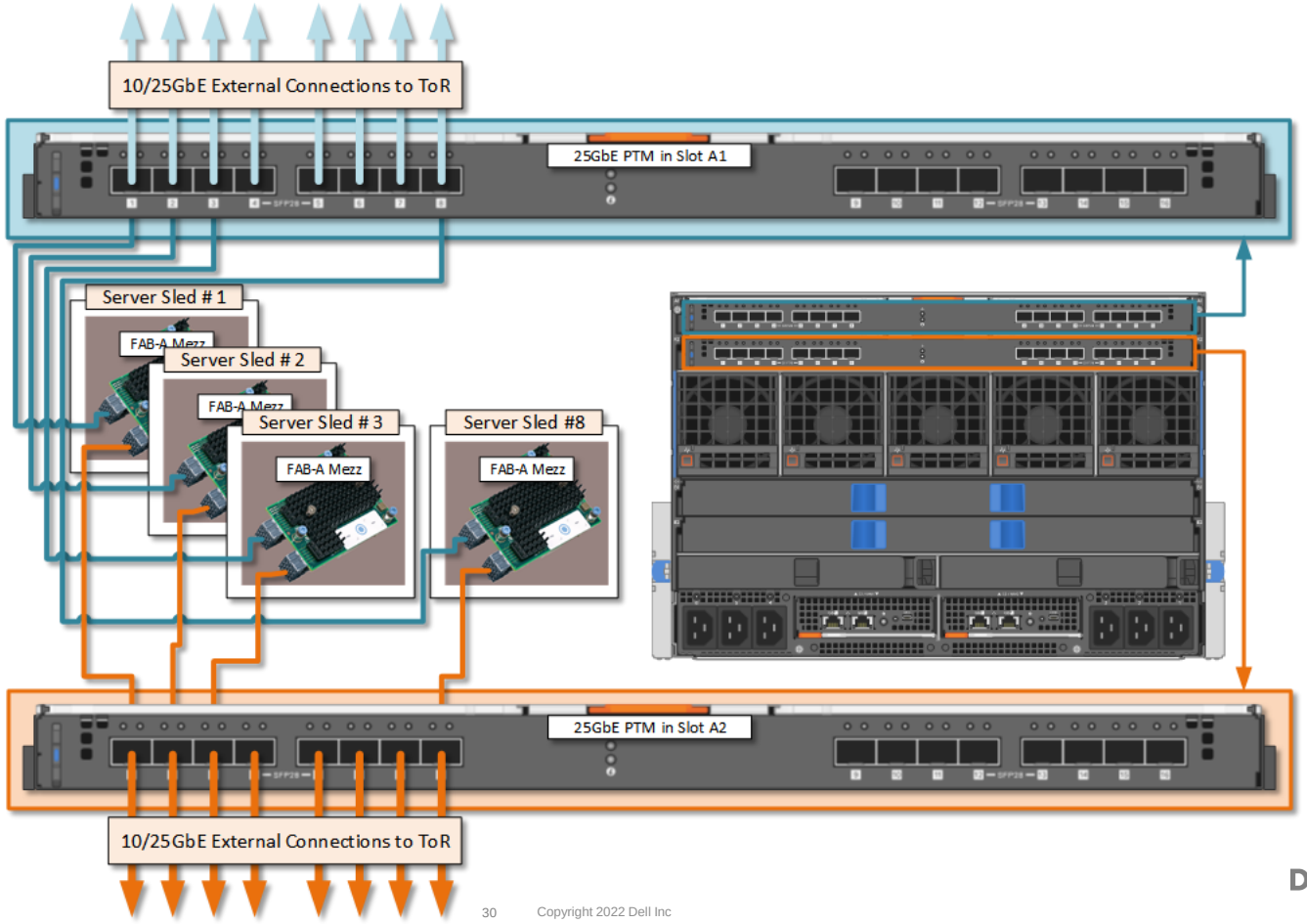
Pass-Through Module Port Mapping – Dual Port NIC



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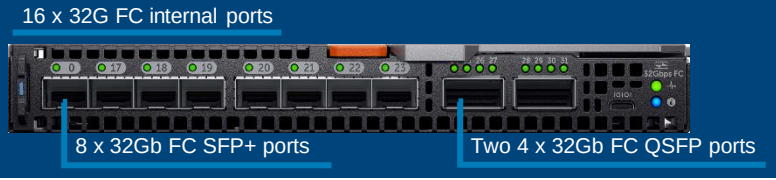
PowerEdge MXG610s Fibre Channel Switch

High-performance, Brocade Gen 6 32G FC switch

The latest Fibre Channel technology for large scale Storage Area Networks



Key Capabilities

- 16 x 32G FC server-facing ports, 8 x 32G SFP FC ports, and 2 QSFP FC uplink ports (4 x 32G per QSFP)
- Supported in Fabric C Only
- Supports all MX Fibre Channel HBAs
- Designed for maximum flexibility and value with “pay-as-you-grow” scalability and Ports on Demand (PoD) licensing
- Compatible with Brocade and Cisco fabric/director class switches
- NVMe over Fabric Ready

HIGHLIGHTS

- High performance, non-blocking FC switch in a modular chassis platform for demanding all flash storage environments
- Ports on Demand licensing to “pay-as-you-grow”
- Simplified cable management using QSFP ports

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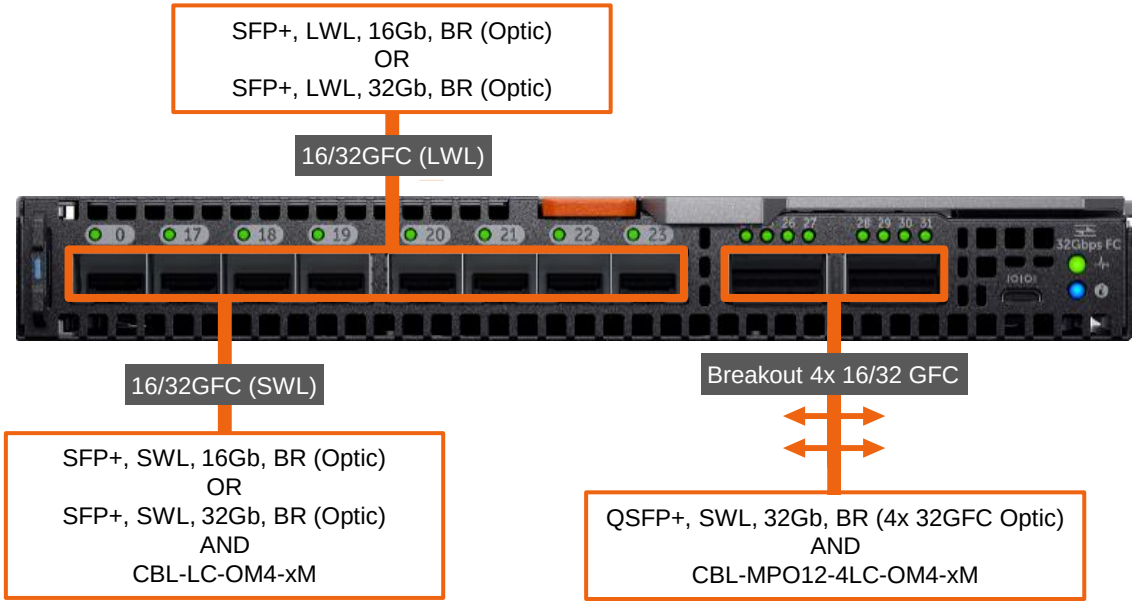
PowerEdge MXG610s Fibre Channel Switch

Typical Cable & Optic Options



NOTE: Not every option is presented on this page.
Contact your account team for additional options

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MXG610s Additional Information

- Must be ordered in pairs
- Supports all PowerEdge MX Fibre Channel HBAs
- 2 models available:
  - 16x activated ports & 4x FC32 SFP+ optics
  - 16x activated ports & 8x FC32 SFP+ optics, Enterprise Bundle
- Additional port licenses can be added
- Additional 16G FC and 32G FC optics can be purchased for activated ports

- **NOTE**: A port license is consumed when that port is activated, regardless if port is internal or external (QSFP ports count as 4 licenses)

- **NOTE**: While 32 licensed ports is technically possible, 24 ports is the maximum number of ports that are usable. Don't purchase more than 24 port licenses

The Enterprise bundle includes ISL Trunking, Fabric Vision, and Extended Fabric licenses:

- **ISL Trunking**: Provides the ability to aggregate multiple physical links into one logical link for enhanced network performance and fault tolerance. Also enables Brocade Access Gateway ISL Trunking (N_port Trunking)
- **Fabric Vision**: Enables MAPS (Monitoring and Alerting Policy Suite), Flow Vision, IO Insight, VM Insight, and ClearLink (a.k.a. D_Port) to non-Brocade devices
  - MAPS enables rules based monitoring and alerting capabilities, provides comprehensive dashboards to quickly troubleshoot problems in Brocade SAN environments
  - Flow Vision enables host to LUN flow monitoring, application flow mirroring for offline capture and deeper analysis, and test traffic flow generation function for SAN infrastructure validation
  - IO Insight automatically detects degraded storage IO performance with integrated device latency and IOPS monitoring embedded in the hardware
  - ClearLink (D_Port) to non-Brocade devices allows extensive diagnostic testing of links to devices other than Brocade switches and adapters. (Functionality requires support by attached device, availability to be checked by the user)
- **Extended Fabric**: Provides greater than 10km of switched fabric connectivity at full bandwidth over long distances

- **NOTE**: These features are only available in the Enterprise Bundle - individual feature licenses are not available

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MXG610s: Popular SKUs

Factory SKU	After Sale SKU	Description
210-AOCK	210-AOCJ	Dell MXG610S switch, includes 16 activated ports & 4x FC32 SFP+ SWL optics
210-AOCM	210-AOCL	Dell MXG610S switch, includes 16 activated ports & 8x FC32 SFP+ SWL optics, Enterprise Bundle
528-BFOY	528-BFOH	Dell MXG610S 8 Ports-On-Demand activation, no additional optics
528-BFOE	528-BFOS	Dell MXG610S ENT Feature License Bundle (Trunking, Extended Fabric, and Fabric Vision)

16 ports licensed = 8 servers & up to 8 external uplinks (any combination of SFP+ & QSFP ports)*
24 ports licensed = 8 servers & all 16 external uplinks

NOTE: If you need the enterprise bundle, purchase the SKU with the license included (210-AOCM). Do not purchase a different SKU and then add the stand-alone ENT license bundle

NOTE: QSFP ports use 4 activation licenses

NOTE: As of April 13th, 2023, Brocade software licenses are delivered digitally

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Fibre Channel Optics & Cables for MXG610s

Factory SKU	After Sale SKU	Description
407-BBCF	407-BBBB	Brocade 16G SFP SWL Fibre Channel, 1 pack, requires port license (Supports 8G/16G)
407-BBXJ	407-BBXM	Brocade 32G SFP SWL Fibre Channel, 1 pack, requires port license (Supports 8G/16G/32G)
407-BBXK	407-BBXL	Brocade 32G SFP SWL Fibre Channel, 8 pack, requires port license (Supports 8G/16G/32G)
407-BBXH	407-BBXO	Brocade 32G SFP LWL, 10Km SMF, 1 pack, requires port license
407-BBXI	407-BBXN	Brocade 32G SFP LWL, 10Km SMF, 8 pack, requires port license
407-BCBB	407-BCBC	Brocade 32G QSFP SWL Fibre Channel QSFP (4 x 32G),1 pack, requires 4 port licenses (Supports 16G/32G)

NOTE: *These optics are NOT supported in the MX9116n Fabric Switching Engine*

MMF LC/LC cables for SFP+ SWL optics

Factory SKU	After Sale SKU	Description
470-ACMB	470-ACLV	OM4 LC/LC Fiber Patch Cable 1 Meter
470-ACLS	470-ACLT	OM4 LC/LC Fiber Patch Cable 2 Meter
470-ACMF	470-ACMO	OM4 LC/LC Fiber Patch Cable 3 Meter
470-ACLK	470-ACLY	OM4 LC/LC Fiber Patch Cable 5 Meter
470-ACMH	470-ACMN	OM4 LC/LC Fiber Patch Cable 10 Meter

Breakout cables for 4x32GFC QSFP optic

Factory SKU	After Sale SKU	Description
470-ABOF	470-ABPH	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 1M
470-ABOG	470-ABPE	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 3M
470-ABOH	470-ABPG	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 5M
470-ABOI	470-ABPK	Dell Networking Cable, MPO to 4xLC, Fiber Breakout Cable, MMF, OM4, Optics Required, 7M

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IOM Placement Rules for Fabrics A & B

- Mixing MX9116n and MX7116n within the same fabric *IS* allowed
- No mixing of Ethernet switch and Pass-Through Modules within the same fabric on MX7000
  - For example, MX9116n in A1 and 25G PTM in A2 is not allowed
- No mixing of Pass-Through Module speeds within the same fabric on MX7000
  - For example, 10G-BaseT PTM in A1 and 25G PTM in A2 is not allowed

For the comprehensive table of recommended slot configurations for IOMs, see Appendix A in the *Dell OpenManage Enterprise-Modular Edition Version 2.20.00 for PowerEdge MX7000 Chassis User's Guide*

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100GbE solution
External Fabric Switching Engine and IOM Fabric Expander Module

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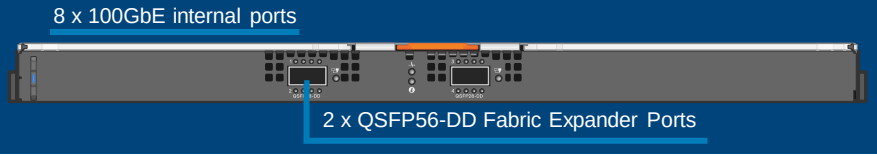
PowerEdge MX8116n Fabric Expander Module

Low latency 100G fabric expander

Scales fabric bandwidth across multiple chassis



Key Capabilities

- 8 x 100GbE server-facing ports, 2x Fabric Expansion ports back to FSE
- Supported in Fabrics A & B
- Supports PowerEdge MX Ethernet Cards – BCOM 57508, BCOM 57504, Intel XXV710, Intel XXV810, and Mellanox ConnectX-4 LX
- No switching ASIC
- Linux based BootOS
- All switching done at Z9432F-ON FSE
- No port-to-port oversubscription
- NVMe/TCP ready

HIGHLIGHTS

- Low latency fabric expander module for efficiently scaling fabric bandwidth across a multi-chassis environment
- One cable supports 4 x 100GbE, 8 x 25GbE, or 4 x 25GbE connections back to the FSE
- Nothing to manage

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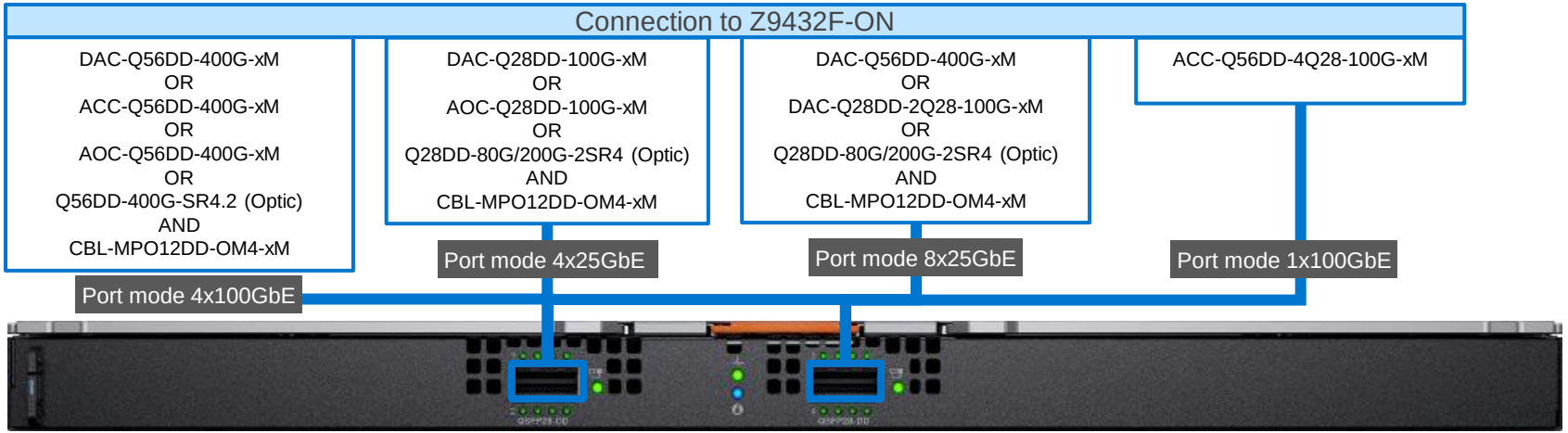
PowerEdge MX8116n Fabric Expander Module

Cable & Optic Options



NOTE:

- A QSFP56-DD or QSFP28DD cable between the MX8116n and Z9432F-ON is **REQUIRED**. Using a QSFP28 cable is not supported
- Breakout is supported only to Dell PowerSwitch
- Starting OME-M 2.20.00 – MX8116n FEM will be supported with Z9664F-ON

QSFP56-DD ports are backwards compatible and support QSFP28-DD Optics and cables

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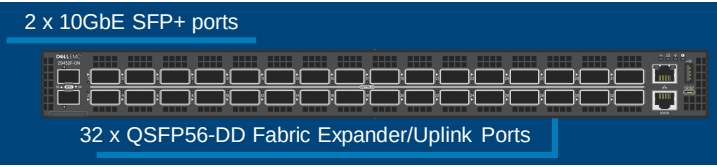
PowerSwitch Z9432F-ON Fabric Switching Engine

High-performance, scalable 100/400G fabric switch

A comprehensive high-end L2/L3 switch with multi-chassis fabric scaling capabilities



Key Capabilities

- 32 x 400GbE Fabric Expansion/Uplink ports
- Port modes used with FEM are 4 x 100GbE, 8 x 25GbE, and 4 x 25GbE
- Additional port modes include 1 x 400GbE, 2 x 100GbE, 1 x 100GbE, 2 x 200GbE, 1 x 200GbE, 8 x 50GbE, 2 x 40GbE, 1 x 40GbE, 8 x 10GbE, and 4 x 10GbE.
- Supports PowerEdge MX Ethernet Cards – BCOM 57508, BCOM 57504, Intel XXV710, Intel XXV810, and Mellanox ConnectX-4 LX
- Supports Open Networking and Full Switch operating modes
- < 850ns latency, 25.6 Tbps switching fabric
- NVMe over Fabric Ready

HIGHLIGHTS

- Optimum performance fabric switch providing high scalability at a low TCO
- Highly efficient embedded ToR functionality that reduces cost and improves performance & latency
- Open Networking fabric switch with ONIE and a choice of OS10 Enterprise Edition or select 3rd party OS

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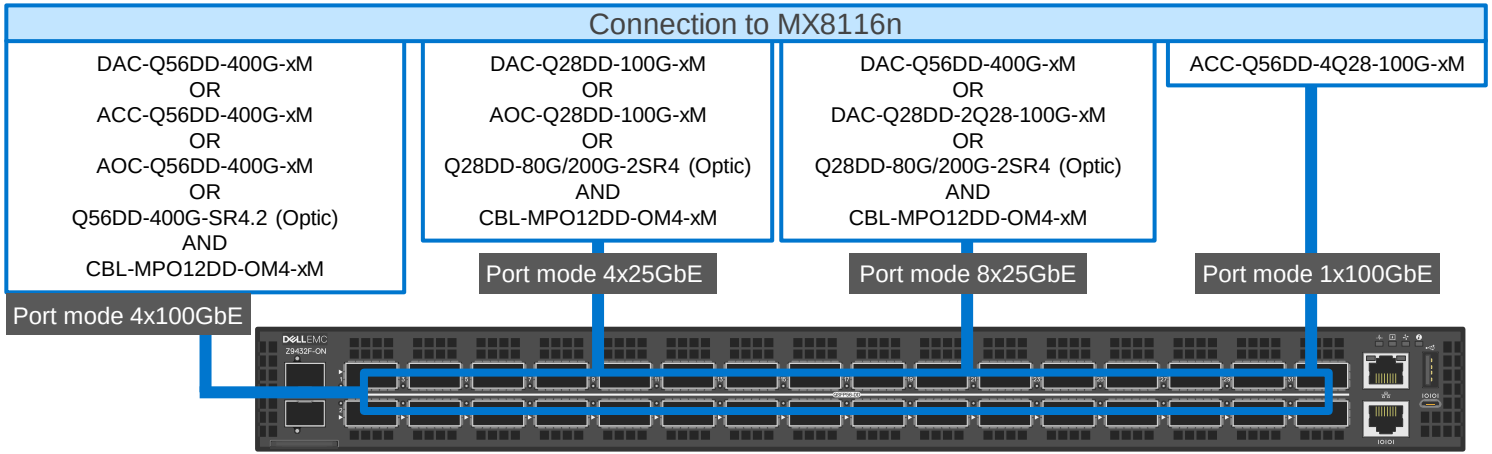
PowerSwitch Z9432F-ON Fabric Switching Engine

Typical Cable & Optic Options

QSFP56-DD ports are backwards compatible and support QSFP28-DD Optics and cables



1GbE and 10G-BaseT are supported via the QSA28 adapter

NOTE:

- A QSFP56-DD or QSFP28DD cable between the MX8116n and Z9432F-ON is **REQUIRED**. Using a QSFP28 cable is not supported
- Breakout is supported only to Dell PowerSwitch

NOTE: Not every option is presented on this page. Please contact your account team for additional options

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PowerSwitch Z9664F-ON Fabric Switching Engine

High-performance, scalable 400G fabric switch

400GbE multi-rate aggregation switch

64 x QSFP56-DD Fabric Expander/Uplink Ports

Key Capabilities

- Fixed config switch in a 2RU design
- 64 ports of 400GbE
- 256 ports of 100GbE
- 4x breakout - can be used as a multi-rate switch via breakout cables for up to 256 ports
- Supports standard 10/25/40/50/100/200/400GbE
- Based on Broadcom Tomahawk 4 chipset

Key Features

- Scalable L2 and L3 Ethernet switching with QoS and a full complement of standards-based IPv4 and IPv6 features, including OSPFB, BGP and VXLAN routing support
- 51.2Tbps non-blocking (full duplex) switching fabric delivers line rate performance under full load
- Supports Dell SmartFabric OS10

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IOM Placement Rules for Fabrics A & B

- Single MX8116n in a fabric *IS* allowed
- No mixing of MX8116n and MX9116n/MX7116n within the same fabric on MX7000
- No mixing of Ethernet switch and Pass-Through Modules within the same fabric on MX7000
  - For example, MX8116n in A1 and 25G PTM in A2 is not allowed
- No mixing of Pass-Through Module speeds within the same fabric on MX7000
  - For example, 10G-BaseT PTM in A1 and 25G PTM in A2 is not allowed

For the comprehensive table of recommended slot configurations for IOMs, see Appendix A in the *Dell OpenManage Enterprise-Modular Edition Version 2.20.00 for PowerEdge MX7000 Chassis User's Guide*

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Cables for QSFP56-DD ports-MX 100G Solution

FI SKU	APOS SKU	Description
470-ADYO	470-ADYS	Dell Networking Cable, 400GbE Q56DD Passive Copper Direct Attach Cable, 0.5 Meter
470-ADXJ	470-ADYU	Dell Networking Cable, 400GbE Q56DD Passive Direct Attach Cable, No FEC, 1 Meter
470-ADYV	470-ADYT	Dell Networking Cable, 400GbE Q56DD Passive Copper Direct Attach Cable, 2 Meter
470-AEDO	470-AEDD	Dell Networking Cable, 400GbE QSFP56-DD to QSFP56-DD, Active Copper Cable, 3 Meter
470-AEDH	470-AEDG	Dell Networking Cable, 400GbE QSFP56-DD to QSFP56-DD, Active Copper Cable, 5 Meter
470-AEDI	470-AEDJ	Dell Networking Cable, 400GbE QSFP56-DD to QSFP56-DD, Active Copper Cable, 7 Meter
470-BBGB	470-BBGC	Dell Networking Cable 400GbE QSFP56-DD to QSFP56-DD Active Optical Cable 10Meter,G2
470-BBGF	470-BBGG	Dell Networking Cable 400GbE QSFP56-DD to QSFP56-DD Active Optical Cable 15Meter,G2
470-BBGH	470-BBGD	Dell Networking Cable 400GbE QSFP56-DD to QSFP56-DD Active Optical Cable 30Meter,G2

NOTE: Active Copper Cable are not supported for the connection between MX8116n FEM and PowerSwitch Z9664F-ON

QSFP56-DD Ethernet Optics for MX8116n and Z9432F-ON/Z9664F-ON

FI SKU	APOS SKU	Long Name
407-BCXF	407-BCXG	Dell Networking,Tcvr,400GbE, Q56DD,SR4.2,GEN3,MPO,MMF,1x400G p2p,4x100G breakout to BIDI or SR1.2

NOTE: For the complete list of supported cables & optics, refer to the Interop matrix on the Sales Portal

DELL Technologies

QSFP56-DD Breakout Cables

FI SKU	APOS SKU	Description
470-AFPF	470-AFPH	Dell Networking Cable 400GbE Breakout, QSFP56-DD to 4xQSFP56 Depop SFF DAC 3 Meter
470-AEDM	470-AEDF	Dell Networking Cable, 400GbE QSFP56-DD to 4xQSFP28 100GbE, Active Copper Cable, Breakout, 3 Meter
470-AEDE	470-AEDL	Dell Networking Cable, 400GbE QSFP56-DD to 4xQSFP28 100GbE, Active Copper Cable, Breakout,5 Meter

DELL Technologies

100GbE Ethernet SKUs

Ethernet I/O Modules

Factory SKU	After Sale SKU	Description
210-BFBJ	210-BFBI	Dell Networking MX8116n 100GbE Fabric Expander Module

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Scalable Fabric Architecture

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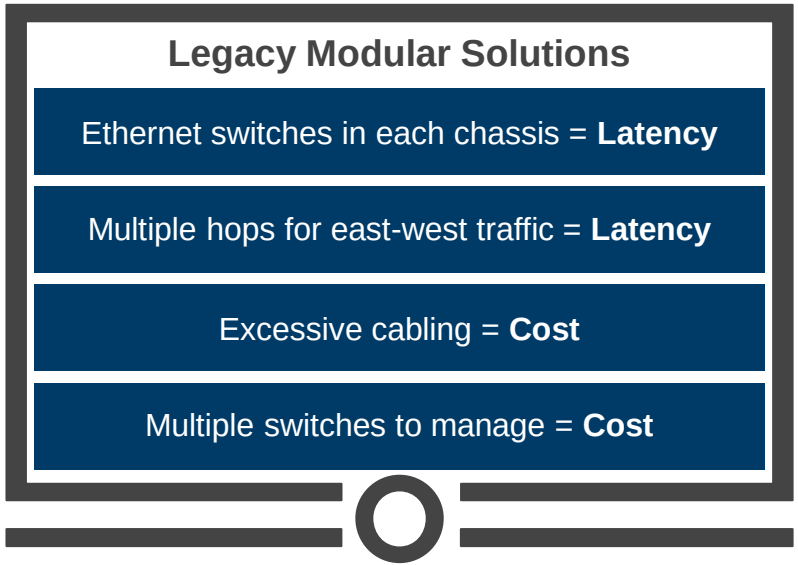
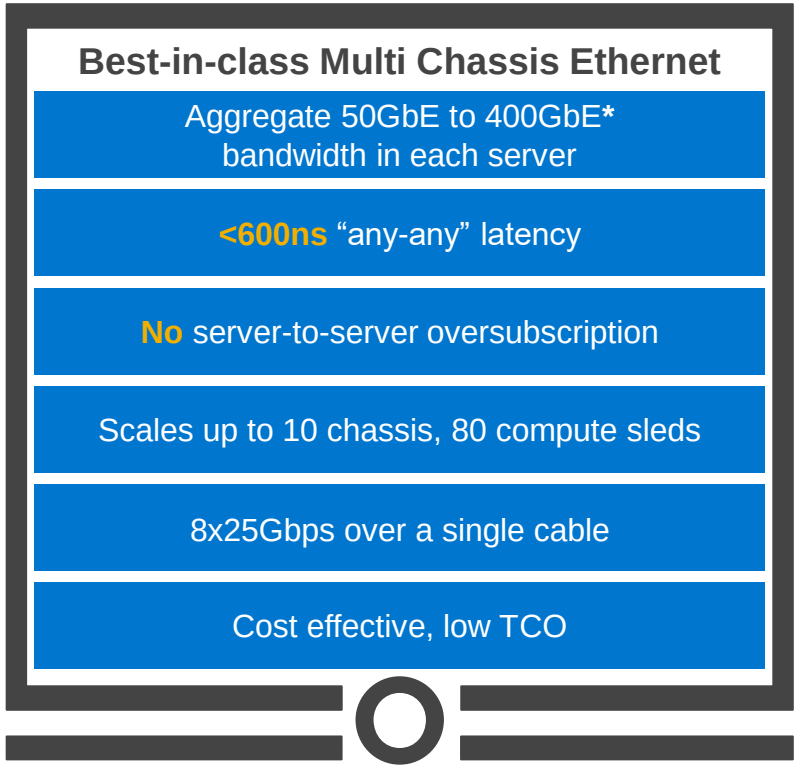
PowerEdge MX Scalable Fabric Architecture

How can multiple chassis behave like a single network?





*Requires Broadcom 57504 Quad Port Ethernet adapter

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Scalable Fabric Architecture Topology – One Fabric

Chassis 1:

Slot A1: MX9116n

Slot A2: MX7116n

Chassis 2:

Slot A1: MX7116n

Slot A2: MX9116n

Chassis 3:

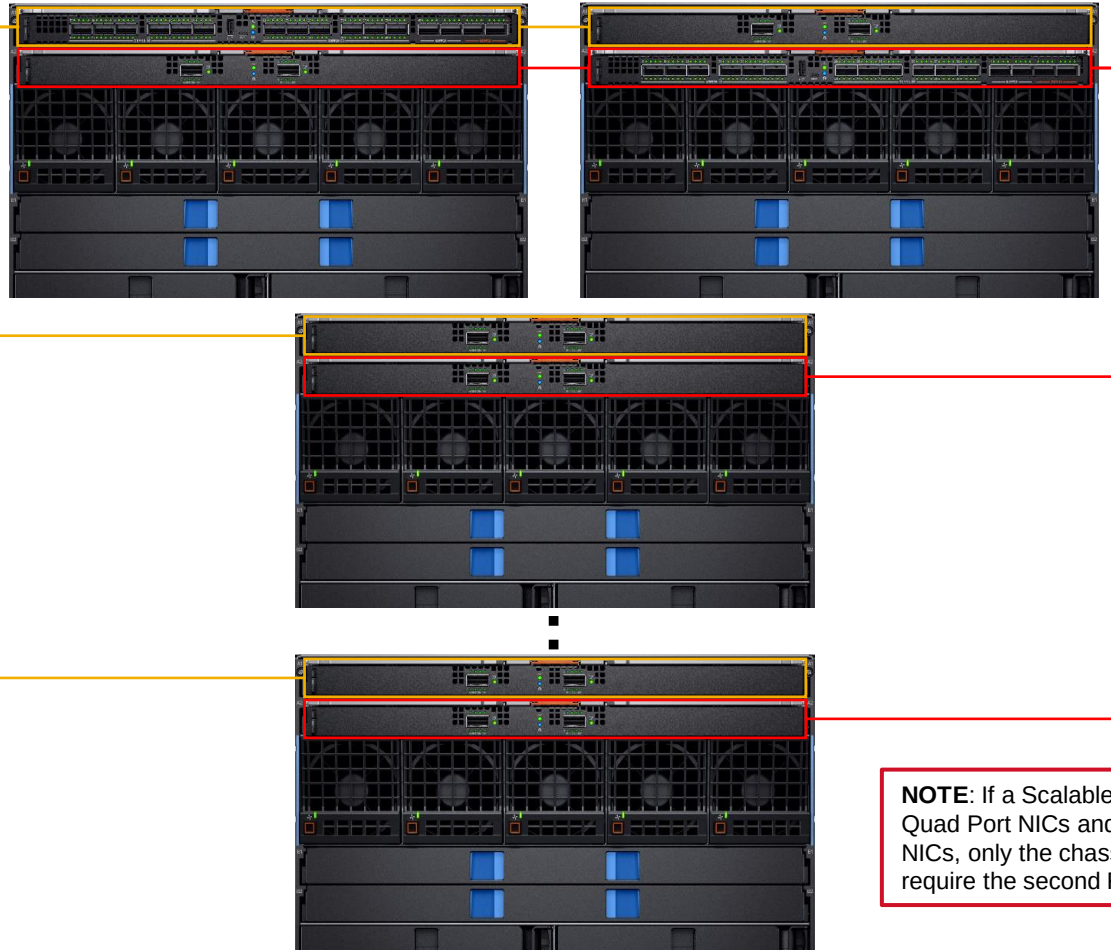
Slot A1: MX7116n

Slot A2: MX7116n

Chassis 10:

Slot A1: MX7116n

Slot A2: MX7116n



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

NOTE: If a Scalable Fabric has some chassis with Quad Port NICs and some with only Dual Port NICs, only the chassis with Quad Port NICs require the second FEM port to be connected

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Scalable Fabric Architecture Topology – Two Fabrics

Chassis 1:

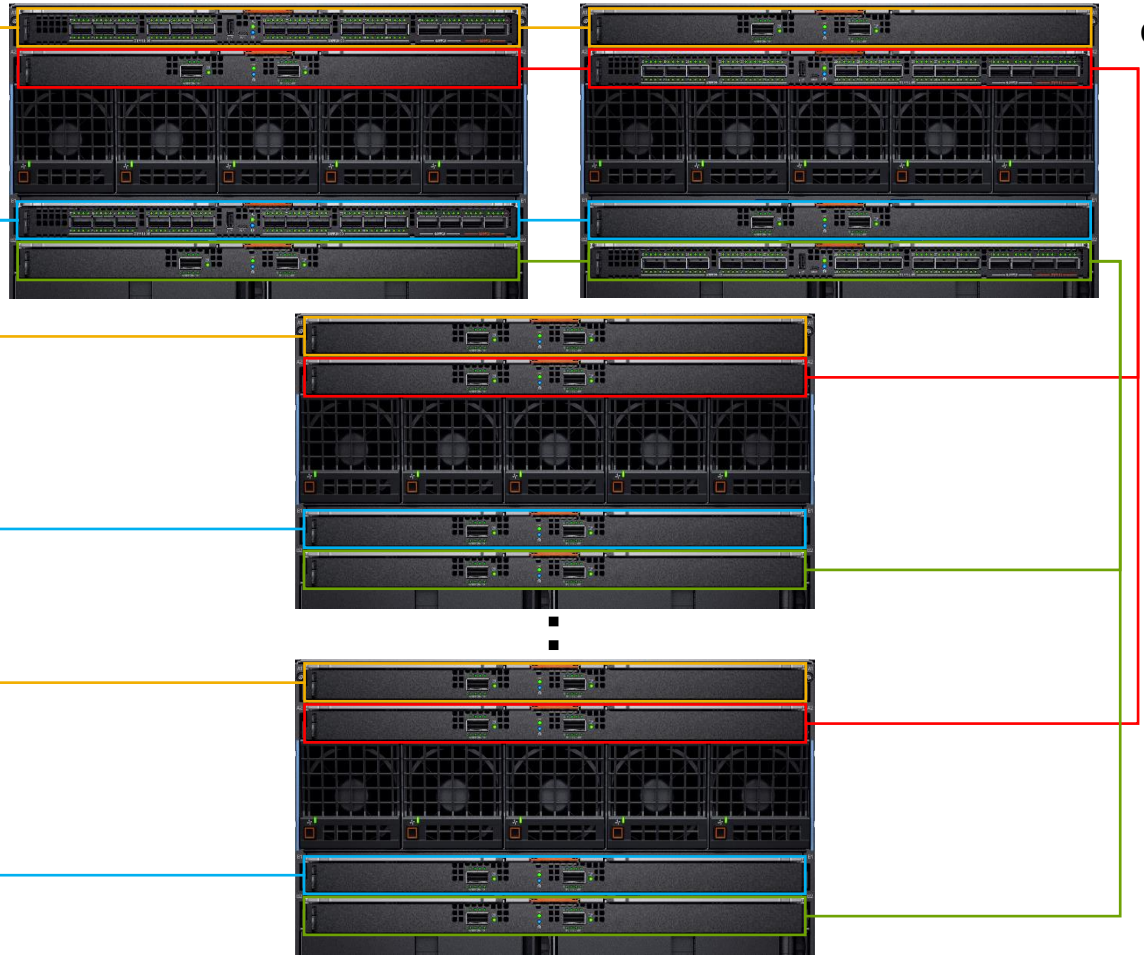
- Slot A1: MX9116n
- Slot A2: MX7116n
- Slot B1: MX9116n
- Slot B2: MX7116n

Chassis 3:

- Slot A1: MX7116n
- Slot A2: MX7116n
- Slot B1: MX7116n
- Slot B2: MX7116n

Chassis 10:

- Slot A1: MX7116n
- Slot A2: MX7116n
- Slot B1: MX7116n
- Slot B2: MX7116n



Chassis 2:

- Slot A1: MX7116n
- Slot A2: MX9116n
- Slot B1: MX7116n
- Slot B2: MX9116n

NOTE: Fabric B is not required to be populated in every chassis

NOTE: If a Scalable Fabric has some chassis with Quad Port NICs and some with only Dual Port NICs, only the chassis with Quad Port NICs require the second FEM port to be connected

NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode.

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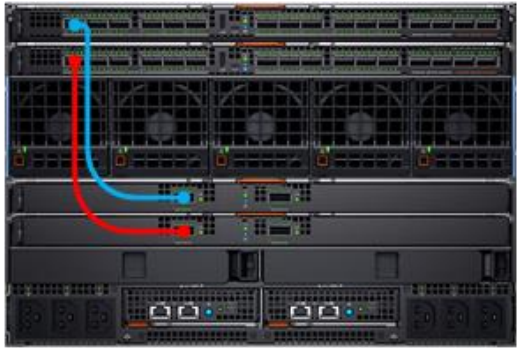
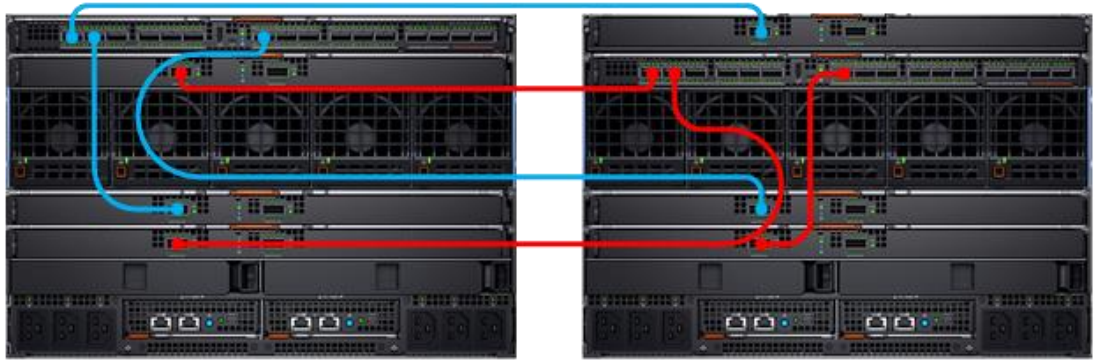
Supported Scalable Fabric Topologies*
Dual Port NICs

These topologies are for scenarios where two physical NICs per server are required but only one pair of MX9116n FSEs are desired



Single Chassis



Dual Chassis

Care must be taken to ensure proper cable placement

NOTE: The diagrams do not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

*These topologies are supported as of OME-M 2.00.00 and OS10.5.4.1 Full Switch and SmartFabric modes

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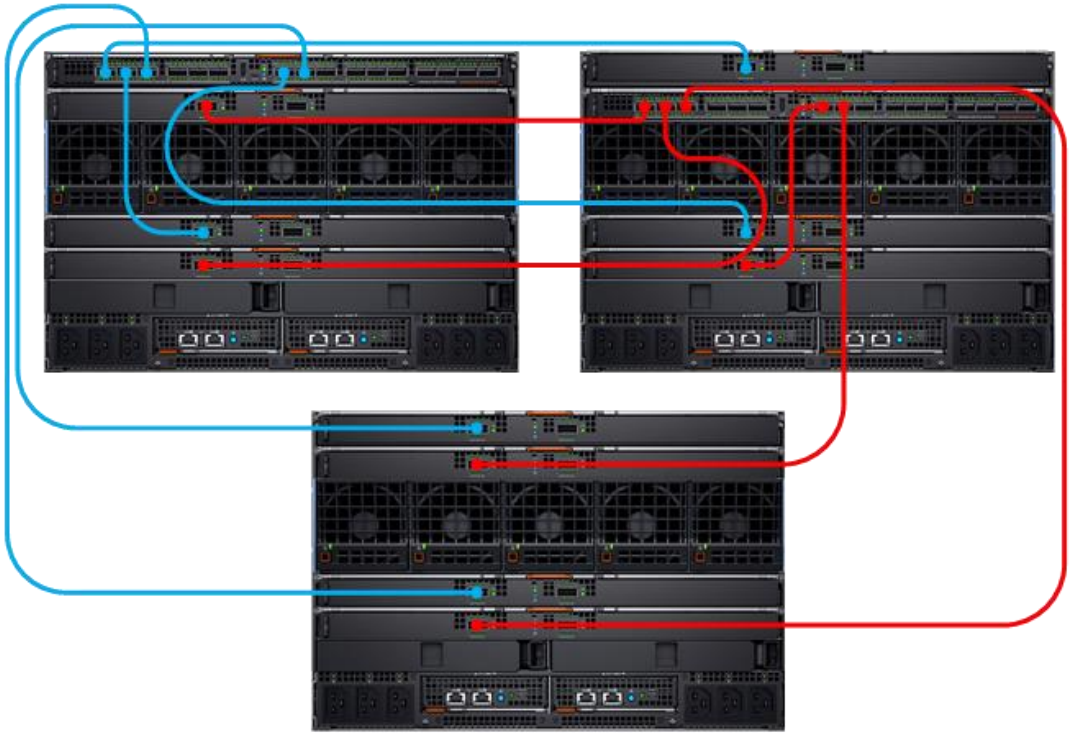
Supported Scalable Fabric Topologies*
Dual Port NICs

These topologies are for scenarios where two physical NICs per server are required but only one pair of MX9116n FSEs are desired



3-5 Chassis

NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

Care must be taken to ensure proper cable placement

*These topologies are supported as of OME-M 2.00.00 and OS10.5.4.1
Full Switch and SmartFabric modes

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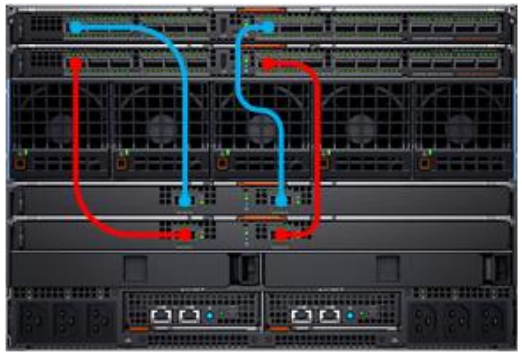
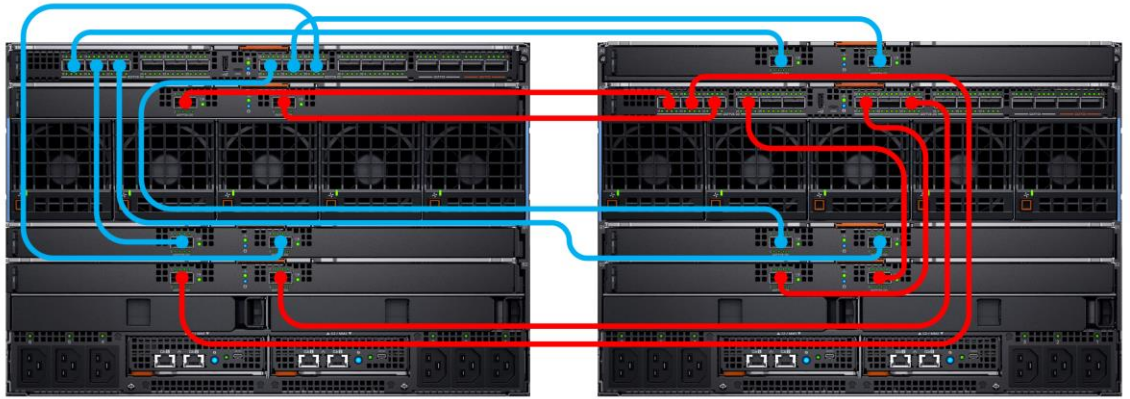
Supported Scalable Fabric Topologies*
Quad Port NICs

These topologies are for scenarios where two physical NICs per server are required but only one pair of MX9116n FSEs are desired



Single Chassis



Dual Chassis

Care must be taken to ensure proper cable placement

NOTE: The diagrams do not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

*These topologies are supported as of OME-M 2.00.00 and OS10.5.4.1 Full Switch and SmartFabric modes

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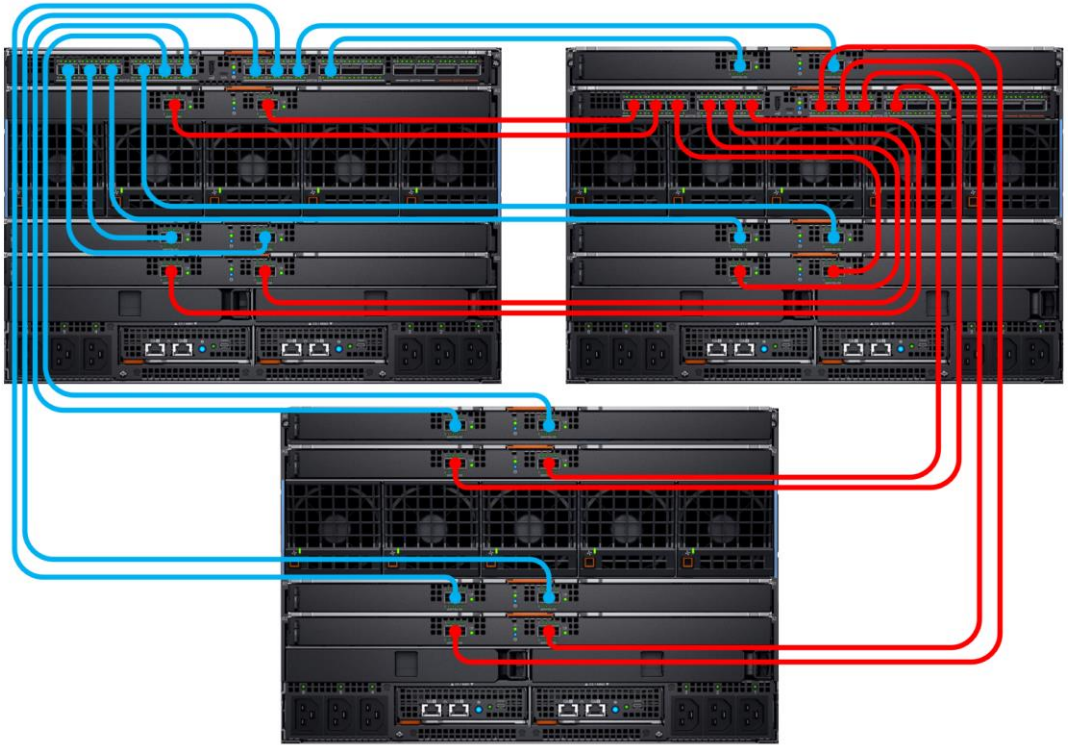
Supported Scalable Fabric Topologies*

Quad Port NICs

These topologies are for scenarios where two physical NICs per server are required but only one pair of MX9116n FSEs are desired



3 Chassis

NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

Care must be taken to ensure proper cable placement

*These topologies are supported as of OME-M 2.00.00 and OS10.5.4.1
Full Switch and SmartFabric modes

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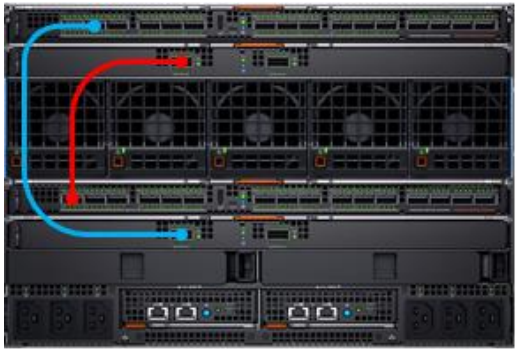
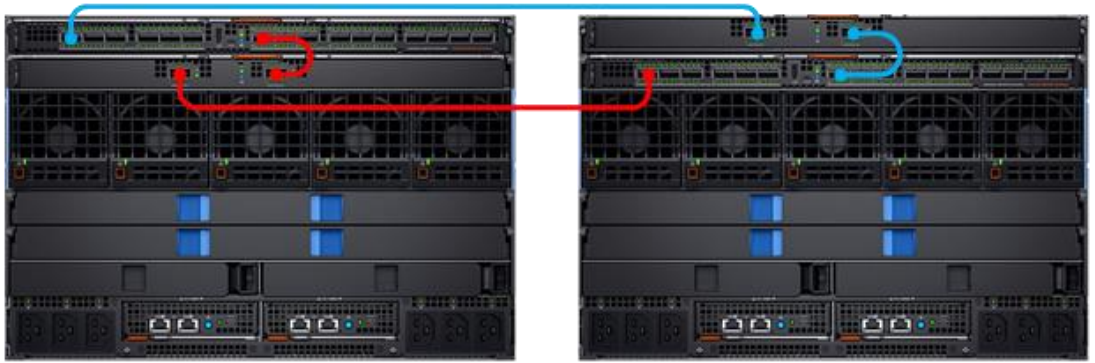
Examples of **Unsupported** Scalable Fabric Topologies

These topologies are not supported





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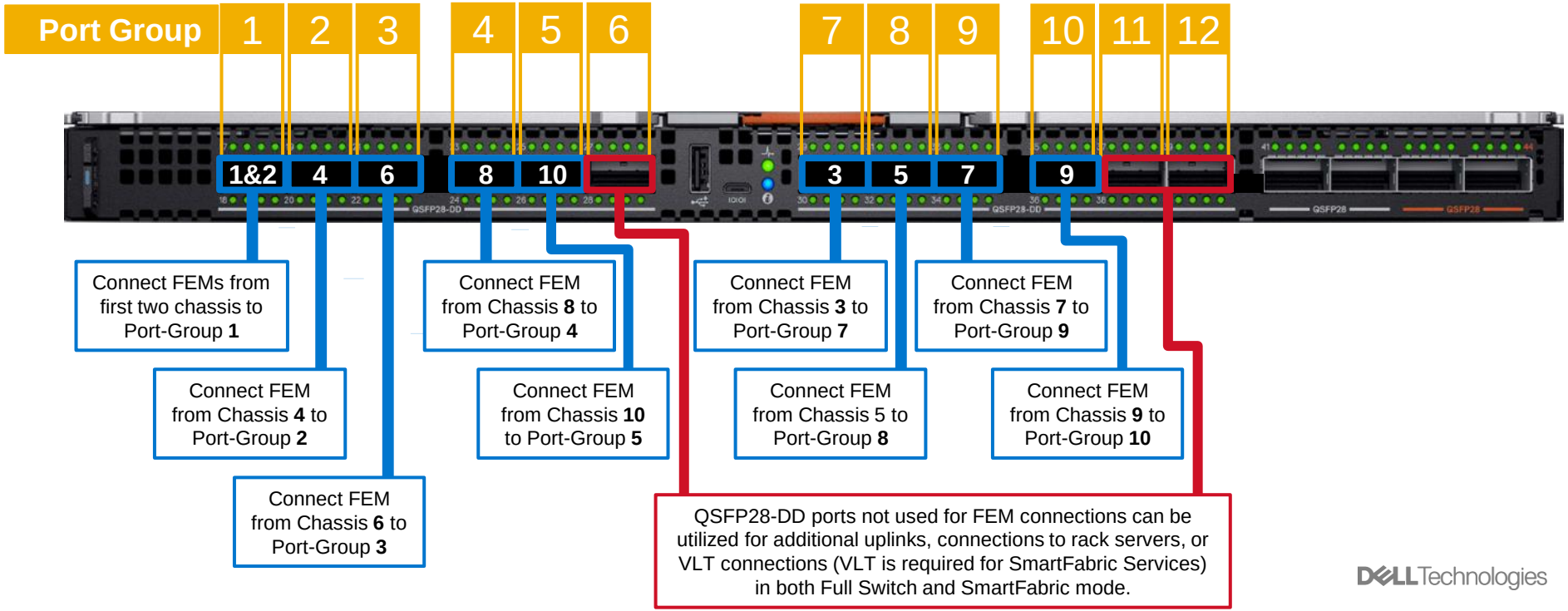
Chassis Connection Order

QSFP28-DD ports are backwards compatible and support QSFP28 and QSFP+ Optics and cables

QSFP28 ports are backwards compatible and support QSFP+ Optics and cables

In order to provide optimal performance through the MX9116n FSE, it is recommended to connect the FEMs to the FSE in the following order:



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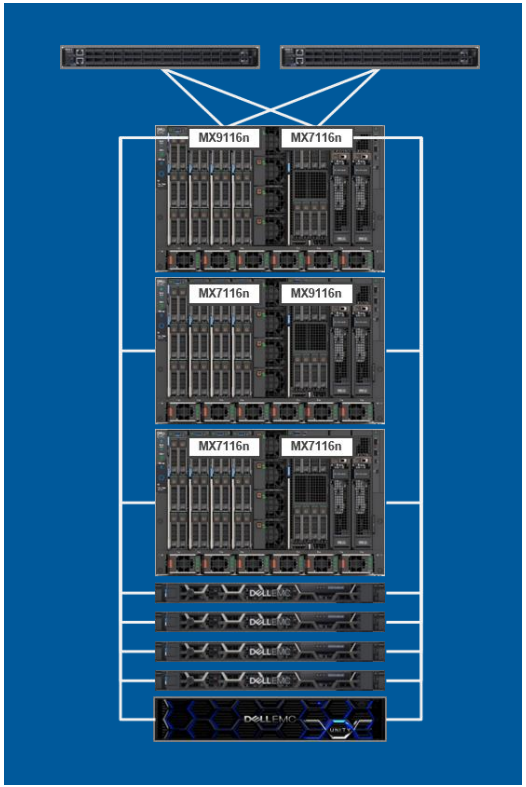
PowerEdge MX networking with Embedded Top of Rack switching

Rack servers and other Ethernet devices can be connected directly to the MX9116n FSE via the appropriate breakout cable

- Rack servers do not need to be connected to separate Top of Rack switches
- Communication between all devices is kept within the FSE
- Provides a single point of management and network security
- Reduces cost and improves performance and latency
- Supported in Full Switch and SmartFabric modes



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Scalable Fabric Architecture 100GbE solution

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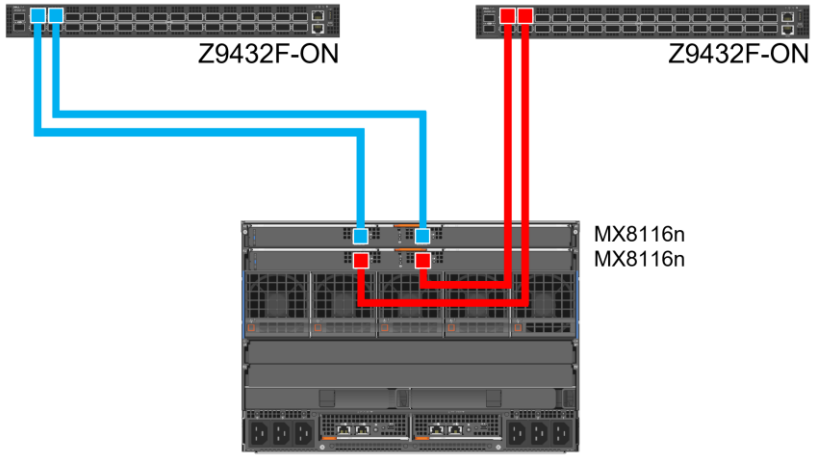
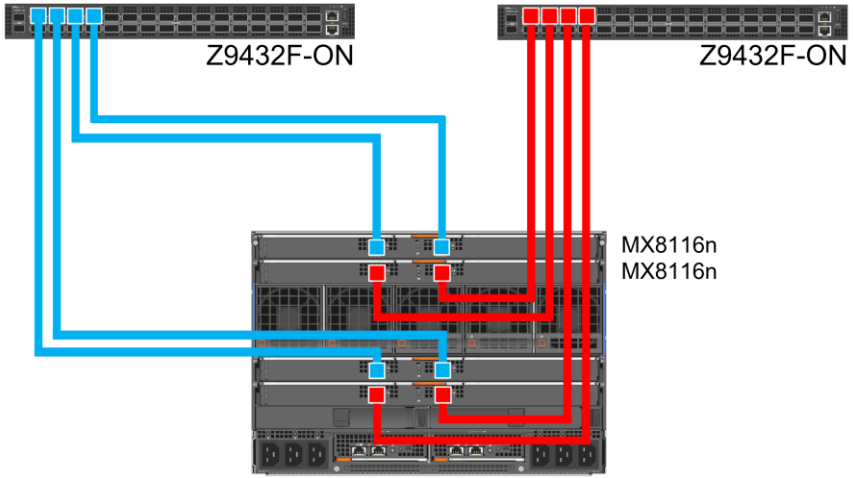
Supported Scalable Fabric Topologies

These topologies are for scenarios for either 100GbE NICs or 25GbE NICs installed. In this section. Z9432F-ON is used as an example. Z9432F-ON or Z9664F-ON can be used as Fabric Switching Engine.
Each individual chassis requires the same NIC model installed in each sled.



Supports up to 14 Chassis

Single Chassis, Single Fabric



Single Chassis, Dual Fabric

Supports up to 7 Chassis

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.

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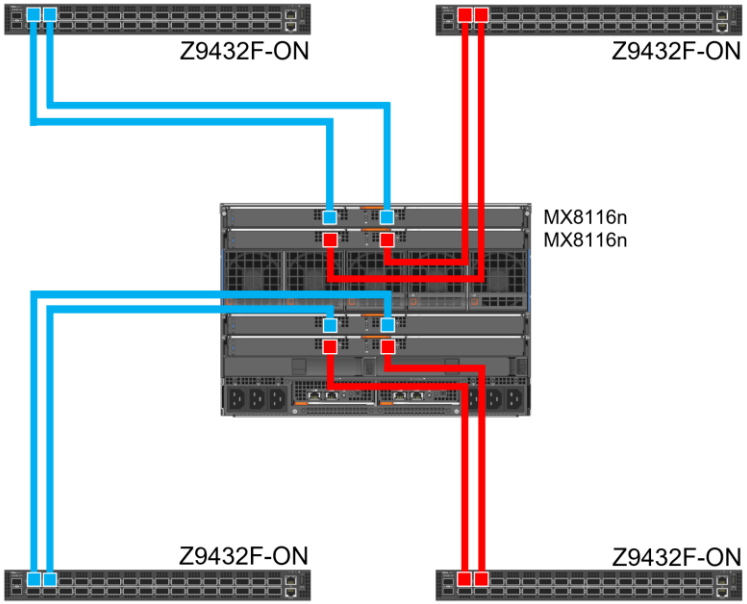
Supported Scalable Fabric Topologies

- This topology is for a scenario for either 100GbE NICs or 25GbE NICs installed. **Each individual chassis requires the same NIC model installed in each sled**.



Single Chassis,
Dual Fabric,
Separate networks

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.

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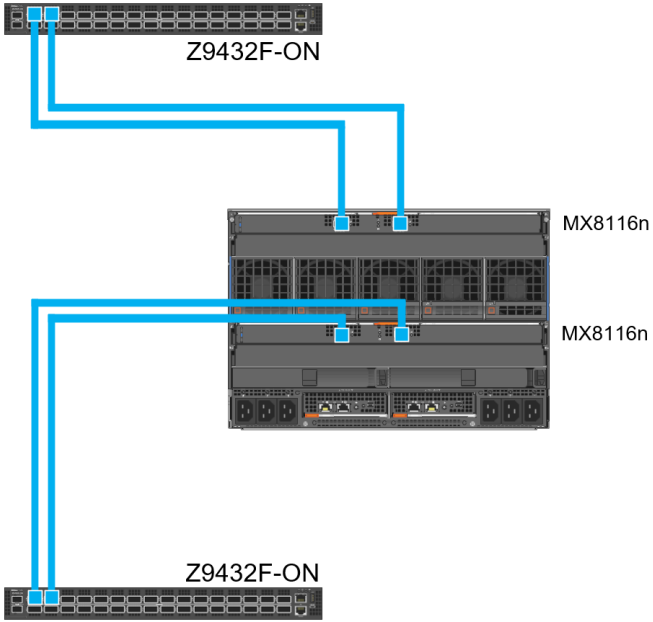
Supported Scalable Fabric Topologies

- This topology is for a scenario for either 100GbE NICs or 25GbE NICs installed. **Each individual chassis requires the same NIC model installed in each sled**.



Dual Fabric,
Single MX8116n per Fabric
Separate networks,
Single Z9432F-ON

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.

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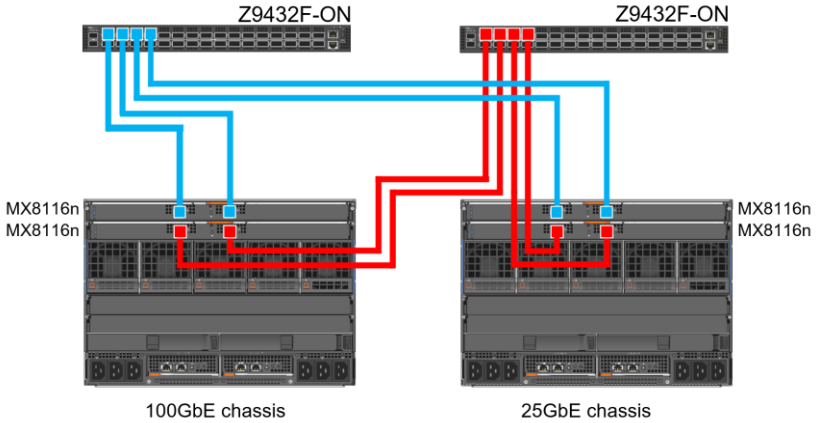
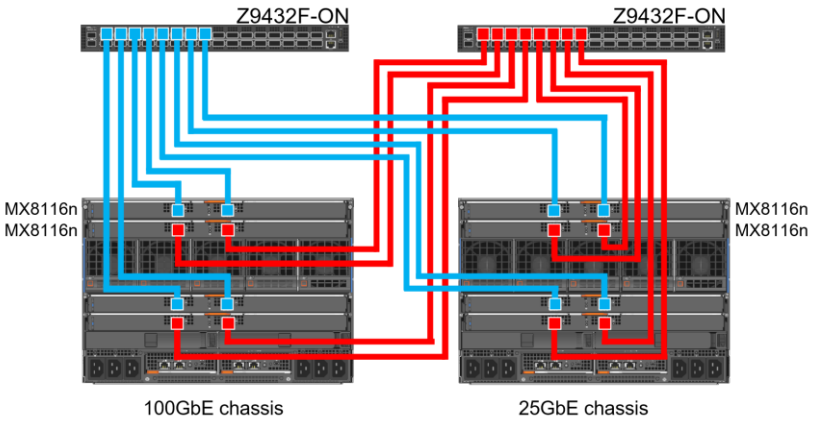
Supported Scalable Fabric Topologies

These topologies are for scenarios for either 100GbE NICs and/or 25GbE NICs installed.
Each individual chassis requires the same NIC model installed in each sled.



Multi Chassis, Single Fabric



Multi Chassis, Dual Fabric

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.

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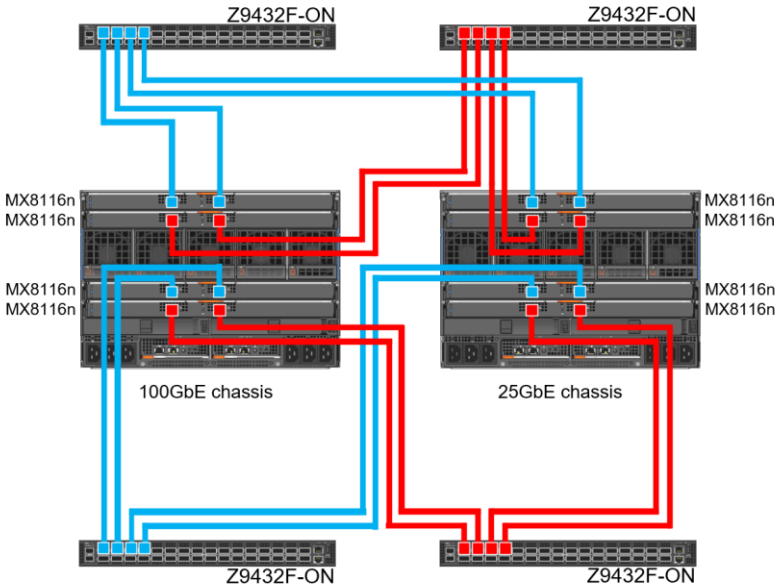
Supported Scalable Fabric Topologies

These topologies are for scenarios for either 100GbE NICs and/or 25GbE NICs installed.
Each individual chassis requires the same NIC model installed in each sled.



Multi Chassis,
Dual Fabric,
Separate networks

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.

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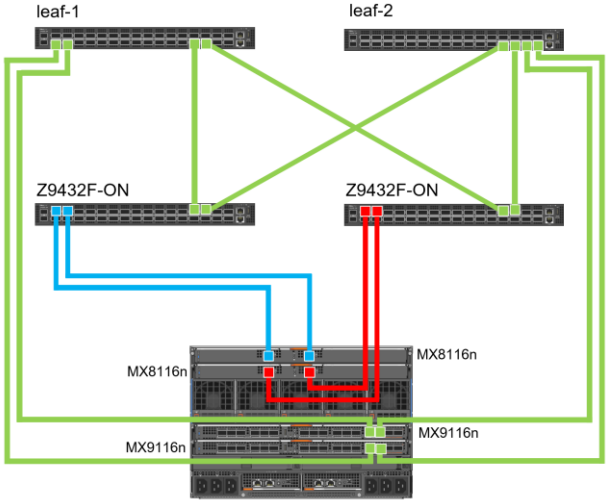
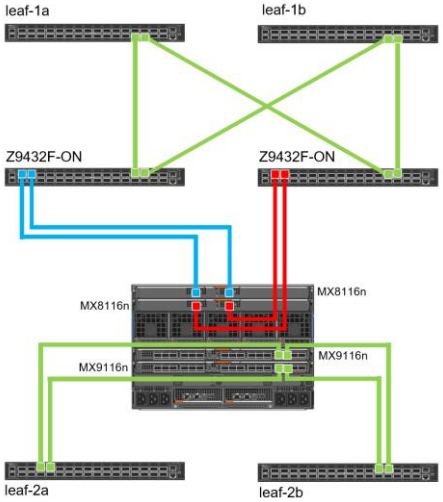
Supported Scalable Fabric Topologies

These topologies are for scenarios for a mixed deployment with the MX8116n and MX9116 in the same chassis. **For MX8116n Fabric, each individual chassis requires the same NIC model installed in each sled**.



Single Chassis, Mixed deployment

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.



Single Chassis, Mixed deployment, Separate networks

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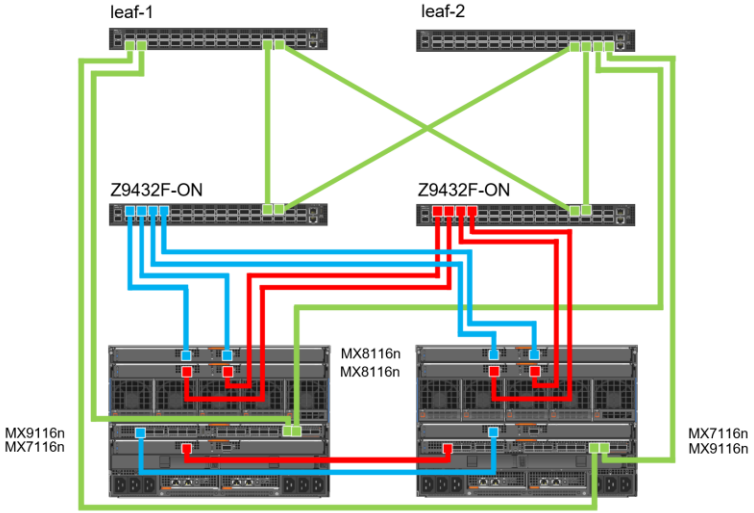
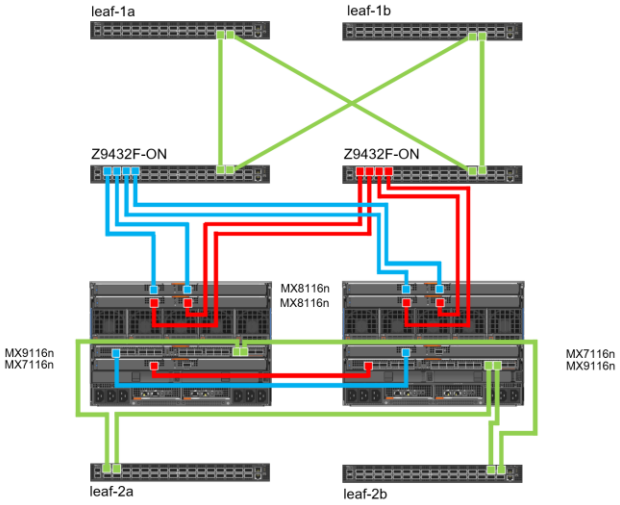
Supported Scalable Fabric Topologies

These topologies are for scenarios for a mixed deployment with the MX8116n and MX9116 in the same chassis. **For MX8116n Fabric, each individual chassis requires the same NIC model installed in each sled**.



Multi Chassis, Mixed deployment

NOTE: The diagrams do not show the VLTi connections recommended in Full switch mode.



Multi Chassis, Mixed deployment, Separate networks

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Example Topologies

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Cable & Optic Option Key

The sample topologies in the following slides will use different cable types depending on the use-case.

Additionally, the cable/optic type used will vary depending on the length required

Cable Option	Description	Connector	DAC (very short)	AOC (short-medium)	Optic[2] (medium-long)	Fiber (Requires Optic)
1	FSE/FEM Connection	QSFP28-DD	DAC-Q28DD-200G-xM	AOC-Q28DD-200G-xM	Q28DD-80G/200G-2SR4	CBL-MPO12DD-OM4-xM or Corning Edge8 Structured Cabling
2	100GbE Uplink	QSFP28	DAC-Q28-100G-xM	AOC-Q28-100G-xM	Q28-100G-SR4-NOF	CBL-MPO12-OM4-xM
3	40GbE Uplink	QSFP28/QSFP+	DAC-QSFP-40G-xM	AOC-QSFP-40G-xM	QSFP-40G-SR4	CBL-MPO12-OM4-xM
4	Breakout 2x100GbE	QSFP28-DD	DAC-Q28DD-2Q28-100G-xM	AOC-Q28DD-2Q28-100G-xM	Q28DD-80G/200G-2SR4	CBL-MPO12DD-2MPO12-OM4-xM
5	Breakout 8x25GbE	QSFP28-DD	DAC-Q28DD-8S28-25G-xM	AOC-Q28DD-8S28-25G-xM	Q28DD-80G/200G-2SR4	Corning Edge8 Structured Cabling
6	Breakout 8x10GbE	QSFP28-DD	DAC-Q28DD-8S28-25G-xM	AOC-QDD-8SFP-10G-xM	Q28DD-80G/200G-2SR4	Corning Edge8 Structured Cabling
7	Breakout 4x25GbE	QSFP28	DAC-Q28-4S28-25G-xM	AOC-Q28-4S28-25G-xM	Q28-100G-SR4-NOF	CBL-MPO12-4LC-OM4-xM
8	Breakout 4x10GbE	QSFP28/QSFP+	DAC-QSFP-4SFP-10G-xM	AOC-QSFP-4SFP-10G-xM	QSFP-40G-SR4	CBL-MPO12-4LC-OM4-xM
9[1]	Breakout 4x16G FC	~~QSFP28/QSFP+~~	~~Not Supported~~	~~Not Supported~~	~~QSFP-64GFC-SW4~~	~~CBL-MPO12-4LC-OM4-xM~~
10	Breakout 4x8/16/32G FC	QSFP28	Not Supported	Not Supported	Q28-128GFC-SW4	CBL-MPO12-4LC-OM4-xM
11	Breakout 2x40GbE	QSFP28-DD	DAC-Q28DD-2Q28-100G-xM	AOC-Q28DD-2Q-40G-7M	Q28DD-80G/200G-2SR4	CBL-MPO12DD-2MPO12-OM4-xM

1 – The QSFP-64GFC-SW4 (4x16GFC Optic) is EoL as of 15 October 2020. Use Q28-128GFC-SW4 (4x32GFC Optic) instead.
2 – SR4 transceivers support distances up to 150M over OM4 fiber. The MX7000 management modules use 1G BASE-T cables with a distance limit of 100M, therefore the effective useable length for a SR4 optic is 100M over OM4 fiber

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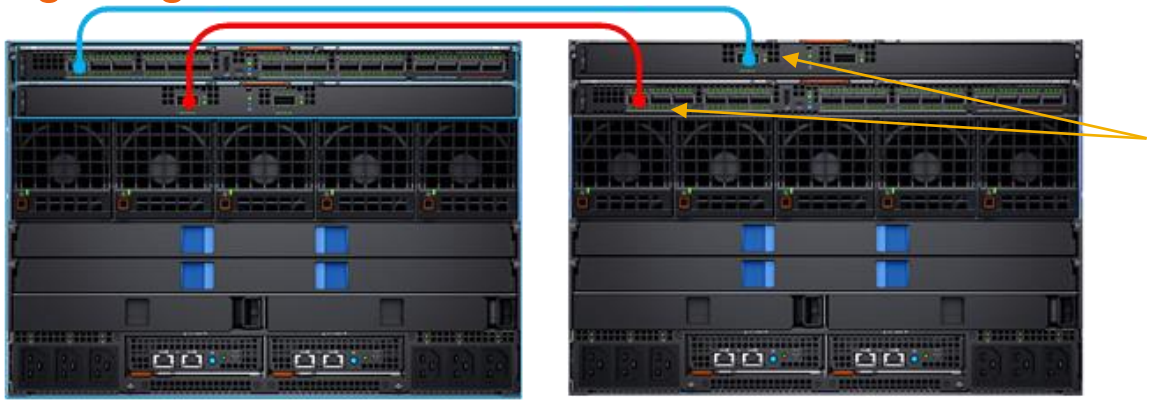
Example Topologies

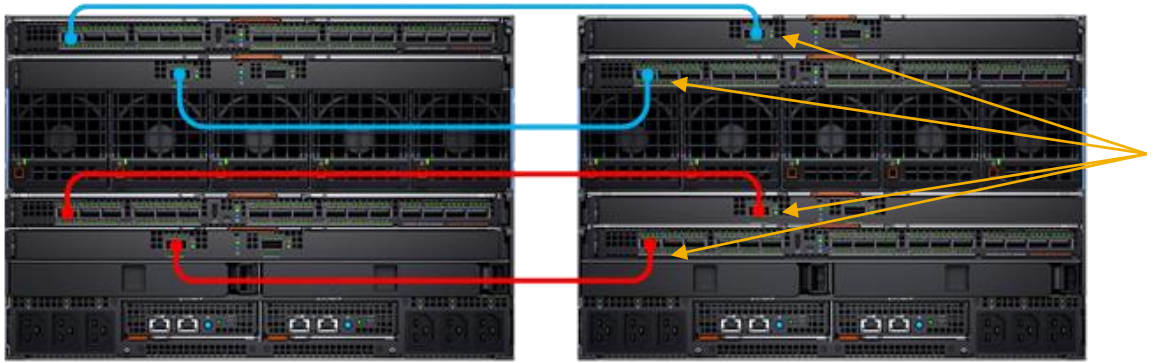
Scalable Fabric Wiring Diagram – 2 Chassis

Fabric A Populated

NOTE: The diagrams do not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.



Fabric A & B Populated



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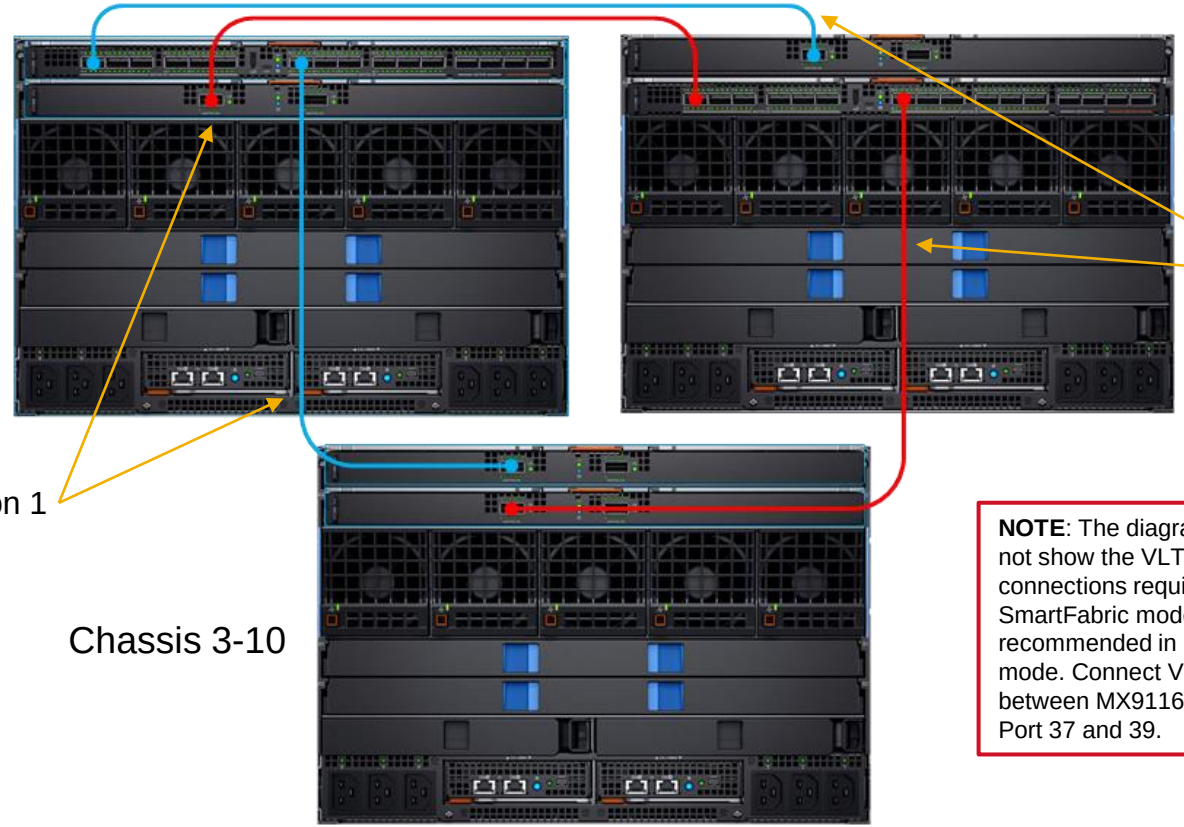
Example Topologies

Scalable Fabric Wiring Diagram – 3+ Chassis



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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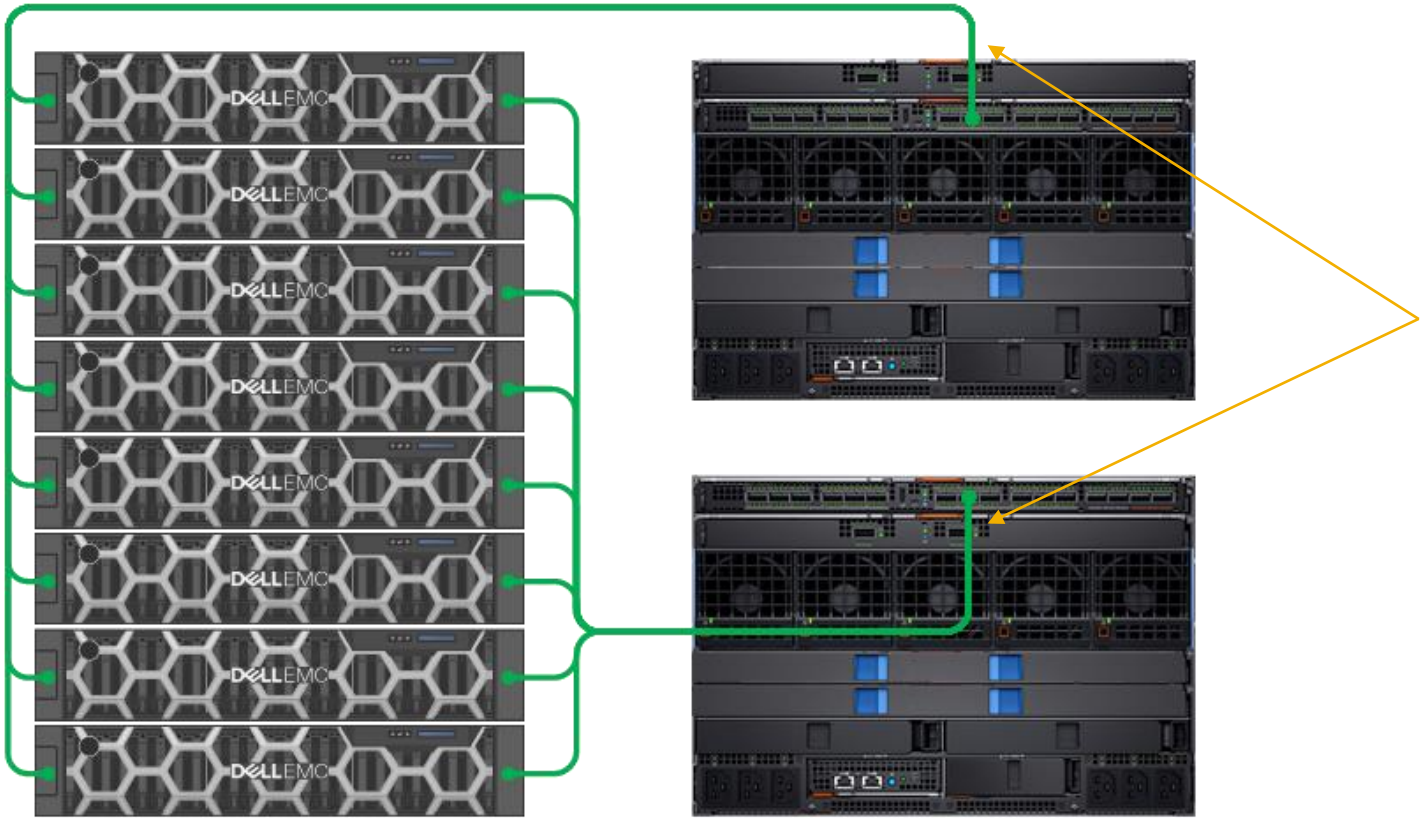
Example Topologies

Scalable Fabric Wiring Diagram – Rack Server Connectivity*



Cable Option 5 (25GbE)
or
Cable Option 6 (10GbE)

NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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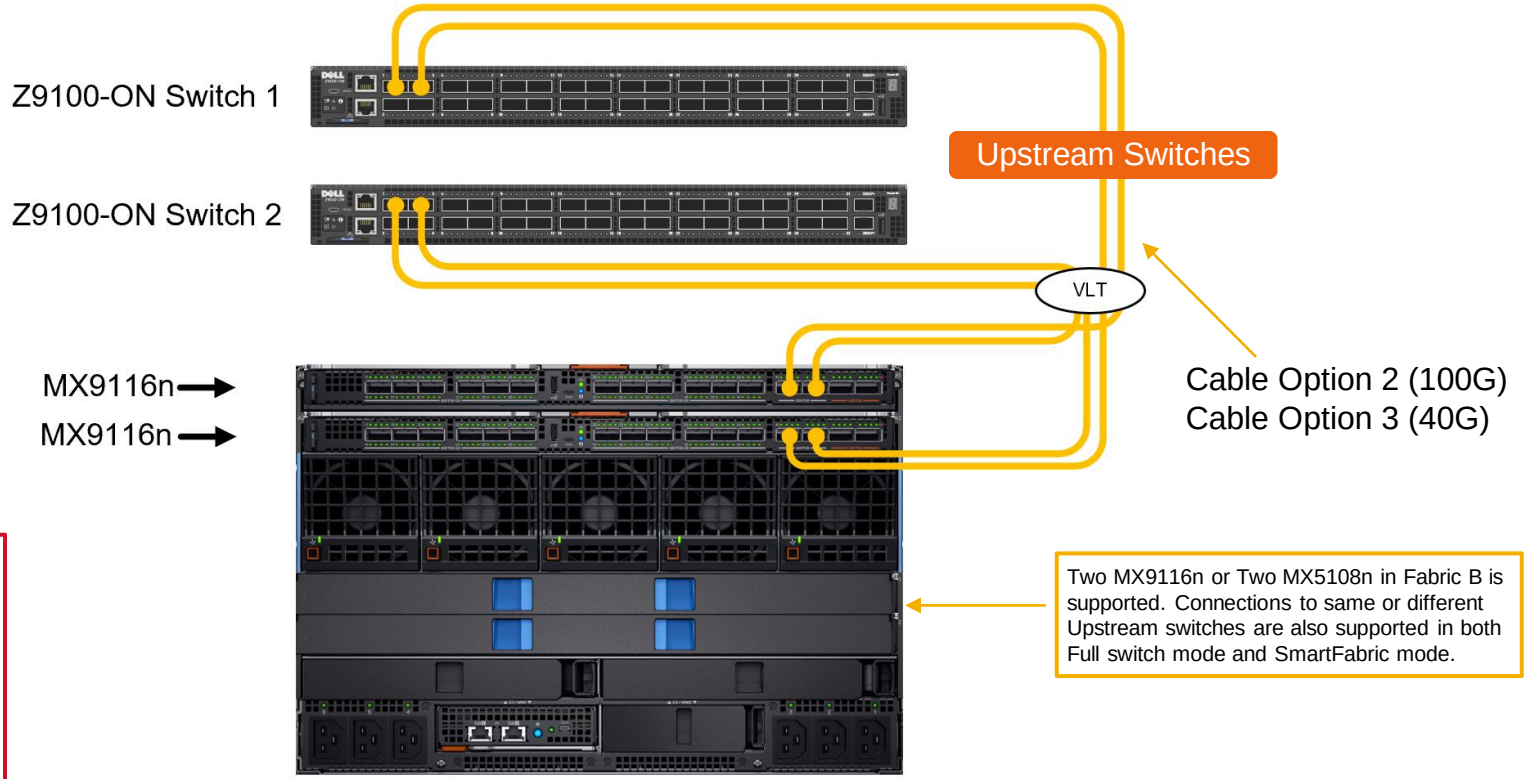
Example Topologies

MX9116n Standard Ethernet w/VLT – 2xMX9116n in same Chassis*



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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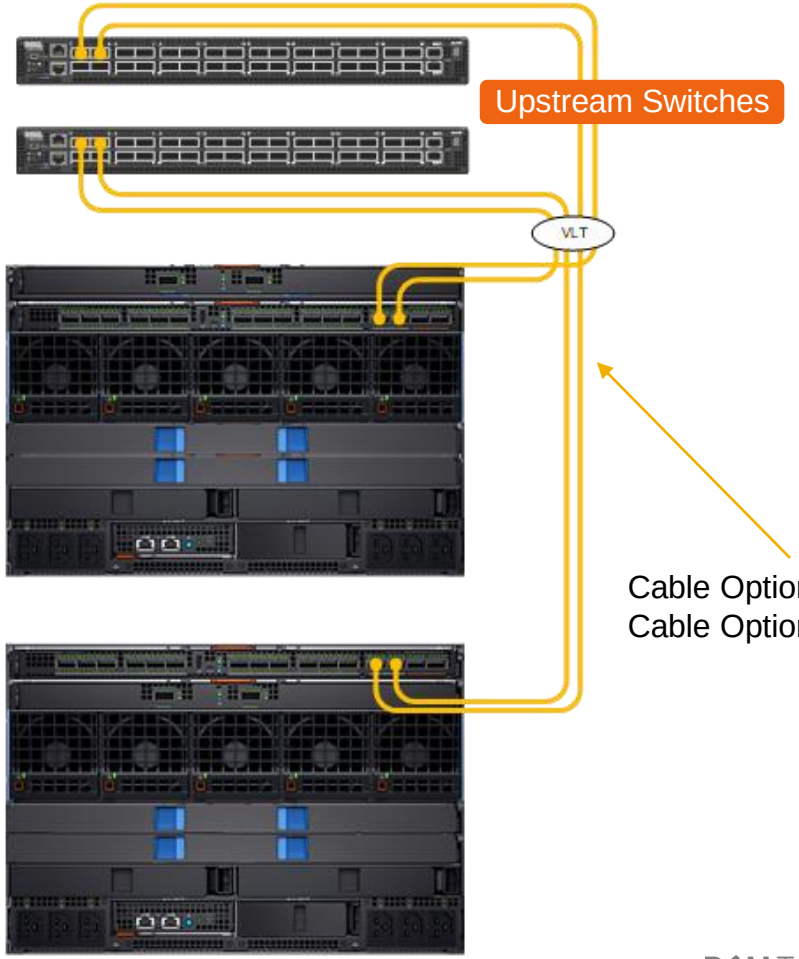
Example Topologies

MX9116n Standard Ethernet w/VLT*



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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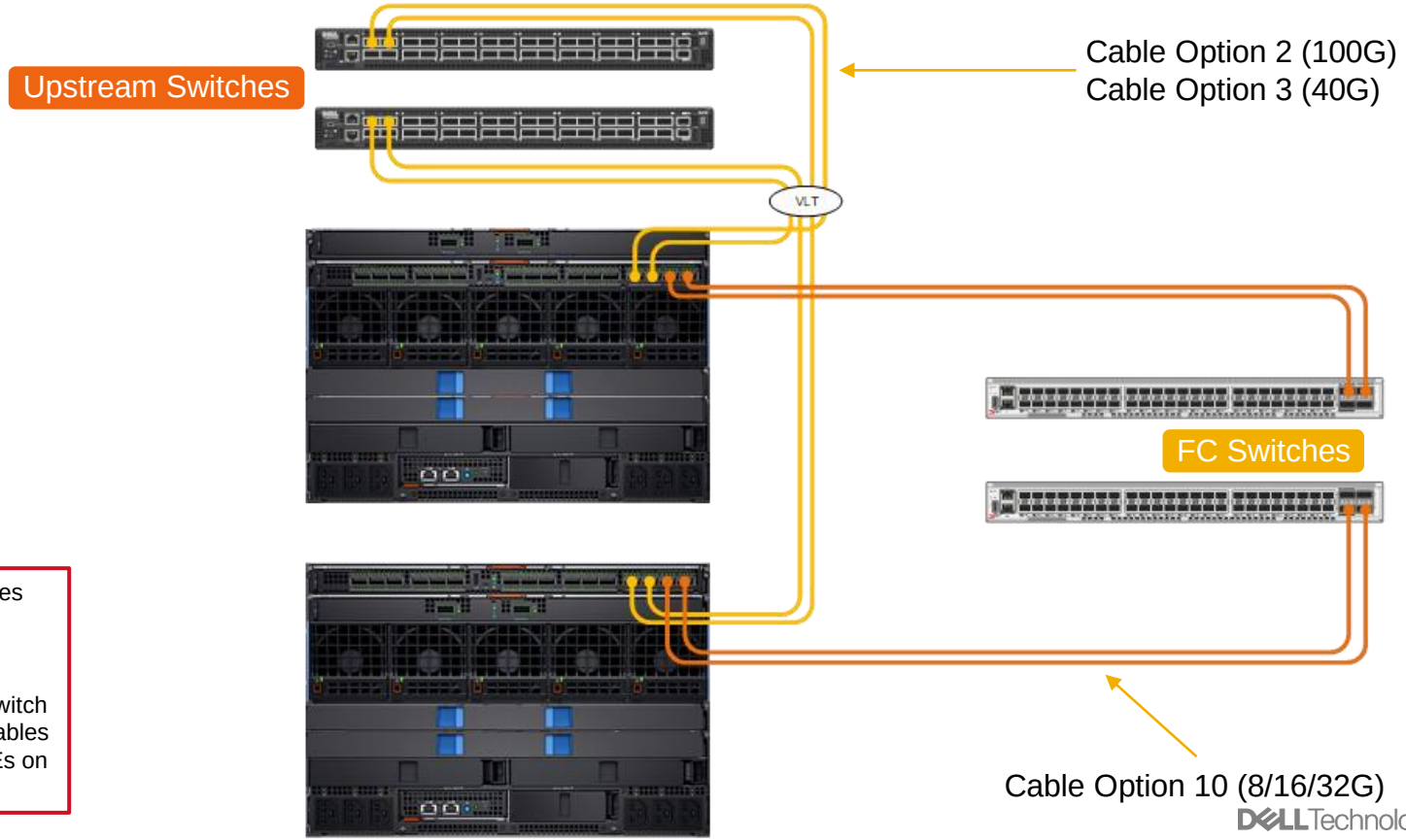
Example Topologies

MX9116n Fibre Channel NPG*



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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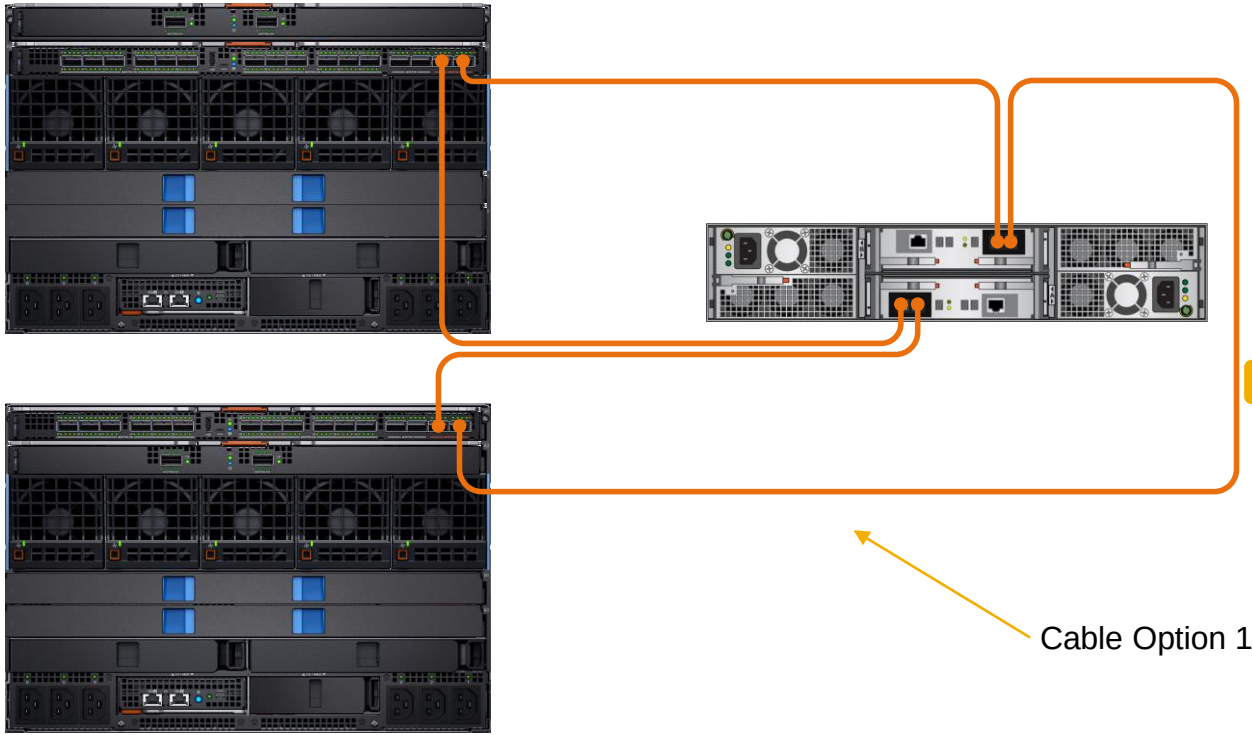
Example Topologies

MX9116n Direct Attached Fibre Channel



NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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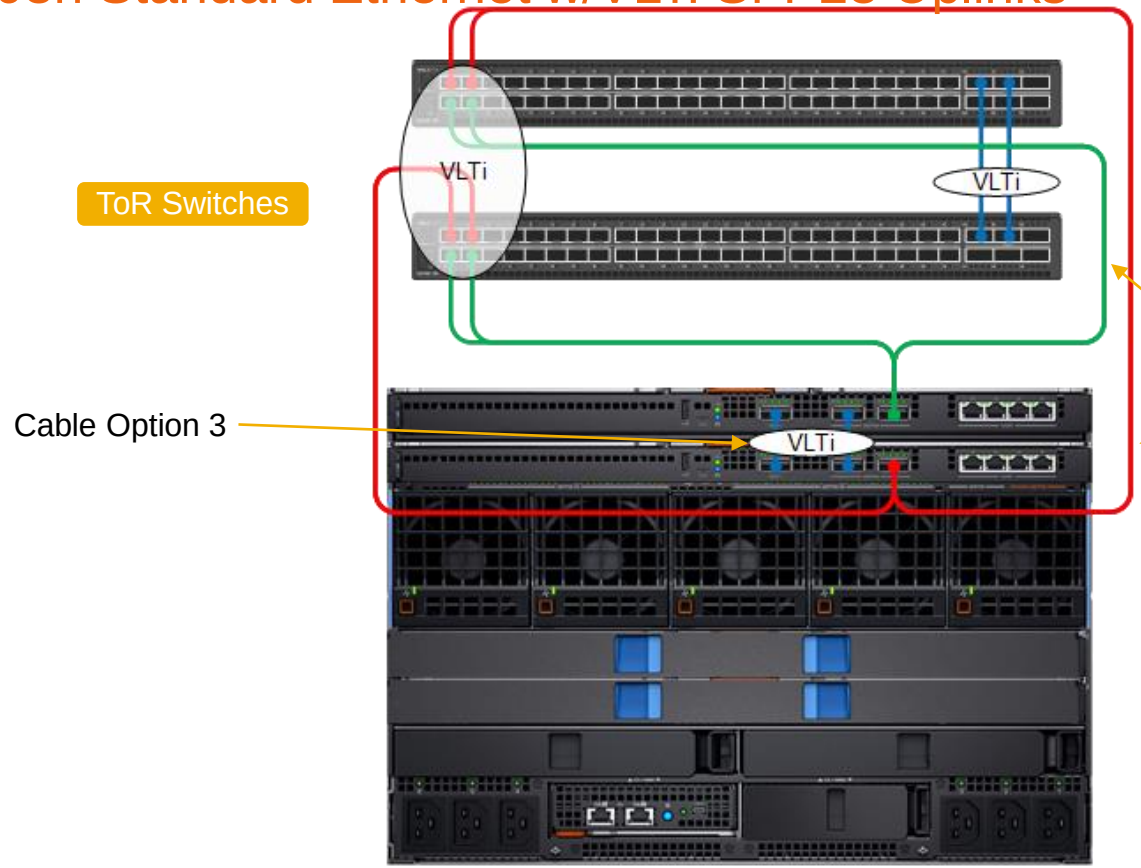
Example Topologies

MX5108n Standard Ethernet w/VLT: SFP28 Uplinks



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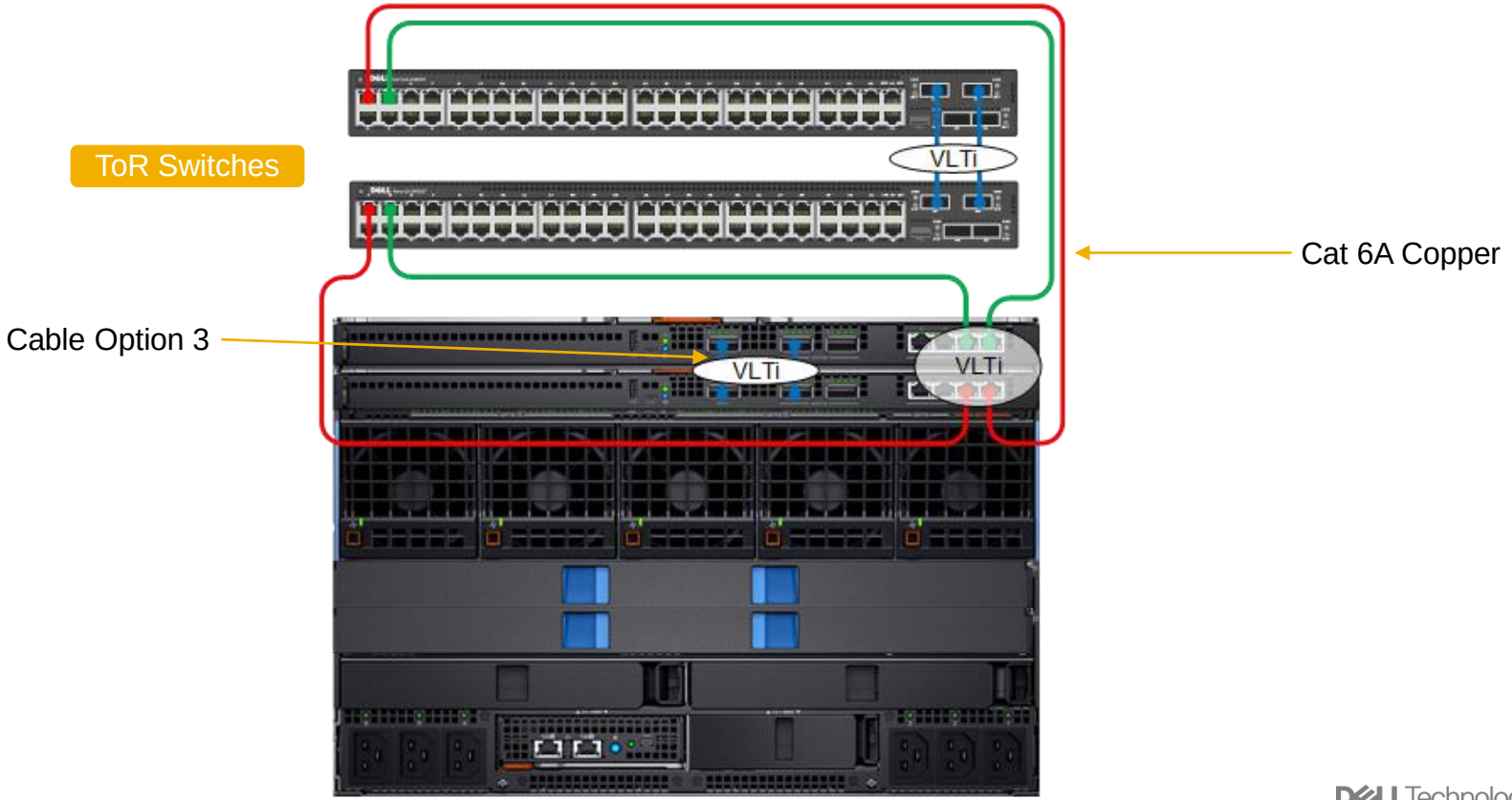
Example Topologies

MX5108n Standard Ethernet w/VLT: 10G-BaseT Uplinks



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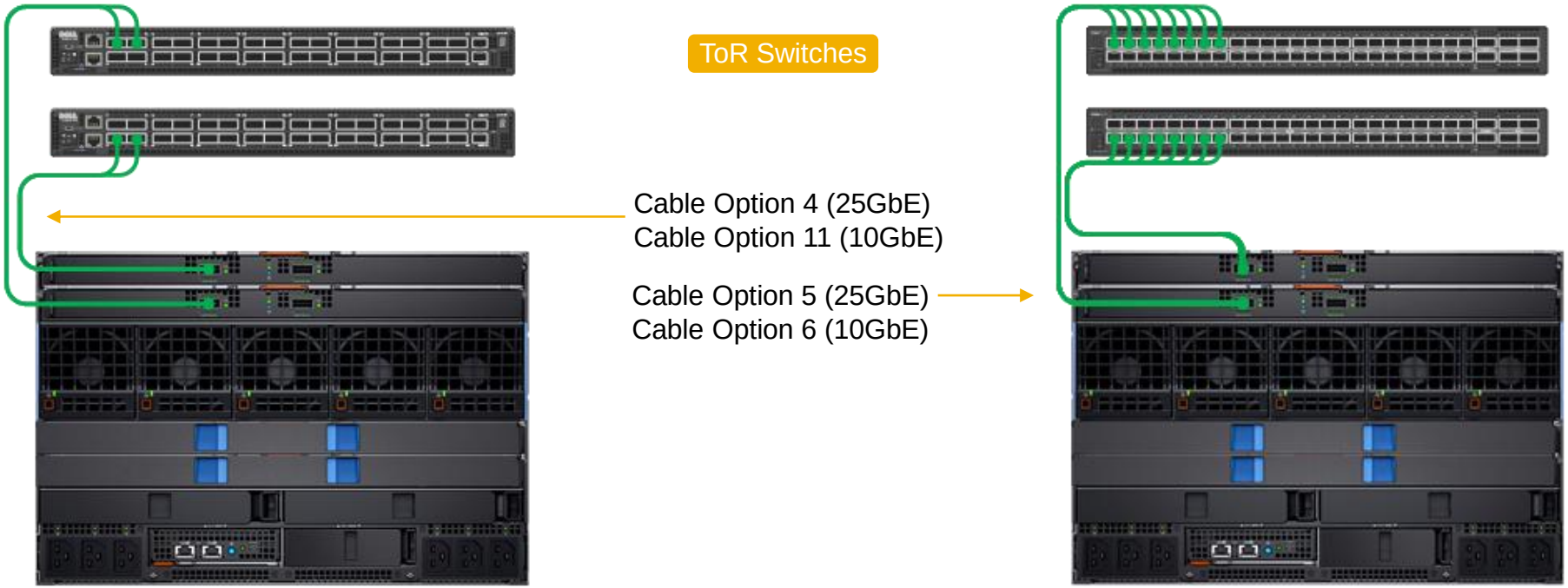
Example Topologies

MX7116n Fabric Expander Module as Pass-Through*

Set 100G ports to 4x25G

Set 40G ports to 4x10



*Pass-Through to Dell Networking switches only. Non-Dell switches are not supported

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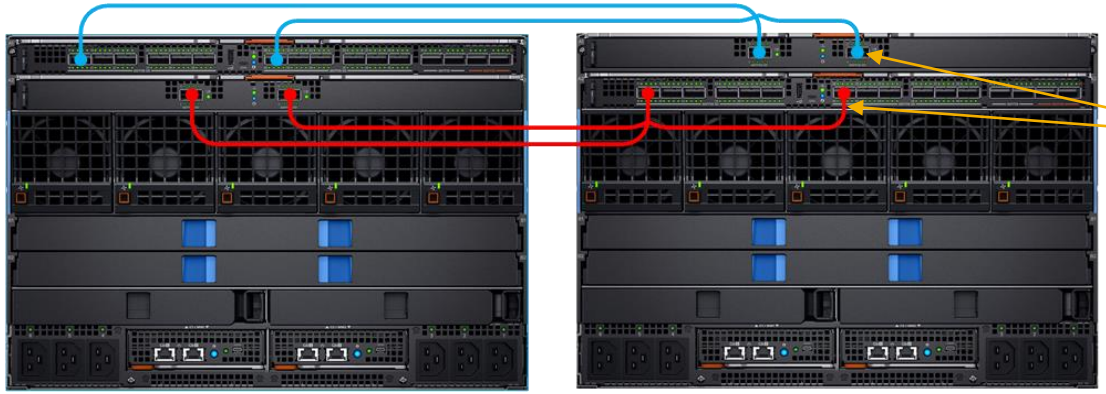
Example Topologies

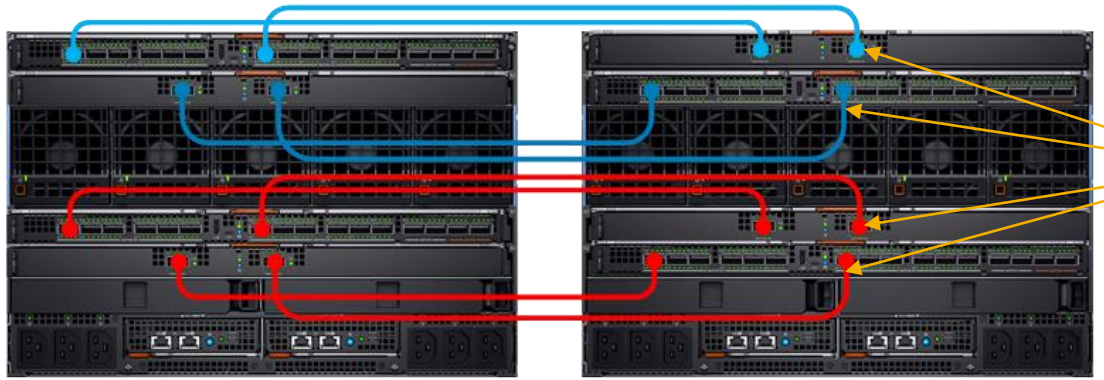
Scalable Fabric Wiring Diagram – 2 Chassis with Quad Port NICs

Fabric A Populated



NOTE: The diagrams do not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

Fabric A & B Populated



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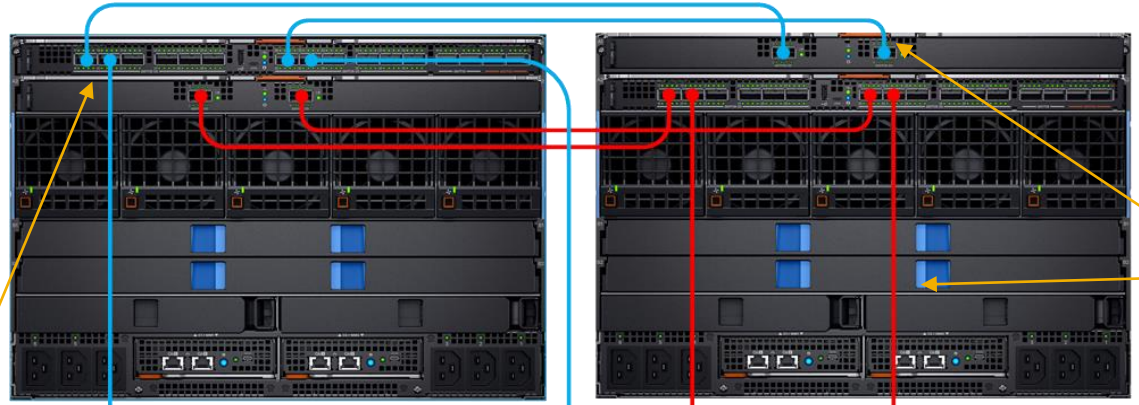
Example Topologies

Scalable Fabric Wiring Diagram – 3+ Chassis with Quad Port NICs



Chassis 1 & 2

Cable Option 1

Cable Option 1

Chassis 3-5

NOTE: The diagram does not show the VLTi connections required in SmartFabric mode and recommended in Full switch mode. Connect VLTi Cables between MX9116n FSEs on Port 37 and 39.

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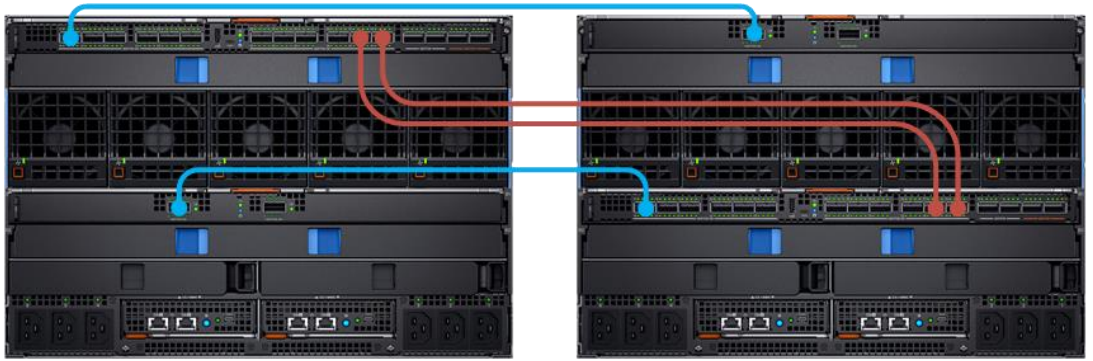
Unsupported Topologies in SmartFabric mode

While these topologies are **supported in Full Switch Mode**, SmartFabric Services currently requires both Ethernet switches to reside in slots A1/A2 or B1/B2.

It is **not supported** having one switch in Fabric A and the second in Fabric B

MX9116n A1/B1

MX5108n A1/B1



MX9116n Chassis 1:A1/Chassis2:B1

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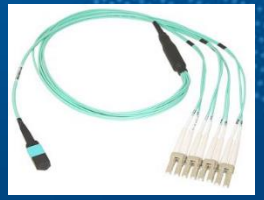
Cable & Optic Information



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Cables & Connectors

There are four primary cable types used with optical connectors in PowerEdge MX Ethernet networking: DAC, AOC, MMF, SMF

There are three optical connectors used in PowerEdge MX Ethernet networking: SFP, QSFP, QSFP-DD

Cable Type	Description
DAC (Copper)	Direct Attach Copper “TwinAx” Copper wires & shielding 2-wires/Channel
ACC (Copper)	Active Copper Cable
AOC (Optical)	Active Optical Cable
MMF (Optical)	Multi-Mode Fiber 50-um Large core fiber 100m (300m) reach Easy to attach components Transceiver are low cost Fiber 3x cost of SMF
SMF (Optical)	Single-Mode fiber 9-um Tiny core fiber 2/10Km reach Hard to attach components Transceivers are expensive SMF cost less than dental floss!

Connector	Description
“SFP” • SFP = 1G • SFP+ = 10G • SFP28 = 25G • SFP56 = 50G • SFP112 = 100G	**S**mall **F**ormFactor **P**luggable 1 Channel 2 Fibers or wires 1-1.5W Duplex LC optical connector MMF or SMF
“QSFP” • QSFP+ = 40G • QSFP28 = 100G • QSFP56 = 200G	**Q**uad **S**mall **F**ormFactor **P**luggable 4 Channels 8 Fibers or wires 3.5W-5W MPO12 8 fiber parallel optical connector
“QSFP-DD” • QSFP28-DD = 2x100G • QSFP56-DD = 2x200G • QSFP112-DD = 2x400G	**Q**uad **S**mall **F**ormFactor **P**luggable – **D**ouble **D**ensity 8 Channels 16 Fibers or wires 10W MPO12DD 16 fiber parallel optical connector

For more information, see the Optic and Cable FAQ: https://www.dell.com/support/kbdoc/000134129/faq-optics-and-cables

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Cables & Connectors

Consideration	Copper	Fiber
Deployment	Already installed in many locations and its use is less expensive to connect devices to a network. Copper solutions can get bulky when bunched together as they are thicker than fiber	Less bulky than copper solutions and easy to utilize breakout units (structured cabling) to deconstruct multi-lane runs into lower capacity end points (i.e. 100G -> 4x25G)
Signal Loss	Copper cables can only transmit information over relatively short distances	Fiber optic cables experience less signal loss than copper cabling and can support long distances
Electro-Magnetic Interference (EMI)	Susceptible	Impervious
Security	Copper solutions are easier to tap	Fiber is more difficult to tap. Some Federal and large enterprises mandate Fiber as a result
Cost	RJ45 ($) → DAC ($$)	AOC ($$$) → Transceiver + Fiber ($$$$)

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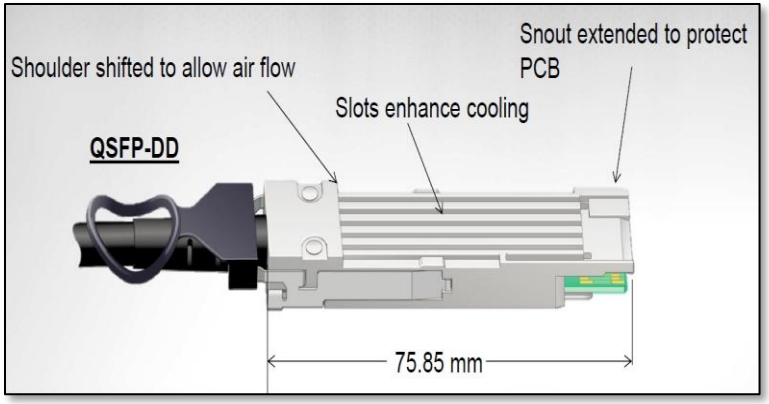
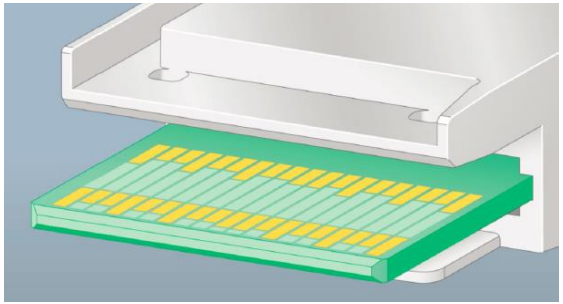
Introduction to QSFP28-DD

Quad Small Form Factor Pluggable Double Density

- Current QSFP28 optical modules support 40 and 100 Gigabit Ethernet applications. They feature four electrical lane pairs that can operate at 10 or 25 Gbps.
- QSFP28-DD is designed with eight lanes that operate at up to 25 Gbps via NRZ modulation (up to 200 Gbps aggregate)
- QSFP56-DD is designed with eight lanes that operate at up to 50 Gbps via PAM4 modulation (up to 400Gbps aggregate)
- QSFP-DD is backward compatible with QSFP+ and QSFP28 connectors
- Slightly deeper than QSFP28 with a second row of contacts
- Breakouts
  - QSFP-DD ↔ 2 × QSFP28 (100G)
  - QSFP-DD ↔ 4 × QSFP28 (50G as 2 × 25G, half-populated)
  - QSFP-DD ↔ 8 × SFP28 (25G)





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QSFP28-DD in Depth

- Q28DD-200G-2SR4 optics require the use of 16-strand MPO cables. They will not function with MPO-12 cables used with Q28-100G-SR4 optics.
  - These cables can be described “MPO-12 Two Row” or “MPO-12DD” cables.
- Dell stocks MPO-12DD cables in lengths of 1,3,5, and 7 Meters.
- Implementations where Q28DD-200G-2SR4 optics are to be used with cable lengths expected to exceed 7 meters, please use Corning MPO-12DD cables. These cables are sourced with the “MPO-12 Two row” or “MPO-12DD” form factor.

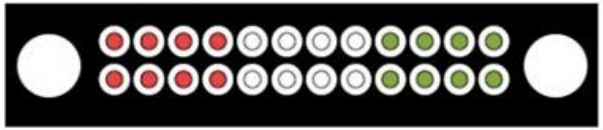
Note the difference in the MPO-12/MPO-12DD diagram below, this shows two rows of 4 strands of transmit on a Q28DD-200G-2SR4 optic (each row of 8 strands operates as its own QSFP28-100G-SR4 link).

MPO-12 Cables

Red = Tx

Green = Rx

MPO-12DD Cables



MPO-12DD with signal

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QSFP28-DD Breakout Cables

DAC-Q28DD-8S28-25G

DAC-Q28DD-2Q28-100G

CBL-MPO12DD-2MPO12-OM4

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Corning Edge8® Structured Cabling

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EDGE8® Fiber Solutions from Corning

- Dell Networking has a wide variety of Ethernet switches with ports that can be broken out into multiple lower speed ports. For example:
  - QSFP+ 40GbE can be decomposed to 4x10GbE or 4x1GbE
  - QSFP28 100GbE can be decomposed to 4x25GbE
  - QSFP28-DD 2x100GbE ports can be decomposed to 2x100GbE, 2x40GbE, 4x50GbE, 8x25GbE or 8x10GbE
- Why Structured Cabling?
  - Control cable sprawl
  - Organize, label and orchestrate a clean footprint so IT staff can quickly and predictably discern the purpose of each fiber run
- Dell has partnered with Corning Structured Cabling Solutions to provide an easy to customize structured cabling solution
  - **Standard Dell ProDeploy and ProDeploy+ services do not include installation for Corning Structured Cabling Solutions. Contact your account team for options for a custom installation contract if needed**
- This solution provides rack housings from 1U to 4U allowing for multiple cassette types in each enclosure. The system has cassettes to do the following:
  - QSFP breakout to 4xLC (MPO12 to 4xLC)
  - QSFP to QSFP extension (MPO12 to MPO12)
  - QSFP-DD to 2xQSFP28 (MPO12-DD to 2xMPO12)
  - QSFP-DD to 8xLC (MPO12-DD to two 4xLC cartridges)
  - QSFP-DD to QSFP-DD extension (MPO12-DD to MPO12-DD)

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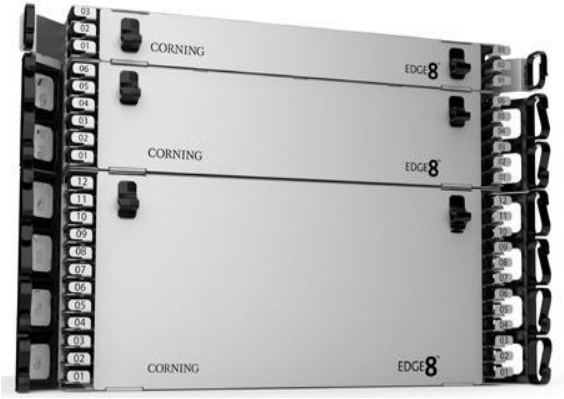
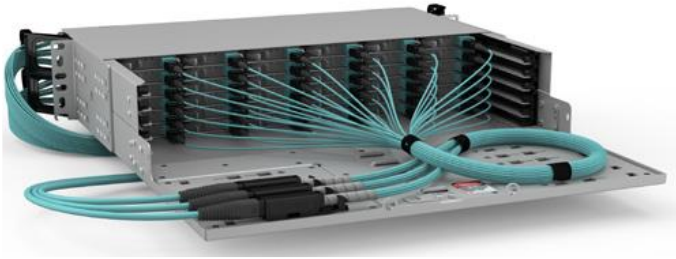
EDGE8® HD Housings

- EDGE8® HD housings include
  - Mountings for standard 19” racks and cabinets
  - Sliding drawers, enabling module or panel installation from the front or rear of the housing.
  - Integrated cable routing elements to make real structured patch cord management possible while providing finger access without the need for tools or any other accessories.
  - Side-routing guides for patch cord integration to the cabinet which provide flexible installation options for back-to-back or flush-mounting requirements
  - Quick-mount capability making it quick and easy for one person to install the housing with little effort.
  - Easy labeling with a full-size mounting area on the inside of the front door
  - An easily installable trunk mounting plate providing flexibility depending on your design (e.g., back-to-back) or application (e.g., reduced depth) concept.
  - 1U, 2U, and 4U housing options





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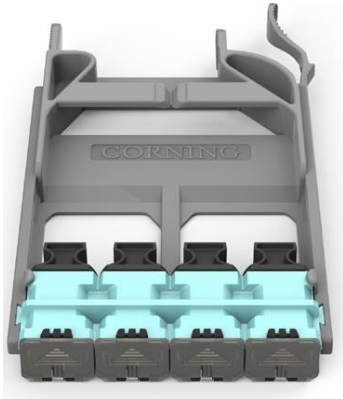
EDGE8® Modules & Adapter Panels

- EDGE8® Modules
  - The EDGE8® modules have an MPO interface on one side and four LC interfaces on the other
  - All EDGE8® modules can be installed without tools from the front or the rear of any EDGE8® housing.
  - LC duplex adapters feature hinged shutters that move up and out of the way when the connector is inserted. Specially designed indents in the shutters ensure that the end faces of the connectors are never touched.
  - In addition, the shutters are visual fault locator (VFL) compatible to allow easy port identification while diffusing the VFL light to ensure adequate eye safety.

- EDGE8® MPO Adapter Panels
  - EDGE8® MPO adapter panels are pass-through panels that provide a simple interface to mate MPO connectors.
  - EDGE8® MPO adapter panels are available with one, two, and four 8-fiber adapters for multimode and single-mode applications. All panels feature unique shuttered reversible adapters at the front of the panel for on-site changes to manage field polarity, and visual port identification while defusing the VFL light to ensure adequate eye safety.



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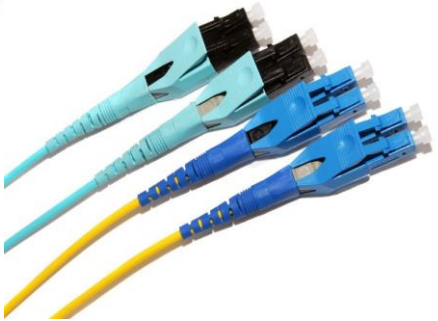
EDGE8® Patch, Trunk, and Jumper Cables

- EDGE8® Trunks
  - EDGE8® MPO trunks are used between patch panel housings and are pre-terminated cables with 8-fiber MPO connectors on both ends. All trunks have strain-relief clips and allow for tool-less installation in EDGE8® housings. These trunks conform to TIA-568 Type-B or Type-A polarity, depending on product selection. In addition, the trunks are standard with a pulling grip for easy handling during installation in cable tray or through fire wall pass throughs.

- EDGE8® MPO Patch Cords
  - EDGE8® 8-fiber MPO patch cords are typically used within racks between the device and an EDGE8® Module or Adapter panel. The EDGE8® MPO patch cord uses MTP® PRO connectors, which allows for a simple one-step, color-coded polarity change feature without removing the connector housing. The connector also provides the capability for field-friendly pinning configuration changes with safe handling of pins and easy color identification while maintaining product integrity.

- Reverse Polarity Uniboot Duplex Jumpers
  - EDGE™ reverse polarity uniboot duplex jumpers allow for the quick and easy conversion from a TIA-568 A-B polarity to a TIA-568 A-A polarity without exposing the fibers or needing any tools. The jumper comes with A-B polarity that can be leveraged for all described applications. This uniboot design allows one cable to carry both fibers, reducing jumper bulk when routing.



DELL Technologies

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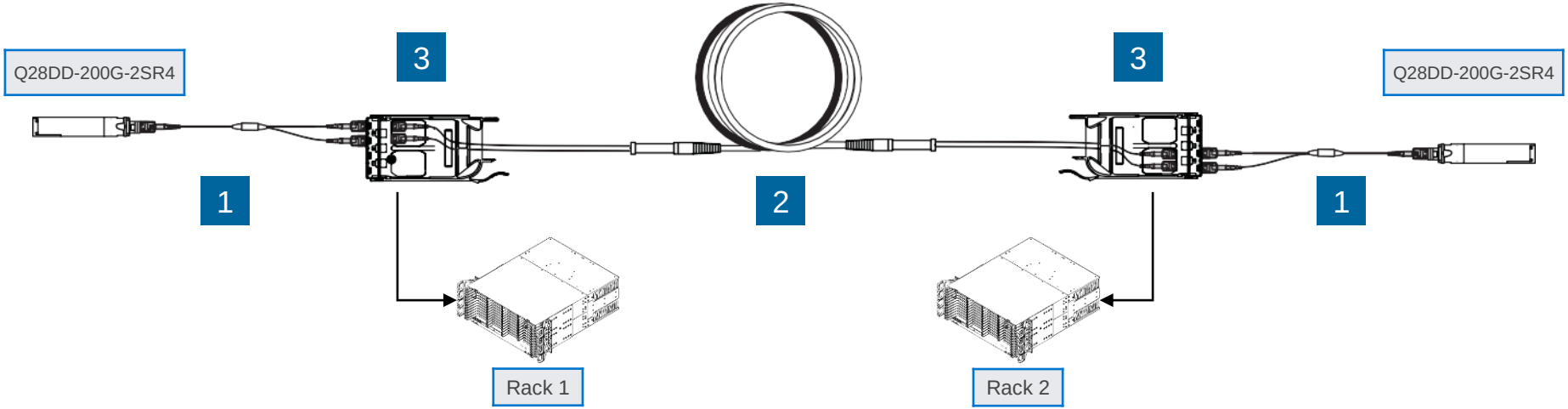
Example 1: MX7116n FEM to MX9116n FSE

MPO12-DD to MPO12-DD across DC

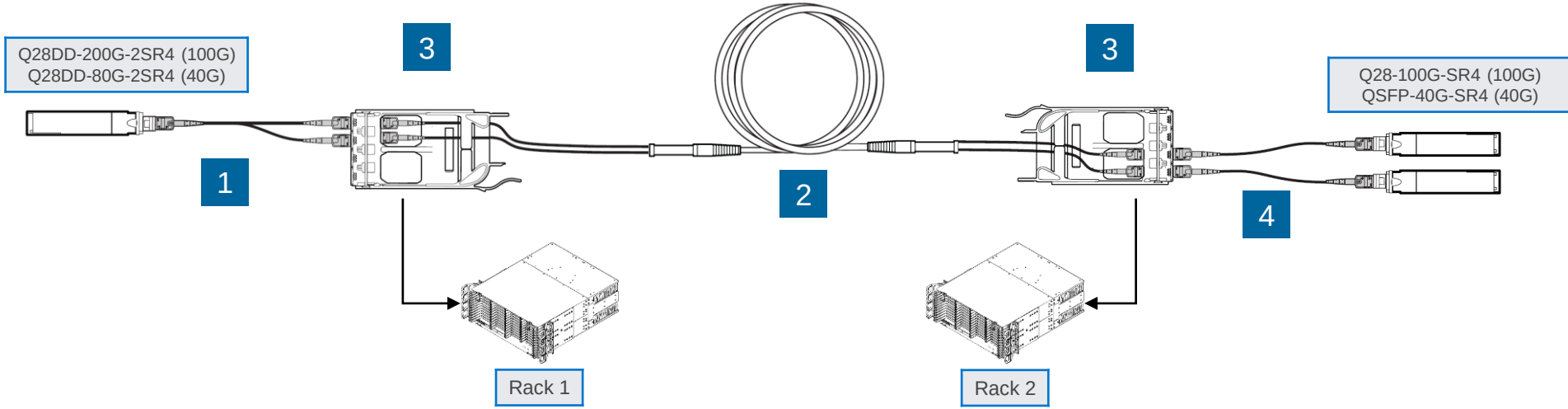


Item	OM4 Part Number (NAFTA)	OM4 Part Number (EMEA and APJ)	Description
1	HA6E616QPH-L4xxxM	HA6E616QLZ-L4xxxM	EDGE 16 F Y-Jumper, MPO-12DD (unpinned) to two MPO-12 (unpinned) MTPs, 36-in breakout leg length, Type-B polarity, 3.1 mm cable, xxxM
2	GE5E516QPNDDUxxxM	GE5E516QLZDDUxxxM	EDGE8® MTP Trunk, 16 F, MPO-12 (pinned) to MPO-12 (pinned), TIA-568 standard Type-B polarity, pulling grip on first end only, 7.0 mm cable, xxxM
3	EDGE8-CP32-V3	EDGE8-CP32-V3	EDGE8 4-Port MPO Connector Panel

Note: NAFTA uses plenum cable and EMEA/APJ uses LSZH cable.

Example 2: QSFP28-DD Uplink to 2x40GbE/100GbE

MPO12-DD to MPO12 across DC

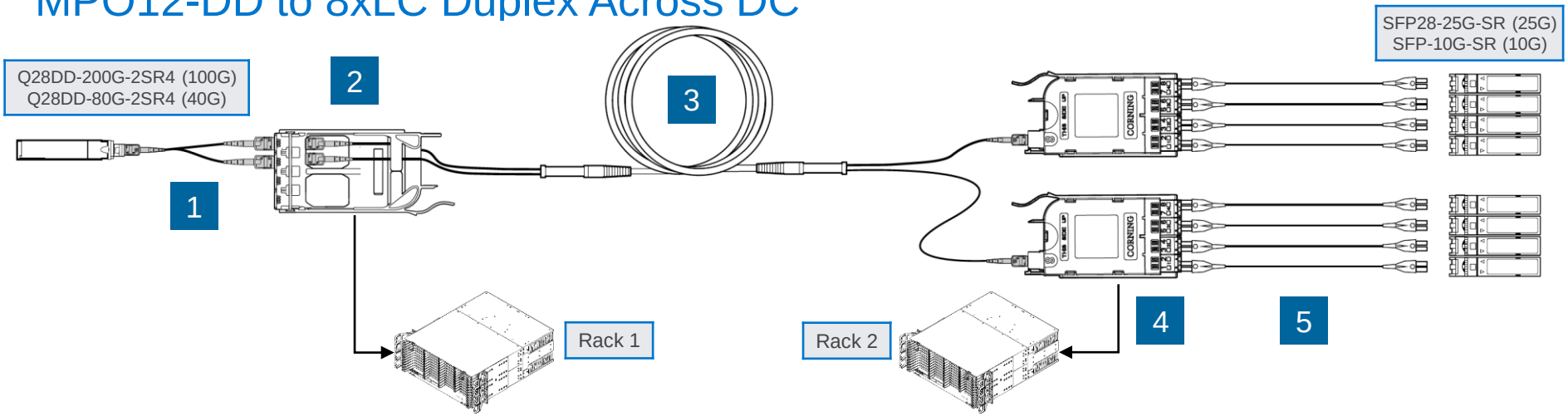


Item	OM4 Part Number (NAFTA)	OM4 Part Number (EMEA and APJ)	Description
1	HA6E616QPH-L4xxxM	HA6E616QLZ-L4xxxM	EDGE 16 F Y-Jumper, MPO-12DD (unpinned) to two MPO-12 (unpinned) MTPs, 36-in breakout leg length, Type-B polarity, 3.1 mm cable, xxxM
2	GE5E516QPNDDUxxxM	GE5E516QLZDDUxxxM	EDGE8® MTP Trunk, 16 F, MPO-12 (pinned) to MPO-12 (pinned), TIA-568 standard Type-B polarity, pulling grip on first end only, 7.0 mm cable, xxxM
3	EDGE8-CP32-V3	EDGE8-CP32-V3	EDGE8 4-Port MPO Connector Panel
4	JE6E608QE8-NBxxxM	JE6E608QEZ-NBxxxM	8-Fiber MTP Jumper, MPO-12 (unpinned) to MPO-12 (unpinned), Type-B polarity, 2.0 mm cable, xxxM

Note: NAFTA uses plenum cable and EMEA/APJ uses LSZH cable.

Example 3: QSFP28-DD to 8x Rack Servers

MPO12-DD to 8xLC Duplex Across DC



Item	OM4 Part Number (NAFTA)	OM4 Part Number (EMEA and APJ)	Description
1	HA6E616QPH-L4xxxM	HA6E616QLZ-L4xxxM	EDGE 16 F Y-Jumper, MPO-12DD (unpinned) to two MPO-12 (unpinned) MTPs, 36-in breakout leg length, Type-B polarity, 3.1 mm cable, xxxM
2	EDGE8-CP32-V3	EDGE8-CP32-V3	EDGE8 4-Port MPO Connector Panel
3	GE5E616QPNDDPxxxM	GE5E616QLZDDPxxxM	EDGE8 MPO Trunk, 16 F, MPO-12 (pinned) to MPO-12 (unpinned), TIA-568 Standard Type-A polarity, pulling grip on first end only, 7.0 mm cable , xxxM
4	ECM8-UM08-05-E5Q-ULL	ECM8-UM08-05-E5Q-ULL	EDGE8 Module, LC duplex to MPO-12 (pinned), 8 F, universal polarity
5	797902QD120xxxM	E797902QNZ20xxxM	EDGE Uniboot Duplex LC Jumper, LC UPC uniboot to LC UPC uniboot, 2.0 mm cable, xxxM

Note: NAFTA uses plenum cable and EMEA/APJ uses LSZH cable.

Corning EDGE8® Resources

- Corning EDGE8® General Information: www.corning.com/dellemc
- Corning EDGE8 Solutions brief (LAN-2480-AEN): Link
- Corning Choosing the correct Bill-of-Material (LAN-2495 AEN): Link
- Corning: EDGE8-01U-SP Housing Quick Guide
- Corning: EDGE8-02U- Housing Quick Guide
- Corning: EDGE8-04U Housing Quick Guide
- Corning: EDGE8 Standard Recommended Procedure
- Corning: Solutions Intro video

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Additional Resources

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Reference Papers

Name	Description	URL
Dell PowerEdge MX Networking Deployment Guide	All in one documentation for PowerEdge MX Networking	https://infohub.delltechnologies.com/t/dell-emc-poweredge-mx-networking-deployment-guide/
Dell OpenManage Enterprise-Modular Edition Version 2.10.00 for PowerEdge MX7000 Chassis User's Guide	PowerEdge MX Chassis User's Guide	https://dl.dell.com/content/manual59744464-dell-openmanage-enterprise-modular-edition-version-2-10-00-for-poweredge-mx7000-chassis-user-s-guide.pdf?language=en-us
Dell PowerEdge MX SmartFabric and Cisco ACI Integration Guide	Reference on integrating PowerEdge MX SmartFabric and Cisco ACI	https://infohub.delltechnologies.com/t/dell-emc-poweredge-mx-smartfabric-and-cisco-aci-integration-guide/
Dell PowerEdge MX SmartFabric Services and VMware NSX-T Data Center Integration Guide	Reference on configuring VMware NSX-T Data Center with the Dell PowerEdge MX platform running SmartFabric Services.	https://infohub.delltechnologies.com/t/dell-emc-poweredge-mx-smartfabric-services-and-vmware-nsx-t-data-center-integration-guide/
Dell PowerEdge MX VMware ESXi with SmartFabric Services Deployment Guide	Reference on integrating VMware ESXi on the Dell PowerEdge MX platform running SmartFabric Services.	https://infohub.delltechnologies.com/t/dell-emc-poweredge-mx-vmware-esxi-with-smartfabric-services-deployment-guide/
Dell PowerEdge MX7000 vSAN Ready Node Networking Deployment Guide	Reference on PowerEdge MX networking for vSAN Ready Nodes	https://infohub.delltechnologies.com/section-assets/poweredge-mx7000-deployment-guide-en-us-12
Dell Networking and Cisco Spanning Tree Interoperability	Reference on Dell Networking and Cisco Spanning Tree Interoperability	https://infohub.delltechnologies.com/t/dell-emc-networking-smartfabric-os10-and-cisco-spanning-tree-interoperability-reference-guide/
Virtual Link Trunking (VLT) in Dell OS10 Enterprise Edition Best Practices and Deployment Guide	Reference on VLT Best Practices and Deployment	https://infohub.delltechnologies.com/t/dell-emc-smartfabric-os10-virtual-link-trunking-reference-architecture/

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Other Resources

Name	Description	URL
SmartFabic OS10 Solutions Support Matrix	Provides information on all supported versions of platform components in each PowerEdge MX Release	https://infohub.delltechnologies.com/l/networking-support-matrix-1/networking-solutions-support-matrix-1
Dell Networking MX9116n Spec Sheet	Dell Networking MX9116n Spec Sheet	https://www.dell.com/learn/product_docs/dellemcnetworkingmx9116nspecsheet.pdf
Dell Networking MX7116n Spec Sheet	Dell Networking MX7116n Spec Sheet	https://www.dell.com/learn/product_docs/dellemcnetworkingmx7116nspecsheet.pdf
Dell Networking MX8116n Spec Sheet	Dell Networking MX8116n Spec Sheet	https://www.delltechnologies.com/asset/en-us/products/networking/technical-support/dell-networking-mx8116n-spec-sheet.pdf
Dell Networking MX5108n Spec Sheet	Dell Networking MX5108n Spec Sheet	https://www.dell.com/learn/product_docs/dellemcnetworkingmx5108nspecsheet.pdf
Dell Networking MXG610s Spec Sheet	Dell Networking MXG610s Spec Sheet	https://www.dell.com/learn/product_docs/dellemcnetworkingmxg610sspecsheet.pdf
Dell Networking Optics Spec Sheet	Dell Networking Optics Spec Sheet	https://www.dell.com/learn/shared-content~data-sheets~en/documents~dell-networking-optics-spec-sheet.pdf
Dell eLabs Networking Switch Support Matrix for Storage	Current support matrix of Dell Networking Ethernet switches and Dell Storage platforms	https://elabnavigator.emc.com/vault/pdf/Dell_EMC_Networking_Switch.pdf?key=1523428507371
MX9116n Support Page		https://www.dell.com/support/home/product-support/product/networking-mx9116n
MX5108n Support Page		https://www.dell.com/support/home/product-support/product/networking-mx5108n
MX7116n Support Page		https://www.dell.com/support/home/product-support/product/networking-mx7116n
MX8116n Support Page		https://www.dell.com/support/home/product-support/product/networking-mx8116n
MXG610s Support Page		https://www.dell.com/support/home/product-support/product/networking-mxg610s
Cable & Optic FAQ		https://www.dell.com/support/kbdoc/000134129/faq-optics-and-cables
PowerEdge MX Visio Template		http://www.visiocafe.com/downloads/dell/Dell-ModularInfrastructure.zip

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Revision History

Date	Version	Changes
Sept 25, 2018	1.1	Initial Public Release
Sept 26, 2018	1.1.2	Corrected FC Gateway Topology, Fixed headers, updated cable images, corrected NPAR support for Intel NICs
October 25, 2018	1.2	Updated PTM image, Added additional cables & optics to 25G PTM, Scalable Fabric design for Dual Fabrics, Clarified supported 40G optics, updated Mellanox NIC information, added Additional Resources section, information on connecting to Cisco switches, unsupported topologies for Scalable Fabric and SmartFabric services
January, 2019	1.3	Clarified items on the switch Quick Reference page, added IOM slot matrix, corrected SKU numbers, updated Dell EMC 4x32G FC optic to reflect support for 4x 8G FC, corrected description of MXG610s on QRG page, updated list of white papers
May, 2019	1.4	Clarified cables/optics for VLTi on MX5108, updated NPAR support on NIC QRG, corrected SKU numbers, updated resources and whitepaper links, updated MX7116n QRG, Updated Layout/Template
September, 2019	1.5	Updated multiple slides to add new cables/optics supported with OS10.5.0, Added Slide for MX7116n FEM as Pass-Through Module, Updated & Added whitepaper links, Added information about Corning Edge8 Structured Cabling
March, 2020	1.6	Updated Brocade SKUs, Minor other corrections, updated broken links
June 2020	1.7	Clarified MXG610s QRG, Updated Edge8 ProDeploy policy, clarified number of NPAR partitions for Marvell NICs, updated max supported VLANs for switches, updated MX7116n breakout options for 10G Support
August 2020	1.8	Added content for Broadcom 57504 quad port NICs, Added content for new Scalable Fabric topologies, Added example topology for direct attached FC, corrected broken links, additional information on QSFP28-DD cables, minor updates and corrections
October 2020	1.9	Updated FC Mezz QRG, Adjusted to account for EOL of QSFP-64GFC-SW4
April 2021	1.10	Added cable configuration for QSFP to QSFP FC optic connection, updated multiple Scalable Fabric and example topology slides, added cable/speed compatibility slide, added C&O FAQ and C&O spec sheet link to resources section, Updated DD optic references to Q28DD-80G/200G-2SR4 Dual-Rate optic
December 2021	1.11	Added new MSA types, updated brocade license SKUs, updated switch P*V limits, Updated Topologies, minor updates and corrections
May 2022	1.12	Updated QSFP28-DD in Depth, Updated MXG610 SKUs
August 2022	1.13	Updated MXG610 Licensing and SKUs, Notes and Link for MX Chassis Management Module Cabling
April 2023	1.14	Updated content with 100GbE MX8116n and Z9432F-ON solution
Jan 2024	1.15	Updated content with Z9664F-ON as FSE on 100 GbE Solution