

# MODULE INTERCONNECTS

## QUICK REFERENCE GUIDE

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### MX modules - Ethernet switching




1/10/25GbE

Overview	 High-performance, scalable 25GbE MX9116n Fabric Switching Engine with multi-chassis fabric scaling capabilities	 MX7116n Fabric Expander Module for low latency 25GbE expansion	 High-performance 25GbE MX5108 Ethernet switch for single MX7000 chassis deployments
Models	MX9116n	MX7116n	MX5108n
<b>Performance</b>			
Speeds	1/10/25GbE	25GbE	1/10/25GbE and 10Base-T
Switch fabric capacity	6.4Tbps	N/A	960Gbps
Forwarding capacity (Mpps)	2380	25GbE line rate L2/L3 forwarding	363
Buffer size	22MB	N/A	TBD
Latency	sub 450ns	sub 75ns	sub 800ns
<b>Ports</b>			
Internal module server ports	16 (25GbE)	16 (25GbE)	8 (25GbE)
External 10/25/40GbE ports or 10Base-T	12 ports using QFSP28-DD	2 ports using QFSP28-DD	4 ports 10GBase-T, 1 port QSFP+ 40GbE
External 100GbE ports	4 ports using QSFP28	N/A	2 ports using QSFP28
Native Fibre Channel support	N/A	N/A	N/A
Expansion modules (FlexIO)	N/A	N/A	N/A
<b>Features</b>			
DCB, PFC, DCBx and ETS	Yes	N/A	Yes
FCoE	Transit	N/A	Transit
Storage fabric services	NPIV	N/A	NPIV
Converged iCSI (LAN/SAN)	N/A	N/A	N/A
Stacking	Via Scalable Fabric Architecture	N/A	N/A
PSVT+	Yes	N/A	Yes
Simplified Networking Mode	N/A	N/A	N/A
Accepts Cisco Twin-ax cables	TBD	N/A	TBD
Optical transceivers supported	QFSP+; QFSP28; QFSP28-DD; MPO12DD	N/A	QFSP+; QFSP28
Max L2 and L3 VLANs	4000/500	N/A	4000/1000
Link Aggregation (Groups/Members)	128/16	N/A	128/16
Jumbo frames (Bytes)	9000	N/A	9000
Max Routes (IPv4/V6)	130K/130K	N/A	136K/68K
IPv4 Routing	RIP, OSPF	N/A	RIP, OSPF
IPv6 Routing	OSPF/OSPFv3	N/A	OSPF/OSPFv3
Multicast Routing	IGMP, PIM	N/A	IGMP, PIM




## MX modules - Fibre Channel

Overview	 MXG610s Fibre Channel I/O Module for MX7000 chassis deployments
Models	MXG610s
Performance	
Speeds	16/32Gbps
Switch fabric capacity (Gbps)	1024 Full fabric switch mode
Max Buffer to Buffer Credit	1764
Latency (Microseconds)	<900 ns
Ports	
Total ports	30 (16 internal and 14 external)
Port model options	8 port with two SFP+ transceivers; 16 port with four SFP+ transceivers; 16 port enterprise with eight SFP+ transceivers
Port types	F_Port, E_Port, M_Port, D_Port (ClearLink Diagnostic Port), 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/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
Enterprise License	Inter-Switch Links (ISL), Trunking, Fabric Vision and Extended Fabric licenses
ISL Trunking (for Brocade FC devices only)	Inter-Switch Link (ISL) Trunking allows all eight external SAN ports to be combined to form a single, logical ISL, delivering scalable I/O bandwidth utilization and load balancing with an aggregate bandwidth of 128Gbps (M6505 model) and 64Gbps (M5424 model)
Maximum frame size	2,112-byte payload
Classes of service	Class 2, Class 3, Class F (inter-switch frames)
Data traffic types	Fabric switch supporting unicast
Brocade optical transceivers (requires SFPLC connector)	16Gbps: SWL, LWL 32Gbps: SWL, LWL 16Gbps: SW4 QSFP 32Gbps: SW4 QSFP
Fabric Services	Monitoring and Alerting Policy Suite (MAPS); Flow Vision; Brocade Adaptive Networking (Traffic Isolation, QoS); Fabric Performance Impact (FPI) Monitoring; Slow Drain Device Quarantine (SDDQ); Brocade Advanced Zoning (default zoning, port/WWN zoning, broadcast zoning, peer zoning, target-driven zoning); Dynamic Fabric Provisioning (DFP); Dynamic Path Selection (DPS); Brocade Extended Fabrics; Enhanced BB credit recovery; FDMI; Frame Redirection; Frame-based Trunking; FSFP; Brocade ISL Trunking; Management Server; NPIV; NTP v3; Registered State Change Notification (RSCN); Reliable Commit Service (RCS); Simple Name Server (SNS); Read Diagnostics Parameter (RDP), VM Insight


## FX modules - Ethernet and Fibre Channel switching

	2/4/8GB and 1/10GbE	1/10GbE	10Base-T
Overview	 Delivers up to 2 ports of 2/4/8Gbps FC and 2 ports of 10GbE SFP+	 Provides 4 ports of 10GbE SFP+ connectivity	 Provides 4 ports of 10GBase-T connectivity
Models	FN2210S	FN410S	FN410T
Performance			
Speeds	Speeds	2/4/8GB and 1/10GbE	1/10GbE
Switch fabric capacity	240Gbps		
Forwarding capacity (Mpps)	179Mpps		
Buffer size	4MB		
Latency	1.6 microsec		
Ports			
Internal module server ports	8 (10GbE)		
External ports	Two 2/4/8GB SFP+ ports and two 1/10GbE SFP+ ports or four 1/10GbE SFP+ ports	Four 1/10GbE SFP+ ports	Four 10Base-T ports
Native Fibre Channel support	Yes via NPG mode to connect to SAN switch	N/A	N/A
Features			
DCB, PFC, DCBx and ETS	Yes		
FCoE		FCoE transit	
FC fabric services	FC-GS, FC-GS2, GC-GS3	N/A	N/A
Converged iCSI (LAN/SAN)	Yes	N/A	N/A
Stacking		Up to 6 IOMs (using 10GbE ports)	
PSVT+	N/A	N/A	N/A
Simplified Networking Mode	N/A	N/A	N/A
Accepts Cisco Twin-ax cables	N/A	N/A	N/A
Optical transceivers supported		SFP+ (SR, LR, DWDM) SFP (1000Base-SX, 1000Base-LX, 1000Base-T)	
Max L2 and L3 VLANs		4094	
Link Aggregation (Groups/Members)		1/4	
Jumbo frames (Bytes)		partial	
Max Routes (IPv4/V6)		N/A	
IPv4 Routing		RIP, OSPF	
IPv6 Routing		OSPF, OSPFv3	
Multicast Routing		IGMP	

## M1000e modules

Ethernet switching	10/40GbE switch	10GbE Plug and Play	10GbE basic	1GbE high-density
Overview	 High performance blade provides maximum throughput, flexibility, and iSCSI/FCoE convergence.	 Converge infrastructure and connect easily to third-party networks with this flexible Layer 2 blade.	 Transition to 10GbE connectivity and extend an available iSCSI/FCoE fabric with this Layer 2/3 switch.	 Leverage existing Ethernet cabling to enable broader scalability in the data center with this Layer 2/3 switch.
Models	MXL	I/O Aggregator	M8024K	M6348
Performance				
Speeds	1, 10, or 40GbE	1 and 10GbE	1 and 10GbE	1 and 10GbE
Switch fabric capacity	1.28Tbps	1.28Tbps	480Gbps	184Gbps
Forwarding capacity (Mpps)	960	960	357	160
Buffer size	9MB	9MB	2MB	4MB
Latency	0.68 µs	0.68 µs	1.85 µs	3.6 µs
Ports				
Internal blade server ports	32 (10GbE)	32 (10GbE)	16 (10GbE)	32 (1GbE)
External 1/10GbE (Base-T)	4 (using module)	4 (using module)	2 (using module)	16 fixed (1GbE)
External 10GbE	8 ports using QSFP+ breakout cables (up to 24 using modules)	8 ports using QSFP+ breakout cables (up to 16 using modules)	4 fixed SFP+ ports (1/10Gb) (Add 4 more 10Gb ports using module)	2 fixed SFP+ and 2 fixed CX4
External 25GbE				
External 40GbE (QSFP+)	2 integrated QSFP+ (up to 6 using modules)	2 integrated QSFP+ fixed in breakout mode (up to 6 using modules)	-	-
Native Fibre Channel support	Up to 8 FC ports (8Gb)	Up to 8 FC ports (8Gb)	-	-
Expansion modules (FlexIO)	2 slots and 3 options (mix or match); 2 port QSFP+ (10/40GbE) (1); 4 port SFP+ (1/10GbE); 4 port Base-T (1/10GbE) (2); 4 port FC8 (2/4/8Gb) (1) QSFP+ port on I/O Aggregator runs breakout mode 4x10GbE only (2) Both devices limited to one Base-T module only. Populate second slot with another module of your choice.		1 slot and 3 options 4 port SFP+ (10Gb only) 2 port Base-T (1/10Gb)	-
Features				
DCB: PFC, DCBx and ETS	Yes	Yes	Yes (PFC and DCBx)	-
FCoE	FCoE transit or direct connect	FCoE transit or direct connect	Transit	-
Storage fabric services	Zoning, F_Port, NPIV	Zoning, F_Port, NPIV		
Converged iSCSI (LAN/SAN)	Yes	Yes	Not suitable for iSCSI over DCB	-
Stacking	Up to 6 using QSFP ports	2 via CLI only	Up to 6 using SFP+ ports or SFP+ module	Up to 12 using CX4 ports
PSVT+	Yes	-	-	-
Simplified Networking Mode	-	Default	Simple Mode	Simple Mode
Accepts Cisco Twin-ax cables	Yes		Yes	Yes
Optical transceivers supported	QSFP+ (SR only); SFP+ (SR or LR); SFP (SX, LX, and SFP to RJ45)		SFP+ (SR, LR, LRM) SFP*: (SX, LX, or SFP to RJ45) *Optics work in fixed ports only	SFP+ (SR, LR, LRM)
Max L2 and L3 VLANs	4094/511	4094 (Layer 2 only)	1024/128	1024/128
Link Aggregation (Groups/Members)	128/16	16-Jan	8-Dec	48/8
Jumbo frames (Bytes)	12000	12000	9216	9216
Max Routes (IPv4/IPv6)	16000/IPv6 Future	-	8160/4096	10000/3000
IPv4 Routing	RIP, OSPF	-	RIP, OSPF	RIP, OSPF
IPv6 Routing	OSPF/OSPF v3	-	OSPF	OSPF
Multicast Routing	IGMP	IGMP snooping only	IGMP, PIM, DVMRP	IGMP, PIM, DVMRP, MLD

## M1000e modules - Fibre Channel switching

Overview	 <p>High performance 16Gb switch Transform SAN connectivity with maximum throughput and advanced management features for virtualized environments.</p>
Brocade M6505	
Performance	
Speeds	16Gbps (multi-speed 2, 4, 8, or 16Gbps)
Switch capacity (Gbps)	384 (768 full duplex)
Max Buffer to Buffer Credit	8106
Latency (Microseconds)	0.7 $\mu$ s
Ports	
Total ports	24 (16 internal and 8 external)
Port model options	24 ports with eight SFP+ transceivers 24 ports with four SFP+ transceivers 12 ports with two SFP+ transceivers (12 port model expands to 24 ports with on-demand license)
Port types	D_Port (Diagnostic Port), E_Port, F_Port, M_Port (Mirror Port); self discovery based on switch type (U_Port); optional port type control in Brocade Access Gateway mode: F_Port and NPIV-enabled N_Port
Features	
Security	SSL, SSH v2, HTTPS, LDAP, RADIUS, Role-Based Access Control (RBAC), DH-CHAP (between switches and end devices), Port Binding, Switch Binding, Secure RPC, Secure Copy (SCP), Trusted Switch, IPSec, IP Filtering
Management	HTTP, SNMP v1/v3 (FE MIB, FC Management MIB), SSH; Auditing, Syslog; Brocade Advanced Web Tools, Advanced Performance Monitoring, Brocade Fabric Watch; Brocade Network Advisor SAN Enterprise or Brocade Network Advisor SAN Professional/Professional Plus; Command Line Interface (CLI); SMI-S compliant; Administrative Domains; trial licenses for add-on capabilities
Enterprise Performance Pack	Software license option that includes Adaptive Networking, ISL Trunking, Fabric Watch, and Advanced Performance Monitoring
ISL Trunking (for Brocade FC devices only)	Inter-Switch Link (ISL) Trunking allows all eight external SAN ports to be combined to form a single, logical ISL, delivering scalable I/O bandwidth utilization and load balancing with an aggregate bandwidth of 128Gbps (M6505 model) and 64Gbps (M5424 model)
Maximum frame size	2112-byte payload
Classes of service	Class 2, Class 3, and Class F (inter-switch frames)
Data traffic types	Fabric Switches supporting unicast
Brocade optical transceivers (requires SFP LC connector)	16Gbps: SWL, LWL, or ELWL
Fabric Services	-

### Warranty and Services

#### Warranty

Select Dell EMC Networking products carry an Extended Life Limited Hardware Warranty (ELW). For details of your product warranty terms go to [Dell.com/LifetimeWarranty](http://Dell.com/LifetimeWarranty).

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