

Dell EMC MX9116N Fabric Switching Engine



High-performance, scalable 25 Gigabit Ethernet fabric switch with multi-chassis fabric scaling capabilities for the PowerEdge MX platform

The Dell EMC Networking MX9116n Fabric Switching Engine is a scalable, high-performance, low latency 25Gbps Ethernet switch purpose-built for the PowerEdge™ MX platform providing enhanced capabilities and cost-effectiveness for the enterprise, mid-market, Tier 2 cloud and NFV service providers with demanding compute and storage traffic environments.

Delivering industry leading performance in a modular switch, the non-blocking switching architecture in the MX9116n provides line-rate 25GbE L2 and L3 forwarding capacity to all connected servers with no oversubscription and a sub 450ns latency. In addition to 16 internal 25GbE ports, the MX9116n provides four QSFP28 100GbE ports for uplinks and twelve QSFP28-Double Density ports. These QSFP28-DD ports provide capacity for additional uplinks, ICLs, connections to rack servers at 10GbE or 25GbE via breakout cables, and fabric expansion connections for up to 9 additional MX7000 chassis.

Maximum performance and functionality

The Dell EMC Networking MX9116n is a high-performance, multifunction, 25GbE Fabric Switching Engine purpose-built for applications in demanding data center, cloud and computing environments. The MX9116n also supports the open source Open Network Install Environment (ONIE) for zero touch installation of alternate operating systems in future releases.

Built-in convergence capabilities

The MX9116n is fully IEEE data center bridging (DCB) compliant, supporting iSCSI, NAS, and FCoE transit. Two of the QSFP28 ports can support eight 32Gb Fibre Channel connections (4 per QSFP28), enabling direct attachment of a FC storage array and as a NPIV Proxy Gateway to an existing FC SAN.

MX Scalable Fabric Architecture

The MX Scalable Fabric Architecture allows the MX9116n to seamlessly support up to 80 MX compute sleds and 10 MX7000 chassis via the ultra-low latency MX7116n Fabric Expander Module.

SmartFabric OS10

The Dell EMC Networking SmartFabric OS10 is a Network Operating System supporting multiple architectures and environments. The networking world is moving from a monolithic stack to a pick-your-own-world. The OS10 solution is designed to allow multi-layered disaggregation of network functionality. While OS10 contributions to Open Source provide users freedom and flexibility to pick their own 3rd party networking, monitoring, management and orchestration applications, OS10 bundles an industry hardened networking stack featuring standard L2 and L3 protocols over a standard and well accepted CLI interface.

SmartFabric Services

Included in OS10, SmartFabric Services provides single pane of glass management and automation across every fabric in a PowerEdge MX deployment, up to the 20 chassis Multi-Chassis Management group limit*. SmartFabric Services key features include:

- I/O Aggregation to simplify connectivity to existing networks
- Integration of VLAN and automated QoS settings with Server Deployment Template
- Fabric-wide firmware upgrades and configuration consistency checks
- Automatic topology validation – detects physical topology misconfigurations and provides corrective guidance
- Automatically heals fabric upon failure condition removal

Key applications

- Organizations looking to enter the software-defined data center era with a choice of networking technologies designed to deliver the flexibility they need
- Native high-density 25 GbE server access in high-performance data center environments
- 25 GbE backward compatible to 10G and 1G for future proofing and data center server migration to faster uplink speeds
- Capability to support 25G and 10G rack mount servers
- iSCSI storage deployment including DCB converged lossless transactions
- Suitable as a ToR or Leaf switch in 100G leaf/spine CLOS Fabric implementations

Key features

- Up to 6.4Tbps of switching I/O bandwidth (full duplex) available and non-blocking switching fabric delivering line-rate performance under full load with sub 450ns latency
- Scalable L2 and L3 Ethernet switching with QoS and a full complement of standards-based IPv4 and IPv6 features, including OSPF and BGP routing support
- Up to eight 32Gb Fibre Channel connections supporting both NPG and Direct Attach FC configurations
- L2 multipath support via Virtual Link Trunking (VLT) and multiple VLT (mVLT) multi-chassis link aggregation technology
- NVMe-oF ready to support the next generation of high performance storage
- Jumbo frame support for large data transfers
- 128 link aggregation groups with up to sixteen members per group, using enhanced hashing
- Converged network support for DCB, with priority flow control
- (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV support
- Supports Routable RoCE to enable convergence of compute and storage

Key features with OS10

- Consistent DevOps framework across compute, storage and networking elements
- Standard networking features, interfaces and scripting functions for legacy network operations integration
- Standards-based switching hardware abstraction via Switch Abstraction Interface (SAI)
- Pervasive, unrestricted developer environment via Control Plane Services (CPS)
- Open and programmatic management interface via Common Management Services (CMS)
- OS10 software enables Dell EMC layer 2 and3 switching and routing protocols with integrated IP Services,
- Quality of Service, Manageability and Automation features
- Platform agnostic via standard hardware abstraction layer (OCP-SAI)
- Unmodified Linux kernel and unmodified Linux distribution
- Leverage common open source tools and best-practices (data models, commit rollbacks)
- Scalable L2 and L3 Ethernet Switching with QoS, ACL and a full complement of standards based IPv4 and IPv6 features including OSPF, BGP and PBR
- Enhanced mirroring capabilities including local mirroring, Remote Port Mirroring (RPM), and Encapsulated Remote Port Mirroring (ERPM)
- Converged network support for DCB, with priority flow control
- (802.1Qbb), ETS (802.1Qaz), DCBx and iSCSI TLV
- Rogue NIC control provides hardware-based protection from NICS sending out excessive pause frames

Product	Description
MX9116n Fabric Switching Engine	
Optics	Transceiver, 2x100/2x80GbE Multi-rate, 2SR4 QSFP28-DD Transceiver, 2x100GbE, 2SR4 QSFP28-DD Transceiver, 2x40GbE, 2SR4 QSFP28-DD Transceiver, 100GbE, SR4 QSFP28 Transceiver, 100GbE, LR4 QSFP28 Transceiver, 100GbE, ESR4 QSFP28 Transceiver, 100GbE, PSM4 500m QSFP28 Transceiver, 100GbE, CWDM4 2Km QSFP28 Transceiver, 100GbE, SWDM4 100m QSFP28 Transceiver, 100GbE, BIDI optic QSFP28 Transceiver, 40GbE, SR4 optic QSFP+ Transceiver, 40GbE, eSR4 optic QSFP+ Transceiver, 40GbE, LR4 optic QSFP+ Transceiver, 40GbE, BIDI optic QSFP+ Transceiver, 40GbE, PSM4 10Km QSFP+ Transceiver, 40GbE, LM4 Duplex QSFP+ Transceiver, 40GbE, SM4 Duplex QSFP+ Transceiver, 4x32G FC SW optic QSFP28 Transceiver, 4x16G FC SW optic QSFP+
Cables	2x 100GbE, QSFP28-DD to QSFP28-DD, active optical, passive DAC 2x 100GbE, QSFP28-DD to 2xQSFP28, active optical, passive DAC 2x 100GbE, QSFP28-DD to 8xSFP28 (8x10/25GbE), active optical, passive DAC 2x 100GbE, MPO12-DD to MPO12-DD optical 2x 100GbE, MPO12DD to 2xMPO12 optical breakout 2x 100GbE, MPO12DD to 8xLC optical breakout 2x 40GbE, QSFP28-DD to 2xQSFP+, active optical, passive DAC 2x 40GbE, QSFP28-DD to 8xSFP+ (8x10/10GbE), active optical, passive DAC 100GbE, QSFP28 to QSFP28, active optical, passive DAC 100GbE, QSFP28 to 4xSFP28 (4x10/25GbE), active optical, passive DAC 100GbE, MTP to MTP optical 100GbE, MTP to 4xLC optical breakout 40GbE, QSFP+ to QSFP+, active optical & passive DAC 40GbE, QSFP+ to 4xSFP+ (4x10GbE), active optical & passive DAC
Software	SmartFabric OS10 Select third-party operating system offerings (future)

Technical specifications

Physical	Performance	802.3x	Flow Control
Full featured 25/100GE switch in PowerEdge MX Fabric A/B I/O sled form factor 1 USB 2.0 type A storage port 1 micro USB type B port for console/ management port access Indicators: Power/Health LED ID LED Link/activity LEDs Size: 1.18”h x 17.11”w x 10.94”d Weight: 8.49lbs (3.85kg) Max. power consumption: 260 Watts w/5W QSFP28-DD Optics Typ. power consumption: 237 Watts w/5W QSFP28-DD Optics Max. operating specifications: Standard Operating Temperature 10°C to 35°C (50°F to 95°F) Operating Relative Humidity 5% to 85%, noncondensing Max. non-operating specifications: Storage temperature: -40°C to 65°C (-40°F to 149°F) Storage humidity: 5 to 95% (RH), noncondensing Expanded Operating Temperature, Continuous Operation: Not Supported	Performance Switching I/O bandwidth: 6.4Tbps Forwarding capacity: 2380 Mpps Latency: Sub 450ns MAC addresses: 137K IPv4 Unicast routes: 130K IPv6 Unicast routes: 130K ARP entries: 48K Layer 2 VLANs: 60K P*V in Full Switch mode Layer 3 VLANs: 30K P*V in Full Switch mode MST: 32 instances PVST+: 128 instances LAG: 128 groups, 16 members per LAG group ACL Entries-Layer 2 Egress: 1020 ACL Entries-Layer 2 Ingress: 767 ACL Entries-IPv4 Egress: 767 ACL Entries-IPv4 Ingress: 767 ACL Entries-IPv6 Egress: 512 ACL Entries-IPv6 Ingress: 767 iSCSI Number of sessions: 256 Jumbo Frames: 9K	802.1D 802.1p 802.1Q 802.1s 802.1w 802.1t 7348	Layer2 Protocols Compatible L2 Prioritization VLAN Tagging MSTP RSTP RPVST+ VxLAN VLT (Virtual Link Trunking) VRRP Active/Active RSTP, MSTP, RPVST+ Port Mirroring on VLT ports DCB, iSCSI, FSB on VLT RPM/ERPM over VLT VLT Minloss upgrade VxLAN with VLT ICMP/MLD snooping over VLT PIM SM/SSM over VLT
Redundancy Redundant Power and Cooling provided by Dell EMC PowerEdge MX7000 Chassis	IEEE Compliance 802.1AB LLDP TIA-1057 LLDP-MED 802.3ad Link Aggregation 802.1D Bridging, STP 802.1p L2 Prioritization 802.1Q VLAN Tagging 802.1Qbb PFC 802.1Qaz ETS 802.1X Network Access Control 802.3ac Frame Extensions for VLAN Tagging	RFC Compliance 768 UDP 793 TCP 854 Telnet 959 FTP 1321 MD5 1350 TFTP 2474 Differentiated Services 2698 Two Rate Three Color Marker 3164 Syslog 4254 SSHv2	

Technical specifications

General IPv4 Protocols

791	IPv4
792	ICMP
826	ARP
1027	Proxy ARP
1035	DNS (client)
1042	Ethernet Transmission
1191	Path MTU Discovery
1305	NTPv4
1519	CIDR
1812	Routers, Static Routes
1858	IP Fragment Filtering
2131	DCHPv4 (server and relay)
5798	VRRPv3
3021	31-bit Prefixes
1812	Requirements for IPv4 Routers
1918	Address Allocation for Private Internets
2474	Diffserv Field in IPv4 and Ipv6 Headers
3195	Reliable Delivery for Syslog
3246	Expedited Forwarding PHB Group

General IPv6 Protocols

1981	Path MTU for IPv6
2372	IPv6 Addressing
2460	IPv6 Protocol Specification
2461	Neighbor Discovery
2462	Stateless Address AutoConfig
2463	ICMPv6
2464	Ethernet Transmission
2675	IPv6 Jumbograms
3493	Basic Socket Interface
3542	Advanced Socket, API
3587	Global Unicast Address Format
3848	Default Address Selection
4291	IPv6 Addressing
3633	DHCPv6 Relay
IPv6	Static Routes
2464	Transmission of IPv6 Packets over Ethernet Networks
2711	IPv6 Router Alert
4007	IPv6 Scoped Address Architecture
4213	Basic Transition Mechanisms for IPv6 Hosts and Routers

OSPF (v2/v3)

1745	OSPF/BGP interaction
1765	OSPF Database overflow
2154	OSPF with Digital Signatures
2328	OSPFv2
2370	Opaque LSA
3101	OSPF NSSA
4552	OSPFv3 Authentication

Multicast

2236	IGMPv2 Snooping
3810	MLDv2 Snooping

Security

1492	TACACS (Authentication, Accounting, Authorization)
2865	RADIUS
3162	RADIUS and IPv6
3579	RADIUS support for EAP
3580	802.1X with RADIUS
3826	AES Cipher in SNMP Control Plane, VTY ACLS
	IP Access Control Lists

BGP

1997	Communities
2385	MD5
2439	Route Flap Damping
2545	BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing

2796	Route Reflection
2858	Multiprotocol Extensions
2918	Route Refresh
3065	Confederations
4271	BGP-4
4360	Extended Communities
4893	4-byte ASN
5396	4-byte ASN Representation
5492	Capabilities Advertisement
5549	BGP Unnumbered
	BGP ADD PATH
	BGP to OSPF route distribution
	BGP EVPN
	L2 & L3 Gateway with VxLAN Tunnels
	BGP EVPN Asymmetric IRB
	Symmetric IRB
	Type 5 Routes

Linux Distribution

Debian Linux version 8
Linux Kernel 3.16

MIBS

BRIDGE-MIB
ENTITY-MIB
EtherLike-MIB
HOST-RESOURCES-V2-MIB
IEEE8021-PFC-MIB
IEEE8023-LAG-MIB
IF-MIB
IP-FORWARD-MIB
IP-MIB
LLDP-EXT-DOT1-MIB
LLDP-EXT-DOT3-MIB
LLDP-MIB
OSPF-MIB
OSPFV3-MIB
Q-BRIDGE-MIB (Get)
RFC1213-MIB
SFLOW-MIB
SNMP-FRAMEWORK-MIB
SNMP-MPD-MIB
SNMPv2-MIB
TCP-MIB
UDP-MIB
SNMP-USER-BASED-SM-MIB
SNMP-VIEW-BASED-ACM-MIB
SNMP-TARGET-MIB

Network Management and Monitoring

SNMPv1/v2c/v3
IPv4/IPv6 Management support (Telnet, FTP, TACACS, RADIUS, SSH, NTP)
Port Mirroring
RPM/ERPM
3176 SFlow
Support Assist (Phone Home)
RestConf APIs, Auto-docs
XML Schema
CLI Commit (Scratchpad)
Uplink Failure Detection
Object Tracking
FarEnd Failure Detection
Bidirectional Forwarding Detection (BFD) – BGPv4/6, OSPFv2/3, Static Routes
Streaming Telemetry System, Buffers, Data monitoring
gRPC Transport with gPB encoding

Automation

Control Plane Services APIs
Linux Utilities and Scripting Tools
CLI Automation (Multiline Alias)
Ansible, Puppet, Chef, SaltStack

Zero Touch Deployment (ZTD)
3rd party packages support on Docker Container

Quality of Service

Prefix List
Route-Map
Rate Shaping (Egress)
Rate Policing (Ingress)
Scheduling Algorithms
Round Robin
Weighted Round Robin
Deficit Round Robin
Strict Priority
Weighted Random Early Detect

Data center bridging

802.1Qbb	Priority-Based Flow Control
802.1Qaz	Enhanced Transmission Selection (ETS)
	Explicit Congestion Notification
	Data Center Bridging eXchange (DCBx)
	DCBx Application TLV (iSCSI, FCoE)
	RoCEv2

Fibre Channel

FIP Snooping

Regulatory compliance

Safety

UL/CSA 60950-1, Second Edition
EN 60950-1, Second Edition
IEC 60950-1, Second Edition Including all National Deviations and Group Differences
EN 60825-1 Safety of Laser Products Part 1: Equipment Classification Requirements and User's Guide
EN 60825-2 Safety of Laser Products Part 2: Safety of Optical Fiber Communication Systems
FDA Regulation 21 CFR 1040.10 and 1040.11

Emissions & Immunity

Australia/New Zealand: AS/NZS CISPR 32:2015, Class A
Canada: ICES-3/NMB-3, Class A
Europe: EN 55024:2010 (CISPR 24:2010), Class A
Japan: VCCI V-3/2010.04 Class A
USA: FCC CFR 47 Part 15, Subpart B:2011, Class A Immunity
EN 300 386 V1.6.1 EMC for Network Equipment
EN 55024:2010
EN 61000-3-2: Harmonic Current Emissions
EN 61000-3-3: Voltage Fluctuations and Flicker
EN 61000-4-2: ESD
EN 61000-4-3: Radiated Immunity
EN 61000-4-4: EFT
EN 61000-4-5: Surge
EN 61000-4-6: Low Frequency Conducted Immunity

RoHS

EN 50581:2012 All MX9116n components are EU RoHS compliant

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Experts, insights and ease

Our highly trained experts, with innovative tools and proven processes, help you transform your IT investments into strategic advantages.



Plan & Design

Let us analyze your multivendor environment and deliver a comprehensive report and action plan to build upon the existing network and improve performance.



Deploy & Integrate

Get new wired or wireless network technology installed and configured with ProDeploy. Reduce costs, save time, and get up and running fast.



Educate

Ensure your staff builds the right skills for long-term success. Get certified on Dell EMC Networking technology and learn how to increase performance and optimize infrastructure.



Manage & Support

Gain access to technical experts and quickly resolve multivendor networking challenges with ProSupport. Spend less time resolving network issues and more time innovating.



Optimize

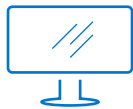
Maximize performance for dynamic IT environments with Dell EMC Optimize. Benefit from in-depth predictive analysis, remote monitoring and a dedicated systems analyst for your network.



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We can help you resell or retire excess hardware while meeting local regulatory guidelines and acting in an environmentally responsible way.

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