Datasheet

Service providers are experiencing a variety of processing and scaling demands for the growth of Ethernet traffic in their edge networks. Additionally, traditional carrier class elements typically not found in Ethernet platforms are now a requirement. These include hierarchical quality of service (QoS), logical interface scalability, High Availability (HA) features and MPLS feature richness. The MX-series Ethernet Services Routers (ESRs) were designed to address these specific Ethernet requirements. Powered by the industry leading JUNOS software operating system and the high performance I-Chip, the MX-series delivers the scalability, reliability, performance and feature richness needed to meet the evolving requirements of the Carrier Ethernet market.

Juniper Networks MX-series Ethernet Services Routing Platforms

Product Description

MX-series routers provide Ethernet switching capabilities without sacrificing carrier-class routing features customers expect from Juniper. Running the same version of JUNOS software shared by all Juniper core and edge platforms, MX-series routers not only separate control and forwarding functions, the Ethernet switching separates Layer 2 and Layer 3 forwarding with the intelligence to bridge when possible and route when needed.

MX-series routers surpass the requirements of carrier-grade Ethernet switches as defined by the Metro Ethernet Forum, leveraging the MPLS capabilities that have made Juniper Networks routers the platforms of choice for service providers seeking maximum performance, availability, and service agility. By extending carrier-class routing functionality of JUNOS software to include LAN switching functionality to facilitate migration and growth, Juniper brings its traditional advantages to Ethernet aggregation. These include high-performance routing capabilities such as Non-Stop Routing (NSR), Fast Re-Route (FRR), and In-Service Software Upgrade (ISSU).

The MX-series is a carrier-grade Ethernet solution that equips customers to profit from the tremendous growth of Ethernet transport with the confidence that the platforms they install now will have the performance and service flexibility to meet the challenges of evolving customer requirements.

MX240 Ethernet Services Router

The MX240 ESR design delivers increased port density over traditional carrier Ethernet platforms as well as performance of 200+ Gbps throughput, scalability and reliability in a space-efficient package. The MX240 offers fully redundant hardware that includes a redundant Switch Control Board (SCB) and Routing Engines (REs) to increase system availability.

MX480 Ethernet Services Router

The MX480 ESR provides a dense, highly redundant platform primarily targeted for dense dedicated access aggregation and provider edge services in medium and large Points of Presence (POPs). The MX480 offers common hardware redundancy including the Switch Control Board, Routing Engines, fan trays and power supplies.

MX960 Ethernet Services Router

The MX960 ESR is a high density Layer 2 and Layer 3 Ethernet platform designed for deployment in a number of service provider Ethernet edge scenarios. The wide range of Ethernet services provided by the MX960 include VPLS services for multi-point connectivity, Virtual Leased Line for point-to-point services, full support for MPLS VPNs throughout the Ethernet Network, Ethernet Aggregation at the Campus/Enterprise Edge, and Ethernet Aggregation at the Multiservice Edge.

The MX960 platform is ideal for large applications requiring predictable performance for feature-rich infrastructures and also supports provider edge services. In addition, this platform is ideal where Switch Control Board and Routing Engine redundancy are required. All major components are field replaceable, increasing system serviceability and reliability, and decreasing mean time to repair.

MX-series Ethernet Services Routers

Router	MX240	MX480	MX960
Aggregate Half-Duplex	240 Gbps	480 Gbps	960 Gbps
DPC Slots and Full Duplex throughput per Slot	3 DPC slots (2 with SCB redundancy) 40 Gbps per slot	6 DPC slots 40 Gbps per slot	12 DPC slots (11 with SCB redundancy) 40 Gbps per slot
Packet Forwarding Capacity	180 Mpps	360 Mpps	720 Mpps
Size (W x H x D)	**17.5 x 8.7 x 23.8 in** (44.5 x 22.1 x 60.5 cm)	**17.5 x 14 x 23.8 in** (44.5 x 35.6 x 60.5 cm)	**17.5 x 27.8 x 23.5 in** (44.5 x 70.5 x 59.7 cm)
DPCs per Chassis	**2 or 3**	**6**	**11 or 12**
Chassis per Rack	**9**	**6**	**3**
Redundancy	Yes	Yes	Yes

MX960 Ethernet Services Router

Key components of each MX-series Ethernet Services Router are the Dense Port Concentrators, the Routing Engine, and the Switch Control Board.

- The Dense Port Concentrators (DPCs) are optimized for Ethernet density and are capable of supporting up to 40 Gigabit Ethernet or 4 10-Gigabit Ethernet ports. The DPC assembly combines packet forwarding and Ethernet interfaces on a single board, with four 10-Gbps Packet Forwarding Engines. Each Packet Forwarding Engine consists of one I-chip for Layer 3 processing and one Layer 2 network processor. The DPCs interface with the power supplies and Switch Control Boards (SCBs).
- The Routing Engine is an Intel-based PC platform that runs JUNOS Software Operating System. Software processes that run on the Routing Engine maintain the routing tables, manage the routing protocols used on the router, control the router interfaces, control some chassis components, and provide the interface for system management and user access to the router.
  - Routing Engines communicate with DPCs via dedicated out-of-band management channels providing a clear distinction between the controls and forwarding planes.
- The Switch Control Board (SCB) powers on and off cards, controls clocking, resets and booting, and monitors and controls systems functions, including fan speed, board power status, PDM status and control, and the system front panel. Integrated into the SCB is the switch fabric, which interconnects all of the DPCs within the chassis, supporting up to 48 Packet Forwarding Engines. The Routing Engine installs directly into the SCB.

To ensure that the MX-series delivers the lowest cost per port without sacrificing performance, reliability, scalability or functionality, it has been purpose-built to be optimized to provide both switching and carrier-class Ethernet routing functionality.

Ethernet-based services present a significant new revenue opportunity for service providers. These services include virtual private networks (VPNs), point-to-point connectivity, high speed Internet access and video-based offerings. With continuous technology advances and ongoing standards development, Ethernet is increasingly the technology of choice at the service provider edge. As an example of Juniper's commitment to delivering Ethernet-centric solutions to meet the needs of next-generation networks and services, the MX-series offers unmatched scalability, performance, reliability and QoS for both business and residential services. Its high density Layer 2 and Layer 3 Ethernet platforms have been designed for deployment in a number of service provider Ethernet edge scenarios.

Examples of the wide range of Ethernet services provided by the MX-series include:

- Virtual private LAN service (VPLS) for multi-point connectivity—native support for VPLS services
- Virtual Leased Line (VLL) for point-to-point services—native support for point-to-point services
- RFC 2547.bis IP/MPLS VPN (L3VPN)—full support for MPLS VPNs throughout the Ethernet Network
- Video Distribution IPTV services
- Ethernet Aggregation at the Campus/Enterprise Edge—supports dense 1 GE and 10 GE configurations as well as providing full L3 support for Campus Edge requirements
- Ethernet Aggregation at the Multiservice Edge—supports up to 480 1 GE ports or 48 10 GE ports for maximum Ethernet density along, with full L2 and L3 VPN support for MSE applications

MPLS

An example of technical advancement and ongoing standards development that is driving the evolution of Ethernet in the service provider edge can be found in Multi Protocol Label Switching (MPLS) technology. MPLS has traditionally been found in network backbones to provide traffic engineering and allow the carriage of a wide range of Layer 2 and Layer 3 traffic such as IP, Frame Relay and ATM. Extending MPLS to the Ethernet edge brings benefits such as restoration techniques, Operations, Administration & Management (OA&M) diagnostic capabilities, and QoS support for services that are sensitive to delay and delay variation. As an industry leader in the development and deployment of MPLS, Juniper Networks leads the way in making it possible for service providers to bring to market network architectures and services based on MPLS. The MX-series provides a wide range of MPLS features and functionality powered by the JUNOS software operating system. The feature richness of JUNOS software provides

the MX-series an advantage over other operating systems that are either too immature to support the required MPLS feature breadth or architected in a monolithic fashion, making them too complicated or unwieldy to efficiently manage. Additionally, the MX-series is designed to lead the industry in the following areas:

Interface Scalability—each MX-series chassis scales in size with choices of 3, 6 or 12 slots that can be populated with line cards for access or network interfaces. With up to 12 line card slots, the MX960 Ethernet Services Router (ESR) supports up to 48 10 GE ports or 480 Gigabit Ethernet ports.

Advanced Packet Processing Performance—each MX slot provides line-rate 40 Gbps packet forwarding.

Service Flexibility—Juniper is an industry leader in both MPLS and VPLS, and the new MX-series Ethernet Services Routers leverage the JUNOS software operating system that is powering over 27,000 Juniper Networks M-series routers currently deployed in over 600 service provider networks worldwide. The field-proven JUNOS software provides the MX-series feature richness, stability and service breadth not typically found in Carrier Ethernet platforms.

Advanced QoS—the MX-series features superior QoS at the interface level, which improves port density, can reduce costs and enables service providers to ensure that services receive the appropriate level of service regardless of traffic conditions. This enables providers to offer a variety of Layer 2 and Layer 3 services over Ethernet, such as VLAN/transparent LAN, L2/L3 VPNs, voice over IP and video over IP, with guaranteed service-level agreements (SLAs).

Simple, Non-Disruptive Deployment—because the new MX-series utilizes the same JUNOS software operating system that the world's largest service providers have relied on for years, service providers can immediately take advantage of the latest Ethernet technology without the cost and risks associated with introducing a new operating system to the network. Service Providers' familiarity, knowledge and integration of JUNOS software in existing back-office systems allows them to drive down capital expenditure costs while rapidly rolling out Ethernet access networks and services.

The MX-series Extends JUNOS Software in the Network

JUNOS software is a world-class operating system with proven stability coupled with industrial-strength routing protocols, flexible policy language and leading MPLS implementation. When building your Ethernet-centric infrastructure, JUNOS software can be a tremendous asset as a flexible and reliable operating system.

JUNOS software runs on Juniper Networks MX-, M-, T-, and J-series routers. JUNOS software—the first routing operating system developed specifically for the Internet—is especially designed for the large production networks typically supported by service providers. JUNOS software has been designed to configure the routing protocols that run on the MX-series and the properties of its interfaces. After a software configuration is activated, JUNOS software has been designed to monitor the protocol traffic passing through the MX-series, as well as troubleshooting protocol and network connectivity problems.

JUNOS software runs on the Routing Engine and consists of processes that:

- Support Internet routing protocols
- Control the MX-series interfaces
- Control the routing of each MX-series chassis itself
- Provide an interface for system management

JUNOS software full suite of industrial-strength routing protocols, flexible policy language and leading MPLS implementation efficiently scales to large numbers of network interfaces and routes.

MX-series VPNs

JUNOS software supports several types of VPNs.

- **Layer 2 VPNs**—linking a set of sites sharing common routing information, and whose connectivity is controlled by a collection of policies. A Layer 2 VPN is not aware of routes within a customer's network. It simply provides private links between a customer's sites over the service provider's existing public Internet backbone.
- **Layer 3 VPN**—linking a set of sites that share common routing information, and whose connectivity is controlled by a collection of policies. A Layer 3 VPN is aware of routes within a customer's network, requiring more configuration on the part of the service provider than a Layer 2 VPN. The sites that make up a Layer 3 VPN are connected over a service provider's existing public Internet backbone.
- **Interprovider VPNs**—supplying connectivity between two VPNs in separate autonomous systems (ASs). This functionality could be used by a VPN customer with connections to several various ISPs, or different connections to the same ISP in various geographic regions.
- **Carrier-of-Carrier VPNs**—allow a VPN service provider to supply VPN service to a customer who is also a service provider. The latter service provider supplies Internet or VPN service to the end customer.

MX-series Features and Benefits

Advantage	Features	Benefits
High Availability	• Fully redundant hardware (Cooling, power supplies, Routing Engines, Switch Control Boards) • Modular Operating System • Separate Data and Control Planes • Graceful Restart • Non-stop Routing • MPLS FRR • VPLS Multi-homing	The MX-series design provides the highest level of redundancy and resiliency to ensure that critical services and customers stay connected. Enables service providers to maximize revenues and ensure customer satisfaction.
High Performance	Powered by Juniper's next-generation I-chip ASIC, the MX-series features include: • Enhanced QoS capabilities • Additional packet processing flexibility • Scaling enhancements including route lookup, next hop, IFL scaling, and interface accounting • Additional microcode capacity that provides headroom for the next three-to-five years of JUNOS software features • Enhanced multicast performance	Industry leading performance enables the MX-series to satisfy critical applications at the edge, including voice, video and data.
Service Flexibility	Simultaneous support for Layer 2 and Layer 3 Ethernet services: VPLS, RFC 2547bis IP/MPLS VPNs, Triple Play services	Providing enterprise and residential services from a common platform increases service breadth and optimizes OPEX and CAPEX.

Specifications

This section lists basic platforms specifications. For further details, refer to the hardware installation manuals on www.juniper.net/techpubs/hardware/.

Specification	MX240	MX480	MX960
Physical Dimensions (W x H x D)	17.5 x 8.7 x 23.8 in (44.5 x 22.1 x 60.5 cm)	17.5 x 14 x 23.8 in (44.5 x 35.6 x 60.5 cm)	17.5 x 27.8 x 23.5 in (44.5 x 70.5 (16 RU) x 59.7 cm)
Weight (lbs/kgs) Fully Configured	130 lb / 59 kg	180 lb / 81.7 kg	334 lb / 151.6 kg
Mounting	Front or Center	Front or Center	Front or Center
Power (DC/AC)	-40 to -60 VDC	-40 to -60 VDC	-40 to -60 VDC
	100 to 240 VAC	100 to 240 VAC	200 to 240 VAC
Maximum Power Draw	2,000 watts	3,500 watts	5,100 watts
Operating Temperature	32° to 104° F (0° to 40° C)	32° to 104° F (0° to 40° C)	32° to 104° F (0° to 40° C)
Humidity	5% to 90% noncondensing humidity		
Altitude	No performance degradation to 13,000 ft / 4,000 m		

Agency Approvals

Safety

- CAN/CSA-22.2 No. 60950-00/UL 1950 Third Edition, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EN 60950 Safety of Information Technology Equipment

EMC

- AS/NZS 3548 Class A (Australia/New Zealand)
- EN 55022 Class A Emissions (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)

NEBS

- GR-63-Core: NEBS, Physical Protection
- GR-1089-Core: EMC and Electrical Safety for Network Telecommunications Equipment

ETSI

- ETS-300386-2 Telecommunication Network Equipment Electromagnetic Compatibility Requirements

Immunity

- EN 61000-3-2 Power Line Harmonics
- 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 Common Immunity
- EN 1000-4-11 Voltage Dips and Sags

Management

Element Management: J-Web Graphical User Interface
Policy Management: SDX-300 Service Deployment System, JUNOScope IP Service Manager
Third Party Management Applications: Dorado, InfoVista, Micromuse, WANDL
SNMP: SNMP v2/v3 bilingual agent support

Ordering Information

Component	Description	Model Number		
		MX-240	MX-480	MX-960
Base Unit	DC Chassis	MX240BASE-DC	MX480BASE-DC	MX960BASE-DC
	AC Chassis	MX240BASE-AC	MX480BASE-AC	MX960BASE-AC
DPC	DPCE-R-40GE-SFP		40X1 GE L2/L3 capable	
	DPCE-R-4XGE-XFP		4X10 GE L2/L3 capable	
	DPCE-X-40GE-SFP		40X1 GE L2+ capable	
	DPCE-X-4XGE-XFP		4X10 GE L2+ capable	
	DPCE-R-Q-40GE-SFP		40x1 GE L2/L3 capable board with enhanced queuing	
	DPCE-R-Q-4XGE-XFP		4x10 GE L2/L3 capable board with enhanced queuing	
	DPCE-X-Q-40GE-SFP		40x1 GE L2+ capable board with enhanced queuing	
	DPCE-X-Q-4XGE-XFP		4x10 GE L2+ capable board with enhanced queuing	
	DPCE-R-Q-20GE-SFP		20x1 GE L2/L3 capable with enhanced queuing	
	DPCE-R-2XGE-XFP		2x10 GE L2/L3 capable	
	DPCE-R-40GE-TX		40x10/100/1000 Ethernet L2/L3 capable with RJ45	
	DPCE-X-40GE-TX		40x10/100/1000 Ethernet L2+ capable with RJ45	
Routing Engine	RE-S-1300-2048-BB		1.3 GHz CPU and 2 GB memory, Base Bundle	
	RE-S-2000-4096-UPG-BB		2 GHz CPU and 4 GB memory, Base Bundle	
	RE-S-1300-2048-R		1.3 GHz CPU and 2 GB memory, Redundant	
	RE-S-2000-4096-R		2 GHz CPU and 4 GB memory, Redundant	
DPC Support	DPCE-Q	Yes	Yes	Yes
	DPCE-X	Yes	Yes	Yes
	DPCE-R	Yes	Yes	Yes
Routing Engine	1300	Yes	Yes	Yes
	2000	Yes	Yes	Yes
SCB	Primary	Yes	Yes	Yes
	Redundant	Yes	Yes	Yes
JUNOS Software	USA	JUNOS	JUNOS	JUNOS
	Worldwide	JUNOS-WW	JUNOS-WW	JUNOS-WW

Juniper Your Net™

About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at www.juniper.net.

Juniper® NETWORKS

CORPORATE AND SALES HEADQUARTERS
Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or 408.745.2000
Fax: 408.745.2100
www.juniper.net

APAC HEADQUARTERS
Juniper Networks (Hong Kong)
26/F, Cityplaza One
1111 King's Road
Taikoo Shing, Hong Kong
Phone: 852.2332.3636
Fax: 852.2574.7803

EMEA HEADQUARTERS
Juniper Networks Ireland
Airside Business Park
Swords, County Dublin, Ireland
Phone: 35.31.8903.600
Fax: 35.31.8903.601

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To purchase Juniper Networks solutions, please contact your Juniper Networks sales representative at 1-866-298-6428 or authorized reseller.