MX960, MX480, MX240, MX104 and MX80 3D Universal Edge Routers

Product Overview

In the midst of worldwide digital transformation, consumers rely on networks more than ever. Global e-commerce sales are growing 20 percent annually; more than 300 hours of video are uploaded to YouTube every minute,[1] and analysts expect 26 billion Internet of Things devices to be generating data by 2020. These trends are straining traditional service provider and enterprise networks—and budgets—to the breaking point.

Powered by the Junos operating system and the programmable Trio chipset, MX Series 3D Universal Edge Routers provide powerful routing, switching, security, and services features that help network operators transform their networks—and their businesses—in a hyper-connected world.

[1] Source: YouTube, https://www.youtube.com/yt/press/statistics.html

Product Description

The continuous expansion of mobile, video, BYOD, and cloud-based services is disrupting traditional networks and negatively impacting the businesses that rely on them. While annual double-digit bandwidth growth requires massive resource investments to prevent congestion and accommodate unpredictable traffic spikes, capturing return on that investment is elusive. Emerging Internet of Things communications promise even greater network challenges in the near future.

At the same time, traditional operations environments are increasingly out of touch with consumer and business requirements for rapid service delivery and cloud-like network experiences. At the same time, issues related to monitoring and managing transitions are placing additional stress on already strained budgets and personnel. And nascent technologies like Network Functions Virtualization (NFV) and SDN introduce an entirely new set of operational questions.

Our hyper-connected world demands more agile, automated, and scalable networks. Now more than ever, network operators need to transform their networks—and their operations environments—to accommodate this reality.

Utilizing state-of-the-art software and hardware innovations, Juniper Networks® MX Series 3D Universal Edge Routers are helping network operators successfully transform their networks and services. Powered by the Juniper Networks Junos® operating system and the programmable Trio chipset, MX Series routers offer a rich set of IP/MPLS services, consistent low latency, and wire-rate forwarding at scale, while providing the reliability needed to meet strict service-level agreements (SLAs).

An Agile Family of Edge Routers

Agility was the overarching design principle for the MX Series portfolio, and our MX Series 3D Universal Edge Routers were built from the ground up to support a “universal set” of edge applications. This approach helps Juniper customers rapidly respond to evolving business and technical requirements without sacrificing their current investments; it also simplifies operations and extends return on investment. This agility starts with the programmable Trio chipset, which is unparalleled in the industry, giving the MX Series routers the ability to add support for new features and protocols without upgrading hardware. Additionally, features like the Juniper Extension Toolkit provide modern programming languages for customization.

The MX Series 3D Universal Edge Router portfolio consists of a broad range of physical and virtual platforms that share a common architecture and feature set, enabling service providers and enterprises to select the right size platform to match their unique business goals and scale, density, resiliency, space and power considerations, and value-added service requirements.

- The MX 2020 and MX2010 are ideal for large service provider and cloud networks, cable applications, and converged edge and core architectures.
- The MX960 is ideal for large service provider and cloud networks, cable applications, and mobile service cores.
- The MX480 is ideal for midsize service provider, cloud/data center, and cable applications, and enterprise cores.
- The MX240 is ideal for smaller service provider and cable sites, data center interconnect, and enterprise WANs.
- The MX104 is a temperature-hardened, space-efficient router that is ideal for mobile aggregation and enterprise WAN applications.
- The MX5, MX10, MX40, and MX80 are space- and power-efficient routers optimized for enterprise WAN, data center interconnect, branch aggregation, and campus applications.

This agility is evident in the wide variety of MX Series use cases that have been proven in the world's most demanding networks, including:

- **Business Edge:** MX Series routers support the broadest range of L2/L2.5/L3 VPN services available today, in combination with multilayer, multiprotocol reliability to ensure that customer SLAs are met under all network conditions.
- **Internet/Peering Gateway:** MX Series routers support the high performance, reliability, scale, and density needed to efficiently peer with Internet and other service provider networks.
- **Broadband Network Gateway (BNG):** MX Series routers offer the highest subscriber density and most sophisticated broadband edge features, including hierarchical quality of service (HQoS) features, available in the industry.
- **Universal SDN Gateway:** MX Series routers deliver a comprehensive solution for interconnecting virtual and physical networks—as well as between virtual networks operating with different technologies—with support for Multiprotocol BGP (MBGP), dynamic tunnels using MPLSoGRE or Virtual Extensible LAN (VXLAN) encapsulation, virtual routing and forwarding (VRF) tables or E-VPNs, and NETCONF, along with the mechanisms required to send traffic between VRF and global routing tables based on configuration and policy.
- **Data Center and Cloud Edge:** MX Series routers are the most flexible data center/cloud edge routers in the industry, with support for multiple overlay encapsulations, including VXLAN, Network Virtualization using Generic Routing Encapsulation (NVGRE), MPLSoUDP, MPLSoGRE, 802.1BR, SR-MPLS, and SR-V6.
- **Enterprise WAN:** Large enterprises and government agencies worldwide use MX Series routers to build their own overlay network over a service provider's Layer 2 or MPLS network, using encapsulation technologies such as MPLSoGRE, VXLAN, and IPsec for secure transport.
- **Universal Metro/Aggregation:** MX Series routers offer a full suite of routing and switching features, allowing network operators to choose a deployment model that best fits their business and technical needs. These routers can be deployed as IP/IP VPN edge routers, Ethernet VPN (EVPN) and virtual private LAN service (VPLS) provider edge (VPLS-PE) routers, MPLS label-switching (LSR) routers, and as Layer 2 Ethernet switches or Layer 3 IP routers.
- **Mobile Backhaul:** In addition to switching, routing, and security features, MX Series routers support highly scalable and reliable hardware-based timing that meets the strictest LTE requirements, including Synchronous Ethernet for frequency and the Precision Time Protocol (PTP) for frequency and phase synchronization. In addition, the MX104 is ETSI 300-compliant for deployment in mobile applications.

At-a-Glance MX Series 3D Universal Edge Routers Comparison

	MX960	MX480	MX240	MX104	MX80	MX40	MX10	MX5
Rack units	16	8	5	3.5	2	2	2	2
Systems per rack	3	6	9	12	24	24	24	24
Slots	11 MPCs	6 MPCs	2 MPCs	4 fixed 10GbE slots + 4 MIC slots	4 fixed 10GbE + 3[2] MIC slots	3[3] MIC slots	2 fixed 10GbE +3[4] MIC slots	3[5] MIC slots
Per slot capacity	480 Gbps	480 Gbps	480 Gbps	20 Gbps	20 Gbps	20 Gbps	20 Gbps	20 Gbps
System throughput	10.56[6] Tbps	5.76 Tbps	1.92 Tbps[7]	80 Gbps	80 Gbps	60 Gbps	40 Gbps	20 Gbps
PDH	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Sonet/SDH	Yes	Yes	Yes	Yes	Yes	Yes	Yes	NA
Maximum 1GbE	440	240	80	80	80	60	40	20
Maximum 10GbE	440	240	80	8	8	4	1	NA
Maximum 40GbE	132	72	24	NA	NA	NA	NA	NA
Maximum 100GbE	44	24	8	NA	NA	NA	NA	NA
10GbE DWDM	88	48	16	NA	NA	NA	NA	NA
100GbE DWDM	22	12	4	NA	NA	NA	NA	NA

[2] The MX80 has two front MIC slots and one rear MIC slot. The rear MIC slot only supports the MS-MIC.
[3] The MX40 has two front MIC slots and one rear MIC slot. The rear MIC slot only supports the MS-MIC.
[4] The MX10 has two front MIC slots and one rear MIC slot. The rear MIC slot only supports the MS-MIC.
[5] The MX5 has one front MIC slot and one rear MIC slot. The rear MIC slot only supports the MS-MIC.
[6] Note, capacity shown is based on most commonly deployed redundant configuration.
[7] Note, capacity shown is based on most commonly deployed redundant configuration.

Architecture and Key Components

The MX960, MX480, and MX240 are modular chassis-based 3D routers that share the following components:

- Modular Port Concentrators (MPCs) provide routing, MPLS, switching, inline services, subscriber management, and HQoS among many other features. MPCs may also host interfaces directly or via Modular Interface Cards (MICs) that allow users to "mix and match" interface types. Powered by the programmable Trio chipset, MPCs collect and stream telemetry that identifies resource utilization, loss and delay, and other metrics.
- Switch Control Boards (SCBs) feature an integrated switch fabric that connects to all slots in the chassis in a nonblocking architecture. The SCBs house the Routing Engine, control power to MPCs, monitor and control system functions such as fan speed and the system front panel, and manage clocking, resets, and boots.
- The Routing Engine (RE) provides the control plane, runs Junos OS, and handles all routing protocol processes as well as the software processes that control MPCs, chassis components, system management, and user access to the router. REs communicate with MPCs via dedicated out-of-band management channels.

The MX104 is a mobile, optimized, ETSI 300mm-compliant chassis with high redundancy and 80 Gbps of throughput. The MX104 offers up to four MIC slots and redundant fixed 10GbE interfaces for flexible network connectivity.

The MX5, MX10, MX40, and MX80 are software upgradeable through 80 Gbps, enabling cost-effective "pay as you grow" scale to meet evolving market requirements. These routers have up to four MIC slots and two fixed 10GbE interfaces for connecting to the network.

Junos OS

Junos OS is a reliable, high-performance, modular network operating system that is supported across all of Juniper's physical and virtual routing, switching, and security platforms. Junos OS improves network operations and increases service availability, performance, and security with features like low-latency multicast, comprehensive QoS, unified in-service software upgrade (unified ISSU), and Junos Continuity, which eliminates the risk and complexity of OS upgrades. With secure programming interfaces, the Juniper Extension Toolkit (JET), versatile scripting support, and integration with popular orchestration frameworks, Junos OS offers flexible options for DevOps style management that can unlock more value from the network.

Network Edge Services

MX Series routers can host optionally licensed Junos OS-based network edge services at scale, both inline on MPCs as well as on dedicated service cards. Hosting network edge services on MX Series routers reduces network cost and complexity by eliminating numerous elements, operating systems, and interconnections.

- MPCs support inline services using the programmable Trio chipset; supported services include flow monitoring, 1:1 Network Address Translation (NAT), port mirroring, generic routing encapsulation (GRE), IP tunneling, logical tunnels, lawful intercept, and video monitoring.
- The MS-MPC and the MS-MIC provide dedicated processing for compute-intensive services such as carrier-grade NAT (CGNAT), IPsec, stateful firewall, deep packet inspection, flow monitoring, and load-balancing.

MX Series Platform/Feature Matrix

		MX960	MX480	MX240	MX104	MX80	MX40	MX10	MX5
Security	Firewall filters/ACLs	✓	✓	✓	✓	✓	✓	✓	✓
	DDoS—control plane	✓	✓	✓	✓	✓	✓	✓	✓
	DDoS—FlowSpec	✓	✓	✓	✓	✓	✓	✓	✓
	Stateless filters L2-L4	✓	✓	✓	✓	✓	✓	✓	✓
	Stateful services[8]	✓	✓	✓	✓	✓	✓	✓	✓
Inline Services	GRE reassembly	✓	✓	✓	✓	✓	✓	✓	✓
	1:1 NAT[9]	✓	✓	✓	✓	✓	✓	✓	✓
	Flow monitoring[10]	✓	✓	✓	✓	✓	✓	✓	✓
	Video monitoring[11]	✓	✓	✓	✓	✓	✓	✓	✓
	Lawful intercept	✓	✓	✓	✓	✓	✓	✓	✓
	Mirroring	✓	✓	✓	✓	✓	✓	✓	✓

[8]Includes IPsec, SFW, CGN, DPI; requires an MS-MPC or MS-MIC
[9]Provided by Junos Address Aware; requires an MS-MPC or MS-MIC
[10]Provided by Junos Traffic Vision; requires an MS-MPC or MS-MIC
[11]Provided by Junos Video Focus; supported on programmable Trio chipset

MX Series Platform/Feature Matrix (continued)

		MX960	MX480	MX240	MX104	MX80	MX40	MX10	MX5
Service Card Supported Services	Deep packet inspection[12]	✓	✓	✓	No	No	No	No	No
	CGNAT	✓	✓	✓	✓	✓	✓	✓	✓
	J-Flow[13]	✓	✓	✓	✓	✓	✓	✓	✓
	Traffic load balancing[14]	✓	✓	✓	No	No	No	No	No
	IPsec[15]	✓	✓	✓	✓	✓	✓	✓	✓
	Stateful firewall[16]	✓	✓	✓	✓	✓	✓	✓	✓
	HTTP header manipulation[17]	✓	✓	✓	No	No	No	No	No
Resiliency	Redundant RE	✓	✓	✓	✓	No	No	No	No
	Unified ISSU	✓	✓	✓	✓	No	No	No	No
	Nonstop active routing (NSR)	✓	✓	✓	✓	No	No	No	No
	Fast restoration	✓	✓	✓	✓	✓	✓	✓	✓
	Operation, Administration, and Maintenance (OAM)	✓	✓	✓	✓	✓	✓	✓	✓
System Virtualization	Enhanced SLA and queuing	✓	✓	✓	✓	✓	✓	✓	✓
	Junos Fusion Edge (AD)	✓	✓	✓	✓	✓	✓	✓	✓
	Logical systems	✓	✓	✓	✓	✓	No	No	No
	Virtual router/switch	✓	✓	✓	✓	✓	No	No	No
Automation	Path Computation Element Protocol (PCEP)	✓	✓	✓	✓	✓	✓	✓	✓
	OpenConfig	✓	✓	✓	✓	✓	✓	✓	✓
	YANG data modeling	✓	✓	✓	✓	✓	✓	✓	✓
	Juniper Extension Toolkit	✓	✓	✓	✓	✓	✓	✓	✓

[12]Provided by Junos Application Aware; requires an MS-MPC

[13]Provided by J-Flow; can be hosted on the Routing Engine (RE), MPC (inline), or MS-MPC/MS-MIC

[14]Provided by Junos Traffic Load Balancer; requires an MS-MPC/MS-MIC

[15]Provided by Junos Site Secure; requires an MS-MPC/MS-MIC

[16]Provided by Junos Network Secure; requires an MS-MPC/MS-MIC

[17]Provided by Junos Web Aware; requires an MS-MPC/MS-MIC

Key Features and Benefits

Unmatched Network Availability

MX Series routers ensure network and service availability with a broad set of multilayered physical, logical, and protocol-level resiliency features, including Juniper's Virtual Chassis technology, which supports chassis-level redundancy while enabling users to manage two routers as a single element. Additionally, a multichassis link aggregation group (MC-LAG) implementation supports stateful chassis, card, and port redundancy, as well as subscriber and session persistence.

Application Aware Networking

MX Series routers use deep packet inspection to detect applications, and they consult with user-defined policies to determine traffic treatment on a per-application basis, enabling highly customized and differentiated services at scale. Working in conjunction with Juniper Networks Contrail Cloud Platform, MX Series routers can also steer into complex service chains and stream granular data to analytics engines and back-office systems to permit real-time charging and end-user engagement at the application and content level.

Junos Continuity and Unified In-Service Software Upgrade (Unified ISSU)

Junos Continuity and Unified ISSU features remove the downtime risks associated with implementing new hardware or upgrading operating systems.

- Junos Continuity eliminates OS upgrades and system reboots when adding new hardware to MX Series routers; a plug-in package provides the drivers and support files needed to bring the hardware online.
- Unified ISSU reduces the risks associated with OS upgrades by enabling upgrades between two different Junos OS releases (major or minor) with no control plane disruption and minimal traffic disruption on the forwarding plane.

Junos Telemetry Interface

The Junos Telemetry Interface feature streams component-level data to monitoring, analytics, performance management, and visualization tools as well as to Path Computation Elements such as Juniper Networks NorthStar Controller. Analytics derived from this streaming telemetry can identify current and trending congestion, resource utilization, traffic volume, and buffer occupancy, which can be used to identify issues and make informed decisions on network design and investments.

Integrated Timing[18]

MX Series routers support highly scalable and reliable hardware-based timing that meets the strictest LTE requirements, including Synchronous Ethernet for frequency, and the Precision Time Protocol (PTP) for frequency and phase synchronization. Synchronous Ethernet and PTP can be combined in a "hybrid" mode to achieve the highest level of frequency (10 ppb) and phase (<1uS) accuracy required for LTE-Advanced, eliminating the need for external clocks.

Junos Fusion Provider Edge

Junos Fusion Provider Edge enables MX Series routers to act as aggregation devices for the Juniper Networks EX4300 Ethernet Switch and QFX5100 line of data center switching platforms acting as satellite devices while appearing to management as a single, port-dense device managed by a single IP address. Junos Fusion Provider Edge significantly expands the number of network interfaces on the MX Series router while keeping operations simple.

Junos Automation Toolkit and Juniper Extension Toolkit

Included in Junos OS software, the Junos Automation Toolkit is a suite of tools supported on all Juniper Networks switches, routers, and security devices. These tools, which leverage the native XML capabilities of Junos OS, include commit scripts, op scripts, event policies and event scripts, and macros that help automate operational and configuration tasks. Additionally, the Juniper Extension Toolkit (JET) provides a modern programable tool kit while maintaining a platform independent architecture, and includes support for:

- OpenConfig/YANG
- gRPC, Thrift, NETCONF
- JSON/XML
- API support for all modern programming languages
- Rich on-box scripting support using Python
- REST APIs

Together, Junos OS automation and programmability features simplify complex configurations and reduce the potential for configuration errors. They also save time by automating operational and configuration tasks, speed troubleshooting, and maximize network uptime by warning operators of potential problems and automatically responding to system events.

MX960

MX240

MX480

MX80/40/10/5

MX104

[18]The MX104 supports integrated timing; timing support is MPC dependent for the MX960, MX480, and MX240.

Specifications

		MX960	MX480	MX240	MX104	MX80-MX5
Layout	System capacity	10.56 Tbps	5.76 Tbps	1.92 Tbps	80 Gbps	80 Gbps[19]
	Slot orientation	Vertical	Horizontal	Horizontal	Horizontal	Horizontal
	Mounting	Front or center	Front or center	Front or center	Front or center	Front or center
Physical Specification	Dimensions (W x H x D)	17.37 x 27.75 x 23 in (44.11 x 70.49 x 58.42 cm)	17.45 x 14 x 24.5 in (44.3 x 35.6 x 62.2 cm)	17.45 x 8.71 x 24.5 (44.3 x 22.1 x 62.2 cm)	17.22 x 9.46 x 6.09 in (43.7 x 24 x 15.47 cm)	17.5 x 3.5 x 23.46 in (44.5 x 8.9 x 59.6 cm)
	Weight fully loaded	334 lb/151.6 kg	180 lbs/81.6 kg	130 lb/59 kg	32 lb/14.5 kg	30 lb/13.7 kg
	Weight unloaded	150 lbs/68.1 kg	65.5 lbs/29.7 kg	52 lbs/23.6 kg	N/A	N/A
Routing Engine	Default memory	2x16 MB NOR flash storage; 64 GB of DDR4 RAM; 2x50 GB SSD	2x16 MB NOR flash storage; 64 GB of DDR4 RAM; 2x50 GB SSD	2x16 MB NOR flash storage; 64 GB of DDR4 RAM; 2x50 GB SSD	4 MB boot flash; 8 GB of NAND Flash; 4 GB of DDR3 RAM	8 MB boot flash; 4 GB on NAND flash storage; 2 GB of DDR2 RAM
	Number of cores	6 cores	6 cores	6 cores	1 core	1 core
Redundancy	Components				Power supplies, REs, fans	Power supplies and fans
Power	Power input [AC]	100 to 240 V AC	100 to 240 V AC	100 to 240 V AC	100 to 240 V AC	100 to 240 V AC
	Power input [DC]	-40 to -72 V DC	-40 to -72 V DC	-40 to -72 V DC	-40 to -72 V DC	-40 to -72 V DC
	Typical power draw (AC)	6520 W	3470 W	1860 W	325 W	365 W
	Typical power draw (DC)	6670 W	3150 W	1690 W	350 W	310 W
Environmental	Air flow	Front to back	Side to side	Side to side	Side to side [forced air]	Side to side [forced air]
	Operating temperature	32°-104°F (0°-40°C)	32°-104°F (0°-40°C)	32°-104°F (0°-40°C)	-40° to 104°F (-40° to 65°C)	32°-104°F (0°-40°C)
	Operating humidity	5% to 90%	5% to 90%	5% to 90%	5% to 90%	5% to 90%
	Operating altitude	10,000 ft (3048 m)	10,000 ft (3048 m)	10,000 ft (3048 m)	6,000 ft (1,900 m)	13,000 ft (4,000 m)
Certifications	NEBS	- GR-1089-Core (2006) EMC and Electrical Safety - Common Bonding Network (CBN) - National Electrical Code (NEC)	- GR-1089-Core (2006) EMC and Electrical Safety - Common Bonding Network (CBN) - National Electrical Code (NEC)	- GR-1089-Core (2006) EMC and Electrical Safety - Common Bonding Network (CBN) - National Electrical Code (NEC)	- SR-3580 (2007) NEBS Criteria Levels (Level 3 Compliance) - GR-63-Core (2006) NEBS Physical Protection - GR-1089-Core (2006) EMC and Electrical Safety - E26GR-3108-CORE Issue 2, December 2008 - IEEE 1613: 2009 - IEC 61850-3: 2013	• GR-63-Core:NEBS, Physical Protection • GR-1089-Core:EMC and Electrical Safety for Network Telecommunications Equipment

Ordering Information

MX5, MX10, MX40, and MX80 Base Product Bundles

Product	Product Number	Description
MX5-MX80	MX5BASE-T	MX5 chassis with timing support—includes dual power supplies, MIC-3D-20GE-SFP, S-MX80-ADV-R, S-MX80-Q, and S-ACCT-JFLOW-IN-5G licenses. Power supply cable needs to be ordered separately.
	MX10BASE-T	MX10 chassis with timing support—includes dual power supplies, MIC-3D-20GE-SFP, 1 empty MIC slot, S-MX80-ADV-R, S-MX80-Q, and S-ACCT-JFLOW-IN-5G licenses. Power supply cable needs to be ordered separately.
	MX40BASE-T	MX40 chassis with timing support—includes dual power supplies, 2 empty MIC slots, 2x10GbE fixed ports, S-MX80-ADV-R, S-MX80-Q, and S-AC CT-JFLOW-IN-5G licenses. Power supply cable needs to be ordered separately.
	MX80BASE-P	MX80 chassis with PTP and Synchronous Ethernet support—includes one power supply, 2 empty MIC slots, 4x10GbE 10-gigabit small form-factor pluggable transceiver (XFP) built-in ports, fan tray with filter. Power supply cable needs to be ordered separately.
	MX80BASE-T	MX80 chassis with timing support—includes one power supply, 2 empty MIC slots, 4x10GbE XFP built-in ports, fan tray with filter. Power supply cable needs to be ordered separately.
MX104	MX104-AC	MX104 chassis with 4 MIC slots, 4X10GbE SFPP built-in ports (license required for activation), AC power supply, fan tray with filter, Packet Forwarding Engine and Routing Engine, Altius-MX104
	MX104-DC	MX104 chassis with 4 MIC slots, 4X10GbE SFPP built-in ports (license required for activation), DC power supply, fan tray with filter, Packet Forwarding Engine and Routing Engine, Altius-MX104

MX5, MX10, MX40, and MX80 Ala Carte Chassis

Product	Product Number	Description
MX5	MX5-T-AC	AC chassis
	MX5-T-DC	DC chassis
MX10	MX10-T-AC	AC chassis
	MX10-T-DC	DC chassis
MX40	MX40-T-AC	AC chassis
	MX40-T-DC	DC chassis
MX80	MX80-T-AC	AC chassis
	MX80-T-DC	DC chassis
	MX80-AC	AC chassis
	MX80-DC	DC chassis
	MX80-48T-AC	AC chassis
	MX80-48T-DC	DC chassis

MX5, MX10, and MX40 Upgrade Licenses

Product	Product Number	Description
MX5	MX-5-10-UPG-B	Software upgrade for MX5 to MX10
	MX-5-40-UPG-B	Software upgrade for MX5 to MX40
	MX-5-80-UPG-B	Software upgrade for MX5 to MX80
MX10	MX-10-40-UPG-B	Software upgrade for MX10 to MX40
	MX-10-80-UPG-B	Software upgrade for MX10 to MX80
MX40	MX-40-80-UPG-B	Software upgrade for MX40 to MX80

MX80 Software Licenses

Product	Product Number	Description
MX80	S-MX80-ADV-R	License to support full scale L3 route and L3 VPN on MX80
	S-MX80-Q	License to support per VLAN queuing on MX80
	S-MX80-SA-FP	Subscriber Management Feature Pack License
	S-MX80-SSM-FP	Subscriber Service Management Feature Packet License (RADIUS/SRC Series-based service activation and deactivation) per service accounting features for subscribers, MX80

MX104 Ala Carte Chassis

Product	Product Number	Description
MX104	MX104-AC-Base	MX104 base chassis with 1 AC power supply, fan tray, filter, 1 RE, 4 MIC slots (optics for fixed ports not included, MICs not included)
	MX104-DC-Base	MX104 base chassis with 1 DC power supply, fan tray, filter, 1 RE, 4 MIC slots (optics for fixed ports not included, MICs not included)

MX104 Upgrade Licenses

Product	Product Number	Description
MX104	S-MX104-UPG-2x10GE	Upgrade license to activate 2 x 10GbE fixed ports
	S-MX104-UPG-4x10GE	Upgrade license to activate 4 x 10GbE fixed ports

MX104 Software Licenses

Product	Product Number	Description
MX104	S-MX104-SSM-FP	L3 Subscriber Service Management Feature Packet License, MX104
	S-MX104-Q	License to support per VLAN queuing on MX104
	S-MX104-ADV-R	License to support full scale L3 route and L3 VPN on MX104

MX240, MX480, and MX960 Base Bundles

Product	Product Number	Description
MX240	MX240BASE-AC-HIGH	MX240 AC base unit includes 4 slot chassis, 1 AC power supply, 1 SCB
	MX240BASE-AC-LOW	MX240 AC base unit includes 4 slot chassis, 2 AC power entry modules (PEMs), 1 SCB
	MX240BASE3-DC	MX240 base bundle, DC power
	MX240BASE-DC	MX240 DC base unit includes 4 slot chassis, 1 fan tray, 1 DC power supply, 1 SCB
	MX240BASE3-ACH	MX240 base bundle, highline AC power
	MX240BASE3-ACL	MX240 base bundle, lowline AC power
MX480	MX480BASE3-AC	MX480 base bundle, AC power
	MX480BASE-AC	MX480 AC base unit includes 6 slot chassis, 1 fan tray, 3 AC power supplies, 1 SCB, 1 RE
	MX480BASE3-DC	MX480 base bundle, DC power
	MX480BASE-DC	MX480 DC base unit includes 6 slot chassis, 1 fan tray, 2 DC power supplies, 1 SCB, 1 RE
MX960	MX960BASE3-AC	MX960 base bundle, AC power
	MX960BASE-AC	MX960 AC base unit includes 14 slot chassis, 2 fan trays, 3 AC power supplies, 2 SCBs, 1 RE
	MX960BASE3-AC-ECM	MX960 base bundle, AC power, and extended cable manager
	MX960BASE-AC-ECM	MX960 base AC system with extended cable manager installed
	MX960BASE3-DC	MX960 base bundle, DC power
	MX960BASE-DC	MX960 DC base unit—includes 14 slot chassis, 2 fan trays, 2 DC power supplies, 2 SCBs, 1 RE
	MX960BASE3-DC-ECM	MX960 base bundle, DC power, and extended cable manager
	MX960BASE-DC-ECM	MX960 base DC system with extended cable manager installed

MX240, MX480 and MX960 Premium Bundles

Product	Product Number	Description
MX240	MX240BASE-AC-HIGH	MX240 AC base unit includes 4 slot chassis, 1 AC power supply, 1 SCB
	MX240BASE-AC-LOW	MX240 AC base unit includes 4 slot chassis, 2 AC power entry modules (PEMs), 1 SCB
	MX240BASE3-DC	MX240 base bundle, DC power
	MX240BASE-DC	MX240 DC base unit includes 4 slot chassis, 1 fan tray, 1 DC power supply, 1 SCB
	MX240BASE3-ACH	MX240 base bundle, highline AC power
	MX240BASE3-ACL	MX240 base bundle, lowline AC power
MX480	MX480BASE3-AC	MX480 base bundle, AC power
	MX480BASE-AC	MX480 AC base unit includes 6 slot chassis, 1 fan tray, 3 AC power supplies, 1 SCB, 1 RE
	MX480BASE3-DC	MX480 base bundle, DC power
	MX480BASE-DC	MX480 DC base unit includes 6 slot chassis, 1 fan tray, 2 DC power supplies, 1 SCB, 1 RE
MX960	MX960BASE3-AC	MX960 base bundle, AC power
	MX960BASE-AC	MX960 AC base unit includes 14 slot chassis, 2 fan trays, 3 AC power supplies, 2 SCBs, 1 RE
	MX960BASE3-AC-ECM	MX960 base bundle, AC power, and extended cable manager
	MX960BASE-AC-ECM	MX960 base AC system with extended cable manager installed
	MX960BASE3-DC	MX960 base bundle, DC power
	MX960BASE-DC	MX960 DC base unit—includes 14 slot chassis, 2 fan trays, 2 DC power supplies, 2 SCBs, 1 RE
	MX960BASE3-DC-ECM	MX960 base bundle, DC power, and extended cable manager
	MX960BASE-DC-ECM	MX960 base DC system with extended cable manager installed

MX240, MX480 MX960 Chassis

Base Unit	MX240	MX480	MX960
DC Chassis	MX240BASE-DC, MX240BASE3-DC	MX480BASE-DC, MX480BASE3-DC	MX960BASE3-DC; MX960BASE-DC
AC Chassis	MX240BASE-AC, MX240BASE3-ACH, MX240BASE3-ACL	MX480BASE-AC, MX480BASE3-AC	MX960BASE3-AC; MX960BASE-AC

MPCs

Product Number	Description
MPC7E-10G	Fixed 40x10GbE line card bundle with full scale L2/L2.5 and reduced scale L3 features; optional license permits up to 32,000 queues with HQoS
MPC7E-10G-RB	Fixed 40x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3, and L3VPN features
MPC7E-10G-I-RB	Fixed 40x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3 features, and up to 16 L3VPN instances
MPC7E-MRATE	Fixed 12xQSFP line card bundle for the MPC7-MRATE only; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28), with full scale L2/L2.5 and reduced scale L3 features; optional license permits up to 32,000 queues with HQoS
MPC7E-MRATE-RB	Fixed 12xQSFP line card bundle for the MPC7-MRATE only; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28); includes full scale L2/L2.5, L3, and L3VPN features
MPC7E-MRATE-I-RB	Fixed 12xQSFP line card bundle for the MPC7-MRATE only; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28); includes full scale L2/L2.5 and L3 features and up to 16 L3VPN instances
MPC7E-MRATE-Q	Fixed 12xQSFP line card for the MPC7-MRATE only; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28) with HQoS; supports 1 million queues and 128,000 sessions; with full scale L2/L2.5 and reduced scale L3 features

Product Number	Description
MPC7E-MRATE-Q-RB	Fixed 12xQSFP line card bundle; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28) with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3, and L3VPN features
MPC7E-MRATE-Q-I-RB	Fixed 12xQSFP line card bundle for the MPC7-MRATE only; all ports support 4x10GbE and 40GbE, and 4 ports support 100GbE (QSFP 28) with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3 features, and up to 16 L3VPN instances
MPC5E-100G10G	Fixed 2x100GbE and 4x10GbE line card bundle with full scale L2/L2.5 and reduced scale L3 features; optional license permits up to 32,000 queues with HQoS
MPC5E-100G10G-IRB	Fixed 2x100GbE and 4x10GbE line card bundle with full scale L2/L2.5, L3 features and up to 16 L3VPN instances; optional license permits up to 32,000 queues with HQoS
MPC5E-100G10G-RB	Fixed 2x100GbE and 4x10GbE line card bundle with full scale L2/L2.5, L3, and L3VPN features; optional license permits up to 32,000 queues with HQoS
MPC5E-40G10G	Fixed 6x40GbE or 24x10GbE line card bundle with full scale L2/L2.5 and reduced scale L3 features; optional license permits up to 32,000 queues with HQoS
MPC5E-40G10G-IRB	Fixed 6x40GbE or 24x10GbE line card bundle with full scale L2/L2.5, L3 features and up to 16 L3VPN instances; optional license permits up to 32,000 queues with HQoS
MPC5E-40G10G-RB	Fixed 6x40GbE or 24x 10GbE line card bundle with full scale L2/L2.5, L3 and L3VPN features, optional license permits up to 32,000 queues with HQoS
MPC5EQ-100G10G	Fixed 2x100GbE and 4x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5 and reduced scale L3 features
MPC5EQ-100G10G-IRB	Fixed 2x100GbE and 4x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3 features, and up to 16 L3VPN instances
MPC5EQ-100G10G-RB	Fixed 2x100GbE and 4x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3, and L3VPN features
MPC5EQ-40G10G	Fixed 6x40GbE or 24x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5 and reduced scale L3 features
MPC5EQ-40G10G-IRB	Fixed 6x40GbE or 24x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3 features, and up to 16 L3VPN instances
MPC5EQ-40G10G-RB	Fixed 6x40GbE or 24x10GbE line card bundle with HQoS; supports 1 million queues and 128,000 sessions; includes full scale L2/L2.5, L3, and L3VPN features
MPC4E-3D-2GE	Fixed 2x100GbE and 8x10GbE line card bundle with full scale L2/L2.5 and reduced scale L3 features
MPC4E-3D-32XGE-SFPP	Fixed 32x10GbE line card bundle with full scale L2/L2.5 and reduced scale L3 features
MPC4E-3D-2CGE-8XGE-IRB	Fixed 2x100GbE and 8x10GbE line card bundle with full scale L2/L2.5, L3 features; up to 16 L3VPNs per MPC

Product Number	Description
MPC4E-3D-32XGE-IRB	Fixed 32x10GbE SFPP line card bundle with full scale L2/L2.5, L3 features; up to 16 L3VPNs per MPC
MPC4E-3D-2CGE8XGE-RB	Fixed 2x100GbE and 8x10GbE line card bundle with full scale L2/L2.5, L3, and L3VPN features
MPC4E-3D-32XGE-RB	Fixed 32XGbE SFPP line card bundle with full scale L2/L2.5, L3, and L3VPN features
MX-MPC3E-3D	MPC3 with support for 100GbE, 40GbE, and 10GbE interfaces, L2.5 features, optics sold separately
MX-MPC3E-3D-R-B	MPC3E with support for 100GbE, 40GbE, and 10GbE interfaces; includes full scale L2, L3, L3VPN features; optics sold separately
MPC3E-3D-NG	Next-generation MPC3E with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 and reduced scale L3 features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E, MPC2E, and MPC3E
MPC3E-3D-NG-IR-B	Next-generation MPC3E line card bundle with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 and L3 features and up to 16 L3VPNs per MPC; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by the MPC1E, MPC2E, and MPC3E
MX-MPC3E-3D-R-B	MPC3E with support for 100GbE, 40GbE, and 10GbE interfaces; includes full scale L2, L3, L3VPN features, optics sold separately
MPC3E-3D-NG	Next-generation MPC3E with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 and reduced scale L3 features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E, MPC2E, and MPC3E
MPC3E-3D-NG-IR-B	Next-generation MPC3E line card bundle with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 and L3 features and up to 16 L3VPNs per MPC; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by the MPC1E, MPC2E, and MPC3E
MPC3E-3D-NG-R-B	Next-generation MPC3E line card bundle with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3, and L3VPN features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by the MPC1E, MPC2E, and MPC3E
MPC3E-3D-NG-Q	Next-generation MPC3E with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 features, reduced scale L3 features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by the MPC1E, MPC2E, and MPC3E
MPC3E-3D-NG-Q-IR-B	Next-generation MPC3E line card bundle with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3, and up to 16 L3VPN features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by the MPC1E, MPC2E, and MPC3E

Product Number	Description
MPC3E-3D-NG-Q-R-B	Next-generation MPC3E line card bundle with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 features, L3 features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by the MPC1E, MPC2E, and MPC3E
MPC-3D-16XGE-SFPP	Fixed 16x10GbE line card bundle with L2.5 features
MPC-3D-16XGE-SFPP-R-B	Fixed 16x10GbE line card bundle with full scale L2/L2.5 and L3 features
MPC2E-3D-NG	Next-generation MPC2E with upgraded CPU and memory; offers full feature parity with the MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5 and reduced scale L3 features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-IR-B	Next-generation MPC2E line card bundle with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3 features, and up to 16 L3VPNs per MPC; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-R-B	Next-generation MPC2E line card bundle with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3, and L3VPN features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-Q	Next-generation MPC2E with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, and reduced scale L3 features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-Q-IR-B	Next-generation MPC2E line card bundle with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3, and up to 16 L3VPN features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-R-B	Next-generation MPC2E line card bundle with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3, and L3VPN features; flexible queuing option enables hierarchical QoS support with up to 32,000 total queues; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-Q	Next-generation MPC2E with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, and reduced scale L3 features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by MPC1E and MPC2E
MPC2E-3D-NG-Q-IR-B	Next-generation MPC2E line card bundle with upgraded CPU and memory. Offers full feature parity with MPC1E, MPC2E, and MPC3E. Includes full scale L2/L2.5, L3 and up to 16 L3VPN features, and hierarchical QoS with up to 512,000 queues per slot. Supports all MICs supported by MPC1E and MPC2E

Product Number	Description
MPC2E-3D-NG-Q-R-B	Next-generation MPC2E line card bundle with upgraded CPU and memory; offers full feature parity with MPC1E, MPC2E, and MPC3E; includes full scale L2/L2.5, L3 features, and hierarchical QoS with up to 512,000 queues per slot; supports all MICs supported by MPC1E and MPC2E
MX-MPC2-3D	MPC2 with port queuing; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2-3D-EQ	MPC2 line card bundle with per-IFL HQoS, 512,000 queues; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2-3D-EQ-R-B	MPC2 line card bundle with per-IFL HQoS, 512,000 queues; includes full scale L3, L2 and L2.5 features
MX-MPC2-3D-Q	MPC2 line card bundle with per-IFL HQoS, 256,000 queues (max 128,000 egress); includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2-3D-Q-R-B	MPC2 line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC2-3D-R-B	MPC2 line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC2E-3D	Enhanced MPC2 with port queuing; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-EQ	Enhanced MPC2 with per-IFL HQoS, 512,000 queues; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-EQ-R-B	Enhanced MPC2 line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC2E-3D-P	Enhanced MPC2 with 1588v2, port queuing; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-P-Q-B	Enhanced MPC2 line card bundle; includes 1588v2, per-IFL HQoS, 256,000 queues (maximum 128,000 egress), full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-P	Enhanced MPC2 with 1588v2, port queuing; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-P-Q-B	Enhanced MPC2 line card bundle; includes 1588v2, per-IFL HQoS, 256,000 queues (maximum 128,000 egress), full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-Q	Enhanced MPC2 line card bundle; includes per-IFL HQoS, 256,000 queues (maximum 128,000 egress); includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC2E-3D-Q-R-B	Enhanced MPC2E line card bundle; includes per-IFL HQoS, 256,000 queues (maximum 128,000 egress), full scale L3, L2, and L2.5 features
MX-MPC1-3D	MPC1 with port queuing; includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC1-3D-Q	MPC1 with per-IFL HQoS, 128,000 queues (maximum 64000 egress); includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC1-3D-Q-R-B	MPC1 line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC1-3D-R-B	MPC1 line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC1E-3D	Enhanced MPC1 with port queuing; includes full scale L2/L2.5 and reduced scale L3 features

Product Number	Description
MX-MPC1E-3D-Q	Enhanced MPC1 with per-IFL HQoS, 128,000 queues (max 64,000 egress); includes full scale L2/L2.5 and reduced scale L3 features
MX-MPC1E-3D-Q-R-B	Enhanced MPC1 with per-IFL HQoS, 128,000 queues (max 64,000 egress) line card bundle; includes full scale L3, L2, and L2.5 features
MX-MPC1E-3D-R-B	Enhanced MPC1 line card bundle; includes full scale L3, L2, and L2.5 features
MS-MPC-128	Multiservices MPC supports a variety of optionally licensed applications including stateful firewall, carrier-grade NAT, and deep packet inspection (DPI); each purchased separately

Modular Interface Cards

Product Number	Description
MIC3-3D-10XGE-SFPP	MIC with 10x10GbE small form-factor pluggable plus transceiver (SFP+) interface; optics sold separately
MIC3-3D-1X100GE-CFP	MIC with 1x100GbE C form-factor pluggable transceiver (CFP) interface; optics sold separately
MIC3-3D-1X100GE-CXP	MIC with 1x100GbE 100-gigabit small form-factor pluggable transceiver (CXP) interface; optics sold separately
MIC3-100G-DWDM	MIC with 1x100GbE OTU4 DWDM PIC, DP-QPSK, full C-band tunable, GFEC, HGFEC, SDFEC; requires MPC3E or MPC3E-NG; optics sold separately
MIC3-3D-2X40GE-QSFPP	MIC with 2x40GbE quad small form-factor pluggable plus transceiver (QSFP+) interface; optics sold separately
MIC-3D-1CHOC48	1 port channelized OC48/channelized STM16 (down to DS0) MIC
MIC-3D-1OC192-XFP	1 port OC192/STM64 MIC
MIC-3D-20GE-SFP	20x10/100/1000 MIC for MX Series; requires optics sold separately
MIC-3D-2XGE-XFP	2x10GbE MIC for MX Series; requires optics sold separately
MIC-3D-40GE-TX	40x10/100/1000 RJ-45 full height MIC (fixed optics)
MIC-3D-4CHOC3-2CHOC12	4 port channelized OC3/2 port channelized OC12 (down to DS0) MIC
MIC-3D-4COC3-1COC12-CE	Multi-rate circuit emulation MIC; 4 port channelized OC3/STM1 (to DS0) or 1 port channelized OC12/STM4 (to DS0)

Routing Engines

Product Number	Description
RE-S-X6-64G-BB	6 Core 2.0 GHz CPU and 64 GB memory, base bundle
RE-S-X6-64G-S	6 Core 2.0 GHz CPU and 64 GB memory, spare
RE-S-X6-64G-R	6 Core 2.0 GHz CPU and 64 GB memory, redundant RE
RE-S-X6-64G-LT-S	6 Core 2.0 GHz CPU with 64 GB memory, limited encryption version, spare
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
RE-S-1800X2-8G-R	Dual-core 1.8 GHz CPU and 8 GB memory, redundant
RE-S-1800X2-16G-R	Dual-core 1.8 GHz CPU and 16 GB memory, redundant
RE-S-1800X4-8G-R	Quad-core 1.8 GHz CPU and 8 GB memory, redundant
RE-S-1800X4-16G-R	Quad-core 1.8 GHz CPU and 16 GB memory, redundant
RE-S-1800X2-8G-UPG-BB	Dual-core 1.8 GHz CPU and 8 GB memory, upgrade for base bundle
RE-S-1800X2-16G-UPG-BB	Dual-core 1.8 GHz CPU and 16 GB memory, upgrade for base bundle
RE-S-1800X4-8G-UPG-BB	Quad-core 1.8 GHz CPU and 8 GB memory, upgrade for base bundle
RE-S-1800X4-16G-UPG-BB	Quad-core 1.8 GHz CPU and 16 GB memory, upgrade for base bundle
RE-S-1800X4-32G-BB	Quad core 1.8GHz CPU with 32 GB memory, base bundle
RE-S-1800X4-32G-R	Quad core 1.8GHz CPU with 32 GB memory, redundant
RE-S-1800X4-32G-S	Quad core 1.8GHz CPU with 32 GB memory, spare
RE-S-1800X4-32G-UB	Quad core 1.8GHz CPU with 32 GB memory, upgrade for base bundle
RE-S-1800X4-32G-WS	Quad core 1.8GHz CPU with 32 GB memory, worldwide version

Switch Control Board

Product Number	Description
SCB-MX960-BB	SCB for MX240, MX480, and MX960
SCBE-MX-BB	Enhanced Switch Control Board for MX240, MX480, and MX960
SCBE2-MX-BB	Enhanced MX Series Switch Control Board for MX240, MX480, and MX960

Junos OS

- USA: Junos OS
- Worldwide: Junos-WW

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at Juniper Networks or connect with Juniper on Twitter and Facebook.

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