MX2020 AND MX2010 3D UNIVERSAL EDGE ROUTERS

Product Overview

Network operators around the world are under extreme pressure to satisfy their consumer and business customer demand for bandwidth. Traffic growth, fueled by the explosive proliferation of mobile devices, promises to continue into the next decade as forecasts for mobile phones are predicted to reach over 1 billion by the year 2016 and mobile devices to eclipse 50 billion by the year 2020.

Juniper Networks MX2020 and MX2010 3D Universal Edge Routers provide a common platform for the delivery of powerful routing, network services, and application enablement for a consolidated, financially optimized network model, scaling up to 80 Tbps and 40 Tbps respectively and allowing network operators to fully leverage assets.

Application Enablement at Massive Scale

Juniper Networks® MX2020 and MX2010 3D Universal Edge Routers leverage Juniper's latest software and hardware products to enable multiscreen video, digital advertising, and advanced virtualization capabilities at ultrahigh scale. This helps operators differentiate and increase revenue across residential, mobile broadband, and enterprise services. The MX2020 and MX2010 routers support Juniper Networks Junos® Content Encore and the Application Services Modular Line Card (AS-MLC), enabling the delivery of streaming television, video on demand (VOD), and other premium content services over any broadband connection. Additionally, operators can use the MX2020 and MX2010 routers to deploy business VPN cloud services, enabling offloading of complex monitoring and Layer 3 routing intelligence from the customer premise and onto centralized MX Series 3D Universal Edge Routers to open up new managed services revenue opportunities while reducing operational overhead.

Through an array of advanced carrier-grade applications, from security to traffic load balancing, the MX2020 and MX2010 3D Universal Edge Routers provide a platform to effectively reduce the number of point products that operators own and maintain. The result simplifies network management, reduces infrastructure maintenance costs, and enables rapid provisioning of new revenue generating services.

The MX2020 and MX2010 routers also provide support for existing Modular Port Concentrators (MPCs), Ethernet, time-division multiplexing (TDM), and network services on the feature rich Juniper Networks Junos operating system. This ensures maximum investment protection and the ability to rapidly qualify and deploy the MX2020 and MX2010 systems at full feature velocity.

Product Description

The MX2020 and MX2010 3D Universal Edge Routers expand the breadth of Juniper's Universal Edge portfolio, from the 20 Gbps MX5 3D Universal Edge Router to the 80 Tbps MX2020. This gives service providers a common system and service delivery platform with variants that cover every market and geography. The MX2020 and MX2010 offer the highest capacity and density for aggregation of massive numbers of businesses and consumers, in a highly reliable, resilient architecture.

The MX2020 and MX2010 are built upon a highly scalable, redundant switch fabric, and a powerful, fully redundant control plane. They provide a flexible, scalable, pay-as-you-grow power system supporting DC or AC power sources designed to be highly efficient now and for many years to come.

Figure 1: MX Series product family

MX5 | MX10 | MX40 | MX80 | MX240 | MX480 | MX960 | MX2010 | MX2020

The MX2020 and MX2010 share common equipment components and are designed with taller, wider I/O slots to support higher interface densities and to promote a more efficient thermal profile. They are also designed for operational simplicity and can be installed in standard equipment racks with all line cards, routing, and control interfaces accessible at the front of the rack.

All routing and control, line cards, power supplies, and switching boards support hot swap capabilities, and offer hitless failover in the rare case of a failure, or during upgrades.

Architecture and Key Components

The MX2020 and MX2010 platforms leverage a highly scalable, highly resilient "all-active" central switch fabric architecture that delivers up to 860 Gbps of switching capacity to each and every line-card slot in the first release, and the ability to scale well beyond that over time. MX2020 and MX2010 routers employ the latest technology in a backplane-oriented design to extract the maximum life and highest signal integrity, and they have been built to scale to 2 Tbps (full duplex) per line-card slot in future releases. All line cards, switch fabric cards, and Routing Engine cards are installed in the front of the system, while all power and cooling components are located in the rear.

The MX2020 and MX2010 share common components that include switch fabrics, Routing Engines, power supplies, and fan trays to enable common sparing for operators who deploy both systems. The MX2020 and MX2010 provide a "pay-as-you-grow" power system so that providers have the ability to deploy power to the rack as it is needed, for locations where power is expensive or difficult to procure such as colocation facilities. The MX2020 and MX2010 power and thermal subsystems use the latest technology advancements to ensure the most optimal efficiency without sacrificing scalability or features. The power subsystem is a highly resilient architecture providing full redundancy for the power supplies and the power cable feeds. This highly resilient architecture ensures great scalability, incremental pay-as-you-grow expansion, and ultimate resiliency. AC or -48 V DC power options are available.

MX2020 3D Universal Edge Router

The MX2020 is a full rack, 20 slot Universal Edge routing platform that has been designed to scale to 80 Tbps (half duplex) over the long haul. Eight (8) Switch Fabric Boards (SFBs) are installed to deliver 17.2 Tbps of switching capacity at inception. The MX2020 is designed to fit into a standard 19 inch, 45 rack units, 4 post equipment rack. The MX2020 is a fully redundant design for all common components, including fan trays, power supplies, and power cabling. Both -48 V DC or AC power modules are offered. AC power is available in Delta or Wye 3-phase configurations.

The MX2020 utilizes dual, redundant Routing Engines, initially supporting the quad-core RE-S-1800x4 for high performance routing and control that is upgradable in a hitless manner in the event of a failure, and when upgrading to future Routing Engines.

Air intake is in the front of the system and flows through the back where air is exhausted. Two cooling zones are implemented, an upper cooling zone for the top half of the system and a lower cooling zone for the bottom half of the system. Both zones have fully redundant fan trays and provide cooling for all of the line cards, switch fabrics, and Routing Engines housed in the front of the system.

MX2010 3D Universal Edge Router

The MX2010 delivers all of the benefits of the MX2020 and shares a common set of components and cards in a smaller, 10 slot form factor. Eight (8) SFBs are installed to deliver 8.6 Tbps of switching capacity at inception. The MX2010 supports the same line cards as the MX2020 and offers the same powerful feature set as the MX Series family of products.

The MX2010 is designed to fit into a standard 19 inch 4 post equipment rack, and it occupies 34 rack units. The MX2010 is a fully redundant design for all common components. Switch fabrics, fan trays, power supplies, and all line cards are shared with the MX2020. And like the MX2020, the MX2010 provides for fully redundant power, including feed and power module redundancy. Both -48 V DC and AC power modules are offered. AC power is available in Delta or Wye 3-phase configurations.

The MX2010 uses dual, redundant Routing Engines, initially supporting the RE-S-1800x4 for high-performance routing and control that is upgradable in a hitless manner in the event of a failure, and as future Routing Engines are become available.

Air intake is in the front of the system and flows through the back where air is exhausted. The MX2010 has fully redundant fan trays which provide cooling for all of the line cards, switch fabrics, and Routing Engines housed in the front of the system.

Industry-Leading Full Featured Edge Router Density

MX2020 and MX2010 3D Universal Edge Routers offer the industry's highest scalability, highest initial capacity, and highest density where full featured, full service Edge capabilities are required. Operators can deploy initial densities of up to (640) 10GbE Ethernet ports, (80) 40GbE Ethernet ports, or (40) 100GbE Ethernet ports in a single rack with full Edge service support. Additionally, operators can enjoy a full set of line-card offerings enabling rapid deployment of a new platform for any type of connectivity. Support for existing MX Series family MPCs also delivers on unmatched investment protection for network operators everywhere.

Table 1. Initial Maximum Ethernet Interface Densities for the MX2020 and MX2010

	MX2020	MX2010
1GbE	800	400
10GbE	640	320
40GbE	80	40
100GbE	40	20

MX2020 and MX2010 Boards and Components

Switch Fabric Board (SFB)

SFBs are the cards that form the central switching fabric for the MX2020 and MX2010 routers. They deploy an active-active switching model that is highly scalable, highly resilient, and provides for hitless, graceful degradation in the unlikely event of a board failure. 8 SFBs (7 + 1 redundant) are installed vertically into the front of the chassis in the area between the I/O slots. These connect to the upper board area, the lower board area, and backplanes. To ensure optimal air flow and thermal performance, impedance panels are used in all empty SFB slots.

Control Board and Routing Engine (CB-RE)

The MX2020 and MX2010 routers deploy 1+1 redundant CB-REs, which provide all routing protocol processing as well as the software processes that control the router's interfaces, the chassis components, system management, and user access to the router. These routing and software processes run on top of a kernel that interacts with the Packet Forwarding Engine (PFE). The MX2020 and MX2010 CB-REs provide control plane functions and run the 64-bit version of Junos OS. 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 also communicate with MPCs via dedicated high bandwidth management channels, providing a clear distinction between the control and forwarding planes.

Modular Port Concentrator (MPC)

MPCs leverage the Junos Trio chipset to deliver the industry's highest Ethernet densities, as well as the flexibility of modular interface cards (ATM/Sonet/Ethernet) across the MX Series portfolio. These advanced capabilities allow customers to flexibly mix and match interfaces to create service-specific and "pay as you grow" configurations. The MPC houses the PFEs to deliver comprehensive Layer 3 routing (IPv4 and IPv6), MPLS, and Layer 2 switching. These MPCs also support inline services and advanced hierarchical quality of service (HQoS) per MX Series slot.

For more details on MPCs, please visit **www.juniper.net/us/en/local/pdf/datasheets/1000294-en.pdf**.

MPC Adaptor Card

All Trio chipset-based MPCs, including MPC1, MPC2, MPC3, MPC-3D, and MPC4, are usable on the MX2020 and MX2010 routers, providing our customers full investment protection. The native slot size on the MX2020 and MX2010 has been designed to be wider in order to provide optimal air flow and to maximize interface densities. An adaptor card has been created to house existing MPC cards, enabling rapid deployment of a full set of interface types and accelerating time to revenue for operators. No configuration is required on the adapter card, and adapter cards will be visible in the inventory of the system from the command line.

Figure 2: MX2020 and MX2010 MPC adaptor card

As the industry's only Universal Edge, the MX Series family of products is uniquely equipped to help service providers evolve to a truly converged network model.

The Junos OS Advantage

Service providers realize significant operational and economic benefits from Juniper's unique approach to its operating system. Unlike other network operating systems that splinter into many different programs and images joined solely by a common brand, Junos OS has remained a single, cohesive system throughout its lifecycle. With a single Junos OS and a single release cycle, operators benefit from reduced time and effort to deploy their network infrastructure, a more stable process for the addition of new functionality, and a modular architecture.

An Open, Fully Programmable Network

MX2020 and MX2010 routers leverage the powerful, programmable Trio chipset, and the MX Series offers the industry's only truly programmable platform, enabling operators and third-party developers to build applications on top of the network. The Juniper Networks Junos Software Development Kit (SDK) allows operators to build custom applications to expand, create, deploy, and validate innovative network applications tailored to their individual needs. The Junos SDK provides APIs and tools like the Eclipse IDE plug-in for simple creation of network applications.

Network Availability

The MX Series combines carrier-grade architecture with fully redundant hardware components to ensure that critical services and applications are always available. These platforms also support control plane redundancy as well as port and line-card stateful redundancy based on link aggregation group (LAG), with subscriber and session persistence in the case of switchover. Junos OS has a modular architecture, with each program running independently. Each process is protected in its own memory space to ensure that the behavior of any one process does not adversely impact any others. A full set of high availability (HA) features, including unified in-service software upgrade (unified ISSU), gives operators a scalable, upgradable, and fully resilient system.

Broadband Edge Capabilities

The MX2020 and MX2010 routers support the most scalable subscriber management features for a powerful Broadband Network Gateway (BNG) platform. Point-to-Point Protocol (PPP) subscriber termination for legacy systems, as well as Dynamic Host Configuration Protocol (DHCP), IPv4/IPv6 local server, and relay proxy for subscribers migrating towards DHCP access models let operators provision broadband services for today and into the future. Juniper's solution also supports RADIUS and Diameter backend servers to facilitate authentication, policy control, and accounting, and it offers flexible L2/L3 wholesale models. Juniper's broadband edge is a comprehensive solution that delivers advanced features such as hierarchical queuing, granular QoS, dynamic multilayer service activation, IPv4/IPv6 support, carrier-grade Network Address Translation (NAT), seamless MPLS, and voice/video quality monitoring.

Business Edge Capabilities

As a business edge solution, the MX Series offers a comprehensive VPN toolkit that gives service providers and large enterprises the feature rich, standards-based, secure interworking and streamlined operational model needed to reduce expenses and enable innovative business services. The MX Series offers VPN enhancing services such as QoS prioritized VPN traffic for voice and video, as well as VPN-aware multicast and firewall services. In addition to vanilla L3 VPN, L2 VPN, and VPLS, Juniper's MPLS VPN business edge solution comprises technologies such as LDP-BGP VPLS interworking, point-to-multipoint label-switched paths (P2MP LSPs), BGP-based multicast L3VPN, L2 interworking VPNs to interconnect dissimilar L2 access networks, MPLS plug-and-play, and IPsec/generic routing encapsulation (GRE) VPN. Business edge capabilities of the MX Series accelerate value creation through flexible VPN solutions, maximized returns, and service assurance.

Metro Ethernet Capabilities

The Universal Edge as a metro and aggregation solution delivers future-ready infrastructure that is optimized for the next wave of growth. Service convergence allows service providers to choose a deployment model that fits their architecture. A single platform can be deployed as an IP/IP VPN edge router, VPLS provider edge router (VPLS–PE), MPLS label-switching router (LSR), L2 switch, or L3 router, and can also cater to a variety of mobile, cable, and other media rich Edge applications.

Junos Space

Juniper Networks Junos Space-based management and service delivery is an innovative and feature rich environment for streamlining the Universal Edge management plane. Junos Space provides network management capabilities, and Junoscript automation simplifies configuration for complex services and enforces compliance to specific operational policies and procedures.

Features and Benefits

Table 2. Key Features and Benefits of MX2020 and MX2010 Routers

Feature	Description	Benefit
Highest industry slot density	Engineered to scale to 2 Tbps full duplex per slot	Leverage standard equipment rack for maximized capacity and long life
Multi-terabit switch fabric capacity	Up to 860 Gbps per slot switching capacity (17.2 Tbps per MX2020 and 8.6 Tbps per MX2010)	Capacity available at FRS to deliver future-proof switching capacity for higher speed interfaces as they become available
Software support	All L2/L3 features from existing MX Series platform supported	Single Junos OS and single release cycle to ensure a stable process for the addition of new functionality architecture
Hardware support	All MPCs/MICs supported across the full MX Series portfolio	Common equipment and sparing strategy
High availability (hardware)	Support for N+1 fabric redundancy and power redundancy with N+1 power supply module redundancy per half rack and N+N feed redundancy	Ensures that service-level agreements (SLAs) are achieved at all times
High availability (software)	Nonstop active routing (the foundation for unified ISSU), as well as Junos XML management protocol commit script capabilities for continuous operation under maintenance conditions and topological changes	Higher network availability, better network stability, easier operations, and less operational risk

MX2010   MX2020

Specifications

Table 3. Physical Specifications of the MX2020 and MX2010 Routers

Specification	MX2020	MX2010
System scaling capacity (half duplex)	80 Tbps	40 Tbps
Per slot scaling capacity (full duplex)	2 Tbps	2 Tbps
Maximum MPCs per chassis	20	10
Chassis per rack	1	1
Physical dimensions (H x D x W)	78.75 in x 36.20 in x 17.5 in (200 cm x 91.95 cm x 44.45 cm)	59.5 in 36.20 in x 17.5 in (151.1 cm x 91.95 cm x 44.45 cm)
Maximum number of line cards	20	10
Air flow	Front to back	Front to back
Number of fan trays	4	4
Approximate maximum weight	1,500 lbs (680.39 kg)	1,000 lbs (453.59 kg)
System mounting	Four post rack mounting	Four post rack mounting
Normal operating temperature range	0º to 40º C (32º to 104º F)	0º to 40º C (32º to 104º F)
Humidity	5% to 90% non-condensing	5% to 90% non-condensing

Safety, Environmental, and Security Compliance

Safety

- CAN/CSA-C22.2 No. 60950-1 (2007) Information Technology Equipment
- UL 60950-1 (2nd Ed.) Information Technology Equipment – Safety
- EN 60950-1 (2006) Information Technology Equipment – Safety
- IEC 60950-1 (2005) Information Technology Equipment – Safety (All country deviations): CB Scheme report.
- EN 60825-1 Safety of Laser Products – Part 1: Equipment Classification

EMC

- AS/NZS CISPR22 Class A (Australia/New Zealand)
- EN55022 Class A (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)

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-61000-4-11 Voltage Dips and Sags

ETSI

- ETSI EN-300386-2 Telecommunication Network Equipment. Electromagnetic Compatibility

Non-Regulatory Environmental Standards

NEBS

- SR-3580 NEBS Criteria Levels (Level 3 Compliance)
- GR-63-CORE: NEBS, Physical Protection
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- DT EMC requirements as per their requirement spec "1TR9"
- BT Mobile Immunity Requirements
- NEBS Compliance (with AT&T NEBS, Verizon NEBS)
- ETSI 300019

Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services that are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to maximize operational efficiency while reducing costs and minimizing risk, achieving a faster time to value for your network. Juniper Networks ensures operational excellence by optimizing the network to maintain required levels of performance, reliability, and availability. For more details, please visit **www.juniper.net/us/en/ products-services**.

Ordering Information

Model Number	Description
Base Unit	
MX2020-BASE-AC	20 slot MX2020 chassis, base bundle with 1 Routing Engine, SFBs, fan trays, AC power
MX2020-BASE-DC	20 slot MX2020 chassis, base bundle with 1 Routing Engine, SFBs, fan trays, DC power
MX2010-BASE-AC	10 slot MX2010 chassis, base bundle with 1 Routing Engine, SFBs, fan trays, AC power
MX2010-BASE-DC	10 slot MX2010 chassis, base bundle with 1 Routing Engine, SFBs, fan trays, DC power
Premium Units	
MX2020-PREMIUM-AC	20 slot MX2020 chassis, premium bundle with redundant Routing Engine, SFBs, fan trays, AC power
MX2020-PREMIUM-DC	20 slot MX2020 chassis, premium bundle with redundant Routing Engine, SFBs, fan trays, DC power
MX2010-PREMIUM-AC	10 slot MX2010 chassis, premium bundle with redundant Routing Engine, SFBs, fan trays, AC power
MX2010-PREMIUM-DC	10 slot MX2010 chassis, premium bundle with redundant Routing Engine, SFBs, fan trays, DC power
Chassis Spares	
CHAS-BP-MX2020-S	20 slot MX2020 chassis with backplane installed, spare
CHAS-BP-MX2010-S	10 slot MX2010 chassis with backplane installed, spare
Routing Engines	
RE-MX2000-1800x4-S	MX2000 line Routing Engine and control board, Quad Core 1,800 GHz with 16 GB memory, spare
RE-MX2000-1800x4-BB	MX2000 line Routing Engine and control board, Quad Core 1,800 GHz with 16 GB memory, base bundle
RE-MX2000-1800x4-R	MX2000 line Routing Engine and control board, Quad Core 1,800 GHz with 16 GB memory, redundant option
RE-MX2000-1800x4-WW-S	MX2000 line Routing Engine and control board, Quad Core 1,800 GHz with 16 GB memory, worldwide version, spare
Switch Fabric Boards	
MX2000-SFB-S	MX2000 line switch fabric board, spare
MX2000-SFB-BB	MX2000 line switch fabric board, base bundle
MX2000-SFB-R	MX2000 line switch fabric board, redundant option
Modular Port Concentrators (MPC)	
MX-MPC1-3D	1xTrio chipset MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3
MX-MPC1-3D-Q	1xTrio chipset MPC, per-IFL HQoS, 128K queues (max 64K egress); full scale L2/L2.5 and reduced scale L3
MX-MPC1-3D-Q-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC1-3D-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC1E-3D	1xTrio chipset enhanced MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3
MX-MPC1E-3D-Q	1xTrio chipset enhanced MPC, per-IFL HQoS, 128K queues (max 64K egress); full scale L2/L2.5 and reduced scale L3
MX-MPC1E-3D-Q-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC1E-3D-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC2-3D	2xTrio chipset MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3
MX-MPC2-3D-EQ	2xTrio chipset MPC, per-IFL HQoS, 512K queues; full scale L2/L2.5 and reduced scale L3
MX-MPC2-3D-EQ-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC2-3D-Q	2xTrio chipset MPC, per-IFL HQoS, 256K queues (max 128K egress); full scale L2/L2.5 and reduced scale L3
MX-MPC2-3D-Q-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC2-3D-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC2E-3D	2xTrio chipset enhanced MPC, port queuing, price includes full scale L2/L2.5 and reduced scale L3
MX-MPC2E-3D-EQ	2xTrio chipset enhanced MPC, per-IFL HQoS, 512K queues; full scale L2/L2.5 and reduced scale L3
MX-MPC2E-3D-EQ-R-B	Line card bundle, price includes full scale L3, L2, and L2.5
MX-MPC2E-3D-P	2xTrio chipset enhanced MPC, 1588v2, port queuing, price includes full scale L2/L2.5 and reduced scale L3
MX-MPC2E-3D-P-Q-B	Line card bundle, 1588v2, per-IFL HQoS, 256K queues (max 128K egress), full scale L2/L2.5 and reduced scale L3
MX-MPC2E-3D-P-Q-R-B	Line card bundle, 1588v2, per-IFL HQoS, 256K queues (max 128K egress), full scale L3, L2, and L2.5
MX-MPC2E-3D-P-R-B	Line card bundle, price includes 1588v2, full scale L3, L2, and L2.5
MX-MPC2E-3D-Q	2xTrio chipset enhanced MPC, per-IFL HQoS, 256K queues (max 128K egress); full scale L2/L2.5 and reduced scale L3
MX-MPC2E-3D-Q-R-B	Line card bundle, full scale L3, L2, and L2.5
MX-MPC2E-3D-R-B	Line card bundle, full scale L3, L2, and L2.5
MX-MPC3E-3D	MPC3 with support for 100GbE, 40GbE, and 10GbE interfaces, L2.5

Ordering Information (continued)

Model Number	Description
Modular Port Concentrators (MPC) (continued)	
MX-MPC3E-3D-R-B	MPC3E with support for 100GbE, 40GbE, and 10GbE interfaces. full scale L2, L3, L3VPN
MPC-3D-16XGE-SFPP	16x10GbE line card, full scale L2/L2.5 and reduced scale L3
MPC-3D-16XGE-SFPP-R-B	16x10GbE line card bundle, full scale L3, L2, and L2.5
MPC4E-3D-2CGE-8XGE	2x100GbE and 8x10GbE ports, full scale L2/L2.5 and reduced scale L3 features
MPC4E-3D-32XGE-SFPP	32x10GbE SFPP ports, full scale L2/L2.5 and reduced scale L3 features
MPC4E-3D-2CGE8XGE-IR-B	2x100GbE and 8x10GbE ports, full scale L2/L2.5, L3 features, up to 16 L3VPNs per MPC
MPC4E-3D-32XGE-IR-B	32x10GbE SFPP ports, full scale L2/L2.5, L3 features, up to 16 L3VPNs per MPC
MPC4E-3D-2CGE8XGE-R-B	2x100GbE and 8x10GbE ports, full scale L2/L2.5, L3 and L3VPN features
MPC4E-3D-32XGE-R-B	32x10GbE SFPP ports, full scale L2/L2.5, L3 and L3VPN features
MICs	
MIC3-3D-10XGE-SFPP	MIC with 10x10GbE SFP+ interface, optics sold separately
MIC3-3D-1X100GE-CFP	MIC with 1x100GbE CFP interface, optics sold separately
MIC3-3D-1X100GE-CXP	MIC with 1x100GbE CXP interface, optics sold separately
MIC3-3D-2X40GE-QSFPP	MIC with 2x40GbE 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	Multirate circuit emulation MIC, 4 port channelized OC3/STM1 (to DS0) or 1 port channelized OC12/STM4 (to DS0)
MIC-3D-4OC3OC12-1OC48	4 port non-channelized OC3-OC12/1 port non-channelized OC48 MIC
MIC-3D-4XGE-XFP	4x10GbE MIC for MX Series (supported on MX-MPC2 line cards)
MIC-3D-8CHDS3-E3-B	8 port channelized DS3 (down to DS0)/non-channelized E3 MIC, 75 ohm mini SMB
MIC-3D-8CHOC3-4CHOC12	High density multirate MIC channelized, 8 port channelized OC3/4 port channelized OC12 (down to DS0) MIC
MIC-3D-8DS3-E3	8 port non-channelized DS3/non-channelized E3 MIC, 75 ohm mini SMB
MIC-3D-8OC3-2OC12-ATM	Multirate 8 port non-channelized ATM OC3/STM1 or 2 port non-channelized OC12/STM4 ATM MIC
MIC-3D-8OC3OC12-4OC48	Multirate 8 port non-channelized OC3-OC12/4 port non-channelized OC48 MIC
Cable Management	
MX2000-CBL-TOP-S	MX2000 line front upper cable manager, spare
MX2000-CBL-BTM-S	MX2000 line front lower cable manager, spare
MX2000-CBL-MID-S	MX2000 line front middle cable manager, spare
Fan Trays	
MX2000-FANTRAY-S	MX2000 line fan tray, spare
MX2000-FANTRAY-BB	MX2000 line fan tray, base bundle
MX2000-FANTRAY-R	MX2000 line fan tray, redundant option
Air Filters	
MX2020-FLTR-KIT-S	MX2020 filter set, containing 1 of each filter required
MX2010-FLTR-KIT-S	MX2010 filter set, containing 1 of each filter required
Craft Interface	
MX2020-CRAFT-S	Craft interface panel, MX2020 chassis, spare
MX2010-CRAFT-S	Craft interface panel, MX2010 chassis, spare
Power Distribution Modules	
MX2000-PDM-AC-WYE-S	MX2000 line 3 phase AC Wye power distribution module, spare
MX2000-PDM-AC-WYE-BB	MX2000 line 3 phase AC power distribution module, base bundle

Ordering Information (continued)

Model Number	Description
Power Distribution Modules (continued)	
MX2000-PDM-AC-WYE-R	MX2000 line 3 phase AC power distribution module, redundant option
MX2000-PDM-AC-DELTA-S	MX2000 line 3 phase AC Delta power distribution module, spare
MX2000-PDM-AC-DELTA-BB	MX2000 line 3 phase AC Delta power distribution module, base bundle
MX2000-PDM-AC-DELTA-R	MX2000 line 3 phase AC Delta power distribution module, redundant option
MX2000-PDM-DC-S	MX2000 line DC power 60 Amp distribution module, spare
MX2000-PDM-DC-R	MX2000 line DC power 60 Amp distribution module, spare
Power Supply Modules	
MX2000-PSM-AC-S	MX2000 line AC power supply module, spare
MX2000-PSM-AC-BB	MX2000 line power supply module, base bundle
MX2000-PSM-AC-R	MX2000 line power supply module, redundant option
MX2000-PSM-DC-S	MX2000 line DC power supply module, spare
MX2000-PSM-DC-BB	MX2000 line DC power supply module, base bundle
MX2000-PSM-DC-R	MX2000 line DC power supply module, redundant option
Shipping Containers and Miscellaneous	
MX2020-CHAS-PKG-S	MX2020 20 slot chassis shipping container, spare
MX2010-CHAS-PKG-S	MX2010 10 slot chassis shipping container, spare
MX2020-LC-PKG-S	MX2020 line card bulk shipping container, spare
MX2020-PSM-PKG-S	MX2020 power supply module bulk shipping container, spare
Power Cable Manager	
MX2020-DC-CBL-MGR-S	MX2020 cable manager for DC power cables, spare
Adaptor Card	
MX2000-LC-ADAPTER	MX2000 line card adapter, spare
Mounting Tray	
MX2000-MOUNT-TRAY-S	MX2000 line rack mount tray, spare
Lug Kits	
MX2000-DCLUG-4AWG-S	MX2000 line DC 4AWG terminal lug kit
MX2000-DCLUG-6AWG-S	MX2000 line DC 6AWG terminal lug kit
Junos OS	
USA	Junos OS
Worldwide	Junos-WW

About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at **www.juniper.net**.

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