MX10000 MODULAR 5G UNIVERSAL ROUTING PLATFORMS

Product Overview

Juniper's secure automated distributed cloud blueprint enables service providers to react quickly to changing market conditions in the cloud era, accelerating service delivery with world-class products and innovative architectural components. The MX10000 line of 5G platforms is an integral part of this solution. With its massive scale and efficiency, the MX10000 line is ideal for space- and power-constrained environments. It redefines per-slot economics, enabling customers to do more with less while simplifying network design, reducing OpEx, and enabling the profitable delivery of a broad range of business, residential, mobile, cable, data center, and cloud services—all while seamlessly supporting traditional and emerging network architectures. The MX10000 chassis shares a common set of components with other Juniper products; various line cards and software are available to satisfy specific core routing, edge routing, and switching applications.

Product Description

Increasingly sophisticated technology users are seeking highly responsive and customizable cloud-like online experiences and services that align with their unique needs and interests, creating more traffic that consumes increasing amounts of network bandwidth.

Unfortunately, traditional hardware-centric edge routers lack the programmability and scale required to allow network operators to profitably meet these market demands, limiting their competitiveness, constraining their revenue and market share growth, and increasing their CapEx, OpEx, and TCO. To overcome these challenges, service providers and cloud operators need software-centric edge solutions that address current demand while offering investment-protecting evolution to emerging technologies such as mobility, Internet of Things (IoT), and the continued growth of cloud networking.

The Juniper Networks® MX10000 line of 5G Universal Routing Platforms—including the 13 U, 19.2 Tbps-capable MX10008 and the 21 U, 38.4 Tbps-capable MX10016—offers dense 10GbE, 40GbE, and 100GbE modular solutions that support up to 2.4 Tbps per slot. This enables service providers and cloud operators to confidently build the best networks across data centers, business edge, and cloud markets. The MX10000 line shares common chassis components with equivalent Juniper Networks PTX Series Packet Transport Routers and QFX Series Switches; using specific software and line cards, the universal chassis can be successfully deployed as a core router, IP edge router, or switch, reducing the burden on network operators to qualify multiple platforms.

The MX10000 line of modular platforms is powered by the same programmable Juniper Trio chipset and the same Juniper Networks Junos® operating system that powers the rest of the Juniper Networks MX Series 5G Universal Routing Platform portfolio, leveraging nearly two decades of Juniper R&D investments and innovations that have transformed the economics of networking. Leveraging common Packet Forwarding Engine (PFE) and software ensures complete feature consistency and a common operational and management framework. This consistency reduces the cost, risk, and complexity of network evolution, helping current MX Series customers rapidly qualify and deploy the MX10000 line of modular platforms.

Architecture and Key Components

The MX10000 line of modular 5G routers features a number of architectural elements. Dual redundant Routing Engines (REs) run Junos OS, where they manage all routing protocol processes, router interface control, and control plane functions such as chassis components, system management, and user access to the router. These processes run on top of a kernel that interacts with the PFE on the line cards via dedicated high-bandwidth management channels, providing a clean separation of the control and forwarding planes.

The MX10000 modular line cards currently support 10GbE, 40GbE, and 100GbE interfaces, and are designed to support 400GbE interfaces in the future. The line cards are oriented horizontally in the front of the chassis, connecting directly to the vertical switch fabric cards in the rear of the chassis via orthogonal interconnects without requiring a midplane. This provides unparalleled investment protection by ensuring a smooth upgrade path to higher speed switch fabric cards as they become available. The midplane-less design also improves airflow with a front-to-back design.

To maintain uninterrupted operation, modular fan trays cool the line cards and REs with redundant, variable-speed fans. In addition, all MX10000 modular components are hot-swappable, and all central functions are available in redundant configurations, providing high operational availability by allowing continuous system operation during maintenance or repairs. The chassis' universal design also allows them to be used independently for core, edge, or switching configurations.

MX10000 Line Modular Hardware Components

Line Cards

The line cards for the MX10000 line of modular platforms are based on highly scalable, custom Juniper Trio silicon, making it the industry's leading router for data center edge, core, peering, and aggregation applications. Each slot on the MX10008 and MX10016 supports 2.4 Tbps (4.8 Tbps half-duplex), while the line cards support multi-rate 10GbE, 40GbE, and 100GbE interfaces.

The modular design of the MX10008 and MX10016 routers provides investment protection by allowing future upgrades. The PFEs offer 400 Gbps of WAN and fabric bandwidth. To achieve 2.4 Tbps forwarding performance, a total of six PFEs are implemented on each interface card. The PFEs provide ingress queuing with loopback stream optimization to avoid reading and writing packet tails when packets are sent to and received back from a loopback stream. The line cards also provide Operation, Administration, and Maintenance (OAM) support with per-port Ethernet OAM counters, as well as packet memory, which uses Hybrid Memory Cube DRAM technology to reduce power usage, increase speed, and improve system density.

Processor

The MX10008 and MX10016 RE features a 10-core 2.2 GHz Intel processor with 64 GB memory and 2x200 GB solid-state drive (SSD) storage.

Power

The MX10008 contains six power supply slots while the MX10016 contains ten power supply slots to provide complete flexibility for provisioning and redundancy. Each power supply has its own internal fan for cooling. The MX10000 modular line supports both AC and DC power supplies; however, AC and DC supplies cannot be mixed in the same chassis.

The AC power supplies on the MX10008 and MX10016 accept 200 to 240 volts alternating current (VAC) input, delivering 2700 watts of power to the chassis. The DC power supplies accept -40 to -72 volts direct current (VDC) input, delivering 2500 watts of power to the chassis. Each AC and DC power supply has two inputs for feed redundancy.

Cooling

The MX10000 line of modular chassis supports front-to-back cooling with air drawn in through perforations on the REs and the line cards in the front of the platform, while hot air exits through the rear of the chassis. The modular fan trays are accessible from the rear of the chassis.

Chassis Management

The MX10000 modular line delivers powerful Junos OS chassis management that allows environmental monitoring and field-replaceable unit (FRU) control. Chassis management provides a faster primary switchover, enhanced power budgeting with modular power management, reduced power consumption for partially populated systems, granular control over FRU power-on, single zone cooling with better fan speed control for reduced noise, and CPU leveling during monitoring intervals.

Simplified Management

The MX10000 modular line simplifies management based on the elegance and simplicity of Junos OS. Management applications can receive streaming telemetry data to provide robust protocol analytics for an SDN environment. Junos OS also supports OpenConfig, which today is a YANG-based data model that supports a variety of operator use cases.

Features and Benefits

Table 1. MX10000 Line Features and Benefits

Feature	Feature Description	Benefits
System capacity	The MX10008 scales to 19.2 Tbps (38.4 Tbps half-duplex) in a single chassis, breaking out into 768 10GbE, 192 40GbE, and 192 100GbE interfaces. The MX10016 scales to 38.4 Tbps (76.8 Tbps half-duplex) in a single chassis, breaking out into 1536 10GbE, 384 40GbE, and 384 100GbE interfaces.	The MX10000 line gives cloud and service providers the performance and scalability needed to outpace increased traffic demands.
Packet performance	The innovative and groundbreaking Juniper Trio silicon empowers the MX Series routers with unparalleled packet processing for both full IP and MPLS functionality, leveraging revolutionary 3D memory architecture.	Exceptional packet processing capabilities alleviate the challenge of scaling the network as traffic continues to increase, while optimizing IP/MPLS transit functionality around superior performance and elegant deployability.
Full-scale IP and MPLS routing	The MX10000 modular line features a rich set of IP/MPLS services, low latency, and wire-rate forwarding at scale, while providing the reliability needed to meet strict service-level agreements (SLAs).	Distributed peering scale of 7 million forwarding information base (FIB) and 80 million routing information base (RIB) (also known as forwarding and routing tables, respectively) delivers the performance required to match expanding traffic demands.
Source Packet Routing in Networking (SPRING)	Junos OS supports SPRING, which provides the ability for a trusted source node to specify a forwarding path, other than the normal shortest path, that a particular packet will traverse.	SPRING support provides additional flexibility per packet source. It also adds features such as network path and node protection to support fast reroute (FRR) mechanisms, enhanced network programmability, OAM functionality, simplified network signaling, load balancing, and traffic engineering functions.
High availability hardware	The MX10000 modular line is designed with full hardware redundancy for cooling, power supply, REs, and switch fabric, as applicable.	High availability (HA) is a critical requirement for service providers to maintain an always-on infrastructure to meet stringent SLAs.
High availability software	The MX10000 modular line features a resilient operating system that supports HA features such as graceful RE switchover (GRES), nonstop active routing (NSR), and unified in-service software upgrade (unified ISSU) for high availability. The MX Series also supports game-changing 50 ms redundancy switchover under load.	Junos OS supports HA features that allow software upgrades and changes without disrupting network traffic.
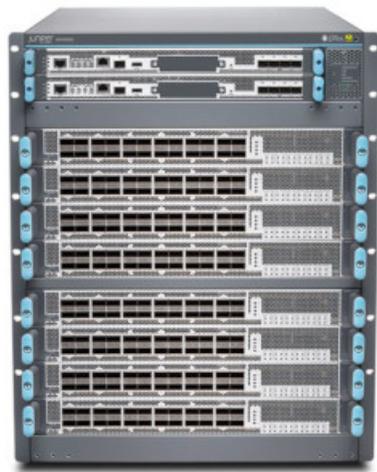
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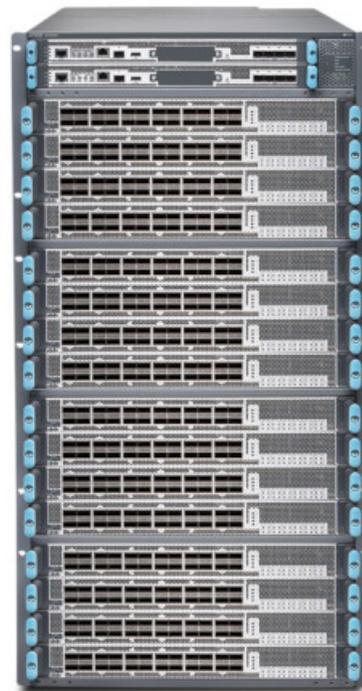
MX10016

Specifications

Table 2. MX10000 Line Specifications

	MX10008	MX10016
Physical dimensions (W x H x D)	17.4 x 22.55 x 32 in (44.2 x 57.76 x 81.28 cm); 39.37 in (100 cm) depth with electromagnetic interference (EMI) door	17.4 x 36.65 x 35 in (44.2 x 93.09 x 88.90 cm); 42.40 in (107.7 cm) depth with EMI door
Maximum weight	330 lb (150 kg) (excluding line cards)	604 lb (274 kg) (excluding line cards)
Mounting	4 post rack	4 post rack
Power system rating*	200-240 VAC/50-60 GHz -48 VDC @ 60 A	200-240 VAC/50-60 GHz -48 VDC @ 60 A
Typical power consumption	12 kW, fully loaded	23 kW, fully loaded
Operating temperature	32° to 115° F (0° to 46° C) at sea level	32° to 115° F (0° to 46° C) at sea level

* These numbers are power supply ratings. Actual power usage is much lower.

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/uk/en/products-services.

MX10008 and MX10016 Ordering Information

For more information, please contact your Juniper Networks representative.

Product Number	Description
MX10008 Base Unit	
MX10008-BASE	MX10008 8-slot chassis [JNP10008]. Includes 1 RE, 3 power supplies, 2 fan trays, 2 fan tray controllers, and 5 Switch Fabric cards.
MX10008-PREMIUM	MX10008 redundant 8-slot chassis [JNP10008]. Includes 2 REs, 6 power supplies, 2 fan trays, 2 fan tray controllers, and 6 Switch Fabric cards.
MX10016 Base Unit	
MX10016-BASE	MX10016 16-slot chassis [JNP10016]. Includes 1 RE, 5 power supplies, 2 fan trays, 2 fan tray controllers, and 5 Switch Fabric cards.
MX10016-PREMIUM	MX10016 redundant 16-slot chassis [JNP10016]. Includes 2 REs, 10 power supplies, 2 fan trays, 2 fan tray controllers, and 6 Switch Fabric cards.
MX10000 Routing Engines and Control Boards	
JNP10K-RE1-BB	MX10000/JNP10000 REx10, base bundle
JNP10K-RE1-R	MX10000/JNP10000 REx10, redundant
JNP10K-RE1	MX10000/JNP10000 REx10
JNP10K-RE1-LT-BB	MX10000/JNP10000 REx10, limited encryption version, base bundle
JNP10K-RE1-LT-R	MX10000/JNP10000 REx10, limited encryption version, redundant
JNP10K-RE1-LT	MX10000/JNP10000 REx10, limited encryption version
JNP10K-RE1-128-BB	MX10000/JNP10000 REx10, 128 GB memory, base bundle
JNP10K-RE1-128-R	MX10000/JNP10000 REx10, 128 GB memory, redundant
JNP10K-RE1-128	MX10000/JNP10000 REx10, 128 GB memory

Product Number	Description
MX10008 Switch Fabric	
JNP10008-SF-BB	MX10008/JNP10008 Switch Fabric card, base bundle
JNP10008-SF-R	MX10008/JNP10008 Switch Fabric card, redundant
JNP10008-SF	MX10008/JNP10008 Switch Fabric card
MX10016 Switch Fabric	
JNP10016-SF-BB	MX10016/JNP10016 Switch Fabric card, base bundle
JNP10016-SF-R	MX10016/JNP10016 Switch Fabric card, redundant
JNP10016-SF	MX10016/JNP10016 Switch Fabric card
MX10000 Line Cards	
MX10K-LC2101	24x100GbE/24x40GbE line card [JNP10K-LC2101]
MX10K-LC2101-IR	24x100GbE/24x40GbE line card [JNP10K-LC2101], IR mode
MX10K-LC2101-R	24x100GbE/24x40GbE line card [JNP10K-LC2101], R mode
MX10008 Fan Tray and Controller	
JNP10008-FAN-BB	MX10008/JNP10008 fan, base bundle
JNP10008-FAN	MX10008/JNP10008 fan
JNP10008FANCTRL-BB	MX10008/JNP10008 fan tray controller, base bundle
JNP10008-FAN-CTRL	MX10008/JNP10008 fan tray controller
MX10016 Fan Tray and Controller	
JNP10016-FAN-BB	MX10016/JNP10016 fan, base bundle
JNP10016-FAN	MX10016/JNP10016 fan
JNP10016FANCTRL-BB	MX10016/JNP10016 fan tray controller, base bundle
JNP10016-FAN-CTRL	MX10016/JNP10016 fan tray controller
MX10000 Power Modules	
JNP10K-PWR-AC-BB	MX10000/JNP10000 2700 W AC power supply, base bundle
JNP10K-PWR-AC-R	MX10000/JNP10000 2700 W AC power supply, redundant
JNP10K-PWR-AC	MX10000/JNP10000 2700 W AC power supply
JNP10K-PWR-DC-BB	MX10000/JNP10000 2500 W DC power supply, base bundle
JNP10K-PWR-DC-R	MX10000/JNP10000 2500 W DC power supply, redundant
JNP10K-PWR-DC	MX10000/JNP10000 2500 W DC power supply
MX10008 Front Panels	
JNP10008-FRPNL-BB	MX10008/JNP10008 front panel, base bundle
JNP10008-FRNT-PNL	MX10008/JNP10008 front panel
JNP10008-FRPNL1-BB	MX10008/JNP10008 front panel with filter, base bundle
JNP10008-FRPNL1	MX10008/JNP10008 front panel with filter
MX10016 Front Panels	
JNP10016-FRPNL-BB	MX10016/JNP10016 front panel, base bundle
JNP10016-FRNT-PNL	MX10016/JNP10016 front panel
JNP10016-FRPNL1-BB	MX10016/JNP10016 front panel with filter, base bundle
JNP10016-FRPNL1	MX10016/JNP10016 front panel with filter

About Juniper Networks

Juniper Networks brings simplicity to networking with products, solutions and services that connect the world. Through engineering innovation, we remove the constraints and complexities of networking in the cloud era to solve the toughest challenges our customers and partners face daily. At Juniper Networks, we believe that the network is a resource for sharing knowledge and human advancement that changes the world. We are committed to imagining groundbreaking ways to deliver automated, scalable and secure networks to move at the speed of business.

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