

Juniper Networks M-series Multiservice Edge Routing Platforms

The Juniper Networks M-series multiservice edge routing portfolio spans from 5 Gbps up to 320 Gbps of throughput and include the M7i, M10i, M20, M40e, M120, and M320 platforms. Because the same scalable and production-hardened JUNOS software runs on all M-series platforms, a consistent set of capabilities is available at all network locations – regardless of customer connection or serving area density.

With its broad interface portfolio, a single M-series platform can provide a single point of edge aggregation for thousands of customers over any access type, including ATM, Frame Relay, Ethernet, and TDM, as well as at any speed from DS0 up to OC-192/STM-64 and 10 Gigabit Ethernet. Leveraging dense Ethernet and highly channelized interfaces, the M-series platforms boast leading densities for virtually all port types.

The M-series platforms also support the industry's most comprehensive VPN portfolio. They can simultaneously run and scale Layer 2 virtual circuits, Layer 2 VPNs, Layer 2.5 Interworking VPNs, Layer 3 2547 VPNs, VPLS, IPsec, GRE, IP-IP and other tunneling mechanisms with no performance compromise. This broad set of VPNs meets the needs of the widest possible set of customers, maximizing the service provider's revenue while minimizing required infrastructure. For example, a provider can use Layer 3 VPNs to deliver an outsourced routing service and can also use Layer 2 VPNs to provide a point-to-point ATM service over a common IP/MPLS infrastructure.

Key features

- Multi-terabit Capacity
- Industry's most comprehensive VPN portfolio
- Granular QoS with low latency and jitter performance
- Hardware-based IPv6 performance
- High-availability Hardware
- High-availability Software
- Superior Packet Processing via Programmable ASIC-based Packet-forwarding Engine (PFE)
- Wide Range of Interfaces
- Optical Transport Integration
- Logical Routing Capability



M320 Router

The M320 is a high performance, 10 Gbps-capable, distributed architecture edge router. It offers up to 16 OC-192c/STM-64 PICs per chassis (32 per rack) or up to 64 OC-48c/STM-16 ports per chassis (128 per rack), with up to 320 Gbps throughput. The M320 platform is ideal for medium-size backbone cores requiring predictable performance for feature-rich infrastructures. It also supports provider edge services in 10-gigabit POPs with the ability to support up to 32 type 1 and type 2 PICs and up to 16 type-3 PICs for 10 Gbps uplinks. In addition, this platform is ideal where switching fabric and Routing Engine redundancy are required. All major components are field replaceable, increasing system serviceability and reliability, and decreasing mean time to repair. PICs are compatible with M40e, M120, T320, and T640.

M120 Router

The M120 Multiservice Edge Router is the newest addition to the industry-leading Juniper Networks M-series product family. The M120 delivers support for 128 Gigabit Ethernet subscriber ports, with 10 Gigabit Ethernet or OC 192 uplink capabilities in an affordable, compact form factor. Ideal for supporting high-bandwidth converged edge routing applications, the M120 platform

is designed to facilitate service aggregation for the multiplay needs of both service providers and enterprise users. The M120 extends a cost-effective, Ethernet-optimized infrastructure with 10 gigabit networking capabilities to the network edge. Capable of supporting MPLS services at Layers 2 and 3, including Layer 3 VPNs, the M120 is designed to deliver superior redundancy and facilitate the transport of legacy Frame Relay and ATM traffic over high-bandwidth Ethernet links.

M40e Router

The M40e router provides a dense, highly redundant platform primarily targeted for dense dedicated access aggregation and provider edge services in medium and large POPs. This 40+ Gbps platform supports 32 ejector-enabled PICs via 8 FPCs and up to OC-48/STM-16 uplink speeds in a half-rack package. The M40e offers common hardware redundancy including the switch fabrics, Routing Engines, fan trays, and power supplies.

M20 Router

Only 14 inches (35.5 cm) in height, the M20 design delivers increased port density, performance of 20+ Gbps throughput, and high scalability and reliability all in a space-efficient package. The M20 offers fully redundant hardware, including redundant switching fabrics and Routing Engines to increase system availability. The M20 supports 16 PICs and up to OC-48/STM-16 uplink speeds in a compact package ideal for the provider edge in medium and large PoPs.

M10i Router

The Juniper Networks M10i router is the company's most compact and cost-effective fully redundant M-series edge router. The M10i boasts fully redundant common hardware components including redundant Routing Engines, Compact Forwarding Engine Boards, fan trays, and power supplies. Combined with JUNOS reliability features, the M10i router is the product of choice for enabling reliable and secure services in small and medium PoPs. The M10i supports 8 ejector-enabled PICs via 2 built-in Flexible PIC concentrators, and interface speeds up to OC-12/STM-4 and Gigabit Ethernet. PICs are interchangeable between the M7i and M10i routers

M7i Router

The M7i router is Juniper Networks most compact routing platform. It's 3.5 inches (8.9 cm) in height and supports 7+ Gbps throughput. The M7i is ideal as an IP/MPLS provider edge router in small POPs. With its integrated Adaptive Services Module supporting hardware-accelerated NAT, stateful firewall, IPSec, and J-Flow accounting, it can be used as a campus border router or as head office customer premise equipment. It supports either 2 fixed Fast Ethernet ports, 2 fixed Gigabit Ethernet ports, or 1 fixed Gigabit Ethernet port via a Fixed Interface Card (FIC), as well as supporting 4 ejector-enabled PICs. The M7i router supports interface speeds of up to OC-12c/STM-4 and Gigabit Ethernet. PICs are interchangeable between the M7i and M10i routers.

Architecture and Key Components

Key components of each M-series router are the Packet Forwarding Engine (PFE) and the Routing Engine.

- The PFE is a logical entity responsible for packet forwarding. It physically consists of the PICs, FPCs, FIC, control/system/forwarding board, and state-of-the-art ASICs.
- PICs provide a complete range of fiber optic and electrical transmission interfaces to the network.
- Flexible PIC Concentrators house PICs and connect them to the rest of the PFE. FPCs parse, prioritize, and queue the packets before forwarding them across the midplane to the appropriate

destination interface. On egress, FPCs prioritize, queue, re-assemble, and forward packets out through the appropriate port. Up to four PICs can be mixed and matched within a single FPC slot, increasing configuration flexibility and network scalability, while maximizing POP efficiency. The FPC required depends on the platform and on the PICs that are needed.

- The FIC is available only on the M7i and contains either 2 fixed Fast Ethernet interfaces or 1 fixed Gigabit Ethernet Interface. The Gigabit Ethernet interface requires small form factor pluggable transceiver optics (ordered separately).
- On M7i, M10i, M20, and M40e, the control/system/forwarding board performs route lookup and switching to the destination FPC. It makes forwarding decisions, distributes data cells throughout memory, processes exception and control packets, monitors system components, and controls FPC resets. There are different names for this component on various platforms:
 - M7i/M10i Compact Forwarding Engine Board
 - M20 System and Switch Board
 - M40e Switching and Forwarding Module
- M320 uses a distributed architecture, where the PFE is contained entirely within the FPC. The latest additions to the M320 FPC family is the set of three M320-FPC-E3 cards. The new E3 FPCs provide additional QoS support, increased next-hop scaling and system performance gains. Route lookup and packet processing occurs on the ingress PFE, and is then switched across the Switch Interface Board (switching fabric) to the egress PFE for final route lookup and packet processing. The feature-rich programmable ASICs deliver a comprehensive, hardware-based system for packet processing and support for uncompromising 40 Gbps performance per PFE. To ensure a non-blocking forwarding path, all channels between the ASICs and between ingress and egress PFEs are oversized, dedicated paths.
- The programmable ASICs deliver a comprehensive, hardware-based system for packet processing. To ensure a non-blocking forwarding path, all channels between the ASICs are oversized, dedicated paths.
- The Routing Engine maintains the routing tables and controls the routing protocols, as well as the JUNOS software processes that control the router's interfaces, the chassis components, system management, and user access to the router.
- The Routing Engine processes all routing protocol updates from the network, so forwarding performance is not affected.
- The Routing Engine implements each routing protocol with a complete set of Internet features and provides full flexibility for advertising, filtering, and modifying routes. Routing policies are set according to route parameters, such as prefixes, prefix lengths, and BGP attributes.

Typical applications

