



Juniper Networks M7i and M10i Multiservice Routers

Product Description

The M7i and M10i platforms are ideal enterprise routing solutions for head offices, campuses and corporate backbones needing reliable, secure and high-performance IP WAN connectivity, Internet access and services. Unlike legacy routers with monolithic architectures and aging operating systems, the M-series M7i/M10i multiservice routers boast a hardware-based architecture coupled with JUNOS software, Juniper's modern object-oriented operating system. This architecture ensures rich packet processing with uncompromising forwarding performance to support latency-sensitive applications such as voice, video and mission critical applications. The M7i and M10i routers are the choice for consolidating multiple services onto a single IP/MPLS network and delivering performance, reliability and security to the enterprise environment.

Deployed predominantly at the service-provider edge and in high-end, high-performance enterprise applications, the IP/MPLS M-series multiservice edge routing portfolio is capable of supporting current and emerging Layer 2 and Layer 3 services. From a Layer 2 perspective, the J-FASE (Juniper Frame and ATM Service Emulation) toolkit, combined with M-series multiservice edge routing performance, enables accurate emulation of Asynchronous Transfer Mode (ATM) and Frame Relay services over MPLS. The same multiservice edge routing platform supports rich Ethernet services, enabling providers to capture revenue from this emerging service. Layer 2.5 Interworking VPNs are available to smoothly transition customers from ATM/FR to Ethernet services as demand dictates. The same M-series multiservice edge routing platform also delivers rich Layer 3 services, including the industry's most scalable and comprehensive Layer 3 VPN portfolio, granular per logical interface quality of service (QoS), hardware-based IPv6, multicast, Network Access Translation (NAT), stateful firewall and IPSec encryption. New revenues are generated faster and more cost effectively with the scalable policy control of the SDX-300 service deployment system leveraging these rich features, making the M-series platform the one to choose for next-generation consolidated infrastructures.

Architecture and Key Components

Juniper Networks service-built M-series multiservice edge routing platforms are deployed in the world's largest networks, delivering advanced IP/MPLS edge routing services at scale and helping service providers transform their businesses. Constructed with clean separation between the control plane, forwarding plane and services plane, M-series systems support multiple services without compromise on a single platform to maximize revenue and minimize operational and capital costs. Services supported include a broad array of VPNs, network-based security, real-time voice and video, bandwidth on demand, rich multicast of premium content, IPv6 services, granular accounting and much more. This IP/MPLS edge routing service portfolio continues to grow with every release of JUNOS software, leveraging the tremendous flexibility and performance headroom of the service-built architecture.

Juniper Networks M-series multiservice edge routing portfolio (M-series) uniquely combines best-in-class IP/MPLS capabilities with unmatched reliability, stability, security and service richness. These multiservice edge routing platforms allow providers and enterprises to consolidate multiple networks into a single IP/MPLS infrastructure while simultaneously generating new revenues with leading-edge services. M-series multi-service edge routing systems use a hardware-based approach combined with the highly scalable, secure and reliable JUNOS™ software, enabling multiple services without compromise on a single IP/MPLS platform. Providers enjoy maximized revenue and minimized operational and capital costs.

Applications

The versatile M-series platforms can be deployed in both the service provider environment and in high-end enterprise environments.

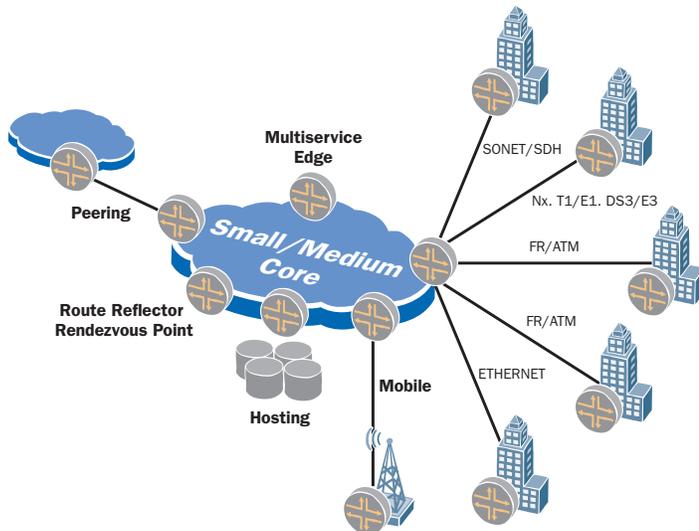


Figure 1: Service Provider Environment

In service provider environments, the M-series platform is deployed predominantly as a multiservice edge router but can also be deployed in small and medium cores, peering, route reflector, multicast, mobile and data center applications.

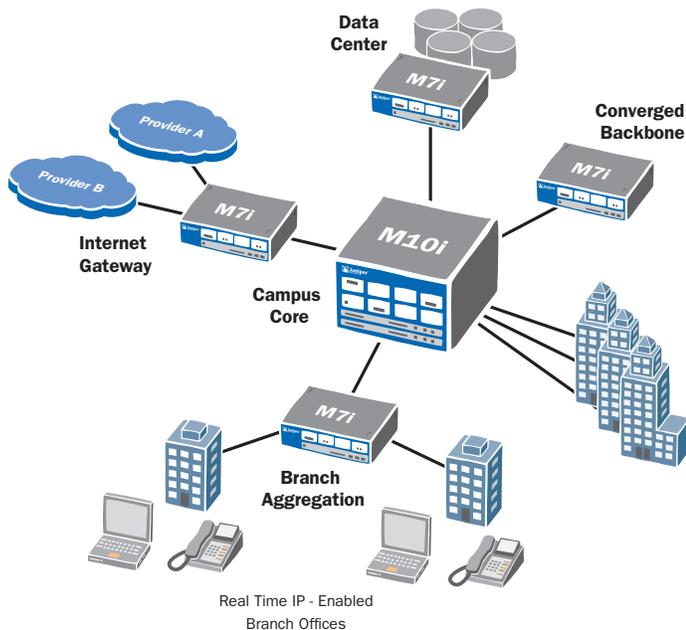


Figure 2: Enterprise

Large enterprises typically deploy M7i or M10i in a number of different locations, including Internet gateway router, WAN router, campus core router, regional backbone and data center.

Enhanced for the Edge

The versatile IP/MPLS M-series routing platforms can be deployed at the edge of provider networks, in small and medium cores, and in peering, route reflector and data center applications. Recent M-series innovations have dramatically expanded edge capabilities by leveraging the highly programmable Internet Processor II application-specific integrated circuit (ASIC) and the IP/MPLS-rich JUNOS software. M-series routers are now deployed and scaling services at the edge of some of the world's largest production networks.

Consistent Services to All Customers

The M-series spans from 7 to 320 Gbps of throughput, including the M7i, M10i, M40e, M120 and M320 platforms. The same scalable and production-hardened JUNOS software runs on all IP/MPLS M-series platforms, making a consistent set of capabilities available at all network locations regardless of customer connection or serving area density.

Access-Agnostic with Leading Densities

With its broad interface portfolio, a single M-series multiservice edge routing platform can provide a single point of edge aggregation for thousands of customers over any access type—including ATM, Frame Relay, Ethernet and time-division multiplexing (TDM)—and 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.

Most Comprehensive VPN Portfolio

The M-series platforms also support the industry's most comprehensive VPN portfolio with the ability to simultaneously run and scale Layer 2 virtual circuits, Layer 2 VPNs, Layer 2.5 Interworking VPNs, Layer 3 2547 VPNs, virtual private LAN service (VPLS), IPSec, generic routing encapsulation (GRE), IP over 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.

Granular QoS and Statistics

Rich packet processing enables the M-series routers to support multiple levels of granular QoS per port, per logical circuit (DLCI, VC/VP, VLAN), and per channel (to DS0) for traffic prioritization. These comprehensive QoS functions include classification, rate limiting, shaping, weighted round-robin scheduling, strict priority queuing, weighted random early detection, random early detection and packet marking. For network convergence applications, Layer 2 class of service (CoS) can be mapped to Layer 3 CoS on a per DLCI, per VP/VC or per-VLAN basis. Simultaneously, extensive statistics can be collected and diagnostics performed at this same level of granularity to enable flexible billing, traffic planning and rapid troubleshooting.

Rich Packet Processing

A broad portfolio of edge routing services can be layered on top of VPNs for additional revenue generation. A comprehensive suite of multicast capabilities, including multicast over MPLS VPNs, enables efficient distribution of premium content. Hardware-based IPv6 and a number of IPv6 migration tools, such as IPv6 over MPLS, ease access to the benefits of this next-generation IP protocol without performance compromise. NAT and stateful firewall can be configured per VPN routing and forwarding table (VRF) to enable network-based security for additional revenues. IPSec can be used to support a premium security service for end users with high security requirements. The M-series service-built edge is continuously enhanced with new packet processing capabilities to ensure maximum revenue-generation opportunities.

Highly Reliable

The M-series service-built architecture has been constructed with scale and stability in mind, including the modular and fault-protected design of JUNOS software and a rigorous system testing process. All M-series routers offer redundant power and cooling. The M10i, M40e, M120 and M320 routers offer fully redundant hardware, including redundant routing engines and Switching/Forwarding Engine Boards. JUNOS software features enhance this

redundant architecture. For example, nonstop forwarding is enabled in the event of a routing engine failure, via a hitless switchover, and in-service software upgrades are supported when a minor software upgrade is required. Other High Availability (HA) capabilities include graceful protocol routing restart, MPLS fast reroute, Virtual Router Redundancy Protocol (VRRP), SONET Automatic Protection Switching (APS), SDH Multiplex Section Protection (MSP), Bidirectional Forwarding Detection protocol (BFD) and Link Aggregation Control Protocol (LACP).

Robust Security

All M-series platforms support highly scalable J-Protect filtering capabilities, unicast reverse path forwarding and high-performance rate limiting for industry-leading Denial of Service (DOS) attack protection. The J-Protect security capabilities of the M-series platforms can be further enhanced with the MultiServices PIC, hardware that accelerates additional network-based security services such as high-speed NAT, stateful firewall with attack detection and J-Flow accounting. With the rich feature set of JUNOS software combined with industry-leading ASIC technology, M-series service-built edge routing provides a new level of reliable and secure service delivery at the edge of service-provider networks.

M7i/M10i Specifications

Internet Protocols

- IPv4
- IPv6

Routing and Multicast

- OSPF
- BGP
- RIPv2
- Static routes
- IS-IS
- Multicast (IGMPv3, PIM, SDP, DVRMRP, Single Source)

IP Address Management

- Static
- DHCP relay

MPLS

- LDP
- RSVP-TE
- Traffic Engineering
- Layer 3 2547 VPN
- Layer 2 VPN
- Virtual Private LAN Service (VPLS)
- Diffserv-aware Traffic Engineering
- MPLS Detour
- MPLS Fast Reroute Link Protection
- MPLS Fast Reroute Node Protection
- MPLS Point-to-Multipoint (P2MP) Traffic Engineering

Encapsulations

- Ethernet (MAC + VLAN Tagged)
- PPP (Synch)
- PPPoA
- Frame Relay
- ATM
- HDLC
- Serial (RS-232, RS-449, X.21, V.35, EIA-530)
- 802.1q support
- MLPPP¹
- MLFR (FRF.15, FRF.16)¹
- L2TP (M7i, M10i and M120 can act as LNS)²

Traffic Management

- Policing & Shaping
- Class Based Queuing with Prioritization
- WRED
- Queuing based on VLAN/VC/VP/DLCI/Interface/Bundles

Voice Support

- FRF.12
- LFI¹
- cRTP²

Security

- Stateful Firewall²
- Attack detection²
- DOS & DDOS protections
- Tunnels (GRE, IP in IP)
- IPSec DES (56-bit), 3DES (168 bit) encryption³
- MD5 and SHA-1 authentication
- Packet filters

System Management

- JUNOS CLI
- JUNOScope Manager
- J-Web browser interface
- Service Deployment System (SDX)
- SNMPv2 and SNMP v3
- JUNOScript XML API

SLA and Measurement

- Real-Time Performance Measurement (delay/jitter)
- Alarm generation on SLA violation
- J-Flow²

Logging and Monitoring

- Syslog
- Traceroute
- MPLS Ping

High Availability

- VRRP
- IETF Graceful Restart
- Redundant forwarding and routing engines (M10i)
- Graceful Routing Engine Switchover (M10i)

Administration

- External administrator database RADIUS
- Configuration rollback
- Commit confirm for changes
- Software upgrades

¹These features require the Link Services PIC

²These features require the optional Adaptive Services Module for the M7i or the Adaptive Services PIC or Adaptive Services II PIC or MultiServices PIC

³These features require either ASP, ASM, or ES PIC

Specifications

	M7i	M10i
Platform		
Dimensions (W x H x D)	17.5 x 3.5 x 18 in (44.5 x 8.9 x 45.7 cm)	17.5 x 8.75 x 18 in (44.5 x 22.2 x 45.7 cm)
Fixed interfaces	2 Fast Ethernet or 1 Gigabit Ethernet	None
Number of PIC Slots	4 open slots	8 open slots
Available Physical Interface Cards (PIC)	See www.juniper.net	See www.juniper.net
Performance		
Packet Per second	16 Million packets per second	16 Million packets per second
Bits per second	8.4 Gbps	12.8 Gbps
WAN Uplink	up to 1 Gigabit Ethernet	up to OC-48/STM-16
Power System		
Nominal Voltage AC (DC option available)	100-240V AC, 47-63Hz	100-240V AC, 47-63Hz
Current/Power	4-2 Amps, 400 watts	8-4 Amps, 800 watts
Power Supplies Required	1 required, 2 for redundancy	2 required, 3 for redundancy
Environment		
Operating Temp	32° to 104° F (0° to 40° C)	32° to 104° F (0° to 40° C)
Storage Temp	-40° to 158° F (-40° to 70° C)	-40° to 158° F (-40° to 70° C)
Relative Humidity (operating)	5% to 90% noncondensing	5% to 90% noncondensing
Agency Approvals		
Safety Certifications	CAN/CSA-C22.2 No. 60950-00/UL 60950 EN 60825-1 EN 60825-2 EN 60950	
EMC	AS/NZS 3548 Class B (Australia / New Zealand) BSMI Class B (Taiwan) EN 55022 Class B Emissions (Europe) FCC Part 15 Class B (USA) VCCI Class B (Japan)	
ETSI	ETS-300386-2 Telecommunication Network Equipment Electromagnetic Compatibility Requirements	
Immunity	EN 61000-3-2 Power Line Harmonics 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	
NEBS Compliant	GR-63-Core: NEBS, Physical Protection GR-1089-Core: EMC and Electrical Safety for Network Telecommunications Equipment SR-3580 NEBS Criteria Levels (Level 3 Compliance)	

Ordering Information

M7i Bundles

One chassis, one Fixed Interface Card (FIC) with either 2 x Fast Ethernet or 1 Gigabit Ethernet (GE includes small form factor pluggable optic module with SX optics), one routing engine (400 MHz) with 768 M DRAM, one compact forwarding engine board with 128 M DRAM, one power supply, one fan tray, JUNOS software, documentation CD. AC bundles include country-appropriate power cable. The Adaptive Services Module option (includes a free NAT/FW multi instance license) can be ordered installed on the compact forwarding engine board by using model numbers in the right column.

Standard	with Adaptive Services Module	Fixed Interface Card with Fast Ethernet
M7i-AC-2FE-RE400-US-B	M7i-AC-2FE-ASM-RE400-US-B	M7i, AC, (US cable) 2 FE ports, DOC CD
M7i-AC-2FE-RE400-UK-B	M7i-AC-2FE-ASM-RE400-UK-B	M7i, AC (UK cable), 2 FE ports, DOC CD
M7i-AC-2FE-RE400-IT-B	M7i-AC-2FE-ASM-RE400-IT-B	M7i, AC (IT cable), 2 FE ports, DOC CD
M7i-AC-2FE-RE400-EU-B	M7i-AC-2FE-ASM-RE400-EU-B	M7i, AC (EU cable), 2 FE ports, DOC CD
M7i-AC-2FE-RE400-AU-B	M7i-AC-2FE-ASM-RE400-AU-B	M7i, AC (AU cable), 2 FE ports, DOC CD
M7i-AC-2FE-RE400-JP-B	M7i-AC-2FE-ASM-RE400-JP-B	M7i, AC (JP cable), 2 FE ports, DOC CD
M7i-DC-2FE-RE400-B	M7i-DC-2FE-ASM-RE400-B	M7i, DC, 2 FE ports, DOC CD

Standard	with Adaptive Services Module	Fixed Interface Card with Gigabit Ethernet and SFP
M7i-AC-1GE-RE400-US-B	M7i-AC-1GE-ASM-RE400-US-B	M7i, AC (US cable), 1 GE port (w/SFP), DOC CD
M7i-AC-1GE-RE400-UK-B	M7i-AC-1GE-ASM-RE400-UK-B	M7i, AC (UK cable), 1 GE port (w/SFP), DOC CD
M7i-AC-1GE-RE400-IT-B	M7i-AC-1GE-ASM-RE400-IT-B	M7i, AC (IT cable), 1 GE port (w/SFP), DOC CD
M7i-AC-1GE-RE400-EU-B	M7i-AC-1GE-ASM-RE400-EU-B	M7i, AC (EU cable), 1 GE port (w/SFP), DOC CD
M7i-AC-1GE-RE400-AU-B	M7i-AC-1GE-ASM-RE400-AU-B	M7i, AC (AU cable), 1 GE port (w/SFP), DOC CD
M7i-AC-1GE-RE400-JP-B	M7i-AC-1GE-ASM-RE400-JP-B	M7i, AC (JP cable), 1 GE port (w/SFP), DOC CD
M7i-DC-1GE-RE400-B	M7i-DC-1GE-ASM-RE400-B	M7i, DC, 1 GE port (w/SFP), DOC CD

Software Licenses for the Adaptive Services Module

Model	Description
S-ACCT	J-Flow
S-CRTP	CRTP
S-LNS	L2TP LNS license for M7i, M10i and M120
S-ES	IPSec

M10i bundles

Each bundle includes chassis, one routing engine with 768 M DRAM (400 MHz or 850 MHz options), one compact forwarding engine board with 128 M DRAM (two for redundant), one high availability chassis manager board (two for redundant), two fan trays, two power supplies (three for AC redundancy, four for DC redundancy), JUNOS software, documentation CD. AC bundles include country-appropriate power cables.

RE-400	RE-850	
M10i-AC-RE400-US-B	M10i-AC-RE850-US-B	M10i, AC (US cable)
M10i-AC-RE400-UK-B	M10i-AC-RE850-UK-B	M10i, AC (UK cable)
M10i-AC-RE400-IT-B	M10i-AC-RE850-IT-B	M10i, AC (IT cable)
M10i-AC-RE400-EU-B	M10i-AC-RE850-EU-B	M10i, AC (EU cable)
M10i-AC-RE400-AU-B	M10i-AC-RE850-AU-B	M10i, AC (AU cable)
M10i-AC-RE400-JP-B	M10i-AC-RE850-JP-B	M10i, AC (JP cable)
M10i-DC-RE400-B	M10i-DC-RE850-B	M10i, DC

M10i/M7i Spares

Model	Description
FEB-M10i-M7i-S	M10i/M7i forwarding engine spare
FEB-M7i-SVCS-S	M7i forwarding engine spare with built-in services module
RE-400-768-S	Routing Engine board spare (400 MHz Celeron, 768 MB DRAM)
RE-400-768-WW-S	Routing Engine board spare (400 MHz Celeron, 768 MB DRAM) - JUNOS worldwide
RE-850-1536-S	Routing Engine board spare (850 MHz Pentium III, 1536 MB DRAM)
RE-850-1536-WW-S	Routing Engine board spare (850 MHz Pentium III, 1536 MB DRAM) - JUNOS worldwide
CHAS-MP-M10i-S	M10i Chassis Spare
CHAS-MP-M7i-1GE-S	M7i Chassis Spare, 1 built-in GE port
CHAS-MP-M7i-2FE-S	M7i Chassis Spare, 2 built-in FE ports
HCM-M10i-S	High availability chassis manager board for M10i
PWR-M10i-M7i-AC-S	M10i/M7i AC power supply spare
PWR-M10i-M7i-DC-S	M10i/M7i DC power supply spare
FANTRAY-M7i-S	M7i fan tray spare
FANTRAY-M10i-S	M10i fan tray spare
CF-UPG2-1G-S	Upgrade kit 1 G compact flash upgrade for RE 400/850
RE-CF-1G-S	Compact flash media upgrade for RE
MEM-FEB-256-S	Optional M10i, M7i Forwarding Engine Board (FEB) memory upgrade: 256 MB DRAM module
MEM-RE-256-S	Optional RE memory upgrade: 256 MB DRAM module

Ordering Information (cont'd)

M10i/M7i Physical Interface Cards

Model	Description
Ethernet	
PE-1GE-SFP-QPP	1-port Gigabit Ethernet IQ PIC (requires SFP)
PE-1GE-SFP	1-port Gigabit Ethernet PIC (requires SFP)
PE-4GE-TYPE1-SFP-IQ2	4-port Type1 Gigabit Ethernet IQ2 PIC (requires SFP)
PE-12FE-TX-MDI	12-port 10,100 TX Ethernet PIC. Includes 3-meter VHDCI to RJ21 Ethernet breakout cable. Connects to RJ21 to RJ45 patch panel and services (12) 10,100 Ethernet ports. Configured for MDI pinout.
PE-12FE-TX-MDIX	12-port 10,100 TX Ethernet PIC. Includes 3-meter VHDCI to RJ21 Ethernet breakout cable. Connects to RJ21 to RJ45 patch panel and services (12) 10,100 Ethernet ports. Configured for MDI-X pinout.
PE-4FE-TX	4-port Fast Ethernet PIC, TX interface, RJ45 connector
ATM	
PE-1OC12-ATM2-SMIR	1-port OC-12/STM4 ATM2 IQ PIC, single mode, IR
PE-2OC3-ATM2-MM	2-port OC-3/STM1 ATM2 IQ PIC, multi mode
PE-2OC3-ATM2-SMIR	2-port OC-3/STM1 ATM2 IQ PIC, single mode, IR
PE-4DS3-ATM2	4-port DS3 ATM2 IQ PIC (ships with cable)
PE-2E3-ATM2	2-port E3 ATM2 IQ PIC (ships with cable)
POS	
PE-1OC12-SON-SFP	1-port OC12/STM4 or OC3/STM1, rate-selectable PIC. Requires OC12 or OC3 SFP
PE-2OC3-SON-SFP	2-port OC3/STM1 PIC. Requires OC3 SFP
PE-4OC3-1OC12-SON-SFP	4-port OC3/STM1 or 1-port OC12/STM4, rate-selectable PIC. Requires OC3 or OC12 SFP
Clear Channel	
PE-4DS3	4-port DS3 PIC (and cables) with PIC ejector
PE-2DS3	2-port DS3 PIC (and cables) with PIC ejector
PE-4E3-QPP	4-port E3 IQ PIC
PE-2E3	2-port E3 PIC (and cables) with PIC ejector
PE-4E1-COAX	4-port E1 PIC (75-ohm BNC connectors) (ships with cables)
PE-4E1-RJ48	4-port E1 PIC (120-ohm, RJ48 connectors)
PE-4T1-RJ48	4-port T1 PIC, (120-ohm, RJ48 connectors)
PE-2EIA530	2-port EIA-530 PIC (DB-25 connector)
Channelized	
PE-1CHSTM1-SMIR-QPP	1-port channelized STM1 to DS0 IQ PIC, SM, IR
PE-4CHDS3-QPP	4-port channelized DS3 to DS0 IQ PIC, BNC
PE-10CHE1-RJ48-QPP	10-port channelized E1 to DS0 IQ PIC, RJ48
PE-1CHOC3-SMIR-QPP	1-port channelized OC3 to DS0 IQ PIC, SM, IR
PE-1CHOC12SMIR-QPP	1-port channelized OC-12 to DS0 IQ PIC, SM, IR
PE-10CHT1-RJ48-QPP	10-port channelized T1 to DS0 IQ PIC

Model	Description
Services	
PE-MS-100-1	MultiServices PIC, 1 GB DRAM
PE-AS2-FIPS	Adaptive Services PIC II - FIPS
PE-AS2-LAYER2SERVICES	Adaptive Services PIC II - Layer 2 services: supports link services (S-LSSL-4, S-LSSL-64, S-LSSL-256), CRTP (S-CRTP) and tunnel services (S-TUNNEL)
PE-LS-4	Link services PIC, 4 ML bundles, 256 LFI links, tunnel services
PE-LS-32	Link services PIC, 32 ML bundles, 256 LFI links, tunnel services
PE-TUNNEL	Tunnel services PIC with PIC ejector
For additional physical interface cards please see www.juniper.net/products/modules	
Interface Accessories	
CBL-EIA530-V35-DTE	EIA-530 to V.35 cable (DTE) for M-series
CBL-EIA530-X21-DTE	EIA-530 to X.21 cable (DTE) for M-series
CBL-RJ21-MDI-S	3-meter VHDCI to RJ21 Ethernet cable spare for PE-12FE-TX
CBL-RJ21-MDIX-S	3-meter VHDCI to RJ21 Ethernet cable spare for PE-12FE-TX
CBL-SMZ-BNC-M-S	10-ft SMZ to BNC coaxial cable spare, for DS3/E3 PICs
SFP-1GE-SX	SFP 1000Base-SX Gigabit Ethernet optic module
SFP-1GE-LX	SFP 1000Base-LX Gigabit Ethernet optic module
SFP-1GE-T	SFP 1000Base-T Gigabit Ethernet module (uses Cat 5 cable)
SFP-OC12-SR	SFP OC12/STM4 optic module, SR
SFP-OC12-IR	SFP OC12/STM4 optic module, IR
SFP-OC12-LR	SFP OC12/STM4 optic module, LR
SFP-OC3-SR	SFP OC3 optic module, MM, SR
SFP-OC3-IR	SFP OC3 optic module, SM, IR
SFP-OC3-LR	SFP OC3 optic module, SM, LR

About Juniper Networks

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



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