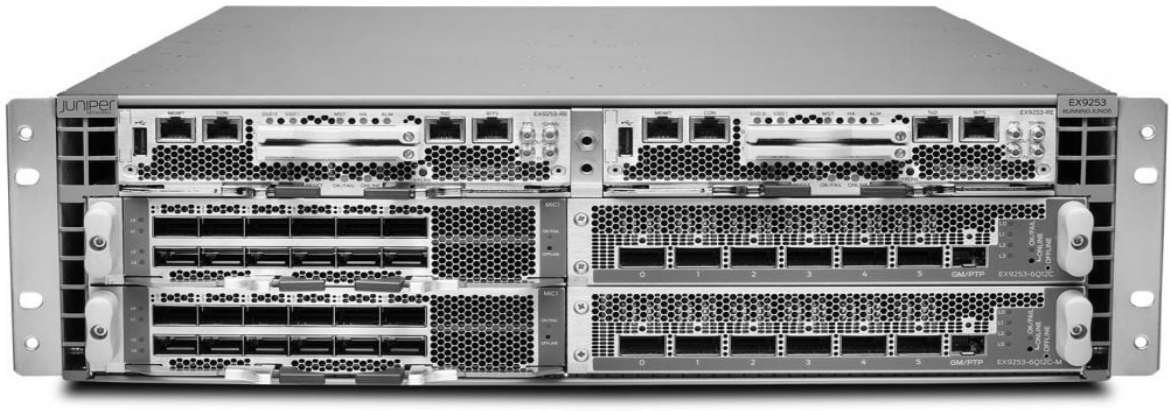
HPE JUNIPER networking

Data sheet



# JUNIPER NETWORKS EX9250 SWITCH

HPE

## Product overview

The Juniper Networks EX9250 line of Switches provides compact, programmable, and scalable core and aggregation devices for enterprise environments, reducing cost and complexity while offering carrier-class reliability. The Juniper Networks EX9250 Switches dramatically simplify campus and data center architectures by enabling Evolved Enterprise Core deployments with Ethernet VPN, creating a path to a 100GbE core.

## Product description

The Juniper Networks EX9250 line of compact, programmable, and scalable Ethernet Switches is ideal for aggregating access switches such as Juniper Networks EX2300, EX3400, EX4300, and EX4600 Ethernet Switches deployed in campus wiring closets and in on-premises data centers.

The EX9250 is also a key component of HPE AI-Driven Enterprise. The switch decouples the overlay network from the underlay with technologies such as Ethernet VPN (EVPN) and Virtual Extensible LAN (VXLAN), addressing the needs of the modern enterprise network by allowing network administrators to create logical L2 networks over different L3 networks.

Two EX9250 chassis options are available, providing considerable deployment flexibility:

— EX9251 Ethernet Switch is a fixed-configuration 1 U chassis that supports 8-port 1GbE/10GbE and 4-port 40GbE/100GbE.

— EX9253 Ethernet Switch is a two-slot modular 3 U chassis that supports any combination of the following line cards:

- EX9253-6Q12C, a 12-port QSFP28 40GbE/100GbE and 6-port QSFP+ 40GbE line card
- EX9253-6Q12C-M, a 12-port QSFP28 40GbE/100GbE and 6-port QSFP+ 40GbE line card with Media Access Control Security (MACsec) support

Fully configured, a single EX9253 chassis can support up to 144 10GbE ports (all at wire speed), delivering one of the industry's densest line-rate 10GbE port densities for this class of feature-rich and programmable switch. The EX9253 switch is capable of delivering up to 2.4 Tbps per slot.

### Custom silicon

The EX9250 switches are based on Juniper One custom silicon, an ASIC designed by HPE that provides a programmable Packet Forwarding Engine (PFE) and natively supports networking protocols such as virtualization using MPLS over IP and overlay network protocols. ASIC micro code changes, delivered through updates to JHPE Juniper Networking Junos operating system, protect investments by allowing existing hardware to support new or future networking protocols.

As a key component of HPE Cloud-Enabled Enterprise architecture, EX9250 switches provide a simple, open, and smart approach to building enterprise networks. The EX9250 switches support Junos fusion for enterprise technology, which enables a large number of devices deployed throughout a building to be managed as a single logical device. The EX9250 switches also support Data Center Interconnect (DCI), critical to workload mobility and application availability, by delivering leading technologies such as MPLS, virtual private LAN service (VPLS), and EVPN.

EX9250 switches offer Evolved Enterprise Core capabilities that allow the creation of larger networks supporting both Layer 2 and Layer 3 application traffic. An Evolved Enterprise Core is enabled by combining technologies such as EVPN and VXLAN. EVPN uses control plane-based learning to ensure efficient network utilization and natively supports active/active multihoming. VXLAN overlay with EVPN allows L2 connectivity across the network while providing active/active redundancy, aliasing, and mass media access control (MAC) withdrawal.

In an Evolved Enterprise Core, the provider edge (PE) switch/router can, in most cases, also use a VXLAN L3 gateway and route between VXLAN segments when required. Since the core is a standard IP network, EVPN/VXLAN allows the creation of an evolved core without having to replace the rest of the core infrastructure. Enabling an evolved core with EVPN provides flexibility by integrating with Junos fusion and other technologies in the distribution/access layer, paving the way for a broader EVPN deployment over time.

The EX9250 line of switches is designed with simplicity in mind to enable the Self-Driving Network, with the goal of detecting and correcting network faults and anomalies before services or customer experiences can be impacted. The following capabilities, integrated into the EX9250 switches, make this possible.

— **Automation:** In addition to integration with Puppet, Python, OpenStack, and other automation applications, Juniper Extension Toolkit (JET), available on the EX9250 switches, covers all phases of network design, construction, provisioning, and operations implemented with the APIs and programming tools to deliver more programmatic interaction. JET provides a notification API that allows users to subscribe to events and designate a callback function, as well as a service API that allows users to access the control plane and management plane to run operational and configuration commands.

— **Analytics:** Junos Telemetry Interface (JTI), available on the EX9250 switches, delivers advanced telemetry for collecting the data needed to detect the state of network resources and services. This includes capacity analysis, scenario simulation, and detection, as well as prevention of network incidents. JTI uses a push model to deliver data asynchronously, eliminating the need for polling, while allowing a management station to request data once and subscribe to streaming periodic updates. As a result, JTI can effectively scale to support thousands of devices, gathering telemetry data essential to the Self-Driving Network.

Like all Juniper Networks EX Series Switches, as well as HPE Juniper Networking virtual and physical SRX Series Services Gateways, the EX9250 switches are supported by management applications such Junos Space Network Director and the Juniper Sk Enterprise cloud management offering.

**Table 1.** EX9250 features at a glance

| Feature | EX9251 | EX9253 |
|---|---|---|
| **Architecture** | Single data control and management plane | Separate dedicated data, control, and management planes |
| **Power** | Holds up to two power supplies<br>-40 to -72 V DC (1+1 redundancy)<br>Autosensing 120/240 V AC (1+1 redundancy)<br>Maximum power draw 312 W (DC) 300 W (AC) | Holds up to six power supplies<br>–40 to –72 V DC (3+1 redundancy)<br>100-120 V AC (3+1 redundancy)<br>200-240 V AC (3+1 redundancy)<br>Maximum power draw 2692 W (DC) 2692 W (AC) |
| **Cooling** | Internally redundant fan tray with front-to-back airflow | Internally redundant fan tray with front-to-back airflow |
| **Weight (fully loaded)** | 23.15 lb (10.5 kg) | 120 lb (54.43 kg) |
| **Maximum throughput** | Up to 800 Gbps | Up to 4.8 Tbps |
| **Routing Engine (RE)** | Integrated single RE<br>1.6 GHz 8 core Intel® Xeon® processor<br>Up to 32 gigabytes DRAM<br>Solid-state drive (SSD) (up to 100 GB)<br>Console auxiliary serial and Ethernet management ports USB storage interface | Primary and backup REs (1+1 redundancy)<br>1.6 GHz 8-core Intel Xeon processor<br>Up to 64 gigabytes DRAM<br>Dual front pluggable solid-state drive (SSD) (up to 100 GB each)<br>Console auxiliary serial and Ethernet management ports USB storage interface |
| **Operating system** | xJunos operating system | Junos operating system |
| **High availability** | Hardware designed for continuous operation:<br>Secure, modular architecture that isolates faults<br>Separate control and forwarding planes that enhance scalability and resiliency | Hardware designed for continuous operation<br>— Secure modular architecture that isolates faults<br>— Separate control and forwarding planes that enhance scalability and resiliency<br>— Transparent failover and network recovery<br>— Graceful Routing Engine switchover (GRES)<br>— Nonstop active routing (NSR)<br>— Nonstop bridging (NSB) |

**Table 1.** EX9250 features at a glance(continued)

| Feature | EX9251 | EX9253 |
|---|---|---|
| **Layer 2 features** | Up to 1 million MAC addresses | |
| | Up to 512000 Address Resolution Protocol (ARP) entries with mid-scale (ML) license (256000 entries without ML license) | |
| | Up to 512000 forwarding information base (FIB) entries with ML license (256000 entries without ML license) | |
| | Jumbo frames (9192 bytes maximum) | |
| | 32000 VLANs | |
| | VLAN Registration Protocol | |
| | 8023ad-Link Aggregation Control Protocol (LACP) | |
| | 8021D-Spanning Tree Protocol (STP) | |
| | 8021w-Rapid Spanning Tree Protocol (RSTP) | |
| | 8021s-Multiple Spanning Tree Protocol (MSTP) | |
| | VLAN Spanning Tree Protocol (VSTP) Layer 2 Protocol Tunneling (L2PT) | |
| **Layer 3 features** | 1 million IPv4 routing information base (RIB) | |
| | 1 million IPv6 RIB | |
| | Static routing | |
| | RIP v1/v2 | |
| | OSPF v1/v2 | |
| | OSPF v3 | |
| | Filter-based forwarding | |
| | Virtual Router Redundancy Protocol (VRRP) | |
| | IPv6 | |
| | Bidirectional Forwarding Detection (BFD) | |
| | Virtual routers | |
| | BGP (Advanced Feature license) IS-IS (Advanced Feature license) | |
| **Hardware tunneling** | GRE tunnels | |
| | MPLS capabilities (Advanced Feature License) | |
| | VPLS | |
| | BGP/MPLS VPNs Ethernet VPNs | |
| **Multicast** | Up to 256000 IPv4 multicast routes | |
| | Up to 256000 IPv6 multicast routes | |
| | Internet Group Management Protocol (IGMP) v1/v2/v3 | |
| | IGMP snooping | |
| | Multicast Listener Discovery (MLD) v1/v2 | |
| | MLD snooping | |
| | Protocol Independent Multicast PIM-SM PIM-SSM PIM-DM Multicast Source Discovery Protocol (MSDP) | |
| **Firewall filters** | Ingress and egress L2-L4 access control lists (ACLS): | |
| | Port ACLS | |
| | VLAN ACLS | |
| | Router ACLS Control plane denial-of-service (DoS) protection | |
| **Quality of service (QoS)** | 16000 policers per chassis | |
| | 8 egress queues per port | |
| | Weighted random early detection (WRED) scheduling | |
| | Weighted round-robin (WRR) queuing Strict priority queuing | |
| **Virtualization** | Integration with Contrail Platform | |
| | Integration with VMware NSX® VMware vSphere® | |
| | Network virtualization protocols such as VXLAN | |
| | VXLAN L2 and L3 gateway EVPN and VPLS for DCI | |

**Table 1.** EX9250 features at a glance(continued)

| | |
|---|---|
| **Management** | Junos OS CLI |
| | Junos Space Network Director |
| | Junos XML management protocol |
| | SNMP v1/v2/v3 |
| | RADIUS |
| | TACACS+ |
| | Extensive MIB support |
| | Firewall-based port mirroring |
| | Link Layer Discovery Protocol (LLDP) Advanced Insight Solutions (AIS) |

## EX9250 campus deployment options

The EX9250 is designed primarily for the following two use cases:

— **EVPN multihoming or MC-LAG:** A pair of interconnected EX9250 switches can be deployed to provide EVPN multihoming (ESI-LAG) or multichassis link aggregation (MCLAG) in a collapsed core/distribution configuration. This eliminates the need for Spanning Tree Protocol (STP) across the campus network by providing multihoming capabilities from the access to the distribution layer, while the distribution to the core layer is an L3 IP fabric. EVPN multihoming also supports horizontal scaling with more than two devices in the distribution layer and can extend EVPN to the core.

— **Campus fabric:** The AI-Driven Enterprise architecture decouples the overlay network from the underlay with technologies such as EVPN and VXLAN, addressing the needs of the modern enterprise network by allowing network administrators to create logical L2 networks over different L3 networks. HPE supports various EVPN-VXLAN-based campus fabric architectures, including:

- Campus fabric core-distribution
- Campus fabric IP Clos

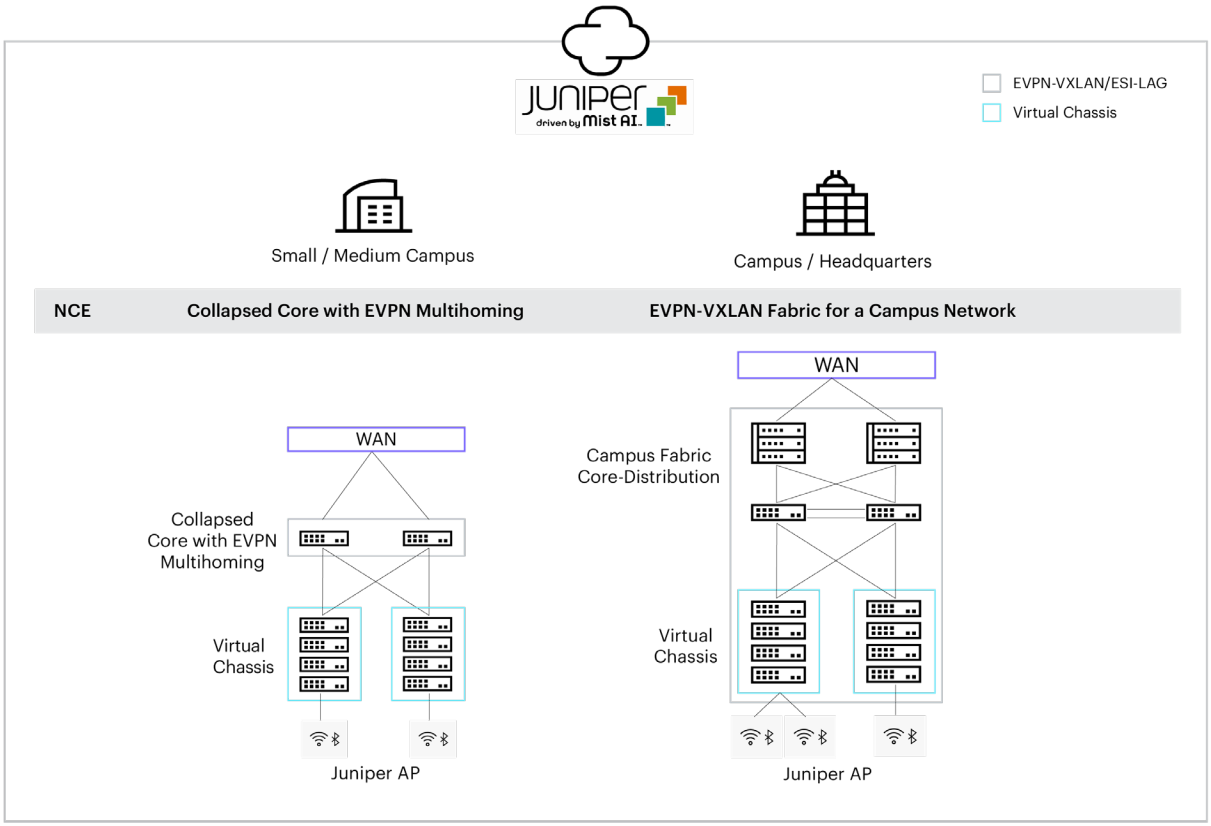



**Figure 1.** EX9250 as distribution and core in EVPN multihoming and campus fabric architectures

Campus fabric architectures let you manage your campus and data center as a single IP fabric, with over-the-top (OTT) policy and control provided by HPE. Any number of switches can be connected in a Clos network or IP fabric; EVPN-VLAN extends the fabric and connects multiple enterprise buildings while VXLAN stretches L2 across the network. An IP Clos network between the distribution and core layers can exist in two modes: centrally routed bridging overlay or edge-routed bridging overlay.

## Architecture and key components

The EX9250 line delivers a number of common architectural elements across its campus distribution and core Ethernet switches. The REs employed by these switches run Junos OS, which processes all L2 and L3 protocols and manages the chassis. The EX9251 switch and the EX9253 line cards include Packet Forwarding Engines (PFEs) that process network traffic.

The EX9251 is designed for small enterprise campus deployments. The switch's shallow depth makes it ideal for wiring closets and distribution facilities. To maintain uninterrupted operation, redundant variable-speed fans cool the system, as well as the RE and PFE. Redundant hot-swappable power supplies convert building power to the internal voltage required by the system.

The EX9253 is designed for medium-sized enterprises, with efficient multicast replication handling and deep buffering to ensure performance at scale. To maintain uninterrupted operation, trays with redundant, variable-speed fans cool the line cards, RE, and PFE. The EX9253 power supplies convert building power to the internal voltage required by the system. All EX9253 components are hot-swappable, and all central functions are available in redundant configurations, providing high operational availability and ensuring continuous system operation during maintenance or repairs.

## Software functionality

The EX9251 and the EX9253 switches support an extensive set of L2 and L3 services. EX9250 switches are built on Juniper One custom silicon, which supports a wide range of L2 and L3 Ethernet functionality, including 802.1Q VLAN, link aggregation, Virtual Router Redundancy Protocol (VRRP), L2-to-L3 mapping, and port monitoring. Additionally, the line cards support filtering, sampling, load balancing, rate limiting, class of service (CoS), and other key features needed for the deployment of dependable, high performance Ethernet infrastructure.

## EX9250 Routing Engine

The Routing Engine used by the EX9250 line of switches is based on the same field-proven hardware architecture used by HPE Juniper Networking routers, bringing the same carrier-class performance and reliability to the EX9250 that HPE Juniper Networking routers bring to the world's largest service provider networks. The RE's central CPU performs all system control functions and maintains hardware forwarding table and routing protocol states for the switches.

— The EX9251 supports control and management plane functionality with a single integrated RE that features an 8-core, 1.6 GHz Intel® processor with 32 gigabytes of DRAM, and an internal fixed SSD providing 100 GB of storage for Junos OS images and logs. Dedicated hardware on the RE supports chassis management functions such as environmental monitoring.

— The EX9253 supports control and management plane functionality with an integrated RE that features an 8-core, 1.6 GHz Intel processor with 64 gigabytes of DRAM and dual front-pluggable SSDs, each providing 100 GB of storage for Junos OS images and logs. Dedicated hardware on the RE supports chassis management functions such as environmental monitoring. Communication between the RE modules and individual line cards takes place over a dedicated internal GbE out-of-band control interface.

Both the EX9251 and EX9253 feature AUX, console, and Ethernet ports on the front panel to support out-of-band system management and monitoring, while an external USB port accommodates a removable media interface for manually installing Junos OS images.

## Power

All EX9250 switches support both AC and DC power supplies; however, AC and DC supplies cannot be mixed in the same chassis.

— The EX9251 supports up to two AC or DC power supplies. The AC supplies accept 100 to 240 V AC input and deliver 650 watts of power to the chassis, while the DC power supplies accept -40 to -72 V DC input and deliver 650 watts of power. The EX9251 can be provisioned with either one or two AC power supplies with high line (200-240 V AC) power inputs; one or two AC power supplies with low line (100-120 V AC) power inputs; or one or two DC power supplies.

**Table 2.** EX9253 power consumption

| | Typical power | Maximum power |
|---|---|---|
| **EX9253-6Q12C Line Card** | 740W | 800W |
| **EX9253-6Q12C-M Line Card** | 770W | 770W |

**Table 3.** EX9250 maximum power consumption

| | EX9251 | EX9253 |
|---|---|---|
| **100-120 V AC Input** | 300W | 2692 W |
| **200-240 V AC Input** | 300W | 2692 W |
| **-40 to -72 V DC Input** | 312W | 72692 W |

— The EX9253 supports up to six AC or DC power supplies. The AC supplies accept 100 to 240 V AC input and deliver 6600 W at 110 V and 9600 W at 220 V, while the DC power supplies accept -40 to -72 V DC input and deliver 6600 W of power to the chassis. The EX9253 can be provisioned with three to six AC power supplies with high line (200-240 V AC) power inputs; three to six AC power supplies with low line (100-120 VAC) power inputs; or three to six DC power supplies.

# Features and benefits

### Simplified network architectures

The EX9250 line of switches is ideal for simplifying campus, data center, and combined campus and data center network environments by collapsing network layers.

When deployed in an MC-LAG configuration in the campus, the EX9250 switches—working in conjunction with HPE Juniper Networking access layer switches like the EX4300, EX3400, and EX2300—eliminate the need for STP and collapse the core and aggregation layers, dramatically simplifying the network architecture and network operations.

Similarly, in the data center, the EX9250 switches can be used to collapse core and aggregation layers. When used with HPE Juniper Networking access switches in an MC-LAG configuration, the EX9251 and EX9253 reduce the number of managed devices by more than 50% and eliminate the need for STP.

In combined campus and data center environments, the EX9250 line consolidates network layers to simplify the network architecture and operations. In all scenarios, the EX9250 line of switches delivers a simple, secure, virtualized network environment that increases enterprise business agility.

### High availability

When serving as core switches, the EX9250 line delivers a number of high availability features that ensure uninterrupted, carrier-class performance in addition to redundant, hot-swappable power supplies and field-replaceable fans. Each EX9253 chassis includes an extra slot to accommodate a redundant RE to serve as a backup in hot-standby mode, ready to take over in the event of a primary RE failure. If the primary RE fails, the integrated L2 and L3 GRES feature of Junos OS, working in conjunction with the NSR and NSB features, ensures a seamless transfer of control to the backup, maintaining uninterrupted access to applications, services, and IP communications.

### Carrier-class operating system

The EX9250 line of switches runs the same Junos OS used by all other Juniper Networks EX Series Switches, as well as the HPE Juniper Networking routers that power the world's largest and most complex networks.

By using a common operating system, HPE delivers a consistent implementation and operation of control plane features across all products. To maintain that consistency, Junos OS adheres to a highly disciplined development process that uses a single source code, follows a single release train, and employs a highly available modular architecture that prevents isolated failures from bringing down an entire system.

These attributes are fundamental to the core value of the software, enabling all Junos OS-powered products to be updated simultaneously with the same software release. All features are fully regression tested, making each new release a true superset of the previous version; customers can deploy the software with complete confidence that all existing capabilities will be maintained and operate in the same way.

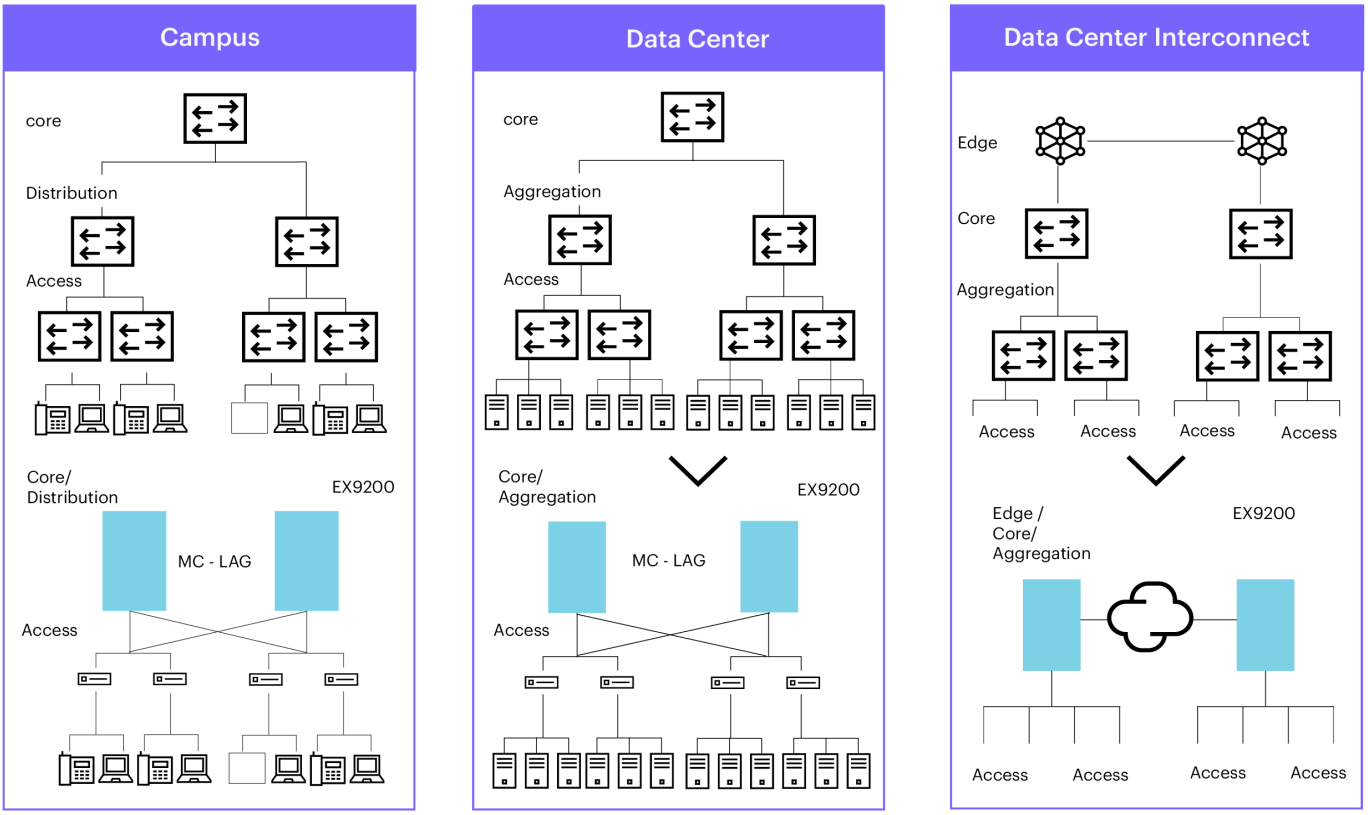



**Figure 2.** EX9250 collapses layers in campus, data center, and combined campus and data center environments.

## Simplified management and operations

A range of system management options are available for the EX9250 line.

The standard Junos OS CLI provides the same granular management capabilities and scripting parameters found in all Junos OS-powered devices. In addition, integrated Junos XML management protocol tools provide early detection and automatic resolution of potential problems related to the operating system. Junos Space Network Director software provides system-level management across all EX Series switches, as well as other HPE products deployed throughout the network—all from a single console.

## MACsec

The EX9253-12C8Q-M line card supports IEEE 802.1ae MACsec with AES-256 bit encryption, ensuring link-layer data confidentiality, data integrity, and data origin authentication. A single EX9253-SFL license is required for the EX9253 chassis to enable MACsec in software.

Defined by IEEE 802.1ae, MACsec provides secure, encrypted communication at the link layer that is capable of identifying and preventing threats from DoS and other intrusion attacks, as well as man-in-the-middle, masquerading, passive wiretapping, and playback attacks launched from behind the firewall. When deployed on switch ports, MACsec encrypts all traffic on the wire but not inside the switch itself. This allows the switch to apply policies such as QoS, deep packet inspection, and sFlow® to each packet without compromising the security of packets on the wire.

Hop-by-hop encryption enables MACsec to secure communications while maintaining network intelligence. In addition, Ethernet-based WAN networks can use MACsec to secure links over long-haul connections. MACsec is transparent to L3 and higher layer protocols and is not limited to IP traffic; it works with any type of wired or wireless traffic traversing Ethernet links.

## Scale licenses

EX9251-ML and EX9253-ML Mega Scale license SKUs enable an EX9250 line chassis to support 512,000 FIB and ARP entries. Only one ML license is required per chassis.

EX9251

EX9253

# Specifications

**Table 4.** EX9250 system capacity

| | EX9251 | EX9253 |
|---|---|---|
| **Maximum throughput bandwidth/slot** | 800 Gbps<br>400 Gbps full duplex | 2.4 Tbps/slot<br>1.2 Tbps full duplex |
| **Maximum 10GbE port density (wire speed)** | 24 | 144 (with break out cables) |
| **Maximum 40GbE port density (wire speed)** | 4 | 36 |
| **Maximum 100GbE port density (wire speed)** | 4 | 24 |

**Table 5.** Chassis specifications

| | EX9251 | EX9253 |
|---|---|---|
| **Dimensions (W x H x D):** | 17.6 x 1.75 x 18.7 in (44.7 x 4.45 x 47.5 cm) | 19 x 5.217 x 30 in. (48.26 x 13.25 x 76.2 cm) Total depth includes standard cable manager measurements. |
| **Rack units** | 1 U | 3 U |
| **Weight (fully loaded)** | 23.15 lb (10.5 kg) | 120 lb (54.43 kg) |
| **Total number of slots** | N/A | 3 |
| **Slots available for line cards** | N/A | 2 |

**Table 6.** EX9253 Line Card capacities

| | EX9253 |
|---|---|
| **EX9253-6Q12C** | 2.4 Tbps |
| **EX9253-6Q12C-M** | 2.4 Tbps |

# EX9253 Line Card specifications

### Dimensions (W x H x D)

— 1.25 x 17 x 22 in. (3.2 x 43.2 x 55.9 cm)

### Weight

— EX9253-6Q12C: 14.0 lb (6.6 kg)

— EX9253-6Q12C-M: 14.8 lb (6.7 kg)

# Feature specifications

### IEEE compliance

— IEEE 802.1AB: Link Layer Discovery Protocol (LLDP)
— IEEE 802.1D-2004: Spanning Tree Protocol (STP)
— IEEE 802.1p: Class-of-service (CoS) prioritization
— IEEE 802.1Q: Virtual Bridged local area network
— IEEE 802.1s: Multiple Spanning Tree Protocol (MSTP)
— IEEE 802.1w: Rapid Spanning Tree Protocol (RSTP)
— IEEE 802.3: 10BASE-T
— IEEE 802.3u: 100BASE-T
— IEEE 802.3ab: 1000BASE-T
— IEEE 802.3z: 1000BASE-X
— IEEE 802.3ae: 10-Gigabit Ethernet

— IEEE 802.3ba: 40-Gigabit/100-Gigabit Ethernet

— IEEE 802.3ah: Operation, Administration, and Maintenance (OAM)

— IEEE 802.3ad: Link Aggregation Control Protocol (LACP)

— IEEE 802.1ae: Media Access Control Security

**RFC Compliance**

— RFC 768: UDP

— RFC 783: Trivial File Transfer Protocol (TFTP)

— RFC 791: IP

— RFC 792: Internet Control Message Protocol (ICMP)

— RFC 793: TCP

— RFC 826: ARP

— RFC 854: Telnet client and server

— RFC 894: IP over Ethernet

— RFC 903: Reverse Address Resolution Protocol (RARP)

— RFC 906: TFTP Bootstrap

— RFC 951, 1542: BootP

— RFC 1027: Proxy ARP

— RFC 1058: RIP v1

— RFC 1112: IGMP v1

— RFC 1122: Host Requirements

— RFC 1195: Use of Open Systems Interconnection (OSI) IS-IS for Routing in TCP/IP and Dual Environments (TCP/IP transport only)

— RFC 1256: IPv4 ICMP Router Discovery Protocol (IRDP

— RFC 1492: TACACS+

— RFC 1519: Classless Interdomain Routing (CIDR)

— RFC 1587: OSPF NSSA Option

— RFC 1591: Domain Name System (DNS)

— RFC 1745: BGP4/IDRP for IP-OSPF Interaction

— RFC 1765: OSPF Database Overflow

— RFC 1771: Border Gateway Protocol 4

— RFC 1772: Application of the Border Gateway Protocol in the Internet

— RFC 1812: Requirements for IP Version 4 Routers

— RFC 1965: Autonomous System Confederations for BGP

— RFC 1981: Path maximum transmission unit (MTU) Discovery for IPv6

— RFC 1997: BGP Communities Attribute

— RFC 2030: Simple Network Time Protocol (SNTP)

— RFC 2068: HTTP server

— RFC 2080: RIPng for IPv6

— RFC 2081: RIPng Protocol Applicability Statement

— RFC 2131: BOOTP/Dynamic Host Configuration Protocol (DHCP) relay agent and DHCP server

— RFC 2138: RADIUS Authentication

— RFC 2139: RADIUS Accounting

— RFC 2154: OSPF with Digital Signatures (password, Message Digest 5)

— RFC 2236: IGMP v2

— RFC 2267: Network Ingress Filtering

— RFC 2270: BGP-4 Dedicated autonomous system (AS) for Sites/Single Provider

— RFC 2283: Multiprotocol Extensions for BGP-4

— RFC 2328: OSPF v2 (Edge mode)

— RFC 2338: VRRP

— RFC 2362: PIM-SM (Edge mode)

— RFC 2370: OSPF Opaque LSA Option

— RFC 2373: IPv6 Addressing Architecture

— RFC 2375: IPv6 Multicast Address Assignments

— RFC 2385: TCP MD5 Authentication for BGPv4

— RFC 2439: BGP Route Flap Damping

— RFC 2453: RIP v2

— RFC 2460: Internet Protocol, v6 (IPv6) specification

— RFC 2461: Neighbor Discovery for IP Version 6 (IPv6)

— RFC 2462: IPv6 Stateless Address Autoconfiguration

— RFC 2463: ICMPv6

— RFC 2464: Transmission of IPv6 Packets over Ethernet Networks

— RFC 2474: DiffServ Precedence, including 8 queues/port

— RFC 2475: DiffServ Core and Edge Router Functions

— RFC 2526: Reserved IPv6 Subnet Anycast Addresses

— RFC 2545: Use of BGP-4 Multiprotocol Extensions for IPv6 Interdomain Routing

— RFC 2547: BGP/MPLS VPNs
— RFC 2597: DiffServ Assured Forwarding (AF)
— RFC 2598: DiffServ Expedited Forwarding (EF)
— RFC 2710: Multicast Listener Discovery (MLD) for IPv6
— RFC 2711: IPv6 Router Alert Option
— RFC 2740: OSPF for IPv6
— RFC 2796: BGP Route Reflection (supersedes RFC 1966)
— RFC 2796: Route Reflection
— RFC 2858: Multiprotocol Extensions for BGP-4
— RFC 2893: Transition Mechanisms for IPv6 Hosts and Routers
— RFC 2918: Route Refresh Capability for BGP-4
— RFC 3031: Multiprotocol Label Switching Architecture
— RFC 3032: MPLS Label Stack Encoding
— RFC 3036: LDP Specification
— RFC 3065: Autonomous System Confederations for BGP
— RFC 3176: sFlow
— RFC 3215: LDP State Machine
— RFC 3306: Unicast-Prefix-based IPv6 Multicast Addresses
— RFC 3376: IGMP v3
— RFC 3392: Capabilities Advertisement with BGP-4
— RFC 3446: Anycast Rendezvous Point (RP) Mechanism using PIM and MSDP
— RFC 3478: Graceful Restart for Label Distribution Protocol
— RFC 3484: Default Address Selection for IPv6
— RFC 3513: Internet Protocol Version 6 (IPv6) Addressing
— RFC 3569: PIM-SSM PIM Source Specific Multicast
— RFC 3587: IPv6 Global Unicast Address Format
— RFC 3618: Multicast Source Discovery Protocol (MSDP)
— RFC 3623: OSPF Graceful Restart
— RFC 3768: Virtual Router Redundancy Protocol (VRRP)
— RFC 3810: Multicast Listener Discovery Version 2 (MLDv2) for IP
— RFC 3973: PIM-Dense Mode
— RFC 4213: Basic Transition Mechanisms for IPv6 Hosts and Routers
— RFC 4291: IPv6 Addressing Architecture
— RFC 4360: BGP Extended Communities Attribute
— RFC 4364: BGP/MPLS IP Virtual Private Networks (VPNs)
— RFC 4443: ICMPv6 for the IPv6 specification
— RFC 4486: Sub codes for BGP Cease Notification message
— RFC 4552: Authentication/Confidentiality for OSPFv3
— RFC 4604: Using Internet Group Management Protocol Version 3 (IGMPv3)
— RFC 4724: Graceful Restart Mechanism for BGP
— RFC 4761: Virtual Private LAN Service (VPLS) using BGP for auto-discovery and signaling
— RFC 4798: Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
— RFC 4861: Neighbor Discovery for IPv6
— RFC 4862: IPv6 Stateless Address Autoconfiguration
— RFC 5095: Deprecation of Type 0 Routing Headers in IPv6
— RFC 5286, Basic Specification for IP Fast Reroute: Loop-Free Alternates
— RFC 5306: Restart Signaling for IS-IS
— RFC 5308: Routing IPv6 with IS-IS
— RFC 5340: OSPF for IPv6
— Draft-ietf-bfd-base-09.txt: Bidirectional Forwarding Detection
— RFC 7432: BGP MPLS-based Ethernet VPN

**Management and analytics platforms**

— Juniper Wired Assurance for Campus
— Junos Space Network Director for Campus
— Junos Space Management Applications

### Device management and operations

— Virtual Extensible local area network (VXLAN)
— REST API
— NETCONF sessions over outbound HTTPS
— Juniper Extension Toolkit (JET)
— OpenFlow v1.3
— Junos OS CLI
— Out-of-band management: Serial; 10/100/1000BASE-T Ethernet
— ASCII configuration file
— Rescue configuration
— Configuration rollback
— Image rollback
— SNMP: v1, v2c, v3
— RMON (RFC 2819): Groups 1, 2, 3, 9
— Network Time Protocol (NTP)
— DHCP server
— DHCP relay with Option 82
— RADIUS
— TACACS+
— SSHv2
— Secure copy
— DNS resolver
— Syslog logging
— Environment monitoring
— Temperature sensor
— Configuration backup via FTP/secure copy

### Network management—MIB support

— J-Flow
— RFC 1155: Structure of Management Information (SMI)
— RFC 1157: SNMPv1
— RFC 1212, RFC 1213, RFC 1215: MIB-II, Ethernet-like MIB, and traps
— RFC 1657: BGP-4 MIB
— RFC 1724: RIPv2 MIB
— RFC 1850: OSPFv2 MIB
— RFC 1901: Introduction to Community-based SNMPv2
— RFC 1902: Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2)
— RFC 1905, RFC 1907: SNMP v2c, SMIv2, and Revised MIB-II
— RFC 2011: SNMPv2 for IP using SMIv2
— RFC 2012: SNMPv2 for transmission control protocol using SMIv2
— RFC 2013: SNMPv2 for user datagram protocol using SMIv2
— RFC 2096: IPv4 Forwarding Table MIB
— RFC 2287: System Application Packages MIB
— RFC 2465: Management Information Base for IP Version 6
— RFC 2570–2575: SNMPv3, user-based security, encryption, and authentication
— RFC 2576: Coexistence between SNMP Version 1, Version 2, and Version 3
— RFC 2578: SNMP Structure of Management Information MIB
— RFC 2579: SNMP Textual Conventions for SMIv2
— RFC 2665: Ethernet-like interface MIB
— RFC 2787: VRRP MIB
— RFC 2819: RMON MIB
— RFC 2863: Interface Group MIB
— RFC 2863: Interface MIB
— RFC 2922: LLDP MIB
— RFC 2925: Ping/Traceroute MIB
— RFC 2932: IPv4 Multicast MIB
— RFC 3413: SNMP Application MIB
— RFC 3826: The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP
— RFC 4188: STP and Extensions MIB

— RFC 4363: Definitions of Managed Objects for Bridges with traffic classes, multicast filtering, and VLAN extensions

— Draft-ietf-idr-bgp4-mibv2-02.txt: Enhanced BGP-4 MIB

— Draft-ietf-isis-wg-mib-07

— Draft-reeder-snmpv3-usm-3desede-00

— Draft-ietf-idmr-igmp-mib-13

— Draft-ietf-idmr-pim-mib-09

— Draft-ietf-bfd-mib-02.txt

### Troubleshooting

— Debugging: CLI via console, Telnet, or SSH

— Diagnostics: Show, debug, and statistics commands

— Firewall-based port mirroring

— IP tools: Extended ping and trace

— HPE Juniper Networking commit and rollback

### Environmental ranges

— Operating temperature: 32° to 104° F (0° to 40° C)

— Storage temperature: –40° to 158° F (–40° to 70° C)

— Operating altitude: Up to 10,000 ft (3,048 m)

— Relative humidity operating: 5 to 90% (noncondensing)

— Relative humidity nonoperating: 5 to 95% (noncondensing)

— Seismic: Designed to meet GR-63, Zone 4 earthquake requirements

### Maximum thermal output

(estimated, subject to change)

— EX9251 AC power: 1,275 BTU/hour (360 W); DC power: 1,275 BTU/hour (360 W)

— EX9253 AC power: 13,600 BTU/hour (3840 W); DC power: 13,600 BTU/hour (3840 W)

## Safety and compliance

### Safety

— CAN/CSA-22.2 No. 60950-00/UL 1950 Third Edition, Safety of Information Technology Equipment

— EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements, and User's Guide

— EN 60950 Safety of Information Technology Equipment

— IEC 60950-1 (2001) Safety of Information Technology Equipment (with country deviations)

— EN 60825-1 +A1+A2 (1994) Safety of Laser Products—Part 1: Equipment Classification

— EN 60825-2 (2000) Safety of Laser Products—Part 2: Safety of Optical Fiber Comm. Systems

— C-UL to CAN/CSA 22.2 No.60950-1 (Second Edition)

— TUV/GS to EN 60950-1, Amendment A1-A4, A11

— CE-IEC60950-1, all country deviations

### EMC

— AS/NZS CISPR22:2009

— EN 55022 2006+A1:2007 European Radiated Emissions

— FCC 47CFR , Part 15 Class A (2009) USA Radiated Emissions

— VCCI-V-3/2009.04 and V-4/2009.04 Japanese Radiated Emissions

— BSMI CNS 13438 and NCC C6357 Taiwan Radiated Emissions

— EN 300 386 V1.5.1 Telecom Network Equipment—EMC requirements

— ICES-003 Issue 4, Feb 2004 Canada Radiated Emissions

— CISPR 24:1997/A1:2001/A2:2002 IT Equipment Immunity Characteristics

### Immunity

— EN 55024:1998/A1:2001/A2:2003 Information Technology Equipment Immunity Characteristics

— EN-61000-3-2 (2006) Power Line Harmonics

— EN-61000-3-3 +A1 +A2 +A3 (1995) Power Line Voltage Fluctuations

— EN-61000-4-2 +A1 +A2 (1995) Electrostatic Discharge

— EN-61000-4-3 +A1+A2 (2002) Radiated Immunity

— EN-61000-4-4 (2004) Electrical Fast Transients

— EN-61000-4-5 (2006) Surge

— EN-61000-4-6 (2007) Immunity to Conducted Disturbances

— EN-61000-4-11 (2004) Voltage Dips and Sags

### Customer-specific EMC requirements

— GR-1089-Core Issue 6 (May, 2011) EMC and Electrical Safety for Network Telecommunications Equipment

— AT&T TP-76200 Issue 17 (2012) Network Equipment Power, Grounding, Environmental, and Physical Design Requirements

— Verizon TPR.9305 Issue 5 (2012) Verizon NEBS Compliance: NEBS Compliance Clarification Document

— Deutsche Telekom 1TR9 (2008) EMC Specification

— British Telecom EMC Immunity Requirements (2007)

— IBM C-S 2-0001-005 ESD

— IBM C-S 2-0001-012 Radio Frequency Electromagnetic Susceptibility

— ITU-T K.20 (2011) Resistibility of telecommunication equipment installed in telecom centers to over voltages and over currents

— Juniper Inductive GND (JIG)

### ETSI

— ETSI EN-300386-2 Telecommunication Network Equipment Electromagnetic Compatibility Requirements

### Network Equipment Building System (NEBS)

— SR-3580 NEBS Criteria Levels (Level 3 Compliance)

— GR-63-Core: NEBS, Physical Protection

### Environmental

— Reduction of Hazardous Substances (ROHS) 5/6

### Telco

— Common Language Equipment Identifier (CLEI) code

### Warranty

For warranty information, please visit support.juniper.net/support/

# Ordering information

| Model number | Description |
|---|---|
| **Hardware** | |
| EX9251-8X4C | EX9251 system with 8x10GbE SFP+ ports and 4x40GbE QSFP+/100GbE QSFP28 ports 2x AC PSUs JNP-PWR650-AC 3x fan tray JNP-FAN-1RU and all necessary blank panels (optics sold separately) |
| EX9251-8X4C-DC | EX9251 system with 8x10GbE SFP+ ports and 4x40GbE QSFP+/100GbE QSFP28 ports 2x DC PSUs JNP-PWR650-DC 3x fan tray JNP-FAN-1RU and all necessary blank panels (optics sold separately) |
| EX9253-BASE-AC | Base EX9253 system configuration 3-slot EX9253-CHAS-3RU chassis with 4x fan tray JNP-C1-FAN-3RU 1x Routing Engine EX9253-RE 3x JNP-PWR1600-AC-BB AC PSUs and all necessary blank panels |
| EX9253-BASE-DC | Base EX9253 system configuration 3-slot EX9253-CHAS-3RU chassis with 4x fan tray JNP-C1-FAN-3RU 1x Routing Engine EX9253-RE 3x JNP-PWR1100-DC-BB DC PSUs and all necessary blank panels |
| EX9253-RED-AC | Redundant EX9253 configuration 3-slot EX9253-CHAS-3RU chassis with 4x fan tray JNP-C1-FAN-3RU 2x Routing Engine EX9253-RE 4x JNP-PWR1600-AC-BB AC PSUs and all necessary blank panels |
| EX9253-RED-DC | Redundant EX9253 configuration 3-slot EX9253-CHAS-3RU chassis with 4x fan tray JNP-C1-FAN-3RU 2x Routing Engine EX9253-RE 4x JNP-PWR1100-DC-BB DC PSUs and all necessary blank panels |
| EX9253-BND1 | Bundle comprised of EX9253-BASE-AC and EX9253-6Q12C line card shipped separately as two items |
| **EX9253 Line Cards** | |
| EX9253-6Q12C | EX9253 line card with 6x40GbE ports and 12x40GbE/ 100GbE ports |
| EX9253-6Q12C-M | EX9253 line card with 6x40GbE ports and 12x40GbE/ 100GbE MACsec AES256 ports |
| **EX9250 Pluggable Optics** | |
| EX-SFP-10GE-SR | Small form-factor pluggable transceiver (SFP transceiver) 10GbE (SFP+ transceiver) short reach (SR) optics |
| EX-SFP-10GE-LR | SFP transceiver 10GbE (SFP+ transceiver) long reach (LR) optics |
| EX-SFP-10GE-LRM | SFP transceiver 10GbE (SFP+ transceiver) long reach multimode (LRM) optics |
| EX-SFP-10GE-ER | SFP+ 10GBASE-ER 10GbE optics module 1550 nm for 40 km transmission |
| EX-SFP-10GE-ZR | SFP+ 10GBASE-ZR 10GbE optics 1550 nm for 80 km transmission on single-mode fiber-optic (SMF) |
| JNP-SFP-10G-BX10D | 10G BX optics over SMF 1330 nm up to 10 km |
| JNP-SFP-10G-BX10U | 10G BX optics over SMF 1270 nm up to 10 km |
| EX-SFP-10GE-USR | SFP+ 10GbE ultra short reach 850 nm 10 m on OM1 20 m on OM2 100 m on OM3 multi-mode fiber-optic (MMF) |
| JNP-QSFP-4X10GE-LR | Quad small form-factor pluggable transceiver plus (QSFP+ transceiver) 40GBase optics, up to 10 km transmission on parallel single mode (4X10GbE LR up to 10 km) |
| JNP-QSFP-4X10GE-IR | QSFP+ 40GBASE-LR4 40 gigabit optics for up to 1 km transmission over parallel SMF |
| JNP-QSFP-40GE-IR4 | QSFP+ 40GBASE-LR4 40 gigabit optics for up to 1 km transmission over SMF |
| QFX-QSFP-40G-SR4 | QSFP+ 40GBASE-SR4 40 gigabit optics, 850 nm for up to 150 m transmission on MMF |
| JNP-QSFP-40G-LR4 | QSFP+ 40GBASE-LR4 40 gigabit optics for up to 10 km transmission on SMF |
| QFX-QSFP-40G-ESR4 | QSFP+ 40GBASE-eSR4 40 gigabit optics, 850 nm for up to 300 m transmission on MMF |
| JNP-QSFP-40GE-ER4 | QSFP+ 40GBASE-ER4 40 gigabit optics, 1310 nm for up to 40 km transmission on SMF |
| JNP-QSFP-40G-LX4 | QSFP+ 40GBASE-LX4 40 gigabit optics for up to 150 m transmission with OM4 over duplex MMF |
| JNP-QSFP-100G-LR4 | QSFP28 100GBASE-L4 optics for up to 10 km transmission over serial SMF |
| JNP-QSFP-100G-SR4 | QSFP28 100GBASE-SR4 optics for up to 100 m transmission over parallel MMF |
| JNP-QSFP-100G-CWDM | QSFP28 100GBASE-CWDM4 optics for up to 2 km transmission over serial SMF |
| JNP-QSFP-100G-PSM4 | QSFP28 100GBASE-PSM4 optics for up to 2 km transmission over parallel SMF |
| EX-SFP-10GE-DAC-3M | SFP+ 10GbE direct attach copper (twinax copper cable), 3 M |
| EX-SFP-10GE-DAC-1M | SFP+ 10GbE direct attach copper (twinax copper cable), 1 M |
| EX-SFP-10GE-DAC-5M | SFP+ 10GbE direct attach copper (twinax copper cable) 5 m |
| QFX-QSFP-DAC-1M | QSFP+ Cable Assy, 1 m, 30 AWG, passive, programmable ID |
| JNP-QSFP-DAC-2M | QSFP+ 40GBASE direct attach copper Cable 2-meter |
| QFX-QSFP-DAC-3M | QSFP+ Cable Assembly, 3 m, 30 AWG, passive, programmable ID |
| JNP-QSFP-DAC-5M | QSFP+ 40GBase direct attach copper Cable 5-meter, passive |

# Ordering information (continued)

| Model number | Description |
|---|---|
| EX-QSFP-40GE-DAC-50CM | QSFP+ 40GbE direct attach copper (twinax copper cable) for 50 cm transmission |
| JNP-100G-DAC-1M | QSFP28 to QSFP28 Ethernet direct attach copper (twinax copper cable) 1 m |
| JNP-100G-DAC-3M | QSFP28 to QSFP28 Ethernet direct attach copper (twinax copper cable) 3 m, active |
| QFX-QSFP-DACBO-1M | QSFP+ to SFP+ 10GbE direct attach breakout copper (twinax copper cable) 1 m |
| QFX-QSFP-DACBO-3M | QSFP+ to SFP+ 10GbE direct attach breakout copper (twinax copper cable) 3 m |
| JNP-QSFP-DACBO-10M | QSFP+ to SFP+ 10GbE direct attach breakout copper (twinax copper cable) 10 m, active |
| QFX-SFP-DAC-1MA | SFP+ 10GbE direct attach copper (active twinax copper cable) 1 m |
| QFX-SFP-DAC-3MA | SFP+ 10GbE direct attach copper (active twinax copper cable) 3 m |
| QFX-SFP-DAC-5MA | SFP+ 10GbE direct attach copper (active twinax copper cable) 5 m |
| QFX-SFP-DAC-7MA | SFP+ 10GbE direct attach copper (active twinax copper cable) 7 m |
| QFX-SFP-DAC-10MA | SFP+ 10GbE direct attach copper (active twinax copper cable) 10 m |
| JNP-QSFP-DAC-5MA | QSFP+ 40GBASE direct attach copper cable 5 m, active |
| JNP-QSFP-DAC-7MA | QSFP+ 40GBASE direct attach copper cable 7 m, active |
| JNP-QSFP-DAC-10MA | QSFP+ 40GBASE direct attach copper cable 10 m, active |
| JNP-QSFP-DACBO-5MA | QSFP+ to SFP+ 10GbE direct attach breakout copper (twinax copper cable) 5 m, active |
| JNP-QSFP-DACBO-7MA | QSFP+ to SFP+ 10GbE direct attach breakout copper (twinax copper cable) 7 m, active |
| **EX9250 Software Feature Licenses** | |
| EX9251-AFL | EX9251 Advanced Feature License |
| EX9251-ML | Mid-scale license to enable 512,000 FIB and ARP entries on EX9251 chassis (one required per chassis) |
| EX9253-AFL | EX9253 Advanced Feature License |
| EX9253-ML | Mid-scale license to enable 512,000 FIB and ARP entries on EX9253 chassis (one required per chassis) |
| EX9253-SFL | Security feature license for EX9250 to enable MACsec on EX9253-6Q12C-M |
| **EX9250 Power Cords** | |
| CBL-M-PWR-RA-AU | AC power cord, Australia (SAA/3/15), C19, 15 A/250 V, 2.5 m, right angle |
| CBL-M-PWR-RA-CH | AC power cord, China (GB 2099.1-1996, Angle), C19, 16 A/250 V, 2.5 m, right angle |
| CBL-M-PWR-RA-EU | AC power cord, Cont. Europe (VII), C19, 16 A/250 V, 2.5 m, right angle |
| CBL-M-PWR-RA-IT | AC power cord, Italy (I/3/16), C19, 16 A/250 V, 2.5 m, right angle |
| CBL-M-PWR-RA-JP | "AC power cord, Japan (NEMA LOCKING), C19, 20 A/250 V, 2.5 m, right angle" |
| CBL-M-PWR-RA-TWLK-US | "AC power cord, U.S. (NEMA LOCKING), C19, 20 A/250 V, 2.5 m, right angle" |
| CBL-M-PWR-RA-UK | AC power cord, UK (BS89/13), C19, 13 A/250 V, 2.5 m, right angle |
| CBL-M-PWR-RA-US | AC power cord, U.S./Canada (N6/20), C19, 20 A/250 V, 2.5 m, right angle |
| CBL-PWR-C19S-162-JP | AC power cord, Japan, NEMA 6-20 to C19, 16 A/250 V, 2.5 m, straight |
| CBL-PWR-C19S-162-JPL | "Power cord, AC, Japan/U.S., C19 at 70-80 mm, 16 A/250 V, 2.5 m, straight, locking plug" |
| CBL-PWR-RA-JP15 | AC power cable: JIS 8303 15 A/125 V 2.5 m length for Japan, right angle |
| CBL-PWR-RA-TWLK-US15 | AC power cable: NEMA L5-15P (twist lock) 15 A/125 V 2.5 m length for U.S., Canada, and Mexico, right angle |
| CBL-PWR-RA-US15 | AC power cable: NEMA 5-15 15 A/12 5 V 2.5 m length for North America, parts of South America, parts of Central America, parts of Africa, and parts of Asia, right angle |
| **EX9253 Field Replaceable Units** | |
| EX9253-LC-BLNK | EX9253 line card blank cover panel |
| EX9253-RE | EX9253 Routing Engine |
| EX9253-CHAS-3RU | EX9253 chassis, 3 U |
| JNP-FAN-3RU | Universal fan tray, 3 U |
| JNP-PWR1600-AC | Universal AC power supply, 1600 W, spare |
| JNP-PWR1100-DC | Universal DC power supply, 1100 W, spare |
| EX9253-RE-BLNK | EX9253 RE blank cover panel |
| JNP-MPC2 | Modular Port Concentrator, 6xQSFP+ |
| JNP-MIC1 | 12x100GbE/12x40GbE/48x10GbE Modular Interface Card (MIC) |
| JNP-MIC1-MACSEC | 12x100GbE/12x40GbE/48x10GbE MACsec MIC |
| JNP-CM-3RU | 3 U universal chassis cable manager with air filter |
| **EX9251 Field Replaceable Units** | |
| JNP-FAN-1RU | Universal fan tray, 1 U |
| JNP-PWR650-AC | Universal AC power supply, 650 W, spare |
| JNP-PWR650-DC | Universal DC power supply, 650 W, spare |

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