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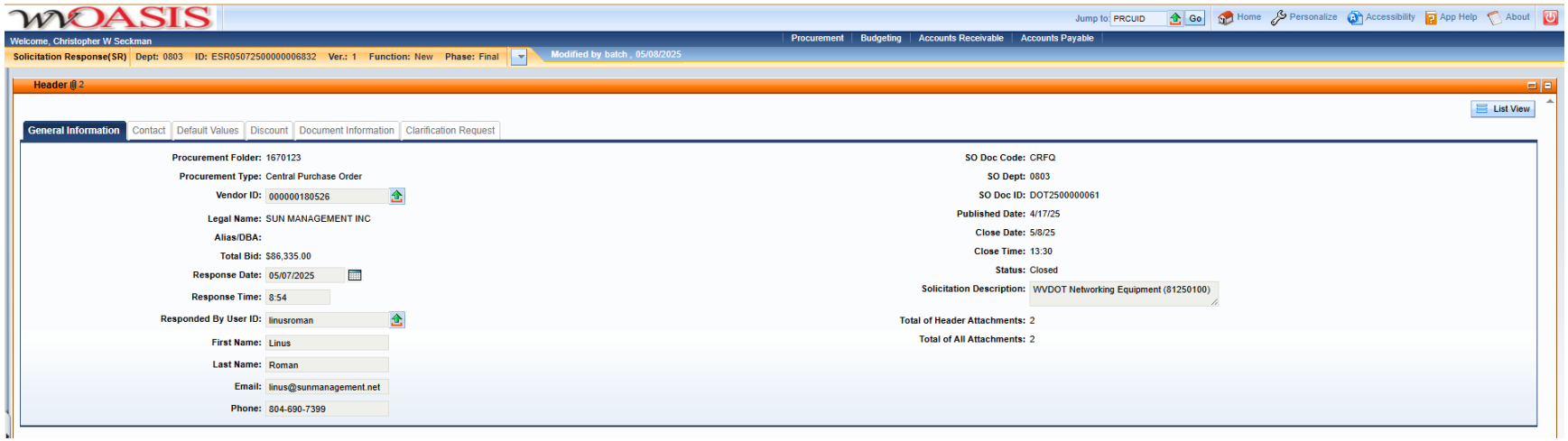
WVOASIS
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Solicitation Response(SR) Dept: 0803 ID: ESR05072500000006832 Ver.: 1 Function: New Phase: Final
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Procurement Type: Central Purchase Order
Vendor ID: 000000180526
Legal Name: SUN MANAGEMENT INC
Alias/DBA:
Total Bid: $86,335.00
Response Date: 05/07/2025
Response Time: 8:54
Responded By User ID: linusroman
First Name: Linus
Last Name: Roman
Email: linus@sunmanagement.net
Phone: 804-690-7399
SO Doc Code: CRFQ
SO Dept: 0803
SO Doc ID: DOT2500000061
Published Date: 4/17/25
Close Date: 5/8/25
Close Time: 13:30
Status: Closed
Solicitation Description: WVDOT Networking Equipment (81250100)
Total of Header Attachments: 2
Total of All Attachments: 2

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
Charleston, WV 25305-0130

State of West Virginia
Solicitation Response

Proc Folder:	1670123
Solicitation Description:	WVDOT Networking Equipment (81250100)
Proc Type:	Central Purchase Order

Solicitation Closes	Solicitation Response	Version
2025-05-08 13:30	SR 0803 ESR05072500000006832	1

VENDOR

000000180526
SUN MANAGEMENT INC

Solicitation Number: CRFQ 0803 DOT2500000061

Total Bid: 86335 **Response Date:** 2025-05-07 **Response Time:** 08:54:03

Comments: Juniper solution proposed. Juniper switches ship with one power supply and one cable.
Pricing is accurate.

FOR INFORMATION CONTACT THE BUYER
John W Estep
304-558-2566
john.w.estep@wv.gov

Vendor
Signature X **FEIN#** **DATE**

All offers subject to all terms and conditions contained in this solicitation

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
1	Extreme Networks 5420M Universal Switch - 48 Port or equal	25.00000	EA	2884.000000	72100.00

Comm Code	Manufacturer	Specification	Model #
43222609			

Commodity Line Comments: 25 EX4100-48P EX4100 48-Port 10/100/1000BaseT PoE+, 4x 10G SFP+ Uplink ports, 4x 25G SFP28 Stacking/ Uplink ports, redundant fans, 1 AC PSU JPSU-920-AC-AFO included (optics sold separately) with Standard SW.
25 SUB-EX48-1S-1Y-COR 1 Year Wired Assurance Subscription for EX48 port switches including JTAC Support; Juniper Care Core Support for EX2300, EX4100-F, EX3400, EX4000, EX4100, EX4300, EX4400 24 ports switches.

Extended Description:

3.1.1 Extreme Networks 5420M Universal Switch - 48 Port, Part Number 5420M-48W-4YE- or equal. Includes (1) one-year XIQ Pilot Cloud Subscription

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
2	Extreme Switching Power Supply - AC - 920 Watt or equal	50.00000	EA	225.500000	11275.00

Comm Code	Manufacturer	Specification	Model #
43222612			

Commodity Line Comments: 25 JPSU-920-AC-AFO EX4100 and EX3400 920W AC Power Supply, Front-to-Back airflow (power cord needs to be ordered separately)
25 CBL-PWR-C13-US-48P Power Cord, AC, US/Canada, C13, 15A/125V, 2.5m, Straight.
A Note - Juniper product ships w/ one power supply and cable.

Extended Description:

3.2.1 Extreme Switching Power Supply - AC - 920-Watt, Part Number XN-ACPWR-920W or equal.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
3	Extreme Networks 20GBase direct attach cable - 0.5 m or equa	30.00000	EA	42.000000	1260.00

Comm Code	Manufacturer	Specification	Model #
43222612			

Commodity Line Comments: 30 SFP-25G-DAC-50CM SFP-28 to SFP-28, 25G, Direct Attach Cable, 50cm, Standard Temperature (0 through 70 deg C)

Extended Description:

3.2.2 Extreme Networks 20GBase direct attach cable - 0.5m, Part Number 20G-DACP-SFPDDZ5M or equal

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
4	Extreme Networks 20GBase direct attach cable - 1 m or equal	10.00000	EA	38.000000	380.00

Comm Code	Manufacturer	Specification	Model #
43222612			

Commodity Line Comments: 10 JNP-SFP-25G-DAC-1M SFP28, 25GE Direct Attach Copper Cable, 1 meter, Standard Temperature (0 through 70 DEGREE C), 0.5W, 30 AWG

Extended Description:

3.2.3 Extreme Networks 20GBase direct attach cable - 1m, Part Number 20G-DACP-SFPDD1M or equal.

Line	Comm Ln Desc	Qty	Unit Issue	Unit Price	Ln Total Or Contract Amount
5	Extreme Networks 10302 Comp 10GBASE-LR SFP+XCVR Module or eq	30.00000	EA	44.000000	1320.00

Comm Code	Manufacturer	Specification	Model #
43222612			

Commodity Line Comments: 30 SFPP-10G-LR-C SFP+, 10GBASE-LR, SMF 10 km, Extended Temperature (0 through 85 DEGREE C), Duplex LC connector

Extended Description:

3.2.4 Extreme Networks 10302 Compatible 10GBASE-LR SFP+ Transceiver Module, Part Number 10302 or equal.

EX4100 LINE OF ETHERNET SWITCHES DATASHEET

Product Overview

The EX4100 line of Ethernet access switches offers secure, cloud-ready access for enterprise campus, branch, and data center networks in the AI era and optimized for the cloud. These platforms boost network performance and visibility, meeting the security demands of today—as well as for networks of the next decade.
As part of the underlying infrastructure for Juniper Mist Wired Assurance, the EX4100 line is purpose-built for, and managed by, the cloud. The switches leverage Mist AI to simplify operations and provide better visibility into the experience of connected devices, delivering a refreshing, experience-first approach to access layer switching.

Product Description

The Juniper Networks® EX4100 line of Ethernet Switches offers a secure, cloud-ready portfolio of access switches ideal for enterprise branch, campus, and data center networks. The EX4100 switches combine the simplicity of the cloud, the power of Mist AI™, and a robust hardware foundation with best-in-class security and performance to deliver a differentiated approach to access switching in the cloud, mobile, and IoT era. With Juniper® Mist™ Wired Assurance, the EX4100 line of Switches can be effortlessly onboarded, configured, and managed from the cloud. This simplifies operations, improves visibility, and ensures a much better experience for connected devices.

Key features of the EX4100 include:

- Cloud-ready, driven by Mist AI with Juniper Mist Wired Assurance and Marvis Virtual Network Assistant
- Ethernet VPN–Virtual Extensible LAN (EVPN-VXLAN) to the access layer
- Standards-based microsegmentation using group-based policies (GBPs)
- Switch-to-switch encryption using Media Access Control Security (MACsec) AES256
- IEEE 802.3bz Multigigabit
- IEEE 802.3bt Power over Ethernet Plus (PoE++)
- Flow-based telemetry to monitor traffic flows for anomaly detection, ability to measure packet delays and report drop reasons
- Precision Timing Protocol–Transparent Clock
- 10-member Virtual Chassis support

Offering a full suite of Layer 2 and Layer 3 capabilities, the EX4100 enables multiple deployments, including campus, branch, and data center top-of-rack deployments. As scale requirements increase, Juniper's Virtual Chassis technology allows up to 10 EX4100 switches to be seamlessly interconnected and managed as a single device, delivering a scalable, pay-as-you-grow solution for expanding network environments.

The EX4100 family of Ethernet switches consists of the following models:

- The EX4100-48MP, which offers 16 x 100 MB/1GbE/2.5GbE and 32 x 10 MB/100 MB/1GbE Power over Ethernet (PoE++) access ports, delivering up to 90 W per PoE port with an overall total 1620 W of PoE power budget (using two power supplies)
- The EX4100-24MP, which offers 8 x 100 MB/1GbE/2.5GbE/5GbE/10GbE and 16 x 10 MB/100 MB/1GbE PoE++ access ports, delivering up to 90 W per port with an overall total 1620 W of PoE power budget (using two power supplies)
- The EX4100-24T, which offers 24 x 1GbE non-PoE access ports
- The EX4100-24P, which offers 24 x 1GbE PoE+ access ports, delivering up to 30 W per port with an overall total 1440 W of PoE power budget (using two power supplies)
- The EX4100-48T, which offers 48 x 1GbE non PoE-access ports
- The EX4100-48P, which offers 48 x 1GbE PoE+ access ports, delivering up to 30 W per port with an overall total 1440 W of PoE power budget (using two power supplies)

Each EX4100 model offers 4 x 1/10GbE small form-factor pluggable plus transceiver (SFP+) fixed uplink ports. The EX4100 switches include 4 x 10GbE/25GbE SFP28 ports to support Virtual Chassis connections, which can be reconfigured for use as Ethernet ports for uplink connectivity. EX4100 switches also include high availability (HA) features such as redundant, hot-swappable power supplies and field-replaceable fans to ensure maximum uptime. In addition, -24 port and -48 port Multi-Gigabit Ethernet EX4100 switch models offer standards-based 802.3af/at/bt (PoE/PoE+/PoE ++) for delivering up to 90 watts on any access port. The EX4100 switches can be configured to deliver fast PoE capability, which enables the switches to deliver PoE power to connected PoE devices within a few seconds of power being applied to the switches.

Architecture and Key Components

Cloud Management with Juniper Mist Wired Assurance Driven by Mist AI

EX4100 switches can be quickly and easily onboarded (Day 0), provisioned (Day 1), and managed (Day 2+) from the cloud with Juniper Mist Wired Assurance, which brings AI-powered automation and insights that optimize experiences for end users and connected devices. The EX4100 provides rich Junos® operating system telemetry data for Mist AI, which helps achieve simpler operations, shorter mean time to repair (MTTR), and streamlined troubleshooting. For more information, read the Juniper Mist Wired Assurance datasheet.

In addition to Juniper Mist Wired Assurance, Marvis Virtual Network Assistant—a key part of The Self-Driving Network™—makes the Mist AI engine interactive. A digital extension of the IT team, Marvis offers automatic fixes or recommended actions, allowing IT teams to streamline how they troubleshoot and manage their network operations.

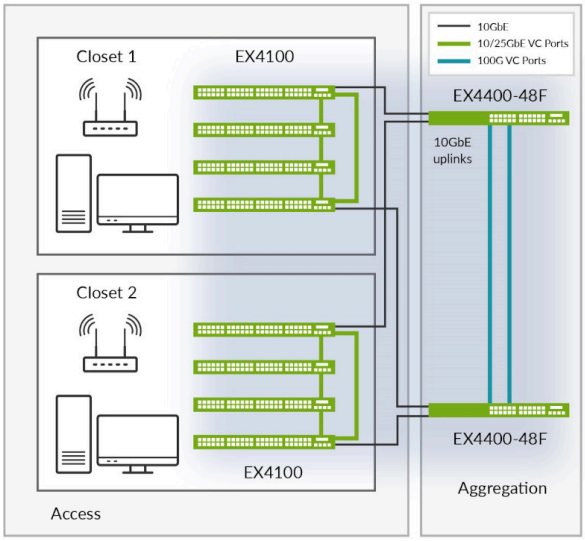

Figure 1: EX4100 Virtual Chassis configuration interconnected via dedicated front-panel 25GbE ports

EVPN-VXLAN Technology

Most traditional campus networks have a single-vendor, chassis-based architecture that worked well for smaller, static campuses with few endpoints. However, this approach is too rigid to support the changing needs of modern campus networks. The EX4100 supports EVPN-VXLAN, extending an end-to-end fabric from campus core to distribution to the access layer.

An EVPN-VXLAN fabric is a simple, programmable, highly scalable architecture built on open standards. This technology can be applied in both data centers and campuses for architectural consistency. A campus EVPN-VXLAN architecture uses a Layer 3 IP-based underlay network and an EVPN-VXLAN overlay network. A flexible overlay network based on a VXLAN overlay with an EVPN control plane efficiently provides Layer 2 and/or Layer 3 connectivity throughout the network. EVPN-VXLAN also offers a scalable way to build and interconnect multiple campus sites, delivering:

- Greater consistency and scalability across all network layers
- Multivendor deployment support
- Reduced flooding and learning
- Location-agnostic connectivity
- Consistent network segmentation
- Simplified management

Virtual Chassis Technology

Juniper's Virtual Chassis technology allows multiple interconnected switches to operate as a single, logical unit, enabling users to manage all platforms as one virtual device. Up to 10 EX4100 switches can be interconnected as a Virtual Chassis using 4 x 25GbE SFP28 dedicated front-panel ports. Although configured as Virtual Chassis ports by default, the 4 x 25GbE SFP28 uplinks can also be configured as uplink ports. The EX4100 switches can form a Virtual Chassis with any other models within the EX4100 product line.

Microsegmentation Using Group-Based Policy

GBP leverages underlying VXLAN technology to provide location-agnostic endpoint access control. This allows network administrators to implement consistent security policies across the enterprise network domains. The EX4100 supports a standards-based GBP solution, allowing different levels of access control for endpoints and applications even within the same VLAN. Customers can simplify their network configuration by using GBP, avoiding the need to configure large numbers of firewall filters on all their switches. GBP can block lateral threats by ensuring consistent application of security group policies throughout the network, regardless of the location of endpoints and/or users.

Flow-Based Telemetry

Flow-based telemetry enables flow-level analytics, allowing network administrators to monitor thousands of traffic flows on the EX4100 without burdening the CPU. This improves network security by monitoring, baselining, and detecting flow anomalies. For example, if predefined flow thresholds are breached due to an attack, IP Flow Information Export (IPFIX) alerts can be sent to an external server to quickly identify the attack. Network administrators can also automate specific workflows, such as further examining the traffic or quarantining a port, to triage the issue. In addition to DOS attacks, Flow-Based Telemetry on EX4100 switches can measure packet delays at ingress, chip, and egress points, as well as report drop reasons.

Features and Benefits

Simplified Operations with Juniper Mist Wired Assurance

The EX4100 is fully cloud onboarded, provisioned, and managed by Juniper Mist Wired Assurance. The EX4100 is designed from the ground up to deliver the rich telemetry that enables AI for IT Operations (AIOps) with simplified operations from Day 0 to Day 2 and beyond. Juniper Mist Wired Assurance provides detailed switch insights for easier troubleshooting and improved time to resolution by offering the following features:

- **Day 0 operations**—Onboard switches seamlessly by claiming a greenfield switch or adopting a brownfield switch with a single activation code for true plug-and-play simplicity.
- **Day 1 operations**—Implement a template-based configuration model for bulk rollouts of traditional and campus fabric deployments, while retaining the flexibility and control required to apply custom site- or switch-specific attributes. Automate provisioning of ports via Dynamic Port Profiles.
- **Day 2 operations**—Leverage the AI in Juniper Mist Wired Assurance to meet service-level expectations such as throughput, successful connects, and switch health with key pre- and post-connection metrics (see Figure 1). Add the self-driving capabilities in Marvis Actions to detect loops, add missing VLANs, fix misconfigured ports, identify bad cables, isolate flapping ports, and discover persistently failing clients (see Figure 2). And perform software upgrades easily through Juniper Mist Cloud.

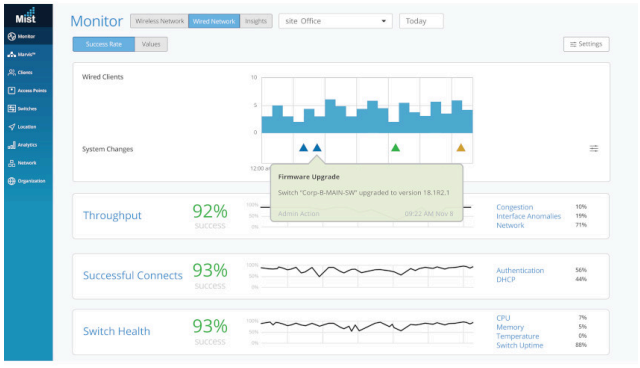

Figure 2: Juniper Mist Wired Assurance service-level expectations screen

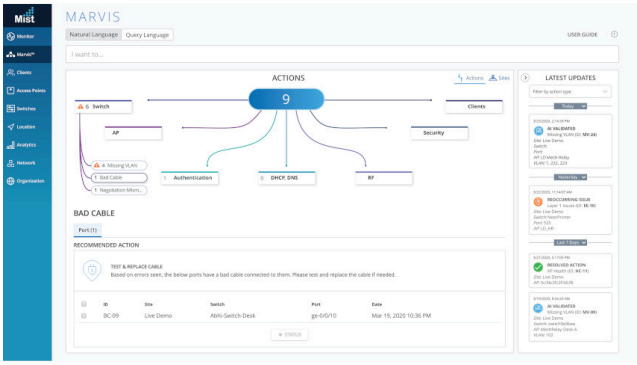

Figure 3: Marvis Actions for wired switches

The complimentary addition of Marvis Virtual Network Assistant, driven by Mist AI, lets you start building a Self-Driving Network that simplifies network operations and streamlines troubleshooting via automatic fixes for Juniper Networks EX Series Switches or recommended actions for external systems.

For more information, see Juniper Mist Wired Assurance.

Campus Fabric Deployments

EVPN-VXLAN for Campus Core, Distribution, and Access

The main advantages of EVPN-VXLAN in campus networks are:

- Flexibility of consistent VLANs across the network: Endpoints can be placed anywhere in the network and remain connected to the same logical L2 network, enabling a virtual topology to be decoupled from the physical topology.
- Microsegmentation: The EVPN-VXLAN-based architecture lets you deploy a common set of policies and services across campuses with support for L2 and L3VPNs.
- Scalability: With an EVPN control plane, enterprises can scale out easily by adding more core, aggregation, and access layer devices as the business grows without having to redesign the network or perform a forklift upgrade. Using an L3 IP-based underlay coupled with an EVPN-VXLAN overlay, campus network operators can deploy much larger and more resilient networks than would otherwise be possible with traditional L2 Ethernet-based architectures.

Juniper offers complete flexibility in choosing any of the following validated EVPN-VXLAN campus fabrics that cater to networks of different sizes, scale, and segmentation requirements:

EVPN multihoming (on collapsed core or distribution): A collapsed core architecture combines the core and distribution layers into a single layer, turning the traditional three-tier hierarchal network into a two-tier network. EVPN Multihoming on a collapsed core eliminates the need for Spanning Tree Protocol (STP) across campus networks by providing link aggregation capabilities from the access layer to the core layer. This topology is best suited for small to medium distributed enterprise networks and allows for consistent VLANs across the network. This topology uses ESI (Ethernet Segment Identifier) LAG (Link Aggregation) and is a standards-based protocol.

Campus Fabric Core distribution: When EVPN VXLAN is configured across core and distribution layers, it becomes a campus Fabric Core Distribution architecture, which can be configured in two modes: centrally or edge routed bridging overlay. This architecture provides an opportunity for an administrator to move towards campus-fabric IP Clos without fork-lift upgrade of all access switches in the existing network, while bringing in the advantages of moving to a campus fabric and providing an easy way to scale out the network.

Campus Fabric IP Clos: When EVPN VXLAN is configured on all layers including access, it is called the campus fabric IP Clos architecture. This model is also referred to as “end-to-end,” given that VXLAN tunnels are terminated at the access layer. Due to the availability of VXLAN at access, it provides us with the opportunity to bring policy enforcement to the access layer (closest to the source) using Group Based Policy (GBP). Standards-based GBP tags bring the unique option to segment traffic both at a micro and macro level. GBP tags are assigned dynamically to clients as part of Radius transaction by Mist Cloud NAC. This topology works for small-medium and large campus architectures that need macro and micro segmentation.

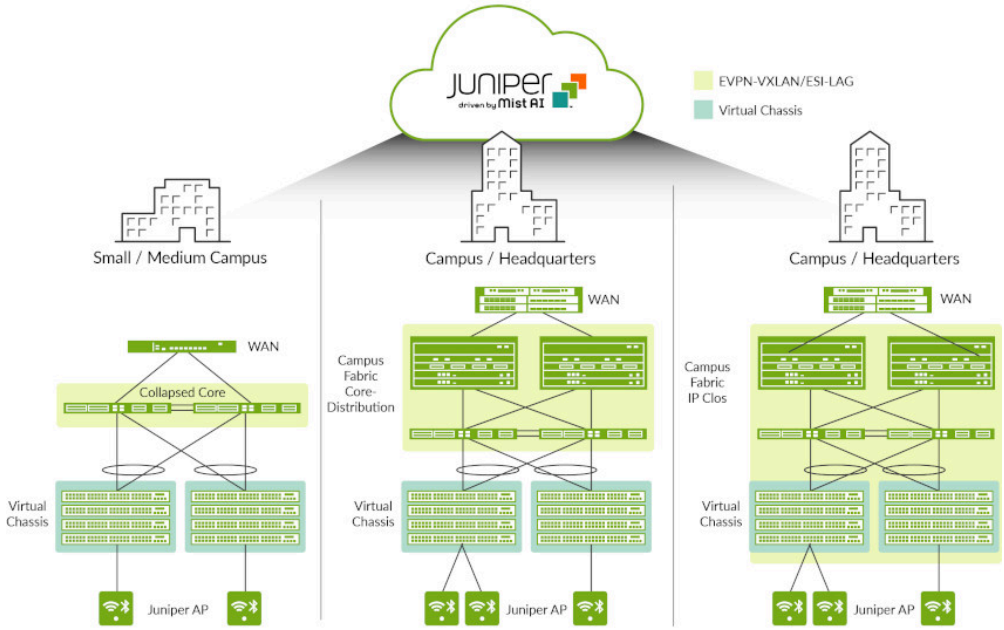

Figure 4: Campus fabrics showing Virtual Chassis and EVPN-VXLAN-based architectures

All three topologies are standards-based and interoperable with third-party vendors.

The EX4100 switches can be deployed in campus and branch access layer networks in the EVPN-VXLAN architectures shown in Figure 4.

Managing AI-Driven Campus Fabric with the Juniper Mist Cloud

Juniper Mist Wired Assurance brings cloud management and Mist AI to the campus fabric. It sets a new standard that moves away from traditional network management towards AI-driven operations, while delivering better experiences to connected devices. Juniper Mist Cloud streamlines deployment and management of campus fabric architectures by allowing:

- Automated deployment and zero-touch deployment (ZTD)
- Anomaly detection
- Root cause analysis

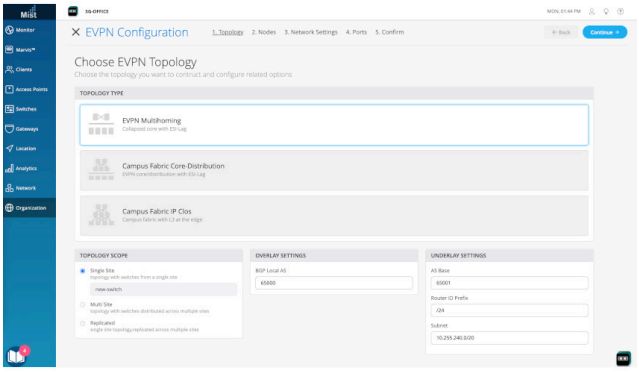

Figure 5: EVPN multihoming configuration via the Juniper Mist cloud

Chassis-Class Availability

The EX4100 switches deliver high availability through redundant power supplies and fans, graceful Routing Engine switchover (GRES), and nonstop bridging and routing when deployed in a Virtual Chassis configuration.

In a Virtual Chassis configuration, each EX4100 switch is capable of functioning as a Routing Engine (RE). When two or more EX4100 switches are interconnected, a single control plane is shared among all Virtual Chassis member switches. Junos OS automatically initiates an election process to assign a primary (active) and backup (hot-standby) RE. An integrated L2 and L3 GRES feature maintains uninterrupted access to applications, services, and IP communications in the unlikely event of a primary RE failure.

When more than two switches are interconnected in a Virtual Chassis configuration, the remaining switch elements act as line cards and are available to assume the backup RE position should the designated primary RE fail. Primary, backup, and line card priority status can be assigned to dictate the order of ascension; this N+1 RE redundancy, coupled with the GRES, nonstop active routing (NSR), and nonstop bridging (NSB) capabilities of Junos OS, assures a smooth transfer of control plane functions following unexpected failures.

The EX4100 implements the same slot/module/port numbering scheme as other Juniper chassis-based products when numbering Virtual Chassis ports, providing true chassis-like operations. By using a consistent operating system and a single configuration file, all switches in a Virtual Chassis configuration are treated as a single device, greatly simplifying overall system maintenance and management.

Individually, the EX4100 offers a number of HA features that are typically associated with modular chassis-based switches. When combined with the field-proven Junos OS and L2/L3 failover capabilities, these features provide the EX4100 with true carrier-class reliability.

- **Redundant power supplies**: The EX4100 line of switches supports redundant, load-sharing, hot-swappable, and field-replaceable power supplies to maintain uninterrupted operations. Thanks to its compact footprint, the EX4100 requires significantly less power than chassis-based switches delivering equivalent port densities.
- **Hot-swappable fans**: The EX4100 includes hot-swappable fans, providing sufficient cooling (for a short duration) even if one of the fans were to fail.
- **Nonstop bridging and nonstop active routing**: NSB and NSR on the EX4100 ensure that control plane protocols, states, and tables are synchronized between primary and standby REs to prevent protocol flaps or convergence issues following an RE failover.
- **Redundant trunk group (RTG)**: To avoid the complexities of STP without sacrificing network resiliency, the EX4100 employs redundant trunk groups to provide the necessary port redundancy and simplify switch configuration.
- **Cross-member link aggregation**: Cross-member link aggregation allows redundant link aggregation connections between devices in a single Virtual Chassis configuration, providing an additional level of reliability and availability.
- **IPv4 and IPv6 routing support**: IPv4 and IPv6 Layer 3 routing (OSPF and BGP) is available with a Flex license, enabling highly resilient networks.

MACsec AES256

The EX4100 switches support IEEE 802.1ae MACsec with AES-256-bit encryption to increase security of point-to-point traffic communications. MACsec provides encrypted communication at the link layer that is capable of identifying and preventing threats from denial of service (DoS) and other intrusion attacks, as well as man-in-the-middle, masquerading, passive wiretapping, and playback attacks launched from behind the firewall. When MACsec is deployed on ports, the traffic is encrypted on the wire, but the traffic inside the switch is not. This allows the switch to apply network policies such as quality of service (QoS) or deep packet inspection (DPI) to each packet without compromising the security of packets on the wire.

PoE/PoE+/PoE++ Power, Perpetual and Fast PoE

The EX4100 delivers PoE for supporting connected devices such as phones, surveillance cameras, IoT devices, and 802.11AX/Wi-Fi 6 access points, offering a PoE power budget of up to 1620W and supporting up to 90W per port based on the IEEE 802.3bt PoE standard.

EX4100 switches support perpetual PoE, which provides uninterrupted power to connected PoE powered devices (PDs) even when the EX4100 switch is rebooting.

The EX4100 switches also support a fast PoE capability that delivers PoE power to connected endpoints during a switch power-up, even before the switch is fully operational. This is especially beneficial in situations where the endpoint only needs the power and is not necessarily dependent on network connectivity.

Junos Telemetry Interface

The EX4100 supports Junos telemetry interface (JTI), a modern telemetry streaming feature designed for switch health and performance monitoring. Sensor data can be streamed to a management system at configurable periodic intervals, enabling network administrators to monitor individual link and node utilization as well as troubleshoot issues such as network congestion in real time. JTI delivers the following features:

- Performance management by provisioning sensors to collect and stream data and analyze application and workload flow paths through the network
- Capacity planning and optimization by proactively detecting hotspots and monitoring latency and microbursts
- Troubleshooting and root cause analysis via high-frequency monitoring and correlation of overlay and underlay networks

Junos Operating System

The EX4100 switches run Junos OS, Juniper's powerful and robust network operating system that powers all Juniper switches, routers, and firewalls. By utilizing a common operating system, Juniper 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 and employs a highly available modular architecture to prevent 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 are maintained and operate in the same way.

Flex Licensing

Juniper Flex licensing offers a common, simple, and flexible licensing model for EX Series access switches, enabling customers to purchase features based on their network and business needs. Flex licensing is offered in Standard, Advanced, and Premium tiers. Standard tier features are available with the Junos OS image that ships with EX Series switches. Additional features can be unlocked with the purchase of a Flex Advanced or Flex Premium license.

The Flex Advanced and Flex Premium licenses for the EX Series platforms are class-based, determined by the number of access ports on the switch. Class 1 (C1) switches have 12 ports, Class 2 (C2) switches have 24 ports, and Class 3 (C3) switches have 32 or 48 ports.

The EX4100 switches support both subscription and perpetual Flex licenses. Subscription licenses are offered for three- and five-year terms. In addition to Junos OS features, the Flex Advanced and Flex Premium subscription licenses include Juniper Mist Wired Assurance. Flex Advanced and Flex Premium subscription licenses also allow portability across the same tier and class of switches, ensuring investment protection for the customer.

For a complete list of features supported by the Flex Standard, Advanced, and Premium tiers, or to learn about Junos OS EX Series licenses, please visit: https://www.juniper.net/documentation/us/en/software/license/licensing/topics/concept/flex-licenses-for-ex.html.

Enhanced Limited Lifetime Warranty

The EX4100 includes an enhanced limited lifetime hardware warranty that provides return-to-factory switch replacement for as long as the original purchaser owns the product. The warranty includes lifetime software updates, advanced shipping of spares within one business day, and 24x7 Juniper Networks Technical Assistance Center (JTAC) support for 90 days after the purchase date. Power supplies and fan trays are covered for a period of five years. For complete details, please visit https://support.juniper.net/support/pdf/warranty/990240.pdf.

Product Options

Available EX4100 models are listed in Table 1.

Table 1. EX4100 Line of Ethernet Switches

Model/Product SKU	Access Port Configuration	PoE/PoE +Ports	PoE+ +Ports	PoE Budget 1 PSU/2 PSU	10GbE Ports	25GbE Ports	Power Supply Rating	Cooling
EX4100-24T	24-port 10/100/1000BASE-T	0	0	N/A	4	4	150 W AC	AFO (front-to-back airflow)
EX4100-48T	48-port 10/100/1000BASE-T	0	0	N/A	4	4	150 W AC	AFO (front-to-back airflow)
EX4100-48T-AFI	48-port 10/100/1000BASE-T	0	0	N/A	4	4	150 W AC	AFI (back-to-front airflow)
EX4100-24T-DC	24-port 10/100/1000BASE-T	0	0	N/A	4	4	150 W DC	AFO (front-to-back airflow)
EX4100-48T-DC	48-port 10/100/1000BASE-T	0	0	N/A	4	4	150 W DC	AFO (front-to-back airflow)
EX4100-24P	24-port 10/100/1000BASE-T	24	0	740 W/1440 W	4	4	920 W AC	AFO (front-to-back airflow)
EX4100-48P	48-port 10/100/1000BASE-T	48	0	740 W/1440 W	4	4	920 W AC	AFO (front-to-back airflow)
EX4100-24MP	8x 100 MB/1GbE/2.5GbE/5GbE/10GbE + 16x 10 MB/100 MB/1GbE	0	24	740W/1620 W	12	4	920 W AC	AFO (front-to-back airflow)
EX4100-48MP	16x 100 MB/1GbE/2.5GbE + 32x 10 MB/100 MB/1GbE	0	48	740 W/1620 W	4	4	920 W AC	AFO (front-to-back airflow)

The EX4100 also offers spare chassis options without power supplies or fans, providing customers with the flexibility to stock SKUs (see Table 2). See the Ordering Information section for additional details.

Table 2. EX4100 Spare Chassis SKUs

Spare Chassis SKU	Description	JPSU-150-AC-AFO + EX4100-FAN-AFO	JPSU-150-AC-AFI + EX4100-FAN-AFI	JPSU-150-DC-AFO + EX4100-FAN-AFO	JPSU-920-AC-AFO + EX4100-FAN-AFO
EX4100-24T-CHAS	Spare chassis, 24-port 10/100/1000BASE-T	Y	X	Y	X
EX4100-48T-CHAS	Spare chassis, 48-port 10/100/1000BASE-T	Y	Y	X	X
EX4100-24P-CHAS	Spare chassis, 24-port 10/100/1000BASE-T	X	X	X	Y
EX4100-48T-CHAS	Spare chassis, 48-port 10/100/1000BASE-T	X	X	Y	X
EX4100-24MP-CHAS	Spare chassis, 8x100 MB/1GbE/2.5GbE/5GbE/10GbE + 16x10 MB/100 MB/1GbE ports	X	X	X	Y
EX4100-48MP-CHAS	Spare chassis, 16x100 MB/1GbE/2.5GbE + 32x10 MB/100 MB/1GbE ports	X	X	X	Y

Y = supported; X = not supported

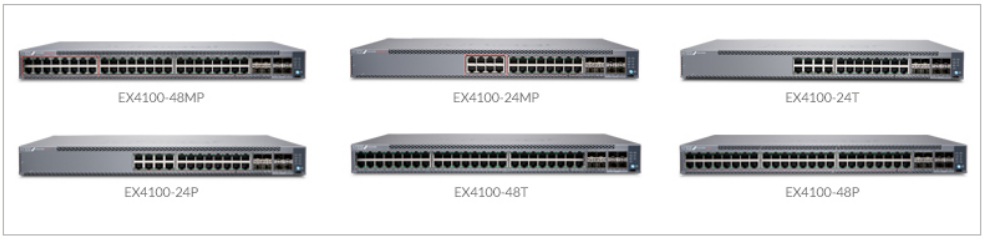

Figure 6: EX4100 line of Switches

EX4100 Line Specifications

Physical Specifications

Backplane

- 200 Gbps Virtual Chassis interconnect to combine up to 10 units as a single logical device

Power Options

- Power supplies: Autosensing; 100-120 V/200-240 V; 150 W, 920 W AC AFO, and 150 W AC AFI dual load sharing hot-swappable internal redundant power supplies
- Maximum current inrush: 30 amps
- DC power supply: 150 W DC AFO; input voltage range 48-60 V max; dual load-sharing hot-swappable internal redundant power supplies
- Minimum number of PSUs required for fully loaded chassis: 1 per switch

Dimensions (W x H x D)

- Base Unit: 17.36 x 1.72 x 13.78 in (44.1 x 4.37 x 35 cm)
- With power supply installed: 17.36 x 1.72 x 15.05 in (44.1 x 4.37 x 38.24 cm)
- Height: 1 U

System Weight

- EX4100-24T switch (with no power supply or fan module): 9.72 lb (4.41 kg)
- EX4100-24P switch (with no power supply or fan module): 10 lb (4.54 kg)
- EX4100-48T switch (with no power supply or fan module): 10 lb (4.54 kg)
- EX4100-48P switch (with no power supply or fan module): 10.27 lb (4.66 kg)
- EX4100-24MP switch (with no power supply or fan module): 10.06 lb (4.57 kg)
- EX4100-48MP switch (with no power supply or fan module): 10.41 lb (4.72 kg)
- 150 W AC power supply: 1.43 lb (0.65 kg)
- 150 W DC power supply: 1.43 lb (0.65 kg)
- 920 W AC power supply: 1.87 lb (0.85 kg)
- Fan module: 0.16 lb (0.07 kg)

Environmental Ranges

- Operating temperature: 32° to 113° F (0° to 45° C)
- Storage temperature: -40° to 158° F (-40° to 70° C)
- Operating altitude: Up to 5000 ft at 40° C (1828.8 m)
- Nonoperating altitude: Up to 16,000 ft (4877 m)
- Relative humidity operating: 5% to 90% (noncondensing)
- Relative humidity non-operating: 0% to 90% (noncondensing)

Cooling [CFM] - Total maximum airflow with two power supplies and fans

- Field-replaceable fans: 2
- EX4100-24MP : 60.9
- EX4100-48MP : 61.7
- EX4100-24T : 65.6
- EX4100-24T-DC : 64.8
- EX4100-24P : 61.6
- EX4100-48T : 65.8
- EX4100-48T-DC : 66.2
- EX4100-48T-AFI : 61.8
- EX4100-48P : 64.1

Hardware Specifications Switching Engine Mode

- Store and forward

Memory

- DRAM: 4 GB with Error Correcting Code (ECC) on all models
- Storage: 8 GB on all models

CPU

- 1.7 GHz ARM CPU on all models

GbE Port Density per System

- EX4100-24P/24T: 32 (24 1GbE host ports + 4 10GbE/25GbE ports + 4 1GbE/10GbE ports)
- EX4100-48P/48T: 56 (48 1GbE host ports + 4 10GbE/25GbE ports + 4 1GbE/10GbE ports)
- EX4100-24MP: 32 (8 10GbE host ports + 16 1GbE host ports + 4 10GbE/25GbE ports + 4 1GbE/10GbE ports)
- EX4100-48MP: 56 (16 2.5GbE host ports + 32 1GbE host ports + 4 10GbE/25GbE ports + 4 port 1GbE/10GbE ports)

Physical Layer

- Time domain reflectometry (TDR) for detecting cable breaks and shorts: EX4100-24P/T and EX4100-48P/T, EX4100-24MP and EX4100-48MP

- Auto medium-dependent interface/medium-dependent interface crossover (MDI/MDIX) support: EX4100-24P/T, EX4100-48P/T, EX4100-24MP and EX4100-48MP
- Port speed downshift/setting maximum advertised speed on
  - 10/100/1000BASE-T ports on EX4100-24P/T and EX4100-48P/T
  - 100/1000BASE-T/2.5GBASE-T/5GBASE-T/10GBASE-T on EX4100-24MP
  - 100/1000BASE-T/2.5GBASE-T on EX4100-48MP

Packet Switching Capacities (Maximum with 64 Byte Packets)

- EX4100-24P/24T: 164 Gbps (unidirectional)/328 Gbps (bidirectional)
- EX4100-48P/48T: 188 Gbps (unidirectional)/376 Gbps (bidirectional)
- EX4100-24MP: 236 Gbps (unidirectional)/472 Gbps (bidirectional)
- EX4100-48MP: 212 Gbps (unidirectional)/424 Gbps (bidirectional)

Software Specifications

Layer 2/Layer 3 Throughput (Mpps) (Maximum with 64 Byte Packets)

- EX4100-48P/T 279 Mpps
- EX4100-24P/T 244 Mpps
- EX4100-48MP 315 Mpps
- EX4100-24MP 351 Mpps

Security

- Media Access Control (MAC) limiting (per port and per VLAN)
- Allowed MAC addresses: 64,000
- Dynamic Address Resolution Protocol (ARP) dynamic ARP inspection (DAI)
- IP source guard
- Local proxy ARP
- Static ARP support
- Dynamic Host Configuration Protocol (DHCP) snooping
- Captive portal
- Persistent MAC address configurations
- Distributed denial of service (DDoS) protection (CPU control path flooding protection)

Layer 2 Switching

- Maximum MAC addresses per system: 64,000
- Jumbo frames: 9216 bytes
- Range of possible VLAN IDs: 1 to 4094
- Virtual Spanning Tree (VST) instances: 253
- Port-based VLAN
- Voice VLAN
- Physical port redundancy: Redundant trunk group (RTG)
- Compatible with Per-VLAN Spanning Tree Plus (PVST+)
- Routed VLAN interface (RVI)
- Uplink failure detection (UFD)
- ITU-T G.8032: Ethernet Ring Protection Switching
- IEEE 802.1AB: Link Layer Discovery Protocol (LLDP)
- LLDP-MED with VoIP integration
- Default VLAN and multiple VLAN range support
- MAC learning deactivate
- Persistent MAC learning (sticky MAC)
- MAC notification
- Private VLANs (PVLANs)
- Explicit congestion notification (ECN)
- Layer 2 protocol tunneling (L2PT)
- IEEE 802.1ak: Multiple VLAN Registration Protocol (MVRP)
- IEEE 802.1p: Class of service (CoS) prioritization
- IEEE 802.1Q: VLAN tagging
- IEEE 802.1X: Port Access Control
- IEEE 802.1ak: Multiple Registration Protocol
- IEEE 802.3: 10BASE-T
- IEEE 802.3u: 100BASE-T
- IEEE 802.3ab: 1000BASE-T
- IEEE 802.3z: 1000BASE-X
- IEEE 802.3bz: 2.5GBASE-T and 5GBASE-T
- IEEE 802.3ae: 10-Gigabit Ethernet
- IEEE 802.3by: 25-Gigabit Ethernet
- IEEE 802.3af: Power over Ethernet
- IEEE 802.3at: Power over Ethernet Plus
- IEEE 802.3bt: 90 W Power over Ethernet
- IEEE 802.3x: Pause Frames/Flow Control
  - IEEE 802.3ah: Ethernet in the First Mile

Spanning Tree

- IEEE 802.1D: Spanning Tree Protocol
- IEEE 802.1s: Multiple Spanning Tree Protocol (MSTP)
- Number of MST instances supported: 64
- Number of VLAN Spanning Tree Protocol (VSTP) instances supported: 253
- IEEE 802.1w: Rapid reconfiguration of Spanning Tree Protocol

Link Aggregation

- IEEE 802.3ad: Link Aggregation Control Protocol
- 802.3ad (LACP) support:

- Number of LAGs supported: 128
  - Maximum number of ports per LAG: 8
- LAG load-sharing algorithm bridged or routed (unicast or multicast) traffic:
  - IP: S/D IP
  - TCP/UDP: S/D IP, S/D Port
  - Non-IP: S/D MAC
  - Tagged ports support in LAG

Layer 3 Features: IPv4

- Maximum number of ARP entries: 32,000
- Maximum number of IPv4 unicast routes in hardware: 32,650 prefixes; 32,150 host routes
- Maximum number of IPv4 multicast routes in hardware: 16,100 multicast routes
- Routing protocols: RIPv1/v2, OSPF, BGP, IS-IS
- Static routing
- Routing policy
- Bidirectional Forwarding Detection (BFD)
- L3 redundancy: Virtual Router Redundancy Protocol (VRRP)
- VRF-Lite: 1000

Layer 3 Features: IPv6

- Maximum number of neighbor discovery (ND) entries: 16,000
- Maximum number of IPv6 unicast routes in hardware: 16,200 prefixes; 16,050 host routes
- Maximum number of IPv6 multicast routes in hardware: 8000 multicast routes
- Routing protocols: RIPng, OSPFv3, IPv6, IS-IS
- Static routing

Access Control Lists (ACLs) (Junos OS Firewall Filters)

- ACL entries (ACE) in hardware per system:
  - Port-based ACL (PACL) ingress: 4092
  - VLAN-based ACL (VACL) ingress: 4092
  - Router-based ACL (RACL) ingress: 4092
  - Port-based ACL (PACL) egress: 1022
  - VLAN-based ACL (VACL) egress: 511
  - Egress across RACL: 1022
  - ACL counter for denied packets
- ACL counter for permitted packets
- Ability to add/remove/change ACL entries in middle of list (ACL editing)
- L2-L4 ACL

Access Security

- 802.1X port-based
- 802.1X multiple supplicants
- 802.1X with VLAN assignment
- 802.1X with authentication bypass access (based on host MAC address)
- 802.1X with VoIP VLAN support
- 802.1X dynamic ACL based on RADIUS attributes
- 802.1X Supported Extensible Authentication Protocol (EAP) types: Message Digest 5 (MD5), Transport Layer Security (TLS), Tunneled TLS (TTLS), Protected Extensible Authenticated Protocol (PEAP)
- MAC authentication (RADIUS)
- Control plane DoS protection
- Radius functionality over IPv6 for authentication, authorization, and accounting (AAA)
- DHCPv6 snooping
- IPv6 neighbor discovery
- IPv6 source guard
- IPv6 router advertisement (RA) guard
- IPv6 Neighbor Discovery Inspection
- MACsec

High Availability

- Redundant, hot-swappable power supplies
- Redundant, field-replaceable, hot-swappable fans
- GRES for Layer 2 hitless forwarding and Layer 3 protocols on RE failover
- Graceful protocol restart (OSPF, BGP)
- Layer 2 hitless forwarding on RE failover
- Nonstop bridging: LACP, xSTP
- Nonstop routing: PIM, OSPF v2 and v3, RIP v2, RIPng, BGP, BGPv6, IS-IS, IGMP v1, v2, v3

Quality of Service

- L2 QoS
- L3 QoS
- Ingress policing: 1 rate 2 color
- Hardware queues per port: 12 (8 unicast + 4 multicast)
- Scheduling methods (egress): Strict priority (SP), weighted deficit round-robin (WDRR)
- 802.1p, DiffServ code point (DSCP)/IP precedence trust and marking
- L2-L4 classification criteria: Interface, MAC address, Ethertype, 802.1p, VLAN, IP address, DSCP/IP precedence, TCP/UDP port numbers, and more

- Congestion avoidance capabilities: Tail drop, weighted random early detection (WRED)

Multicast

- IGMP: v1, v2, v3
- IGMP snooping
- Multicast Listener Discovery (MLD) snooping
- Protocol Independent Multicast-Sparse Mode (PIM-SM), PIM Source-Specific Mode (PIM-SSM), PIM Dense Mode (PIM-DM)

Management and Analytics Platforms

- Juniper Mist Wired Assurance for campus
- Junos Space® Network Director for campus
- Junos Space Management Applications

Device Management and Operations

- Junos OS CLI
- Out-of-band management: Serial; 10/100/1000BASE-T Ethernet
- Rescue configuration
- Configuration rollback
- Image rollback
- RMON (RFC2819) groups 1, 2, 3, 9
- Remote performance monitoring
- SNMP: v1, v2c, v3
- Network Time Protocol (NTP)
- DHCP server
- DHCP client and DHCP proxy
- DHCP relay and helper
- DHCP local server support
- RADIUS
- TACACS+
- SSHv2
- Secure copy
- HTTP/HTTPs
- Domain Name System (DNS) resolver
- System logging
- Temperature sensor
- Configuration backup via FTP/secure copy

Supported RFCs

- RFC 768 UDP
- RFC 783 TFTP
- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 826 ARP
- RFC 854 Telnet client and server
- RFC 894 IP over Ethernet
- RFC 903 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 OSI IS-IS for Routing in TCP/IP and Dual Environments (TCP/IP transport only)
- RFC 1256 IPv4 ICMP Router Discovery (IRDP)
- RFC 1492 TACACS+RFC 1519 CIDR
- RFC 1587 OSPF NSSA Option
- RFC 1591 DNS
- RFC 1812 Requirements for IP Version 4 Routers
- RFC 1981 Path MTU Discovery for IPv6
- RFC 2030 SNTP, Simple Network Time Protocol
- RFC 2068 HTTP server
- RFC 2080 RIPng for IPv6
- RFC 2131 BOOTP/DHCP relay agent and DHCP server
- RFC 2138 RADIUS Authentication
- RFC 2139 RADIUS Accounting
- RFC 2154 OSPF w/Digital Signatures (password, MD-5)
- RFC 2236 IGMP v2
- RFC 2267 Network Ingress Filtering
- RFC 2328 OSPF v2 (edge-mode)
- RFC 2338 VRRP
- RFC 2362 PIM-SM (edge-mode)
- RFC 2370 OSPF Opaque LSA Option
- RFC 2453 RIP v2
- RFC 2460 Internet Protocol, Version 6 (IPv6) Specification
- RFC 2461 Neighbor Discovery for IP Version 6 (IPv6)
- RFC 2463 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
- RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
- RFC 2474 DiffServ Precedence, including 12 queues/port
- RFC 2475 DiffServ Core and Edge Router Functions
- RFC 2526 Reserved IPv6 Subnet Anycast Addresses
- RFC 2597 DiffServ Assured Forwarding (AF)
- RFC 2598 DiffServ Expedited Forwarding (EF)
- RFC 2740 OSPF for IPv6
- RFC 2925 MIB for Remote Ping, Trace
- RFC 3176 sFlow
- RFC 3376 IGMP v3

- RFC 3484 Default Address Selection for Internet Protocol Version 6 (IPv6)
- RFC 3513 Internet Protocol Version 6 (IPv6) Addressing Architecture
- RFC 3569 draft-ietf-ssm-arch-06.txt PIM-SSM PIM Source Specific Multicast
- RFC 3579 RADIUS EAP support for 802.1x
- RFC 3618 Multicast Source Discovery Protocol (MSDP)
- RFC 3623 OSPF Graceful Restart
- RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
- RFC 4291 IPv6 Addressing Architecture
- RFC 4443 ICMPv6 for the IPv6 Specification
- RFC 4541 IBMP and MLD snooping services
- RFC 4552 OSPFv3 Authentication
- RFC 4861 Neighbor Discovery for IPv6
- RFC 4862 IPv6 Stateless Address Autoconfiguration
- RFC 4915 MT-OSPF
- RFC 5095 Deprecation of Type 0 Routing Headers
- RFC 5176 Dynamic Authorization Extensions to RADIUS
- RFC 5798 VRRPv3 for IPv6
- Draft-ietf-bfd-base-05.txt Bidirectional Forwarding Detection
- Draft-ietf-idr-restart-10.txt Graceful Restart Mechanism
- Draft-ietf-isis-restart-02 Restart Signaling for IS-IS
- Draft-ietf-isis-wg-multi-topology-11 Multi Topology (MT) Routing in IS-IS for BGP
- Internet draft-ietf-isis-ipv6-06.txt, Routing IPv6 with IS-IS
- LLDP Media Endpoint Discovery (LLDP-MED), ANSI/TIA-1057, draft 08
- PIM-DM Draft IETF PIM Dense Mode draft-ietf-idmr-pimdm-05.txt, draft-ietf-pim-dm-new-v2-04.txt

Supported MIBs

- RFC 1155 SMI
- RFC 1157 SNMPv1
- RFC 1212, RFC 1213, RFC 1215 MIB-II, Ethernet-Like MIB and TRAPs
- RFC 1493 Bridge MIB
- RFC 1643 Ethernet MIB
- RFC 1657 BGP-4 MIB
- RFC 1724 RIPv2 MIB
- RFC 1850 OSPFv2 MIB
- RFC 1905 RFC 1907 SNMP v2c, SMIv2 and Revised MIB-II
- RFC 2011 SNMPv2 for Internet Protocol using SMIv2
- RFC 2012 SNMPv2 for transmission control protocol using SMIv2
- RFC 2013 SNMPv2 for user datagram protocol suing SMIv2
- RFC 2096 IPv4 Forwarding Table MIB
- RFC 2287 System Application Packages MIB
- 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 3414 User-based Security model for SNMPv3
- RFC 3415 View-based Access Control Model for SNMP
- RFC 3621 PoE-MIB (PoE switches only)
- RFC 4188 STP and Extensions MIB
- RFC 4363 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and VLAN extensions
- RFC 5643 OSPF v3 MIB support
- Draft – blumenthal – aes – usm - 08
- Draft – reeder - snmpv3 – usm - 3desede -00
- Draft-ietf-bfd-mib-02.txt
- Draft-ietf-idmr-igmp-mib-13
- Draft-ietf-idmr-pim-mib-09
- Draft-ietf-idr-bgp4-mibv2-02.txt – Enhanced BGP-4 MIB
- Draft-ietf-isis-wg-mib-07

Troubleshooting

- Debugging: CLI via console, Telnet, or SSH
- Diagnostics: Show and debug command, statistics
- Traffic mirroring (port)
- Traffic mirroring (VLAN)
- IP tools: Extended ping and trace
- Juniper Networks commit and rollback

Traffic Monitoring

- ACL-based mirroring
- Mirroring destination ports per system: 4
  - LAG port monitoring
  - Multiple destination ports monitored to 1 mirror (N:1)
- Maximum number of mirroring sessions: 4
- Mirroring to remote destination (over L2): 1 destination VLAN

Safety and Compliance

Electromagnetic Compatibility (EMC) Requirements

- FCC 47 CFR Part 15
- ICES-003 / ICES-GEN
- EN 300 386 V1.6.1
- EN 300 386 V2.1.1
- EN 55032
- CISPR 32
- EN 55024
- CISPR 24
- EN 55035
- CISPR 35
- IEC/EN 61000 Series
- AS/NZS CISPR 32
- VCCI-CISPR 32
- BSMI CNS 13438
- KN 32 and KN 35
- KN 61000 Series
- TEC/SD/DD/EMC-221/05/OCT-16
- TCVN 7189
- TCVN 7317

Safety Requirements Chassis and Optics

- CAN/CSA-C22.2 No. 62368-1 and 60950-1
- UL 62368-1 and 60950-1
- IEC 62368-1 and 60950-1 (All country deviations): CB Scheme report
- IEC 62368-3 for USB and PoE: CB Scheme report
- CFR, Title 21, Chapter 1, Subchapter J, Part 1040
- REDR c 1370 OR CAN/CSA-E 60825-1- Part 1
- IEC 60825-1
- IEC 60825-2

Energy Efficiency

- AT&T TEER (ATIS-06000015.03.2013)
- ECR 3.0.1
- ETSI ES 203 136 V.1.1.1
- Verizon TEEER (VZ.TPR.9205)

Environmental

- Reduction of Hazardous Substances (ROHS) 6/6

Telco

- CLEI code

Noise Specifications

- Noise measurements based on operational tests taken from bystander position (front) and performed at 23° C in compliance with ISO 7779.

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 https://www.juniper.net/us/en/products.html.

Table 3: EX4100 Power Supply Ratings

Product	Power Supply Rating
EX4100-24T	150 W AC AFO
EX4100-48T	150 W AC AFO
EX4100-48T-AFI	150 W AC AFI
EX4100-24T-DC	150 W DC AFO
EX4100-48T-DC	150 W DC AFO
EX4100-24P	920 W AC AFO
EX4100-48P	920 W AC AFO
EX4100-24MP	920 W AC AFO
EX4100-48MP	920 W AC AFO

Ordering Information

Product	Description
EX4100-48MP	Multigigabit 48 port, PoE++ (up to 90 W) switch with 16x100 MB/1GbE/2.5GbE + 32x10 MB/100 MB/1GbE, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-920-AC-AFO included with Standard SW, optics sold separately, TAA-compliant.
EX4100-24MP	Multigigabit 24 port, PoE++(up to 90 W) switch with 8x100 MB/1GbE/2.5GbE/5GbE/10GbE + 16x10 MB/100 MB/1GbE, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-920-AC-AFO included with Standard SW, optics sold separately, TAA-compliant.
EX4100-48P	48-port 10/100/1000BASE-T PoE+ switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-920-AC-AFO included with Standard SW. optics sold separately, TAA-compliant.
EX4100-24P	24-port 10/100/1000BASE-T PoE+ switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-920-AC-AFO included with Standard SW, optics sold separately, TAA-compliant.
EX4100-48T	48-port 10/100/1000BASE-T switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-150-AC-AFO included with Standard SW, optics sold separately, TAA-compliant.

Product	Description
EX4100-24T	24-port 10/100/1000BASE-T switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-150-AC-AFO included with Standard SW, optics sold separately, TAA-compliant.
EX4100-48T-AFI	48-port 10/100/1000BASE-T switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, back-to-front airflow, 1x JPSU-150-AC-AFI included with Standard SW, optics sold separately, TAA-compliant.
EX4100-48T-DC	48-port 10/100/1000BASE-T switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-150-DC-AFO included with Standard SW, optics sold separately, TAA-compliant.
EX4100-24T-DC	24-port 10/100/1000BASE-T switch, 4x10GbE uplinks, 4x25GbE stacking/uplink ports, MACsec AES256, redundant fans, 1x JPSU-150-DC-AFO included with Standard SW, optics sold separately, TAA-compliant.
Perpetual Licenses	
S-EX-A-C2-P	Software, EX Series Advanced license, Class 2 (24 ports), Perpetual license for EX4100 24-port switches
S-EX-P-C2-P	Software, EX Series Premium license, Class 2 (24 ports), Perpetual license for EX4100 24-port switches
S-EX-A-C3-P	Software, EX Series Advanced license, Class 3 (32 or 48 ports), Perpetual license for EX4100 48-port switches
S-EX-P-C3-P	Software, EX Series Premium license, Class 3 (32 or 48 ports), Perpetual license for EX4100 48-port switches
S-EX-MACSEC-C2-P	Software, EX Series MACsec license, Class 2 (24 ports), Perpetual license for EX4100 24-port switches
S-EX-MACSEC-C3-P	Software, EX Series MACsec license, Class 3 (48 ports), Perpetual license for EX4100 48-port switches
S-EX4100-FBT-P	Software, EX Series Flow Based Telemetry License. Perpetual license for all EX4100 switches.
Subscription Licenses	
S-EX-A-C2-1	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 1 year
S-EX-A-C2-3	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 3 year
S-EX-A-C2-5	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 5 year
S-EX-P-C2-1	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 1 year
S-EX-P-C2-3	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 3 year
S-EX-P-C2-5	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches, 5 year
S-EX-A-C3-1	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 1 year
S-EX-A-C3-3	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 3 year
S-EX-A-C3-5	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 5 year
S-EX-P-C3-1	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 1 year
S-EX-P-C3-3	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 3 year
S-EX-P-C3-5	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches, 5 year
S-EX-A-C2-1-COR	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 1 year
S-EX-A-C2-3-COR	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 3 year
S-EX-A-C2-5-COR	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 5 year
S-EX-P-C2-1-COR	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 1 year
S-EX-P-C2-3-COR	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 3 year
S-EX-P-C2-5-COR	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC CORE support, 5 year
S-EX-A-C3-1-COR	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 1 year
S-EX-A-C3-3-COR	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 3 year
S-EX-A-C3-5-COR	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 5 year
S-EX-P-C3-1-COR	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 1 year
S-EX-P-C3-3-COR	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 3 year
S-EX-P-C3-5-COR	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC CORE support, 5 year
S-EX-A-C2-1-ND	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 1 year
S-EX-A-C2-3-ND	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 3 year
S-EX-A-C2-5-ND	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 5 year
S-EX-P-C2-1-ND	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 1 year
S-EX-P-C2-3-ND	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 3 year
S-EX-P-C2-5-ND	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC NEXT DAY support, 5 year
S-EX-A-C3-1-ND	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 1 year
S-EX-A-C3-3-ND	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 3 year
S-EX-A-C3-5-ND	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 5 year

Product	Description
S-EX-P-C3-1-ND	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 1 year
S-EX-P-C3-3-ND	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 3 year
S-EX-P-C3-5-ND	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC NEXT DAY support, 5 year
S-EX-A-C2-1-SD	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 1 year
S-EX-A-C2-3-SD	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 3 year
S-EX-A-C2-5-SD	Software, EX Series Advanced license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 5 year
S-EX-P-C2-1-SD	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 1 year
S-EX-P-C2-3-SD	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 3 year
S-EX-P-C2-5-SD	Software, EX Series Premium license, Class 2 (24 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 24-port switches with SVC SAME DAY support, 5 year
S-EX-A-C3-1-SD	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC SAME DAY support, 1 year
S-EX-A-C3-3-SD	Software, EX Series Advanced license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC SAME DAY support, 3 year
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S-EX-P-C3-3-SD	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC SAME DAY support, 3 year
S-EX-P-C3-5-SD	Software, EX Series Premium license, Class 3 (32 or 48 ports), includes Juniper Mist Wired Assurance and VNA subscription for EX Series 48-port switches with SVC SAME DAY support, 5 year
Power Supplies	
JPSU-150-AC-AFO	EX Series 150 W AC power supply (power cord needs to be ordered separately) (front-to-back airflow)
JPSU-150-AC-AFI	EX Series 150 W AC power supply (power cord needs to be ordered separately) (back-to-front airflow)
JPSU-150-DC-AFO	EX Series 150 W DC power supply (power cord needs to be ordered separately) (front-to-back airflow)
JPSU-920-AC-AFO	EX Series 920 W DC power supply (power cord needs to be ordered separately) (front-to-back airflow)
Fans	
EX4100-FAN-AFO	Spare fan with front-to-back airflow
EX4100-FAN-AFI	Spare fan with back-to-front airflow
Mounting Options	
EX-4PST-RMK	Adjustable 4-post rack-mount kit for EX4100
EX-WMK	Wall-mount kit for EX4100
EX-RMK	EX Series Rack Mount Kit
Spare Chassis	
EX4100-48MP-CHAS	Spare chassis, 16x100 MB/1GbE/2.5GbE + 32x10 MB/100 MB/1GbE ports PoE++ (optics, power supplies, and fans sold separately)
EX4100-24MP-CHAS	Spare chassis, 8x100 MB/1GbE/2.5GbE/5GbE/10GbE + 16x10 MB/100 MB/1GbE ports PoE++ (optics, power supplies, and fans sold separately)
EX4100-48P-CHAS	Spare chassis, 48-port 10/100/1000BASE-T PoE+ (optics, power supplies, and fans sold separately)
EX4100-24P-CHAS	Spare chassis, 24-port 10/100/1000BASE-T PoE+ (optics, power supplies, and fans sold separately)
EX4100-48T-CHAS	Spare chassis, 48-port 10/100/1000BASE-T (optics, power supplies, and fans sold separately)

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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or +1.408.745.2000

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Juniper Networks | Driven by Experience™

Department of Transportation- WEST VIRGINIA

WVDOT Networking Equipment (81250100)

Solicitation # CRFQ 0803 DOT2500000061

May 9, 2025

Contents

Cover Letter

May 9, 2025

Dear Sir or Madam:

Juniper's AI-driven wired and wireless solutions improve digital continuity for governments while easing the burden on your IT team.

Government agencies looking to modernize legacy IT, including some of the country's largest, have standardized on Juniper to elevate experiences for staff, and residents, while automating processes that have proven efficiency in time and effort saved. You can read about the experiences of City of Philadelphia No. 6 (Pennsylvania), VA Medical Center (Florida), Office of Management and Enterprise Services (Oklahoma), and California Department of Natural Resources (California).

With the acquisition of Mist, Juniper is the fastest-growing company in the history of the wireless LAN industry. Gartner has selected Juniper as the leader of leaders in the Magic Quadrant (view report).

Government agencies, as you know, have unique and diverse requirements to improve the experience of their staff and the residents they serve. This places incredible demands on the network when improving experience is a top priority. Juniper helps improve both staff and resident experiences by providing AI-driven, real-time insights into network, device, and application activities. This enables you to proactively identify and troubleshoot problems before users report them. Once a problem is identified, the system will dynamically capture packets and perform an automated root cause analysis. If your day starts and ends with firefighting network problems, this is the solution for you. In most cases, it can save you travelling to remote locations to solve tricky problems.

The Juniper Mist microservices cloud architecture delivers greater reliability, unlimited scale, and automatic and non-disruptive upgrades. And it makes legacy controllers a thing of the past.

We greatly appreciate your consideration and look forward to demonstrating how Juniper can help you and your agency. Contact your Juniper Partner or Juniper Account Sales Representative today.

Sincerely,

Tom Wilburn

VP Sales
AI-Driven Enterprise

Juniper at a Glance

We support

DIFFERENTIATED INDUSTRY RECOGNITION

LEADER: 2024 Gartner Magic Quadrant Wired and Wireless Access Infrastructure

LEADER: 2024 Gartner Magic Quadrant Indoor Location Services

JUNIPER GLOBAL REACH

10,400 employees

120 locations in 43 countries

24/7 availability tech support to address all customer needs

EXECUTIVE SUMMARY

Introduction

At Juniper Networks, we strive to deliver network experiences that transform how people connect, work, and live. By challenging the inherent complexity in the 5G and cloud era, our solutions power connections that matter most—from government to education to healthcare and the citizens they serve. Our commitment is to advance real outcomes for network teams and every individual they serve by providing a simplified experience in running networks and those who depend on them. Our mission is to help advance government innovation, productivity, and citizen experience.

It all starts with Juniper software innovation. From the Junos operating system to Mist AI, to Apstra and Paragon, we push the envelope on predictability, programmability, automation, and actionable insights. By making **experience** the top priority, we help you build more agile networks upon simplified operations that transcend expectations and position governments for success when facing future challenges. It's that simple.

Juniper has helped many governments and other companies modernize by improving the experience for users and operators and automating processes material to government, both leading to financial benefit calculated in time and effort saved. Please see the attachment at the end for more references.

STATE & LOCAL GOVERNMENT TECHNOLOGY CHALLENGES

"The State of Oklahoma accomplished incredible things over the past year. Working with great partners, like Juniper Networks, OMES secured one of Oklahoma's most valuable resources—2.6 million gigabytes of data. Our team should be proud of the work we accomplished together. Ultimately, it's the people of our great state who will benefit from this project for decades to come."

Jerry Moore,
Chief Information Officer,
State of Oklahoma

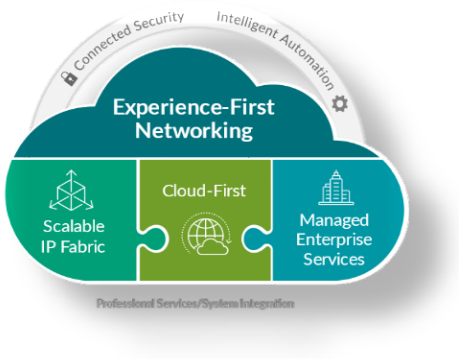
"Being a Juniper shop makes my life and my team's lives easier. We run a network that supports 30,000 employees with four people. We have efficient network operations."

Dennis Doyne,
Chief Network Operations Officer,
City of Philadelphia

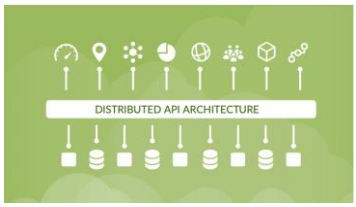
Governments want to elevate digital experiences for staff and citizen services. Traditional networking creates complexity and unnecessary overhead for hybrid and remote governing models. Equally challenging is ensuring governments are ready for what's next. To succeed in this ever-changing environment, many government networks are not up to the task. Networks need to be modernized, not refreshed:

- **MISSION CRITICAL GOVERNMENT:** Advanced networks must operate reliably all day and night to delight agency staff and citizens they serve. Network downtime is measured in failure of agencies to deliver services to citizens, government productivity, and reduced situational awareness needed for agency office safety. A smooth journey to Cloud is essential to accelerate enable digital services for staff and citizens.

- **MORE SERVICES, MORE DEVICES, MORE INNOVATION - IT DEPARTMENT ASKED TO DO MORE:** While the number of devices and technology integration at the network edge has increased, so has the extension of the network and security perimeter. IT department head count has not kept up. Overall, team size remains the same, and staffing remains a critical challenge. IT needs efficiency, which starts with reducing complexity, simplifying operations, and automating workflows. Network tools focus only on managing the network equipment and lack focus on the end-user experience. They also don't want more data and alarms across multiple dashboards; they



Juniper partners with industry leading system integrators, managed service providers and consulting firms to ensure digital experiences delivered by staff and citizens scale with agility and assurance enabled by Juniper AI Driven networking solutions and real time location services.



AI Driven Assurances and Services

Wireless Assurance

Wired Assurance

IoT Assurance

AIOps

WAN Assurance

Advanced Threat Protection

Risk Profiling

Mist AI and Cloud

Cloud Services

want actionable insights to help them reduce and eliminate trouble tickets from users complaining about accessing Wi-Fi or applications critical for government continuity.

- **MODERN GOVERNMENT:** As an example, the pandemic stunned the transportation industry. Now aviation agencies are looking to modernize digital experiences to better engage with travelers, airport staff and tenants by leveraging actionable insights for each user experience, while improving processes, efficiency, and safety. Airport systems are now looking to cloud, AI, ML, IoT and a rich suite of APIs to accelerate reliable service delivery well into the future. The network architecture needs to firmly align to this strategy by being foundationally architected for modernized cloud, microservices, AI, ML, IoT and a rich suite of APIs to scale services and simplify IT operations.

- **AI DRIVEN ASSURANCES:** Whether a government agency wants to self-manage the network or leverage managed services providers, Juniper AI Driven Enterprise delivers differentiated functionality and services:

- Wi-Fi APs with vBLE beacon technology onboard combines best in class Wi-Fi and Bluetooth for accurate real time location services for experience and public safety
- Capture 150+ experience measurements on every network connected user or asset to ensure a great experience and drastically reduce trouble tickets
- Dynamically capture experience issues without disturbing staff to recreate issues
- Gain actionable insights on each staff or citizen experience, illusive until now
- Marvis virtual network assistant simplifies operations with natural query language and attract young IT talent
- Seamlessly integrate future services as needed: track assets, alert janitorial services, and blue tooth enabled badges. Even more services can be employed to advance public safety safe zones for all forms of government

A modernized architecture drives positive outcomes for all agencies:

- Simplify IT operations - know the experience of every connected user or asset
- Seamlessly enable accurate wayfinding - citizen experience and efficiency

- Use AI-driven queue reporting and management – data driven resourcing
- Digitally connect concessions with citizens – improve experience, send notifications
- Future Innovation – AI on a modern cloud architecture with seamless API integration

  Every government agency should demand more from their network to ensure an exceptional experience for every connected user or asset. The network must be foundationally architected to measure each experience, provide insights on each experience, and automatically recommend actions to maintain exceptional experiences. Traditional networks only focus on network health. Modernized networks expand visibility and actionable insights well beyond network health to ensure a great experience for each connected user and asset.

- **DIGITAL GOVERNMENT AND HYBRID WORKFORCE EXPANDS VULNERABILITY TO CYBER THREATS:** Public sector is bound by data privacy and security state-federal guidelines, laws and maintain certifications of compliance. Government authorities have raised alerts warning of an increase in cyber actor activity causing disruptions and stealing data. Phishing and ransomware are perceived as top risk concerns.

With these unrelenting pressures, government agencies are considering new options that will meet their needs today and for the next decade. This is where Juniper Networks has helped governments and we are ready to help your agency on all these fronts, plus more.

JUNIPER NETWORKS, RECOGNIZED LEADER, PIONEER OF AI FOR IT

The Juniper Mist AI-Driven Network for Digital Government includes Juniper's industry recognized wired and wireless access, all driven by Mist AI. This solution has been recognized in the 2024 Gartner Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure where Gartner positioned Juniper as a Leader, furthest in completeness of vision and highest in ability to execute across all vendors. This announcement reaffirms Juniper's leadership in wired and wireless networking, driven by AIOps, the lynchpin to realize the vision of a self-driving network.

2024 GARTNER MAGIC QUADRANT FOR WIRED AND WIRELESS LAN ACCESS INFRASTRUCTURE

Juniper Networks is a TOP SCORE Leader for furthest in Completeness of Vision and highest in Ability to Execute across all vendors.
4x Magic Quadrant ™ Leader

3 Years a Leader
Positioned
Furthest in Execution & Vision

Juniper Networks is proud to be recognized in the 2024 Gartner® Magic Quadrant™ for Indoor Location Services. Gartner has positioned Juniper as a Leader and furthest in Completeness of Vision. We offer:

- **Highly accurate location service using patented virtual BLE technology**
- **Simplified deployment and operations enabled by Mist AI and 100% API-based platform**
- **Comprehensive analytics platform**
- **Rich portfolio of partner solution integrations**
- **Very positive customer feedback on experience**

The Only Networking company Leading in the Location Services MQ

Figure 1: Magic Quadrant for Enterprise Wired and Wireless LAN Infrastructure

Gartner

Figure 1: Magic Quadrant for Indoor Location Services

Source: Gartner (February 2024)

Gartner

Juniper Networks was recognized as a 2024 Gartner Peer Insights™ Customers' Choice Vendor for Wired and Wireless LAN Access Infrastructure, based on a high satisfaction rate of 4.9/5.0 across all end-user reviews. Juniper received the highest rating in this market.

THE JUNIPER PROPOSED SOLUTION OFFERS UNMATCHED CAPABILITIES GIVING GOVERNMENTS REAL BENEFITS THAT ALIGN TO THEIR PRIORITIES

ASSURED USER EXPERIENCES

Only solution with service levels down to the device, client, session, and application level

The solution focuses on delivering great user experiences, not just managing the network. Even when the network says it is up, does not mean governments, agency staff, or citizens are happy. For every device or client on the government network, the Juniper Mist Cloud tracks 150 pre- and post-connection states in real time and understanding exactly what is happening at every moment. No more wasting valuable time chasing IT ghosts during static or changing environments. You can focus IT efforts for maximizing government innovation and citizen outcomes.

SELF-DRIVING AUTOMATION

Best programmability; leader in intent-based networking and AIOps; only AI-driven support

The solution harnesses quality data and leverages artificial intelligence to enable a proactive IT team. When trouble occurs, automated dynamic packet captures (PCAP) are taken, and automated root cause analysis tells you exactly what is wrong with that student, educator, or staff user experience with industry leading efficacy. Powerful AI-driven network tools deliver end-to-end actionable insights for monitoring, troubleshooting, and streamlining operations and support. No more fumbling with multiple dashboards, disparate alarms, network sniffer traces and time-consuming troubleshooting or trying to recreate intermittent troubles. Let Marvis™ Virtual Network Assistant do the heavy work of locating and troubleshooting problems quickly so IT can solve issues fast and stay ahead of trouble, many times without the end user being aware of the issue –reducing trouble tickets and speeding mean time to resolution (MTTR). When it comes time to get your network and devices ready for assessments, let Marvis quickly identify compliant and non-compliant devices for you so you can prepare your district for assessment readiness. When commissioning a new government office, leverage best-in-class zero-touch provisioning.

CLOUD FIRST AND CLOUD READY

Bringing SaaS agility to best-in-class hardware, including weekly production updates with no downtime

The solution is designed with a modern microservices cloud to future-proof your government agencies, increase the reliability of the network, and bring agility not possible from networks built on traditional legacy architectures. Adding more users, agency services, or IoT devices is no problem. The solution scales as you need. Inherent to the solution is the ability for the network to evolve as rapidly as the endpoints and IoT devices that connect to it. No more fussing with cumbersome and complex controller updates. With this solution, updates are pushed out weekly with **NO DOWNTIME**, and it is 100% programmable (API driven).

LOCATION—ENGAGEMENT

Engage citizens and staff digitally without overlay systems

The solution can make your government's wireless network more valuable by enabling location and engagement services. Enhance government innovation and operational strategic initiatives such as boosting citizen and staff engagement, locating assets, and supporting future contact tracing. By leveraging Juniper's patented Bluetooth technology antenna array, quickly and accurately identify people and assets, and engage people on their devices in the network and provide engagement services that are unparalleled. These are all executed with ease and accuracy through optional software subscriptions, built on virtual BLE, machine learning, and integrated IoT technologies that eliminate the need for costly, inaccurate overlay hardware and software solutions commonly found in lesser competitive offerings.

WHAT JUNIPER BRINGS TO GOVERNMENT THAT COMPETITION CLAIMS BUT CAN'T

Juniper Benefits	What Juniper Brings to Government	Real Customer Results
Best Operational Experience 	**Simplest Ongoing Operations** • Become proactive with the user experience monitoring in Marvis Actions • Enable a first-line helpdesk to support the network • Eliminate site visits with Dynamic PCAP • Reduce wired provisioning burden with dynamic port configuration • Improve agency staff safety and asset tracking with integrated location services • Realize cloud driven bi-weekly updates for wired, wireless, and SD-WAN with service interruption	***"...dramatically decreased rollout time"*** ***"...85% reduced site visits"*** ***"...it's like we woke up from a dream, watching Mist roll out"*** ***"Being a Juniper shop makes my life and my team's lives easier. We run a network that supports 30,000 employees with four people. We have efficient network operations."***
Fewest Tickets 	**Self-Driving Network Reduces Tickets** • Deliver the best RF network for governments with AI-Driven Radio Resource Management (RRM) • Fix problems with self-healing network without IT intervention • Receive fewer trouble tickets • Resolve issues faster when problems occur	***"...over 90% reduction in user opened support tickets"*** ***"...since Marvis, escalated tickets are down by factor of 10"*** ***"...MTTR down 96% on average per ticket"*** ***"40% reduction in troubleshooting time."***
Fastest Rollout 	**Automated, No Mistakes** • Zero Touch Provisioning for wired, wireless, and SD-WAN in one cloud • APs compatible with Cisco brackets • Complete templatization (no CLI needed) for wired, wireless, SD-WAN • Fewer templates with more flexibility • Automated IoT onboarding	***"...fully automated deployments for wired and wireless"*** ***"AI-driven operations allowed IT team to install 35 to 40 APs in five hours"*** ***"< 4 hours to set up and install 45 access points"***

SCALABLE SOLUTIONS

In meeting the needs and requirements of any project, the solution proposed contains the following Juniper products and services.

Network Switches	**Juniper Networks® EX Series Switches:** Designed for the converged government agency and data center to address demands for high availability, unified communications, and virtualization, EX Series switches are cloud-ready, and they offer high-performance, scalable, fixed-configuration 1GbE, and multigigabit platforms. The fixed configuration 10GbE aggregation switches are ideal for high-density office deployments, and the modular core switches are optimized for high-density, mission-critical applications. With the EX Series, wired access networks don't have to be complex and difficult to manage. Network administrators can easily onboard, configure, and manage the switches and operate agency fabrics at scale with Juniper Mist Cloud. When the EX Series is combined with the Juniper Wi-Fi portfolio for a unified wired and wireless solution, driven by Mist AI, government agencies gain simple and secure connectivity at scale. Juniper solutions reduce network complexities while addressing scalability by managing multiple devices as one. Government entities can design end-to-end agency fabric architectures using Virtual Chassis technology or open, standards-based Ethernet VPN–Virtual Extensible LAN (EVPN-VXLAN) to avoid costly rip-and-replace upgrades. 
Network Switches	**Juniper Networks QFX Series Switches:** QFX Series Switches, ideally suited for government agency traffic aggregation points and data centers, improve the efficiency of agency fiber networks by aggregating traffic for WAN and Internet access transport. The QFX5100 line of Switches consists of scalable Layer 2/Layer 3 switches that are optimized for application delivery and contain a powerful feature set for virtualized data centers. The QFX10000 line of Switches offers a highly scalable, high-density network foundation for supporting today's most demanding data center and cloud environments, including midsize to large data centers, private clouds, and public clouds. 
SD-WAN	**Juniper Networks Session Smart Router:**  The Juniper Session Smart Router (SSR) powers Juniper's AI-driven SD-WAN solution that is designed to provide users with exceptional experiences. Built on an application-aware and zero-trust secure network fabric, the SSR meets the most stringent enterprise performance, security, and availability requirements. The SSR overcomes inherent inefficiencies of conventional solutions with a tunnel-free architecture that enables improved performance, fast deployments, and cost savings. The solution can run on customer premises equipment (CPE), data center network servers, and in the cloud for flexible deployments.

Operating System	**Junos® Operating System:** All Juniper switches, security platforms, and routers run Junos OS—the networking operating system that defines carrier-grade. With best-in-class protocol support, Junos OS offers the most flexible and capable CLI, including automation capabilities, open programmability for automation, and extensive libraries for Ansible, Python, Ruby, PowerShell, and others. Every Juniper device with Junos OS includes configuration management. For example, the agency network administrator can work on the switching infrastructure during the workday, writing configurations and testing, then when ready, "commit" the changes to the devices. This can even be done safely during the day since the device will not accept an incorrectly formed configuration. Junos OS can automatically recover in the event of a fat-fingered IP address or similar human error. With other network operating systems, such errors would result in significant downtime and be difficult to diagnose and resolve, often requiring a device reboot. Each Juniper device holds up to 50 previous configurations and the agency gets a full audit trail of changes made for easy comparison and for rollback to a previous configuration if needed for resolving problems quickly.
Wireless Access Points	**Juniper Series of High-Performance Access Points:** Designed for the demands of digital government, Juniper makes Wi-Fi predictable, reliable, and measurable by providing unprecedented visibility into the user experience. Wi-Fi, Bluetooth Low Energy (BLE), and IoT are merged with our enterprise-grade access points. They work in conjunction with the Juniper Mist Cloud architecture and Mist AI so government entities can easily customize Wi-Fi service levels, easily provide guest services, quickly identify compliant and noncompliant devices for assessment readiness, replace frustrating, time-consuming manual IT tasks with proactive automation, gain insights through detailed analytics, and leverage location-based services to support functions such as contact tracing and locating valuable assets.
Juniper Mist AI and Cloud Services	**Mist AI and Cloud Family of Services**: Government network administrators save time and money with faster problem resolution and fewer onsite agency visits. Citizens and staff benefit from a network infrastructure that is more predictable, reliable, and measurable. Mist AI uses a combination of artificial intelligence, machine learning, and data science techniques to optimize user experiences and simplify operations across the wireless access, wired access, and SD-WAN domains. Marvis is the first virtual network assistant (VNA) purpose-built with Mist AI for enterprise WLANs, LANs, and WANs. It fundamentally transforms network operations from reactive troubleshooting to proactive remediation through self-driving actions.
Routers	**Juniper Networks MX Series Universal Routing Platforms**: The Juniper portfolio of high-performance, software-centric physical and virtual routers delivers all of the performance, features, and functionality government applications need, including private WAN for multisite connectivity through a private backbone; data center interconnect for connecting multiple data centers for disaster recovery; geo clustering and virtualization; and Internet edge to act as the agency's Internet gateway.

Security	**Juniper Networks SRX Series Firewalls:** SRX Series Firewalls are rightsized for multiple agency applications. These next-generation firewalls reduce risk of attack and safeguard users, applications, and devices through identity-based policies, micro segmentation, VPN connectivity, and validated threat prevention.	
Maintenance	**Juniper Care Services:** This comprehensive and flexible portfolio of support services delivers mission-critical support for Juniper hardware and software products around the clock, 365 days a year. Tailored offerings help keep your network running reliably, reduce network risk, decrease operational costs, and protect network investment.	

CONCLUSION

Government agencies must be ready to seamlessly deliver digital government services across traditional, remote, or hybrid governing models while protecting against ever-evolving cybersecurity threats and keeping government employees healthy and safe. The process of procuring network equipment can be as complex and challenging as it is vital to their mission. Juniper has a deep history in helping governments, and with our partners, we are ready to help you with your future projects.

Juniper Networks, driven by Mist AI, is a central piece of any digital transformation. Our technologies would provide faster and more reliable broadband and Wi-Fi connections, more effective cyber threat protection, and readiness to support value-add services such as asset location and customer engagement. Juniper's AI-Driven solution helps support the mission of advancing government with streamlined operations, simplified troubleshooting, and self-driving operations that let you focus on agency staff and customer outcomes instead of the network. Digital transformation should start with a modernized network architecture to ensure each user and asset connects to the right applications at the right time with the best experience.

Thank you for your consideration of Juniper Networks. We leave you with the **Top 10 reasons why governments choose Juniper Networks:**

1. **Maximizes government and citizen outcomes through great user experiences:** The first and only solution that measures the experience of every government staff member, government device and citizen in places of government, every minute to make it better for all.
2. **Future-proofs your governments with a modern network architecture:** The only solution providing weekly feature updates—with no downtime or the complexities of upgrading controllers or access points in controller-based architectures.
3. **Adds bench strength to IT team and attract talent:** Let Marvis ™ Virtual Network Assistant do the heavy work of locating and troubleshooting problems quickly so IT can solve issues fast and stay ahead of trouble.
4. **Stops chasing IT ghosts:** Juniper's patented, dynamic packet capture technology captures packets automatically when an issue occurs.
5. **Keeps government and operational continuity with the only AI-Driven network management:** Juniper provides powerful AI-driven network tools that deliver end-to-end insights for monitoring, troubleshooting, and streamlining operations and support.
6. **Set up personal Wi-Fi space for staff and citizens:** Give governments control of their engagement with citizens with per-user, pre-shared keys. You can enable security at scale, while using the same SSID to establish Wi-Fi bubbles for offices, users, or IOT devices.
7. **The network takes care of itself:** Automated radio management and AI-driven, self-healing help maintain a great user experience, reducing the number of support help tickets typically associated with legacy government networks.

8. **Speeds error-free network provisioning:** Using 100% API-driven automation, all devices and connected clients are automatically detected and configured for faster processes, minimizing errors.
9. **Enhances digital experiences with location-based services**: Location-based services can be turned on with optional software subscriptions through the integrated, patented Bluetooth antenna arrays in Juniper access points to avoid battery-operated beacons.
10. **Lowest TCO:** Unlike traditional, controller-based architectures, governments with Juniper realize faster network deployments, fewer trouble tickets, faster mean time to repair, and easier, more cost-efficient operations.

Juniper Advantages over Extreme

Thank you for evaluating our Juniper Networks based proposal. In the following tables, Juniper Networks demonstrates its equivalency or superiority in the key essential networking features through a side-by-side comparison to Extreme. These essential features are extremely important to:

- achieve a top performing network;
- provide users and network administrators the best user experience;
- achieve the lowest possible total cost of ownership; and
- maximize the return on your network infrastructure project investment.

	Juniper, driven by Mist AI	Extreme
Essential Wireless Features		
Wired Assurance	●●●●● - Measure wired experiences with Service Level Expectations (SLEs) - Switch templates offered within UI; use CLI for corner cases - Dynamic port config that works with any RADIUS server - Port profiles with manual or dynamic config based on endpoint type	●○○○○ Limited insight into wired experience. - Many features require CLI templates. - Port profiles very restricted configurations. - No automatic RMA.
Telemetry	●●●●● API driven and leverages telemetry data from Juniper EX Series Switches to offer anomaly detection and identify when switch health is trending negatively.	●●○○○ Telemetry for wireless and limited for wired switching.
Stacking capabilities	●●●●● 10 member stacking with standards DAC and flexible optics of various lengths up to 960 Gbps	●●●○○ 8-member stacking high bandwidth. Can support up to 40KM stacking distance. Different Gbps link supported.

High availability for redundancy	●●●●● - Virtual Chassis leads the wiring closet solution with NSSU, GRES, high capacity backplane, etc. - Juniper switches support redundant hot swappable power supplies and fans - Offers a variety of choices: MC-LAG, ESI-LAG, EVPN-VXLAN	●●●○○ Yes, virtual chassis SummitStack.
Multigigabit	●●●●● 1/2.5/5/10GbE speeds	●●●●● 1/2.5/5/10/40GbE speeds.
Power over Ethernet	●●●●● UPoE/PoE/PoE+	●●●●● UPoE/PoE/PoE+/UPoE+.
Integrates with standard network access control	●●●●● Compatible with 3rd parties such as Forescout, Clearpass, ISE, FreeRadius and other, etc.	●●●○○ Supported Unified Policy management.
Security	●●●●● - Juniper Connected Security brings visibility and enforcement to every part of the network. - SecIntel leverages EX Switches to quarantine compromise devices and Mist APs to monitor signs of compromise in connected devices. - MACSEC256 on select platforms. - FedRAMP In-Process.	●●●●○ Radsec. IPSec. TrustSec. FedRAMP(cert).
Common hardware building blocks	●●●●● - A single operating system across the Juniper hardware portfolio. - Common building blocks for WAN, WLAN and wired networks.	●●●○○ Different depending on the line. New release of white box like Open switch.
Fabric architectures	●●●●● EVPN-VXLAN, GPB, MC-LAG, ESI-LAG, VC supports 10 devices for stacking, microsegmentation.	●●●○○ Virtual Chassis for Enterprise Supported BPG-EVPN Not deep enough visibility on CloudExtreme IQ.
Multivendor support	●●●●● Built on open standard technologies like EVPN-VXLAN and NAC.	●●○○○ Built with open standards, but very limited.

	Juniper, driven by Mist AI	Extreme
Essential Wired Features		
Inline microsegmentation	●●●●● WxLAN classifies IoT/headless devices and segments by policy	●●○○○ Combination of several elements from Extreme Networks to provide micro segmentation. Needs extra licenses. Need extra equipment and/or software. Containers supported on AP.
Personal WLAN (private user groups)	●●●●● - Self-serve Personal WLAN for segmentation - Unique PSK - Scalable (5,000)	●●○○○ Controller allows user/role segmentation. Limited. - Shared PSK. - PPSK supported, Unable to find maximum supported keys.
Fast AP boot	●●●●● APs boot under 20 seconds	○○○○○ Several minutes.
Automation and Optimization	●●●●● AI for AX to automate and optimize Wi-Fi 6 network settings.	●○○○○ No AI for optimization.
Installation	●●●●● Mist Installation App (IOS and Android) - Easy to scan QR Code, claim AP and place on site & map - can take "top of ladder" pictures that will remain in AP record if there are building changes down the road Auto Provisioning - plug in an AP and automatic - Site assignment - Dynamic Profile Assignment - AP Name Generation Speeds up installation over 5x	●●●○○ ExtremeCloud IQ companion, medium class App with inventory, location , basic visibility and summaries.
	Juniper, driven by Mist AI	**Extreme**
Essential Access Features		
Core design	●●●●● - Controller-free modern microservices architecture. - Service containerization. - Quick and low-risk feature updates. - Near real-time bug fixing without network disruption.	●●○○○ - Moved from 1st generation cloud to microservices. - Presence in several geo locations.
Scalability	●●●●● - Elastic vertical and horizontal scale. - No expensive hardware required.	●●●○○ - Complex and non-elastic. - Virtual controllers hosted in co-located data centers. - Require separate servers and controllers to scale. - On-site controllers stacked.

Programmability	●●●●● - 100% accessible through APIs. - Support for complete IT automation, such as ticketing or web alerts.	●●○○○ - APIs portal under ExtremeCloud IQ. No cost. - UI not based on APIs - Limited set of APIs to input information. - Very confusing depending on the type of controller. - Swagger availability.
Resiliency	●●●●● Microservice containerization - The failure of one service doesn't impact others. - Network remains running if not connected to cloud.	●●●○○ - On Prem with more hardware required. - Each piece of hardware needs proper software versions. - Version compatibility matrix allows some of the controller, not all. - ExtremeCloud IQ not defined.
Agility	●●●●● - Modern, microservices-based cloud of monolithic code base. - Rapid updates without network disruption.	●●●○○ - Slow updates - Microservices architecture.
Deployment flexibility and cloud management	●●●●● - Scale from the largest to the smallest enterprise businesses for rapid updates. - Single click activation for streamline rollouts. - Wired, Wi-Fi and WAN Assurance for full lifecycle management. - ZTP Configuration across AP, Switch and WAN gateway. - Template Driven. - Use Site variables to easily customize as needed.	●●●○○ Microservices co-located data centers. - Controller/Gateway for large customers, monolithic architecture. - Offers on-premises and cloud solutions. - Offered across different applications.
User Interface	●●●●● Easy to configure with complete flexibility on what is visible and in what order.	●●●○○ Good looking dashboard with limited customizability.
	Juniper, driven by Mist AI	**Extreme**
Architecture		
Virtual Network Assistant	●●●●● - Continuous learning through Supervised Machine Learning. - Performs root cause analysis for most detected network issues. - Supports wireless, wired and WAN at a site level. - Troubleshoot issues instead of pulling logs. - Can be accessed through WebUI or API. - Built on 6 years of continuous learning and rich data science toolbox.	●○○○○ - Dashboard and network assistant only on cloud. - Chatbot called Co-Pilot, very limited, No AI. Allows NLP version 1.0. No query. - In beta the last 2 years.

Anomaly detection	●●●●● - Proactively identifies anomalies and uses data science tools to determine root cause. - Leverages both Wired and Wireless SLEs for anomaly detection. - 3rd generation algorithm with ARIMA boosts efficacy. - Anomaly detection performed across Wi-Fi, LAN, WAN, Security Domains - ChatGPT integrated.	●●●○○ Client 360 tracks basic anomalies. Pilot and CoPilot supported. 1st generation anomaly detection algorithm. Limited anomalies detected (Latency, Throughput, airtime).
Self-driving capabilities	●●●●● - Marvis Actions Framework for self-driving or driver-assist mode (e.g. RF optimization, proactive RMA, unhealthy APs, missing VLANs, bad cables, switch config errors, etc.). - Validated by Mist Customer Service to solve or help train system. - Closed loop feedback providing actionable intel to administrators "bottoms up".	○○○○○ - Dashboards generated by basic math. - Lacks self-driving, only having "drive-assist" capabilities where it provides recommendations to IT. - Limited self-driving capabilities (Latency, Throughput, Airtime).
AI-driven location	●●●●● Creation of probability surfaces in the cloud and ongoing unsupervised machine learning to constantly update the model.	○○○○○ No.
AI-Driven RF Optimization (RRM)	●●●●● Based on reinforcement learning: - Optimizes channel/power with AI-based reinforcement learning - AI continuously maximizes User experience (SLE) and minimizes interference in real-time - Adapts dynamically on an ongoing basis while network under load learning from client experience - Learns and deprioritized triggered DFS channels to boost network uptime - Coverage SLE is an ongoing 'Site Survey'	●○○○○ Basic RRM. No AI/ML, requires several days of tuning.
AI-driven support	●●●●● - Mist Support utilizes Marvis to troubleshoot issues. - Marvis efficacy is continuously evaluated and when support issues arise where data or answer is not available, we train Marvis or add the missing data collection. - When Marvis detects a hardware failure in an AP, it can perform an automatic RMA minimizing the 'burden of proof' on IT teams rather than escalating issues with a vendor. - As AP deployments have grown at a rapid pace, support tickets have remained flat due to the use of Mist AI.	○○○○○ - Dashboards. - Lacks automated support capabilities driven by AI.
	Juniper, driven by Mist AI	**Extreme**
Artificial Intelligence		
Service level monitoring	●●●●● - Realtime and inline SLEs for wired and wireless including: Throughput, Time to Connect, Roaming, Coverage, Capacity, AP Uptime, Switch Health. - User/site/device level monitoring. - 100+ states monitored.	●●○○○ Services level monitoring. Fair with false positives some of them not correlate.

Virtual assistant to accelerate help desk	●●●●● - Simple queries with integrated helpdesk based on Mist AI. - Continuous learning and evolution.	●●●●● Not available.
Root cause identification	●●●●● - Automated event correlation using machine learning across wireless/wired/device domains. - Provide real actionable intelligence.	●●●●● Yes, can detect root cause. False positives with no correlations.
Dynamic packet capture	●●●●● - Proactively captures packets when an error event occurs in real-time. - Eliminates need to reproduce issues as every failure has a PCAP starting before the failure and playing though it. - No more sending out tech folks with sniffers *after* the problem has happened.	●●●●● No.
Baselining and anomaly detection	●●●●● Proactive device/OS baselining and anomaly detection by Mist AI.	●●●●● Anomaly detection by Pilot and CoPilot
Network analytics	●●●●● Deep end user data, Freemium & Subscription (Premium Analytics) offering.	●●●●● Requires additional software, licenses and support.
	Juniper, driven by Mist AI	**Extreme**
AI Ops		
BLE antenna in APs	●●●●● - Patented 16-element BLE antenna array. - Dynamic beam-forming.	●●●●● - Single integrated omni-directional BLE antenna.
Virtual beacons	●●●●● Unlimited virtual beacons per AP.	●●●●● No.
Site calibration(unsupervised machine learning)	●●●●● - Unsupervised machine learning. - Site and device calibration without administrator input.	●●●●● - Wi-Fi/AP BLE and BLE beacon for integration. - Does not adapt/learn or auto calibrate. - GPS location

Location algorithm	●●●●●	●●○○○
	- Unsupervised machine learning. - Triangulates and adapts to varying BLE clients and changing RF.	- Triangulation dependent on accurate map placement. - Errors introduced by variance in BLE clients. - GPS location Support Micro Location.
Location analytics	●●●●●	●●○○○
	- BLE & Wi-Fi. - Freemium and subscription services available. - API, first for ease of data sharing.	- Wi-Fi and BLE beacons - Wi-Fi based proximity tracing that has no BLE antenna array, no ML, and poor accuracy. -Support real time and historical analytics.
Asset tracking	●●●●●	●●○○○
	Tracking of 3rd party BLE asset tags.	- Wi-Fi, BLE, 802.15.4 - Requires additional software and third-party integration.
BLE overlay for existing Wi-Fi deployments	●●●●●	●●○○○
	vBLE APs available.	-Yes, BLE beacons Requires licenses, software and support.
Open standards economics	●●●●●	●●○○○
	Interoperability, vendor neutral, efficient use of existing resources.	RESTful APIs.
Comprehensive built-in applications	●●●●●	●●○○○
	Best of breed solution via partnerships.	Presence, zone tracking and asset visibility rules engine.
Technology versatility	●●●●●	●●●●○
	- Native: Wi-Fi, vBLE. - 3rd party integration: BLE, UWB LiDAR, Wi-Fi RADAR.	- Wi-Fi and BLE - 802.15.4.
	Juniper, driven by Mist AI	**Extreme**
Location Engagement and Insight		
Architectural Upgrades	●●●●●	●●●○○
	Microservices based - always upgrading.	Extreme tries to release a cloud update every 30 days, although this has been inconsistent. Past feature releases are very hard to find.

	Juniper, driven by Mist AI	Extreme
Future Proofing		
Cloud native NAC	●●●●● Juniper Mist Access Assurance provides automatic scaling, service geo-affinity for optimal latency and service redundancy. In addition, periodic hitless feature and security updates to the Access Assurance happen automatically and dot not require a downtime. Customers need not worry about client scale, redundandy, Geographic redundancy and affinity.	●○○○○ Customers need to design and deploy NAC infrastructure depending on the number of client devices, design and deploy NAC and network infrastructure for redundandy, geo affinity. Furthermore any feature or security update requires downtime planning and manual execution for each and every server in the cluster.
Simplified policy management	●●●●● Single page for policy creation and management with unified labels.	○○○○○ Not available.
End-to-end visibility	●●●●● Clients even visibility across wired, wireless and NAC. Complete suite from Onboarding sequence of events. Full visibility.	●●○○○ Limited end-to-end client connection experience visibility in case of using Extreme Management Center and Extreme Control, not available inside the Extreme XIQ cloud, no visibility into granular client network connectivity experience like DHCP, ARP, DNS.
AI infused NAC	●●●●● Marvis validates each and every user networking experience across wired, wireless, wan and NAC, automatically bubbles up issues that have wide impact for admin to take action removing all the noise, or highlights persistently failing clients or offenders. Marvis provide easy hierarchical debugging and troubleshooting.	●○○○○ No Conversational interface or hierarchical debugging, all troubleshooting process requires manual investigation of a per-client logs in either Extreme Management Center or Extreme XIQ Cloud, with limited visibility provided by these logs. Extreme XIQ AI-like features are still in early days and do not provide any substantial benefit.

Government Agency Experience

1. State: https://www.juniper.net/us/en/customers/california-natural-resources-agency-case-study.html
2. City: https://www.juniper.net/us/en/customers/city-of-philadelphia-case-study.html
3. State: https://www.juniper.net/us/en/customers/state-of-oklahoma-omes-case-study.html
4. Airport Experience: Juniper Networks leverages our global partner community of Value Added Resellers, System Integrators and Service Providers to meet modernization requirements of aviation agencies. Few public references are available currently:

    a. **A Top 20 Airport** – Modernize the Traveler Experience, automate processes, and Simplify IT Operations with Juniper AI Driven Enterprise - wired, wireless and real time location services.
    b. **A Top 40 Airport** - Modernize the Traveler Experience, automate processes, and Simplify IT Operations with Juniper AI Driven Enterprise - wired, wireless and real time location services.
    c. **A Top 30 Airport** - BWI Airport – Modernize the Traveler Experience, automate processes, and Simplify IT Operations with Juniper AI Driven Enterprise - wired, wireless and real time location services.
    d. **A Top 10 Airport** – Modernize core wired network with Juniper.
    e. **Major US Airline Lounges** – Provide the best wireless experience in approximately 50 airport lounges globally, with over 500 APs connecting 40,000 unique wireless customers every day, leveraging AIOps 7x24x365 for actionable insights - 14.6 million happy wireless customers annually.

ACTIVE MEMBER OF GOVERNMENT ASSOCIATIONS

NACo NATIONAL ASSOCIATION of COUNTIES

NASCIO Representing Chief Information Officers of the States

NASTD

JUNIPER MIST ACHIEVES STATERAMP AUTHORIZATION

AUTHORIZED StateRAMP

Agencies seeking efficiency from the cloud need assurances that supporting products meet rigorous standards to protect their infrastructures. Juniper Mist has now demonstrated the highest level of compliance with all required security controls for moderate impact level. With the approval of the StateRAMP organization, governments and educational agencies can confidently leverage Mist to effectively manage their cloud networking environment in a more automated and cost-effective way.

The StateRAMP certification is a green light for building cloud networks to serve agency objectives and the people who depend on them for vital services. The certification not only provides a stamp of approval regarding the security of the technology, but streamlines the procurement process, helping agencies plan and execute new projects and select from a pre-vetted list of cloud service providers.

With this certification, government agencies and educational institutions can have the assurance that their cloud data is securely handled according to strict standards set by the FedRAMP program[1], the National Institute of Standards and Technology (NIST), and the International Standards Organization (ISO).

Non-Government Related Industry Experience

1. **Healthcare** - Orlando VA Hospital - Veterans receive proper care through wireless with Mist AI. The U.S. Department of Veterans Affairs' Orlando VA Medical Center (VAMC) serves more than 400,000 veterans across a brand-new 65-acre, 1.2 million square-foot facility. As a state-of-the-art medical center, the Orlando VAMC is constantly looking for innovative ways to leverage technology to deliver a high-touch experience to patients, guests, and staff.

2. **Media and Entertainment** - Walmart AMP - The Walmart Arkansas Music Pavilion (AMP) brings big-name entertainment to the northwest corner of the state. To meet the digital expectations of artists, patrons, and staff, Walmart AMP turned to AI-driven networking from Juniper.

3. **Retail** – Gap Inc. - The IT team wanted a WLAN that would leverage the scale and resiliency of public cloud and be based on modern engineering principles. It also wanted a network platform that offered full access to rich APIs so IT could integrate the network with its in-house-developed tool suite.

Juniper Networks Corporate Overview

THE JUNIPER WAY

BE BOLD	BUILD TRUST	DELIVER EXCELLENCE

OUR ENGINEERING ROOTS

In 1996, Juniper Networks was founded by Pradeep Sindhu under the premise of connecting everything and empowering everyone. Pradeep and his team engineered a revolutionary new product, the M40 Router. This unique design, which for the first time separated the user and control planes, forever changed routing technology industry wide.

> **Our mission is "Power connections. Empower change."**
> **Our vision is "Driven by Experience."**

This spirit of taking on difficult challenges and applying the discipline of engineering to create a breakthrough solution is deeply ingrained in our company culture.

Juniper Networks is dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security, and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability, and equality.

FINANCIAL STABILITY

From a financial standpoint, Juniper Networks continues to execute on our objective of delivering high-quality financial metrics, including continued non-GAAP profitability, positive cash flow from operations, strong gross margins, and a strong balance sheet.

The table below highlights several of Juniper Networks financial accomplishments for the 2022 Financial Year.

HIGHLIGHT	DETAILS
Revenue growth	$5,301.2 million in FY 2022
Net Income	$471.0 million
Strong cash position	$880.1 million
Net cash flow from operations	$97.6 million
Geographical diversification	Americas: 59.6% - $3,156.8 million in revenue EMEA: 25.8% - $1,370.0 million in revenue APAC: 14.6 % - $774.4 million in revenue
Product revenue	$3,539.9 million
Market diversification	Cloud: $1,393.6 million Service Provider: $1,891.2 million Enterprise: $2,016.4 million Software & Related Services: $994.0 million Automated WAN: $1,865 million Cloud-Ready Data Center: $879 million AI-Driven Enterprise: $1,026 million
Employees	10,400 employees
Research and development spending	$1,036.1 million

Further details on Juniper Networks financials, including annual reports and documents filed with the SEC, can be found at the following website:
http://www.juniper.net/company/investor/.

Juniper Networks, Inc. Disclaimer

Juniper Networks Inc. (“Juniper”) is extremely pleased to present this proposal for your evaluation and consideration. Please note that the information contained in this proposal is proprietary and confidential to Juniper and is furnished in confidence to you with the understanding that it will not, without the express written permission of Juniper, be used or disclosed for other than proposal evaluation purposes.

For public sector customers, please note that this proposal may include information of a type that Juniper considers to be a trade secret and not subject to disclosure under any public records act. In the event such information is provided to you, Juniper retains all rights and remedies available under the public records act and requests that you provide us with written notice and an opportunity to respond in the event that a third party seeks disclosure of all or part of this response pursuant to such statutes. Juniper recognizes that public sector customers have particular procurement rules and processes that they must follow, and we will gladly work with you to ensure that we appropriately address and follow your procurement rules and processes.

This proposal is not, and should not be construed as, an offer to contract with Juniper. If you ultimately decide to purchase any or all of the products and/or services described in this proposal directly with Juniper, then all terms and conditions (inclusive of all business terms and conditions) will only be pursuant to a final and definitive written agreement, in the form of either: (i) an existing written agreement between us, or (ii) a mutually negotiated final written agreement. For purposes of clarity, for a direct relationship with Juniper, the final agreement would replace any other suggested terms and conditions, and Juniper hereby takes exceptions to any such purported terms and conditions. Notwithstanding anything to the contrary, Juniper makes no representations, warranties, or covenants in this proposal (including without limitation as to any products, services, service levels, third-party products or services or interoperability) separate from, in contravention of, or in addition to those contained in the final agreement, and any purported representation, warranty or covenant in this proposal shall be of no force or effect. If you desire a direct relationship with Juniper, we will welcome the opportunity to discuss mutually acceptable terms and conditions.

Alternatively, you may choose, and Juniper may require you, to purchase the Juniper products and services through a Juniper authorized reseller, and the terms and conditions, and all pricing, would be governed by your contract with such reseller. Juniper cannot, in any fashion, dictate or control resale pricing.

Any information contained in this proposal relating to pricing or to future technology under development may be subject to change, including as a result of the negotiations which might occur in contemplation of the final agreement. If any pricing is provided by Juniper in this proposal, it is provided solely for your convenience and budgetary purposes only and does not constitute a bid or an offer from Juniper. Any other pricing will be provided directly by an authorized reseller, and any discussions relating thereto should be held directly with such reseller and not Juniper. Any descriptions, documentation, or references to third-party products not on Juniper’s price list are provided for informational purposes only and shall not be considered a part of Juniper’s proposal.

Thank you for considering Juniper for this exciting opportunity. We look forward to further assisting you with your technology requirements.