EX SERIES ETHERNET SWITCHES

Advancing the Economics of Enterprise Networking

High-Performance Business Requirements

Today's high-performance businesses demand a high-performance network infrastructure that provides fast, secure and reliable delivery of the applications that drive business processes. Switches deployed in regional offices, campuses and data centers enable these business processes by connecting users to applications, delivering everything from traditional file services to telephony, messaging, presence, video conferencing and Web services.

To fill this critical role, network infrastructure switches must:

- Be highly available to ensure uninterrupted, uncompromised delivery of business processes in the event of failures and outages

- Support unified data, voice, messaging, presence and video communications on a single IP infrastructure

- Integrate security functions traditionally implemented in appliances to defend against malicious, sophisticated attacks and optimize application response times

- Deliver operational excellence by delivering consistency and simplicity across the infrastructure to reduce total cost of ownership
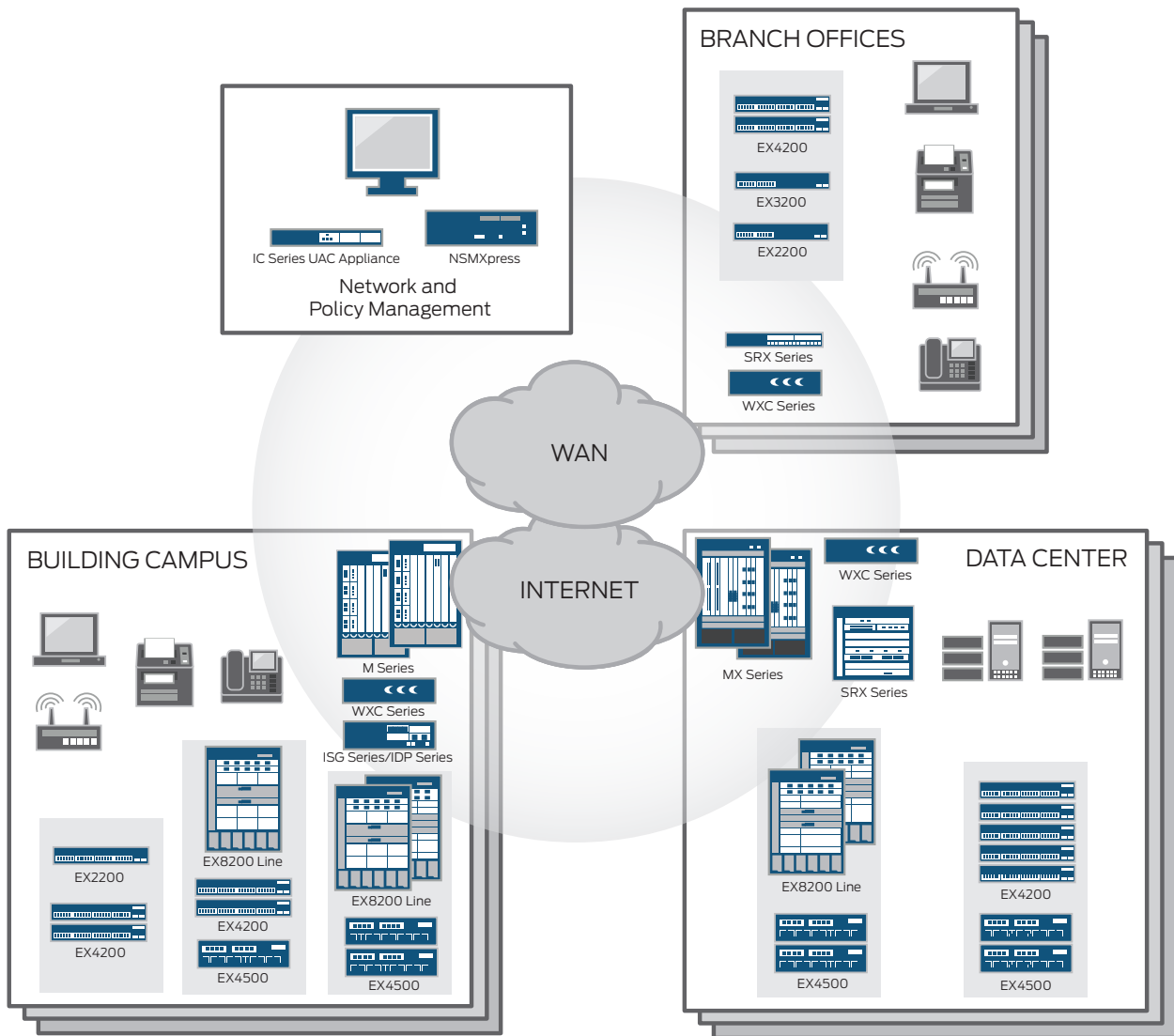
Unfortunately, most contemporary switches don't meet these requirements. Designed and installed over several years, these switches—deployed in multiple layers across the network—fall short of delivering the performance, scalability and wire-speed port densities that today's converged networks demand. Multiple switch layers add considerable cost, delay and complexity to the network, which in turn drives capital and operational expenses ever higher.

Enterprises need a new approach—a strategic, innovative solution that allows them to spend less on their network infrastructure and more on revenue-generating and productivity-enhancing technologies that help them gain a competitive edge.

Juniper Networks® offers such a solution—a new class of Ethernet switches for the enterprise, designed specifically to meet the demands of today's high-performance businesses. The Juniper Networks EX Series Ethernet Switches are changing the game, delivering the next generation of switching technology for today's—and tomorrow's—networks.

With the EX Series, businesses can deploy a cost-effective family of switches that delivers the high availability (HA), unified communications, integrated security and operational excellence they need today, while providing a platform for supporting the requirements of tomorrow.

Welcome to the future of enterprise switching.

BRANCH OFFICES
EX4200
EX3200
EX2200
SRX Series
WXC Series

IC Series UAC Appliance
NSMXpress
Network and
Policy Management

WAN

INTERNET

BUILDING CAMPUS
M Series
WXC Series
ISG Series/IDP Series
EX2200
EX8200 Line
EX4200
EX4200
EX4500
EX8200 Line
EX4500

WXC Series
MX Series
SRX Series
DATA CENTER
EX8200 Line
EX4200
EX4500
EX4500

The Juniper Networks EX Series Ethernet Switches

The Juniper Networks EX2200, EX3200, EX4200, EX4500, and EX8200 Ethernet switches exhibit five key characteristics that, working together, deliver a true enterprise switching solution: carrier-class reliability, security risk management, network virtualization, application control, and reduced total cost of ownership (TCO).
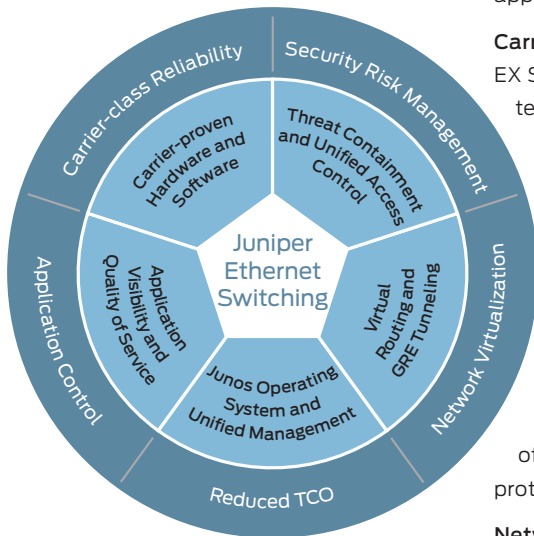
Carrier-class Reliability: Nothing succeeds like success. That's why the Juniper Networks EX Series Ethernet Switches leverage much of the same field-proven Juniper Networks technology—including high-performance application-specific integrated circuits (ASICs), system architecture and Juniper Networks Junos® operating system—that power the world's largest service provider networks. The result is a robust, time-tested and highly reliable network infrastructure solution for high-performance enterprises.

Security Risk Management: The Juniper Networks EX Series Ethernet Switches are fully compatible with the Juniper Networks Unified Access Control (UAC), delivering an extra layer of security by first authenticating users and performing virus checks, then enforcing precise, end-to-end security policies that determine who can access what network resources, as well as quality of service (QoS) policies to ensure delivery of business processes. Integrated anomaly-based threat detection provides additional protection by identifying and blocking distributed denial of service (DDoS) attacks.

Network Virtualization: The EX Series switches feature Juniper Networks Virtual Chassis technology, which enables multiple EX4200 or EX4500* switches to be interconnected and operate as a single system. With Virtual Chassis technology, users get the reliability, availability and high-port densities of traditional chassis-based systems in a cost-effective, compact form factor—the best of both worlds.

Application Control: Successfully managing a network requires knowing how it's being used in order to optimize application delivery and maximize efficiency. Integrated high-performance ASICs on the chassis-based EX8200 line of Ethernet switches provide wire-speed forwarding for any and all packet sizes.

To ensure application traffic is properly prioritized, the EX Series Ethernet Switches support a robust eight QoS queues per port—more than enough to establish separate queues for control plane, voice, video and multiple levels of data traffic, with room to converge other networks such as building automation and security cameras.

Lower TCO: A highly scalable pay-as-you-grow architecture, network designs with lower power consumption, space and associated cooling requirements, a common operating system, and unified management tools across the Juniper portfolio all combine to help reduce operational and capital expenses for EX Series Ethernet Switch customers.

The high-performance, high-density platforms let users start small and grow incrementally, saving valuable space in crowded wiring closets and data centers while lowering recurring power and cooling costs. Leveraging a common version of the Junos operating system across the switch families ensures consistency throughout the infrastructure and accelerates the learning curve. And unified management tools consolidate system monitoring and maintenance, saving time and money.

Working together, these EX Series switch attributes advance the economics of networking by allowing businesses to spend less money and time on their network infrastructure—and more on innovative technologies that help them gain a competitive edge.

*Roadmap

EX2200 Line of Ethernet Switches

The Juniper Networks EX2200 line of Ethernet switches deliver an economical standalone solution for access layer deployments in branch offices and low-density campus networks, satisfying the connectivity requirements of today's high-performance businesses.

Occupying a single rack unit, the EX2200 provides a compact solution for crowded wiring closets and access locations where space and power are at a premium. Four EX2200 switch models are available, offering 24 and 48 10/100/1000BASE-T ports with or without Power over Ethernet (PoE).

The PoE-enabled models deliver 15.4 watts of standards-based 802.3af Class 3 PoE on all ports for supporting networked devices such as telephones, video cameras, and wireless LAN (WLAN) access points in converged networks. Support for the IEEE 802.3at PoE+ standard means the EX2200 offers additional power for devices such as multiple radio IEEE 802.11n wireless access points that may require more than 15.4 watts.

Four fixed front panel gigabit Ethernet (GbE) uplink ports on the EX2200 support high-speed backbone or link aggregation connections between wiring closets and upstream aggregation switches without sacrificing base ports, offering true 24+4 and 48+4 configuration options.

And support for Layer 2 and basic Layer 3 protocols such as RIP and static routing in the base license delivers a level of functionality typically associated with higher cost solutions.

Highly Available, Environmentally Friendly Solution

The EX2200 switch's 10-inch depth, low power consumption and low-acoustic fans make it an environmentally friendly solution that is ideal for open office deployments.

To avoid the complexities of the Spanning Tree Protocol without sacrificing network resiliency, the EX2200 employs Redundant Trunk Group (RTG) to provide the necessary port redundancy while simplifying switch configuration.
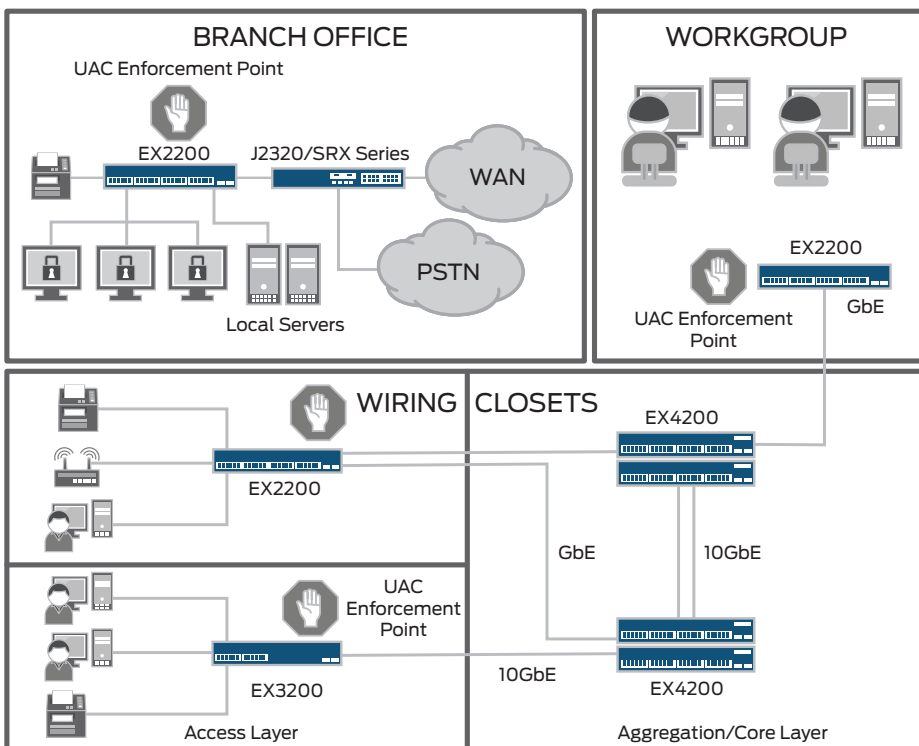
The EX2200 also supports an optional redundant power supply (RPS), ensuring power resiliency and uncompromised availability.

Limited Lifetime Warranty

The EX2200 switches run the same Junos operating system as other Juniper Networks EX Series switches, routers and security products, ensuring a consistent implementation and operation of control plane features across all products.

And the EX2200 line, as well as the Juniper Networks EX3200 line and EX4200 line, offers a limited lifetime warranty that provides return-to-factory switch replacement for as long as the original purchaser owns the product. It's the ultimate protection for the ultimate family of Ethernet switches.

The EX2200 switches deliver a cost-effective, high-performance solution for branch offices and low-density campus and wiring close environments.

EX3200 Line of Ethernet Switches

The Juniper Networks EX3200 line of Ethernet switches offers a simple, cost-effective solution for low-density branch and regional offices. Deployed in wiring closets to provide network access for users and other IP-enabled devices, the EX3200 switches offer plug-and-play 10/100/1000BASE-T connectivity for today's converged networks.

Both 24- and 48-port fixed-configuration switches are available to provide sufficient port densities for most branch offices. Optional four-port Gigabit Ethernet (GbE) and two-port 10 GbE uplink modules with pluggable optics are also available to provide high-speed connections to other EX3200 switches or upstream devices such as aggregation switches or routers. The uplink modules can be installed in the field without taking the system offline, delivering a flexible solution for remote facilities.

Converged Communications and Power over Ethernet

The EX3200 Ethernet switches were designed with today's converged communications networks in mind. Both the 24- and 48-port platforms offer full and partial PoE options to support networked telephones, closed-circuit video cameras, wireless access points and other IP-enabled devices.

Each EX3200 switch delivers a full 15.4 watts of power for every PoE-enabled port, eliminating any provisioning concerns so IT doesn't have to worry about equitable power distribution. Full (all ports) and partial (eight ports) PoE options ensure that there is a solution optimized for virtually every environment.

Simplified Maintenance

Most branch and regional offices don't have the luxury of an IT staff. The EX3200 switch makes it easy for non-technical workers to keep the network up and running.

The EX3200 switch features modular, field-replaceable fans and power supplies—the two items most likely to fail on any networking device. Spares can be stored on site and replaced in literally seconds, dramatically reducing mean-time to repair (MTTR) and lessening the impact of device failures on employee productivity. And an external redundant power-supply option makes the internal power supply hot-swappable, allowing replacements to be installed without powering down the switch.

Juniper Networks Operating System Heritage

By leveraging the same time-tested, field-proven Junos OS employed by other Juniper Networks switches, routers and security products, the EX3200 delivers a true enterprise-class switch that exceeds expectations by delivering carrier-class reliability.

The EX3200 switches offer a simple, cost-effective solution for low-density branch and regional offices as well as campus wiring closets.
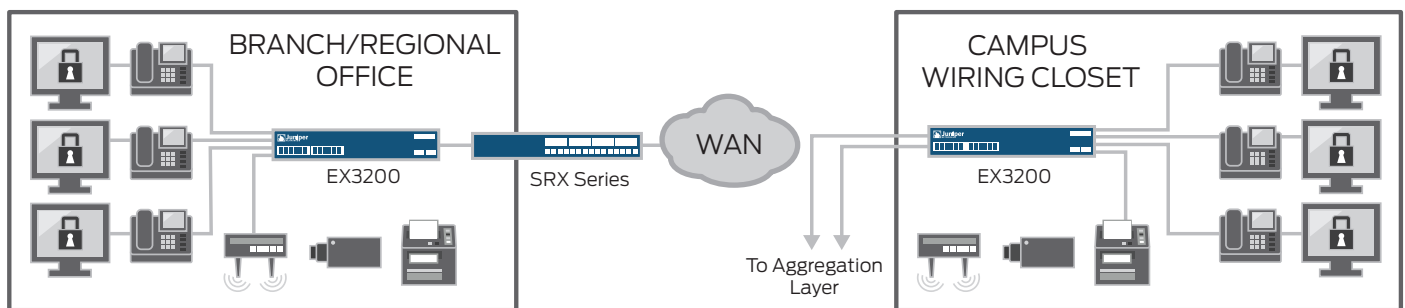
EX4200 Line of Ethernet Switches with Virtual Chassis Technology

The Juniper Networks EX4200 line of Ethernet switches are truly unique, delivering the best elements of chassis-based systems in a compact and efficient form factor.

Designed for access and aggregation deployments, the EX4200 switches are a superset of the EX3200 switches, available in the same 24- and 48-port 10/100/1000BASE-T configurations with full and partial PoE, plus optional GbE and 10 GbE uplink modules. The EX4200 line also offers a 24-port 100BASE-FX/1000BASE-X SFP-based platform for Gigabit aggregation deployments requiring the long distance links afforded by fiber.

Virtual Chassis Technology

What sets the EX4200 switches apart is Virtual Chassis technology. Using Virtual Chassis technology, up to 10 EX4200 switches can be interconnected over a 128 Gigabit-per-second (Gbps) backplane, creating a single virtual switch supporting up to 480 10/100/1000BASE-T ports and up to 40 GbE or 20 10 GbE uplink ports.

Interconnected EX4200 switches act as a single logical device, sharing a common operating system and configuration file, greatly simplifying system operations, maintenance and troubleshooting.

With the EX4200 switch, businesses can start with a single rack-unit device and, as requirements grow, add new units incrementally, avoiding the large up-front investments required by chassis-based solutions while keeping power and cooling costs to a minimum.

High Availability

The EX4200 switches also feature many of the same HA features as chassis-based solutions, including internal redundant hot-swappable power supplies and a field-replaceable fan tray. Power supplies and fan trays are common across the EX4200 line, so spares can be stored onsite for rapid MTTR.

In a Virtual Chassis configuration, Graceful Route Engine Switchover (GRES) ensures that network operations continue uninterrupted and no critical routing data is lost following a master Routing Engine failure. Master and backup Routing Engines are automatically assigned by the Junos OS, dictating an orderly transfer of control-plane functions.

Cost-Effective Alternative

The EX4200 switches deliver a cost-effective alternative to chassis-based systems. For typical aggregation environments requiring 48 GbE SFP fiber ports and four 10 GbE uplinks, two 24-port EX4200 switches deliver the same wire-speed port densities and functionality as the most popular chassis-based solution—at one-sixth the size, one-fifth the power, and one-third the cost.

Using Virtual Chassis technology, multiple EX4200 switches can be interconnected to create a single logical device spanning multiple wiring closets, floors or even buildings.

WEST CLOSET

EAST CLOSET

EX4200

EX4200

Single Virtual Chassis System

Floor N
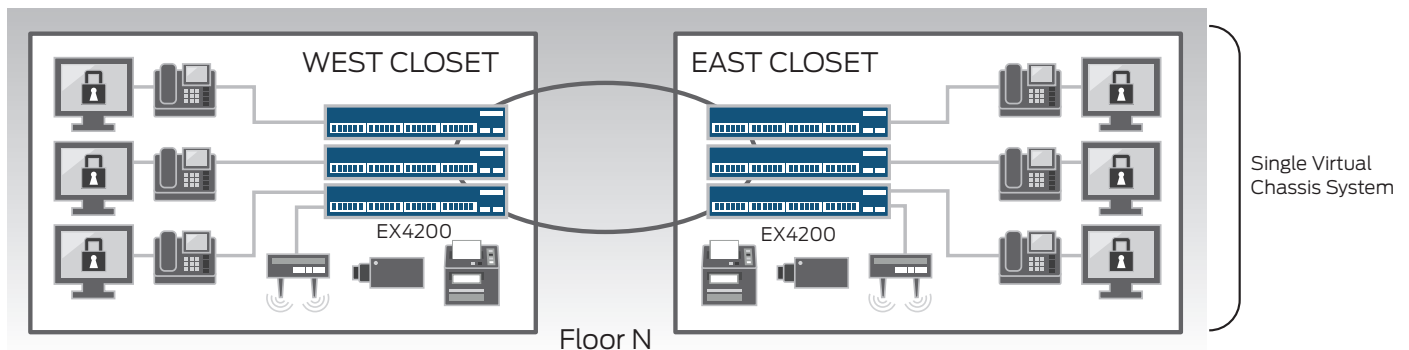
EX4500 Line of Ethernet Switches

The Juniper Networks EX4500 line of Ethernet switches offers scalable, compact, high-performance platforms for supporting high-density 10 gigabit per second (Gbps) data center top-of-rack as well as data center, campus, and service provider aggregation deployments.

Featuring up to 48 wire-speed dual gigabit Ethernet (GbE) and 10GbE pluggable ports in a two rack unit platform, the EX4500 switch delivers full Layer 2 and Layer 3 connectivity to networked devices such as servers and other switches. Forty fixed ports are complemented by two optional high-speed uplink modules available for configuration flexibility, providing eight additional 10GbE ports.

Optimized for the Data Center

The EX4500 is designed for demanding data center applications where high performance, high availability, and energy efficiency are key requirements. Delivering 10Gbps of bandwidth and 14.88 million packets per second (Mpps) throughput on every port for any packet size, the EX4500 is purpose-built for top-of-rack or end-of-row deployments in today's high-performance data center.

The EX4500 also offers an economical, power efficient and compact solution for aggregating 10GbE uplinks from access devices in core data center and building deployments. The EX4500 easily meets enterprise core switch requirements by delivering wire-speed performance on every port, full device redundancy, dual speed GbE and 10GbE interfaces, support for Layer 3 dynamic routing protocols such as RIP and OSPF, and a comprehensive quality-of-service (QoS) feature set.

Virtual Chassis Technology

The EX4500 is also designed to support Virtual Chassis technology*, dramatically reducing complexity and introducing a new level of flexibility for data center top-rack or end-row server aggregation deployments.

Redundant links are only required for each Virtual Chassis group rather than between individual switches, greatly simplifying data center configurations. It will be possible to combine EX4500 and EX4200 switches within a single Virtual Chassis configuration to support environments where both GbE and 10GbE servers are present, making the most efficient use of available resources.

Highly Available, Energy Efficient

The EX4500 switches offer dual internal load sharing AC power supplies and redundant variable-speed fans that adjust their speed based on existing conditions, reducing power consumption and protecting the switch from a single power supply or fan failure.

The EX4500 runs the same Junos operating system as other Juniper Networks EX Series Ethernet Switches, routers, and security products, contributing to a consistent user experience across the entire Juniper network infrastructure.
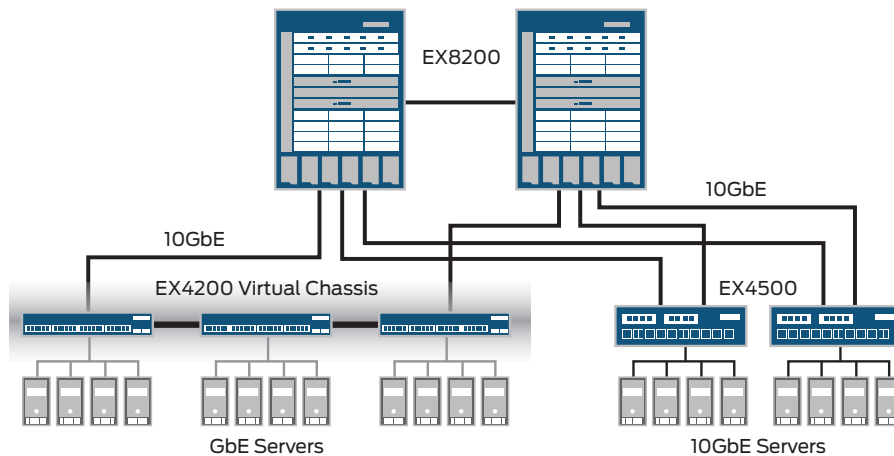
The EX4500 supports high-density 10 Gbps server top-of-rack and aggregation deployments in the data center.

*Roadmap

EX8200 Line of Ethernet Switches

The EX8200 line of modular Ethernet switches delivers a high-performance, highly available platform for today's high-density 10 GbE data center, campus aggregation and core networks.

The EX8200 line of switches consists of two chassis options:

- The Juniper Networks EX8208 Ethernet Switch offers eight dedicated slots in a 14 rack-unit (RU) chassis to support line cards offering a variety of 10/100/1000BASE-T, 100BASE-FX/1000BASE-X and 10 GbE interfaces. The EX8208 switch fabric delivers up to 320 Gbps per slot, enabling wire-rate forwarding performance of 960 million packets per second for packets of any size. A passive backplane supports future scalability to 6.2 Tbps, providing a built-in migration path to future 100 GbE deployments.

- The Juniper Networks EX8216 Ethernet Switch offers 16 dedicated line-card slots in a 21 RU chassis and features a switch fabric with 1.92 billion packets per second forwarding performance—plus the same built-in migration path to support 100 GbE environments in the future.

The EX8200 line of switches also offers some of the industry's highest wire-speed 10 GbE port densities. Up to three EX8208 switches or two EX8216 switches can fit in a single 42-unit rack, delivering an unprecedented 256 wire-speed 10 GbE ports per rack.

Like the EX3200 and EX4200 lines of switches, the EX8200 line leverages the Junos OS as well as other proven Juniper technology including the EX-PFE2 packet-forwarding engine ASIC and the same switching fabric employed by the Juniper Networks MX Series 3D Universal Edge Routers, bringing true carrier-class performance and reliability to the enterprise.
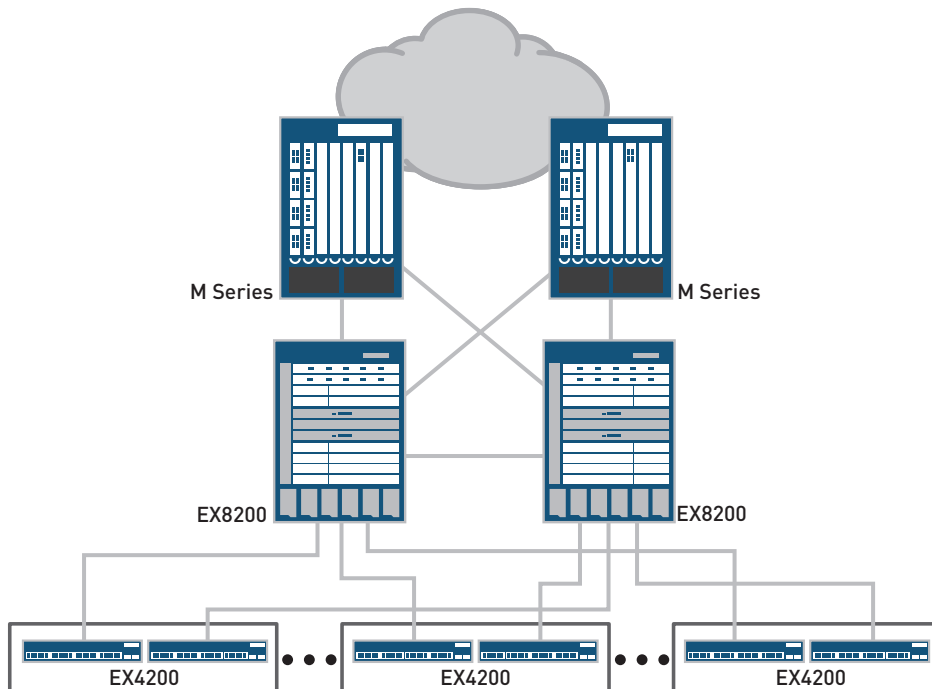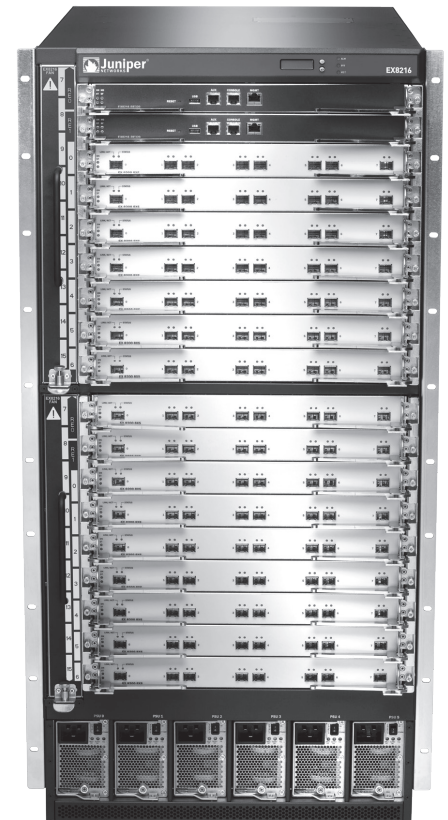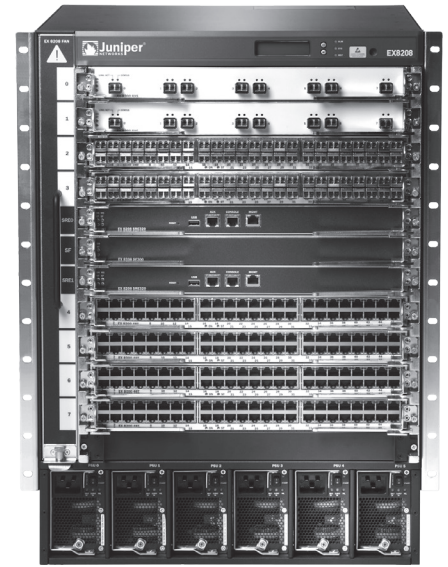
The EX8200 line of switches delivers high-speed, high-density platforms for aggregation and core deployments.

Energy Efficiency

The EX8200 line of switches delivers high-density, wire-rate platforms that consolidate network devices, interconnections, and architectural layers in both data center and campus environments.

In the data center, the EX8200 line of switches accommodates large numbers of 10 GbE line-rate uplinks from access-layer devices such as the EX4200 line of switches, offering a scalable solution for supporting more servers with fewer switches, effectively reducing power consumption, heat generation, and footprint.

In campus aggregation and core environments, the line-rate 10 GbE densities and carrier-class performance enable the EX8200 line of switches to support more users with less network equipment. While EX4200 switches deployed in Virtual Chassis configurations provide network access for floors or buildings with 10 GbE uplinks, the high-density EX8200 line of switches can aggregate the wiring closet uplinks within a single platform, providing an effective solution for reducing energy consumption by deploying less devices.

Investment Protection

While the EX8200 line of switches is ideal for today's high-performance, high-density networks, it also provides investment protection for the future. By providing excess capacity now via the passive backplane design, the EX8200 line of switches will allow users to easily migrate to higher-speed 100 Gigabit Ethernet connections when they are ready—without requiring any upgrades to the switch fabric, Routing Engines, power supplies or cooling system.

The Junos OS Advantage

By leveraging the same modular Junos OS as Juniper Networks router products, the EX Series switches deliver a consistent implementation of each control plane feature across the entire Juniper infrastructure. Running a common operating system across all products dramatically reduces training as well as maintenance and management overhead, which translates into lower TCO.

Junos OS makes this possible by adhering to a rigid and disciplined development process called the "three ones:" one source code, one release train and one modular architecture.

A single source code ensures that Junos OS remains a single, cohesive operating system throughout its development, regardless of the product platform on which it runs. One release train means that each new release is a superset of the previous; new Junos OS features are always implemented in the mainline, not in bug fixes to ensure stability and feature availability from one release to the next.

Junos OS utilizes a single source code, adheres to a consistent and predictable release train, and employs a single modular architecture.

One OS   One Release Track   One Architecture

The Junos operating system's modular architecture ensures that it is more tightly controlled than a monolithic code base. A hardware abstraction layer allows control-plane features to be written once and implemented quickly on the underlying hardware. This modular approach also enhances fault-tolerance; since each Junos OS protocol daemon runs in its own protected memory space, if a single feature such as Spanning Tree fails, it can be gracefully restarted independently without impacting the rest of the system. A similar malfunction in a monolithic operating system would typically force a full system restart.

Management and Support Options

Four management options are available for the EX Series switches, two offering device-level monitoring and control and two providing enterprise-level management.

The Junos OS XML-based command-line interface (CLI) tool and J-Web user interface embedded with each EX Series switch offer device-level management. The Junos OS CLI provides the same feature implementation, automation and scripting parameters found in any Junos OS-based device, while the integrated J-Web-based management tool allows users to easily configure, monitor, troubleshoot and perform system maintenance on individual switches.

The Juniper Networks Network and Security Manager (NSM) extends support to include system-level fault, configuration and performance monitoring for EX Series switches, as well as Juniper Networks firewalls and intrusion detection products. And because they run Junos OS, the EX Series switches are also supported by third-party management systems such as HP OpenView, IBM Tivoli NetView and NetCool, and CA Unicenter, providing a complete, consolidated view of network operations.

About Juniper Networks

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

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