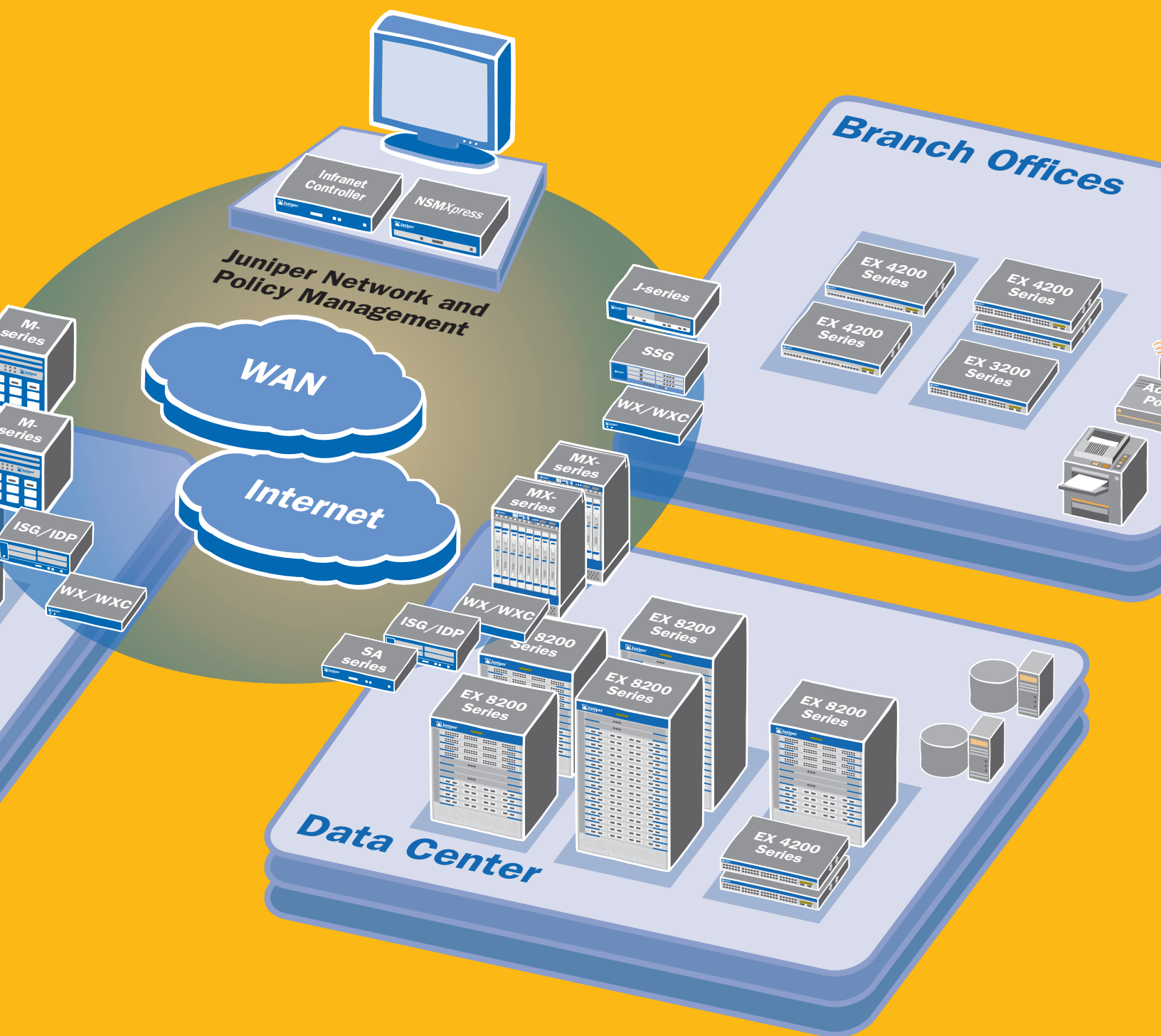


# Juniper Networks EX-series Ethernet Switches

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:

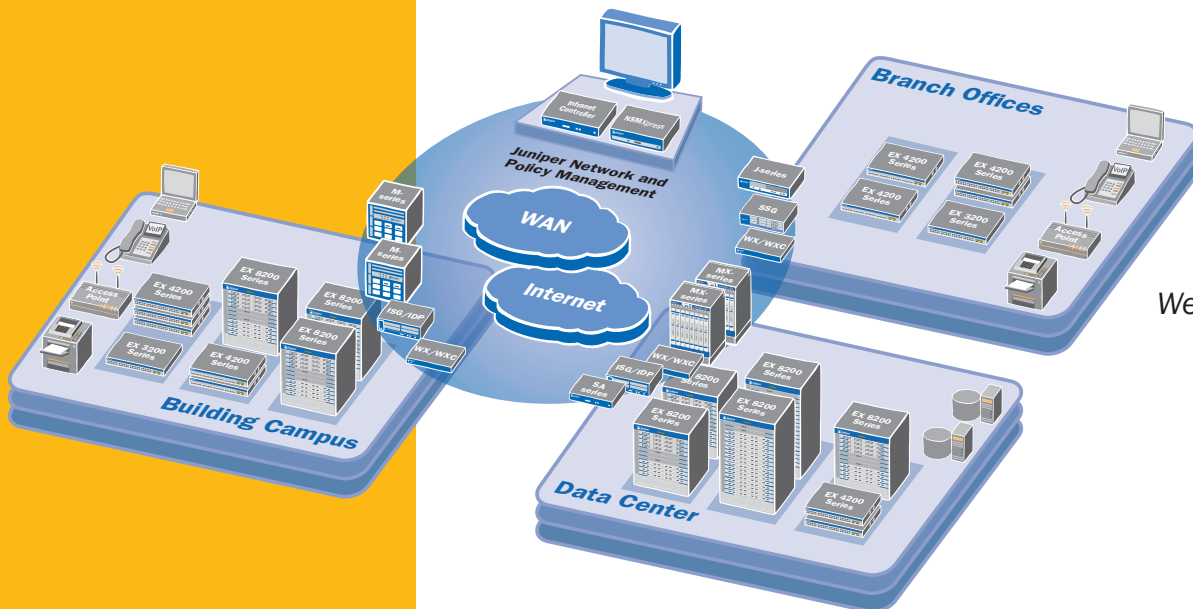
- Be highly available to ensure uninterrupted, uncompromised delivery of business processes in the event of failures and outages
- Support unified data, voice, messaging, presence and video communications on a single IP infrastructure
- Integrate security functions traditionally implemented in appliances 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 EX-series 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.*

## The Juniper Networks EX-series Ethernet Switches

The Juniper Networks EX 3200, EX 4200 and EX 8200 series 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 EX-series Ethernet switches leverage much of the same field-proven Juniper technology—including high-performance application-specific integrated circuits (ASICs), system architecture and JUNOS™ software—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 EX-series Ethernet switches are fully compatible with the Juniper Unified Access Control (UAC) solution, 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's Virtual Chassis™ technology, which enables up to 10 EX 4200 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. The EX-series switches also support generic routing encapsulation (GRE) tunneling for sending mirrored traffic from remote locations to monitoring devices in the network operations center for centralized troubleshooting and analysis, or to build segregated overlay networks without the challenges associated with Spanning Tree.

**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 Juniper chassis-based EX 8200 series Ethernet switches provide wire-speed visibility into more than 150 applications, offering unprecedented insight into how users are actually utilizing the system.

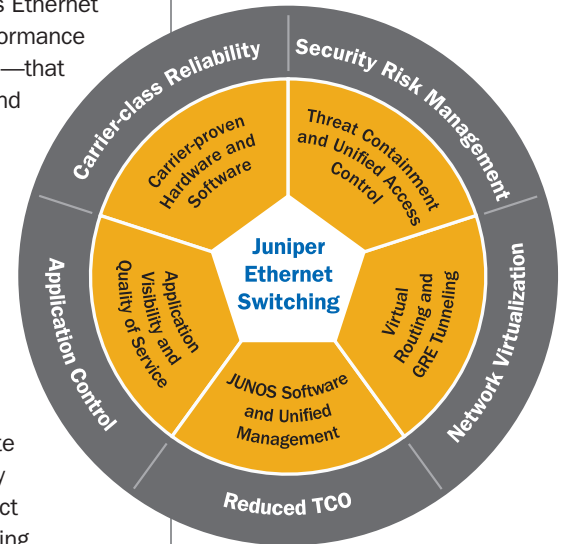
Applications are divided into categories—business, peer-to-peer, messaging or gaming—for easy identification. Additional details such as top talkers, bandwidth consumption by application, and traffic distribution by location are available, providing a detailed snapshot of how applications are behaving across the network.

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 software 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 Juniper EX-series Ethernet 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.





## EX 3200 Series Switches

The Juniper EX 3200 series Ethernet switches offer a simple, cost-effective, standalone solution for low-density branch and regional offices. Deployed in wiring closets to provide network access for users and other IP-enabled devices, the EX 3200 switches offer simple 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 10GbE uplink modules with pluggable optics are also available to provide high-speed connections to other EX 3200 series 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 that are part of a larger enterprise network or individual floors in a building network.

### Converged Communications and Power over Ethernet

The Juniper EX 3200 series Ethernet switches were designed with today's converged communications networks in mind. Both the 24- and 48-port platforms offer full and partial power over Ethernet (PoE) options to support networked telephones, closed-circuit video cameras, wireless access points and other IP-enabled devices.

Each EX 3200 series 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

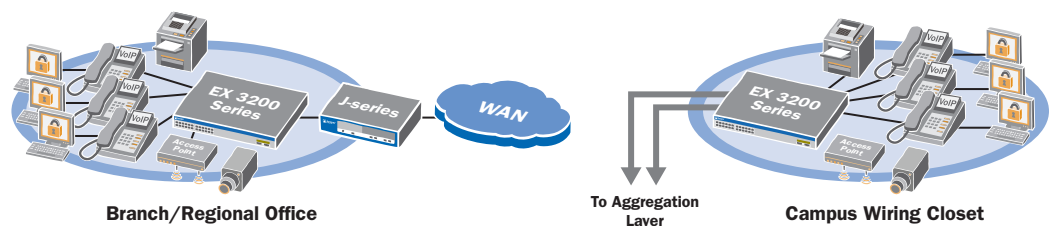
Most branch and regional offices don't have the luxury of a skilled IT staff. The EX 3200 series switches make it easy for non-technical knowledge workers to make basic repairs to keep the network up and running.

All EX 3200 series switches feature 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 Operating System Heritage

Like all EX-series switches, the EX 3200 platforms run the same JUNOS software and leverage the same time-tested, field-proven technology employed by Juniper routers to deliver a true enterprise-class switch that exceeds expectations by delivering carrier-class reliability.

The EX 3200 series switches offer a simple, cost-effective connectivity solution for low-density branch and regional offices as well as campus wiring closets.



## EX 4200 Series Switches

The Juniper EX 4200 series 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 EX 4200 series switches are a superset of the EX 3200 series switches, available in the same 24- and 48-port 10/100/1000BASE-T configurations with full and partial PoE, plus optional GbE and 10GbE uplink modules. The EX 4200 series switches also offer a 24-port 100BASE-FX/1000BASE-X SFP-based platform for Gigabit aggregation deployments requiring the long distance links afforded supported by fiber.

### Virtual Chassis

What sets the EX 4200 series switches apart is the Virtual Chassis™ technology that expands port densities on an as-needed basis. Using Virtual Chassis technology, up to 10 EX 4200 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 10GbE uplink ports.

Interconnected EX 4200 switches act as a single logical device, sharing a common operating system and configuration file; users manage and operate the virtual-chassis configuration just like a chassis-based system, greatly simplifying system operations, maintenance and troubleshooting.

With the EX 4200 series switches, businesses can start with a single rack-unit switch and, as requirements grow, add new units incrementally, avoiding the large up-front investments required by chassis-based solutions. Since switches are only added as needed, power and cooling costs are kept to a minimum, lowering ongoing operational expenses.

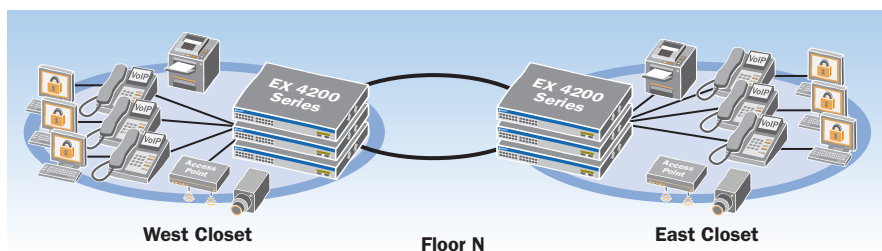
### High Availability

The Juniper EX 4200 series 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. Three blowers on the fan tray—only two of which are needed to cool the entire switch—dramatically increase the availability of networked applications. Power supplies and fan trays are common across the EX 4200 family, 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 Route Engine failure. Master and backup Route Engines are automatically assigned by the JUNOS software, dictating an orderly transfer of control-plane functions.

### Cost-effective Alternative

The EX 4200 series switches deliver a cost-effective alternative to chassis-based systems that truly advances the economics of networking. In fact, for typical aggregation environments requiring 48 GbE SFP fiber ports and four 10GbE uplinks, two 24-port EX 4200 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.



**Single Virtual Chassis System**

Using Virtual Chassis technology, multiple EX 4200 series switches can be interconnected to create a single logical device spanning multiple wiring closets, floors or even buildings.





## EX 8200 Series Switches

The modular Juniper EX 8200 series terabit Ethernet switches deliver a high-performance, highly scalable solution for high-density 10GbE enterprise core and aggregation deployments.

Two EX 8200 series switches will be available: an eight-slot 1.6 terabit model and a 16-slot 3.2 terabit model. Featuring enterprise-class table sizes and deep, hardware-based packet buffers, the EX 8200 platforms offer some of the industry's highest wire-speed 10GbE port densities for its switch class—64 ports in the eight-slot chassis and 128 ports in the 16-slot chassis. Two fully-equipped 16-slot EX 8200 switches can fit in a single 42-unit rack, delivering an unprecedented 256 wire-speed 10GbE ports per rack.

Like the EX 3200 and EX 4200 series switches, the EX 8200 series switches leverage existing, proven Juniper technology such as the JUNOS software, as well as the same switch fabric employed by the MX-series routers. Combined with distributed packet-forwarding engines on each line card and Juniper-developed ASIC technology, the EX 8200 series switches bring carrier-class performance and reliability to Ethernet switching.

### Application Visibility

The EX 8200 series switches will leverage the existing Juniper IDP Profiler technology to identify and provide unprecedented visibility into the performance of up to 150 different applications.

Supplementing the IDP Profiler software with ASIC technology, the EX 8200 series switches can gather full performance and volumetric statistics at wire speed to provide unparalleled insight into how applications are flowing across the switched infrastructure. Users can produce device-level reports with the embedded J-Web interface, or they can aggregate and correlate the data by exporting it to a third-party management solution via NetFlow records to gain a network-level view.

### Integrated Security

The EX 8200 series switches include integrated security features to guard against intruders or other external threats such as distributed denial of service (DDoS) attacks.

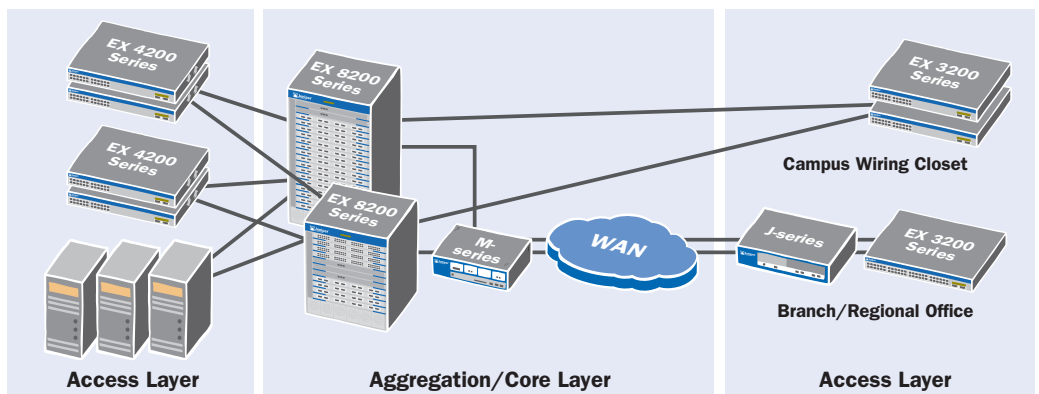
Taking advantage of behavioral threat detection algorithms, the EX 8200 series switches are also capable of identifying and closing half-open sessions—important for defending against zero-day threats for which no signatures exist.

### Investment Protection

While the EX 8200 series switches are ideal for today's high-performance, high-density aggregation and data center core deployments, they also provide investment protection for the future.

Both chassis switches deliver 200 Gbps of switching capacity per slot, enabling the future addition of 100 Gbps uplinks. By providing capacity now, the EX 8200 series switches allow users to easily migrate to higher-speed connections when they are ready—without requiring any changes to the switch fabric, Route Engines, power supplies or cooling system.

The EX 8200 series switches deliver high-speed, high-density platforms for aggregation and core deployments.



## The JUNOS Software Advantage

By leveraging the same modular JUNOS™ software as Juniper 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.

The JUNOS software 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 software 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 software features are always implemented in the mainline, not in bug fixes to ensure stability and feature availability from one release to the next.

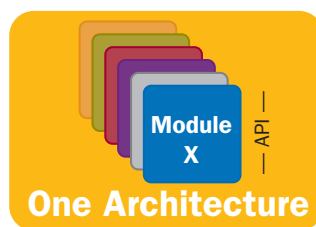
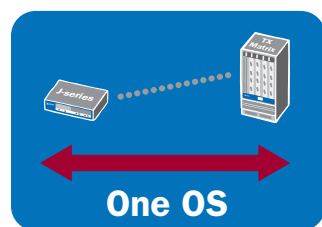
The JUNOS software’s modular architecture ensures that it is more tightly controlled than a monolithic code base. A hardware abstraction layer allows control-plane features to be written once and implemented quickly on the underlying hardware. This modular approach also enhances fault-tolerance; since each JUNOS 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 XML-based Command Line Interface (CLI) tool and J-Web user interface embedded with each EX-series switch offer device-level management. The JUNOS CLI provides the same feature implementation, automation and scripting parameters found in any JUNOS-powered 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 NetScreen-Security Manager (NSM) extends support to include system-level fault, configuration and performance monitoring for EX-series switches, as well as Juniper firewalls and intrusion detection products. And because they run JUNOS software, the EX-series switches are also supported by third-party management systems such as HP OpenView, IBM Tivoli NetView and NetCool, and Computer Associates Unicenter, providing a complete, consolidated view of network operations.



The JUNOS software utilizes a single source code, adheres to a consistent and predictable release train, and employs a single modular architecture.

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### 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](http://www.juniper.net).



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