

The Connected Campus Powers Digital Learning

Education Networks Designed for a New Generation

Challenge

Education and research networks are no longer just institutional necessities. To truly empower and engage today's students, colleges and universities must transform legacy networks into agile, secure services platforms that are accessible by students, faculty, and staff—anywhere, anytime.

Solution

Juniper Connected Campus is a comprehensive reference architecture that allows colleges, universities, and research institutions to build a secure, high-performance, and transformative digital learning and research network.

Benefits

- Attract, engage, and retain students by providing secure access to next-generation digital learning
- Protect data and privacy by securing the network
- Reduce costs with simplified infrastructure deployment, management, and operations while accelerating and automating services
- Integrate partner offerings for WLAN and other key third-party components, providing best-in-class options

The cloud is central to the transformation of today's learning experience. From public to private to hybrid, colleges and universities are adopting cloud technologies as their primary operating model, making the campus network the critical on-ramp to student engagement, learning management, and other critical enterprise resource planning (ERP) applications deployed in private clouds, on-premise data centers, or hosted in remote locations.

Network virtualization is also transforming information technology in higher education, offering a springboard to the flexibility and agility of the cloud. With virtualization, the network can evolve into new deployment and management paradigms, with campus networks reaping the benefits of centralized visibility and control.

The Challenge

Industry challenges are driving continued innovation in higher education. The education network is no longer just an institutional necessity; it needs to truly empower, engage, and inspire students. Colleges and universities must transform their brittle legacy networks into agile, secure services platforms that are accessible to students, faculty, and staff—anytime, anywhere—reducing risk, increasing enrollment and funding, creating differentiation, and reducing TCO.

Reduce Risk

- Privacy laws and regulatory compliance are primary drivers of reduced risk in the higher education industry. Student privacy laws and regulations are placing compliance requirements on all higher education and research institutions.
- Cyberthreats and information security are cited by many sources as the #1 technology issue facing the industry. Data and information systems are central to learning, teaching, and administrative functions. The industry needs advanced security solutions and practices to lower risk; safeguard data, information systems, and networks; and protect private information.
- Business continuity is also an imperative for higher education, and this is particularly true for those institutions providing healthcare services and conducting research.
- Students, faculty, and staff are connecting increasing numbers of devices to the campus network. Allowing for broad, high-density secure access to Wi-Fi is a key challenge, and bring your own app (BYOA) brings new demands for performance, security, and reliability as well.

Increase Enrollment and Funding

- Attracting, engaging, and retaining students all help grow enrollment populations and associated budgets. Technology and the innovative use of it are becoming competitive differentiators for colleges and universities, as ease of use and “always on” access have become top decision making criteria in the college selection process.

- Federal research funding sources vary year to year while the cost of delivering higher education continues to rise. This requires new funding models, as well as partnership and collaboration with third-party and private sector concerns.

Reduce Total Cost of Ownership

- Greater demands for security and performance are being placed on both wired and wireless networks. The exponential growth in digital traffic challenges schools to keep up, as network capacity demand doubles every 18 months.
- Reducing TCO to deliver education and conduct research is an ongoing challenge for higher education, while expectations relative to access and the student experience are at an all-time high.
- Students are simultaneously connecting 2-3 devices and more to the campus network, and they want real-time communications and collaboration with faculty. They also expect it to be as seamless and easy as their current forms of communication on social media apps.

Create Differentiation

- Colleges, universities and research institutions are in a highly competitive global and online industry. They must gain competitive advantage and differentiate to remain relevant.
- Networks need to enable new technologies that increase student engagement from any place by any device, as increased engagement leads to better student outcomes and becomes a competitive differentiator among institutions.
- Research institutions have to continue to develop and innovate projects and create thought leadership. An institution's research innovation and thought leadership lead to student choice as well as funding sources.
- Online classes, virtual schools, online assessments, cloud-based education applications, and digital content are all driving the industry to the cloud. Traditional networks expose colleges and universities with network complexity, strained application delivery, and single points of network failure. An institution's use of cloud, big data, and analytics can help shape competitive advantage as well as help with funding and TCO.

Juniper Connected Campus

The Juniper Connected Campus is based on a three-pronged approach: simplifying the infrastructure, securing the network, and delivering an open, converged framework that ensures best-in-class deployments. Based on Juniper Networks switching and security solutions—including unified threat management (UTM), next-generation firewalls, and malware detection and eradication tools, as well as best-of-breed wireless LAN (WLAN), unified communications and collaboration (UCC), and network solutions through an Open Convergence Framework—the Connected Campus offers all of the essentials a college or university needs to support operations today, while preparing to embrace future developments in education and technology.

Digital Learning and Research Infrastructure

The Juniper Connected Campus begins with the Juniper Networks® EX Series Ethernet Switches, featuring the EX4300 Ethernet Switch for access, the EX4600 Ethernet Switch for high-speed access or distribution, and the EX9200 Ethernet Switch for programmable core switching.

The EX Series switches offer a number of unique features, including Virtual Chassis technology, multichassis link aggregation (MC-LAG), Junos Space Service Insight technology, and unified in-service software upgrade (unified ISSU) in both modular and fixed platforms.

The EX Series has also assumed a new level of manageability and scalability with Junos Fusion Enterprise by enabling users to manage the entire enterprise campus—including hundreds of switches and thousands of ports—as a single, logical device. Organizations can deploy multiple Junos Fusion clusters throughout the enterprise network, each capable of scaling to support thousands of user ports across satellite devices. Junos Fusion Enterprise leverages the open 802.1BR standard to create an enterprise campus network fabric composed of EX Series switches.

In a Junos Fusion Enterprise deployment, EX9200 switches serve as aggregation devices to provide the core service, while EX4300 switches serve as satellite access devices. Juniper Networks QFX5100 Switches are also supported in a leaf topology, offering the unique ability to manage both the campus and data center from a single, logical management plane, creating virtual network segmentation.

The EX Series switches support a number of network automation and plug-and-play operational features, including zero touch provisioning (ZTP), operations and event scripts, automatic rollback, and Python scripting. Juniper also supports integration with Chef and Puppet.

Junos Space Network Director is an intelligent, automated network management tool that enables network administrators to see, analyze, and control their entire enterprise network—physical and virtual; wired and wireless; data center, campus, and branch—through a single pane of glass. Using Network Director, administrators can manage and synchronize both physical and virtual environments in the data center, ensuring that network policies follow workloads as they move from server to server or from virtual machine to virtual machine. In the campus, Network Director automates routine and repetitive management tasks such as network provisioning and troubleshooting, dramatically improving operational efficiency and reliability.

Carrier-Class Security for the Campus

The Juniper Connected Campus offers a comprehensive solution for building secure networks that protect the next-generation learning network. Junos Space Security Director provides global application-level visibility and policy management across a portfolio of scalable Juniper Networks SRX Series Service Gateways. The SRX Series platforms provide a foundation

for implementing a wide array of protections, including high-performance UTM services, next-generation firewall services, and dynamic threat defense and intelligence. SRX Series gateways also offer multiple deployment options, including appliance, chassis-based, and virtual models, all offering the same full feature capability. These building blocks, when combined with Juniper's threat defense and intelligence portfolio, provide a foundational platform for open policy enforcement.

Simplify the Learning and Research Network

By collapsing core, distribution, and access layers into a single logical platform that can be managed from a central location, Juniper removes operational headaches while providing network agility. A single, easy-to-manage platform lets IT organizations expand access port functionality, protect the edge, and centralize configuration, provisioning, management, policy, and visibility. It all works regardless of the deployment model: physical or virtual; public or private cloud; or traditional IT.

Juniper accomplishes this consolidation with Juniper Networks [Junos® Fusion Enterprise](#), an innovative architecture that lets customers build an agile enterprise network that treats access switches as extension ports of the core switch—effectively making multiple switches appear as a single, logical device. Junos Fusion Enterprise uses automated configurations to simplify operations and management; it also supports both stacked and mesh topologies, allowing both end-user access and private cloud or IT data center environments to be consolidated into a single logical system.

Securing the Learning and Research Network

The Juniper Connected Campus also provides comprehensive security and control with SRX Series gateways and the Junos Space Network Director and Junos Space Security Director applications, which provide network performance monitoring and capacity planning as well as centralized security policy management and control. The SRX Series platforms, which offer secure routing (VPN) and next-generation firewall capabilities, are essential to providing a secure foundation for campus and branch network deployments.

While there are many ways to detect and isolate intruders and bad actors, technology that requires the replication of an exact environment for the intruder is inferior to other solutions. Creating such an environment—including the creation of virtual machines (VMs) and mirroring the operating system and applications where the intruder exists—is not only challenging, it doesn't scale well. Simply maintaining such an ecosystem of software compatibility in order to isolate intruders becomes a project in itself.

A much more effective way to detect and isolate attackers is to immediately segment out intruders or bad actors by quarantining them in a sandbox. Such technology currently exists, and Juniper provides this visibility and centralized network policy control using an open policy enforcement platform to stop threats faster and more effectively, both from a cost and an efficiency perspective.

Juniper Networks Spotlight Secure gathers comprehensive, up-to-date threat and security intelligence and instantly communicates it to Security Director, which in turn sends the information to all SRX Series platforms in the network. Additionally, Juniper Networks Sky Advanced Threat Prevention delivers cloud-based protection and prevents malware from infecting the network by “detonating” downloads in a cloud sandbox, allowing SRX Series devices to identify and block any malicious threats.

Open Convergence Framework

The Juniper Connected Campus helps higher education deploy more agile and higher capacity networks that serve greater numbers of users and support an ever-increasing variety of devices with fewer resources and limited budgets. This comprehensive cloud-based solution is designed to accommodate the emerging IT environment, providing access to corporate and educational resources anywhere, anytime.

By partnering with best-in-class WLAN, unified communications and collaboration (UCC), network access control (NAC), and security vendors through its Open Convergence Framework, Juniper ensures easy access to resources from any device, in any environment, by offering a consistent user experience and a network that is easy to deploy, operate, and manage—without locking customers into proprietary solutions when converging or upgrading their enterprise network.

For wireless access, Juniper's Open Convergence Framework includes leading WLAN vendors such as Aruba Networks, Ruckus Wireless, and Aerohive Networks, allowing customers to choose between 802.11n or move to more advanced technologies such as 802.11ac and a variety of other management and integration options.

Also, by integrating with collaboration tools such as Microsoft Lync, Juniper helps users work together in real time, sharing and collaborating anywhere, anytime, over a reliable network infrastructure.

Features and Benefits

- **Manageability:** Broad support for unified device, network, and security management tools helps lower TCO.
- **Single, consistent OS:** Unlike other vendors, EX Series switches and SRX Series gateways run the same Juniper Networks Junos operating system, ensuring easy management and consistent operations.
- **Seamless connectivity:** EX Series switches allow always-on access for any application. Various interface types are supported, including 1GbE and 10GbE copper and fiber. Converged networks are supported for data, voice, and video, along with anytime/anywhere access through integration with Juniper's Open Convergence Framework.
- **Advanced, open, and scalable network security:** Security Director, combined with the Sky Advanced Threat Prevention solution and SRX Series gateways, offers a comprehensive enterprise security solution for everything

from the smallest branch to the largest service provider. The ability to accept open feeds from Juniper as well as outside sources allows users to fine-tune their security for the most efficient network protection available. Both physical and virtual firewalls can be centrally managed, ensuring that policies are consistent throughout the network.

- Broad range of switches for every need: The EX Series switches support everything from access to aggregation to core deployments.
- Architectural advantages: Junos Fusion offers a simple, reliable, and flexible solution for building corporate networks, supported by the EX9200, EX4600, and EX4300 Ethernet Switches.

Solution Components

The Juniper Connected Campus is built on:

- Reliable, high-performance, and automation-ready EX Series Ethernet Switches and SRX Series Services Gateways
- Modern user interfaces focused on the user experience, delivering single pane-of-glass management with Network Director and Security Director, which integrate with Juniper Networks Secure Analytics to enable dynamic workflow execution
- An Open Convergence Framework with published APIs, allowing education and research institutions to choose best-in-class technologies that address all of their needs, from UCC, WLAN access technology, and third-party security feeds

Summary—Transforming Education with a Simplified and Secure Learning and Research Network

As the world shifts to digital learning, students, teachers, and faculty are demanding greater technology integration and innovation. As research and higher education institutions move to the cloud to solve their data management and access challenges, they have a critical need for solutions that can help them bridge the gap between their existing environment and their vision of a more agile and flexible network.

Enter the Juniper Connected Campus—a common, unified solution that supports a diverse set of devices, applications, users, and things to provide reliable, scalable, secure, and highly available access to resources, whether they reside in the cloud, the data center, or the WAN.

Juniper delivers a broad portfolio of reliable, simple, and smart switching, security, and management solutions that securely and seamlessly connect students, faculty, staff, devices, machines, and things in distributed environments. This cloud-enabled education model provides:

- Simplified infrastructure that is scalable and resilient enough to keep up with the demands of users and cloud applications, as well as a management interface that provides ZTP and visibility into network operations, reducing costs associated with today's brittle and complex legacy networks
- Comprehensive enterprise security with visibility into the network and the ability to defend against threats in real time via a multitude of sensors and third-party feeds
- An Open Convergence Framework with APIs that integrate with best-in-class technologies such as WLAN, unified communications, and security feeds, as well as offering automation and orchestration capabilities for the future.

Next Steps

For more information about the Connected Campus, please contact your Juniper representative, or go to <http://www.juniper.net/us/en/solutions/education/higher-education/>.

About Juniper Networks

Juniper Networks challenges the status quo with products, solutions and services that transform the economics of networking. Our team co-innovates with customers and partners to deliver automated, scalable and secure networks with agility, performance and value. Additional information can be found at [Juniper Networks](#) or connect with Juniper on [Twitter](#) and [Facebook](#).

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