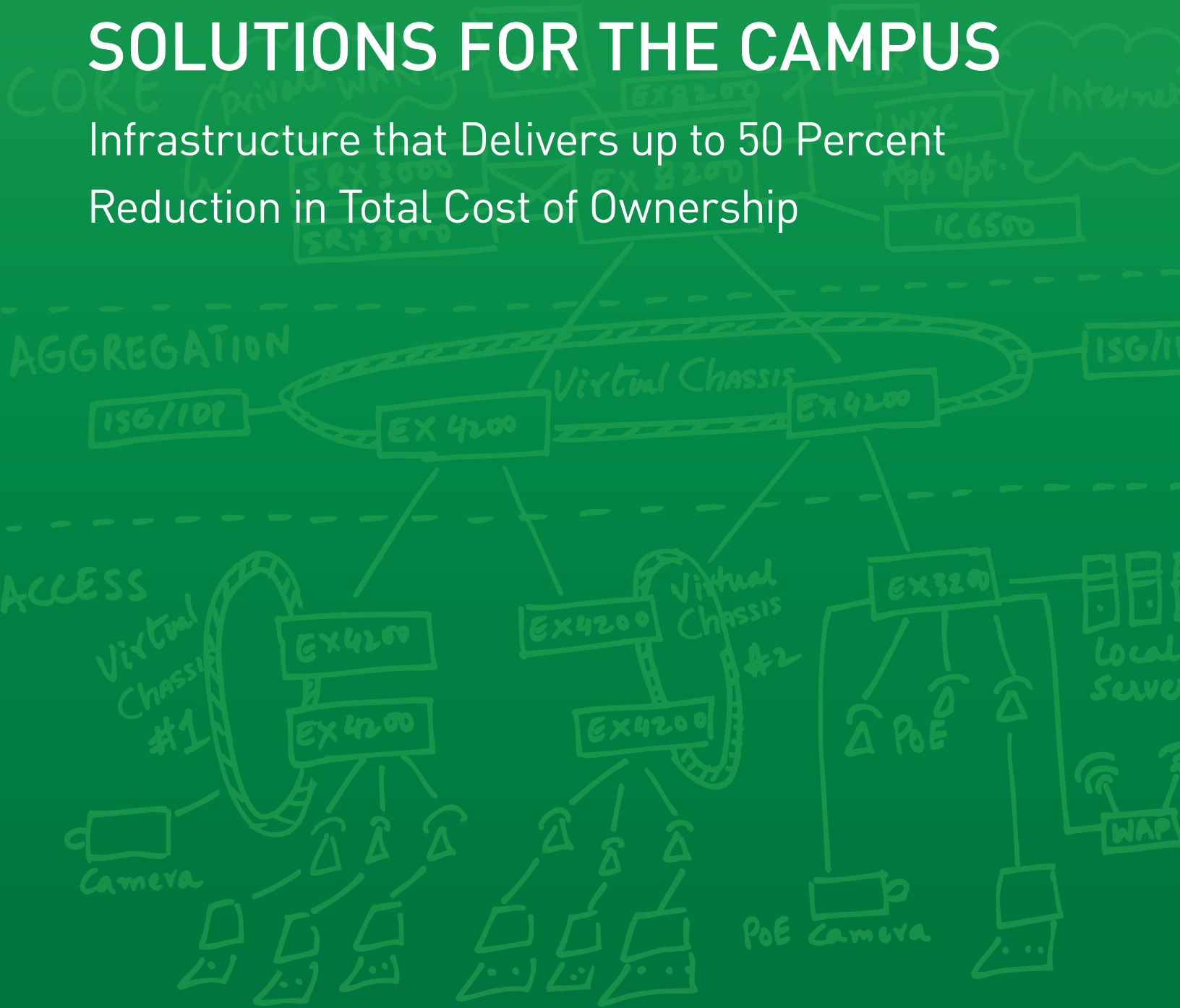![Juniper Networks logo]

DISTRIBUTED ENTERPRISE SOLUTIONS FOR THE CAMPUS

Infrastructure that Delivers up to 50 Percent Reduction in Total Cost of Ownership

Campus Solution Overview

The campus network has matured and, in the process, has become more complex than ever before. The adoption of new trends, applications, and services over the years has brought with it inflexible designs, point product solutions, and a plethora of operating systems and management applications. All of this complexity is not only confusing but is also driving up operating expenses. Furthermore, the task of making any changes to the network without forklift upgrades has become nearly impossible.

Juniper Networks® Distributed Enterprise Solutions for the campus deliver unparalleled consistency, reliability, and security while reducing total cost of ownership (TCO) for campus networks by up to 50 percent.

Defining the "Campus"

The term campus refers to a main enterprise location consisting of one or more buildings in close proximity to one another at the same locale. A campus is typically the corporate headquarters or a major site. Examples include a multi-floored office building housing an enterprise, a corporation with several buildings in an office park complex, and the sprawling facilities that comprise a university. All buildings and floors are connected to shared resources and services in a data center, which may or may not be part of the campus, via a campus LAN or WAN connection.

Trends, and Drivers

During the past few years, the following four key, product-related attributes have emerged as the driving forces behind campus buying decisions.

1. **Cost-effective infrastructure:** TCO, ROI, "cost-effective" are relevant business terms at any time, but they have utmost importance given the current economic situation. Beyond specific product criteria, cost and support capabilities have also become primary aspects of campus networking decisions. Enterprises are no longer buying equipment as insurance policies for what they might need in the future; they want to invest in assets that can give them rapid realization of ROI—sometimes within the first year.

2. **Convergence:** An important criterion influencing buying decisions is the ability of the network to support convergence and collaborative applications such as video and VoIP. Additionally, required network infrastructure must consist of attributes such as flexible Power over Ethernet (PoE), rapid failover mechanisms, auto-configuration, quality of service (QoS), and device negotiation. Delivering voice, video, and data on a single network infrastructure offers huge cost savings in addition to efficiency and maintenance benefits.

3. **Risk Mitigation:** Common characteristics that drive heightened campus security include increased user mobility, a surge in contractors, onsite partner co-locations, exponential growth in converged applications, and increased demand for wireless access. It is the responsibility of IT to protect critical campus resources not only from external threats but from internal ones as well. Administrators must remain technically creative to increase productivity via ubiquitous access, yet work in earnest to mitigate ever-increasing security threats and attacks.

4. **Natural Refresh Cycles:** The final key evaluation criterion is focused on the cyclical nature of the campus networking market. A significant percentage of customers who haven't used sophisticated features now face upgrades as their installed bases age. Organizations that are not driven by network innovation focus on the life cycle costs of their infrastructure, including capital costs, warranty terms and conditions, and available services. Today organizations are upgrading infrastructure that is 5 to 6 years old. More than ever before, they are focusing on cost reductions for both capital and operational expenditures.

Juniper Networks Solution Portfolio for the Campus

With a comprehensive portfolio of products for the campus, all of which run on a single operating system and can be managed centrally by a single network management application, Juniper Networks reduces the cost and complexity of campus networks to maximize revenues and to enhance employee productivity, client satisfaction, and customer retention. This is accomplished by providing industry-changing IT services for connectivity, security, and manageability.
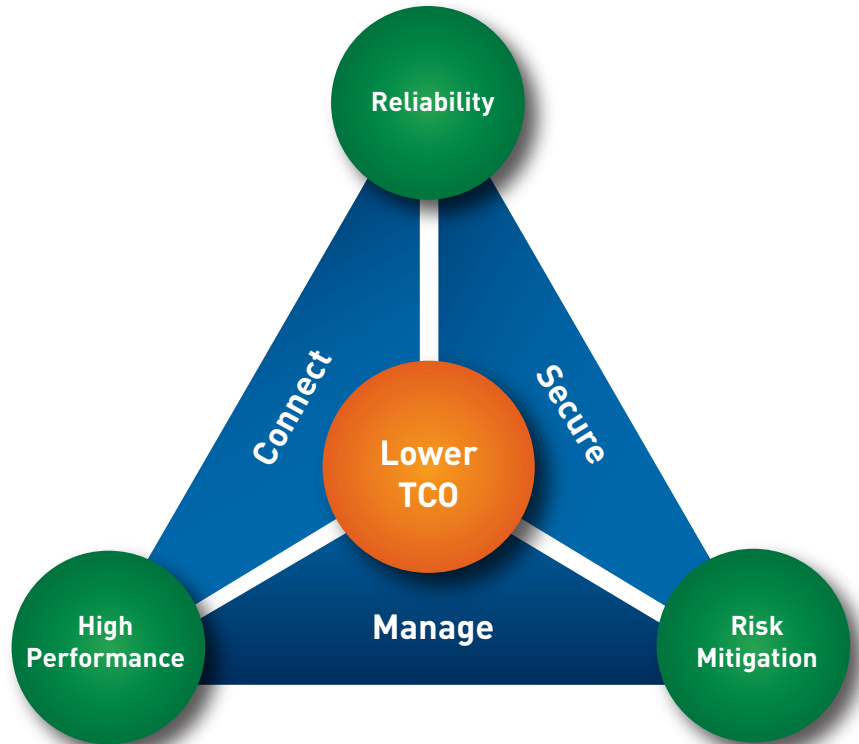
Figure 1: Juniper Networks delivers IT services without boundaries at lower TCO by delivering network-wide consistent connectivity, security, and management leading to increased network performance, reliability, and mitigated risk for campus networks.

Connect

The expansion of the network shouldn't increase the operational complexity or be the bottleneck in rolling out new applications and business services. Juniper Networks Distributed Enterprise Solutions for campus networks deliver consistent connectivity capabilities across routing, switching, and security at all scales.

Simplifying Design

Using Juniper Networks Virtual Chassis technology, up to 10 Juniper Networks EX4200 Ethernet Switches can be interconnected to create a Virtual Chassis configuration that operates as a single device, thus reducing the total number of devices to be managed.

The EX4200, with its Virtual Chassis technology, comprehensive feature set, and line-rate performance, can be configured to take on the dual role of an access and an aggregation device. As a result, it can be attached directly to the network core or backbone to create a compressed, two-tier design instead of the traditional three-tier LAN architecture, especially for medium-sized networks. Eliminating an entire layer simplifies the network and reduces the total number of devices and interconnections needed.

High-Performance for Aggregation/Core

Juniper's latest innovation is the Juniper Networks EX8200 line of Ethernet switches which are designed to meet the aggregation layer and core layer demands of the largest and busiest campus deployments. The EX8200 line of terabit-chassis switches delivers a staggering 3.2 Tbps of total system throughput with up to 80 Gbps of switching capacity per slot.

Virtualization in the Core

The Juniper Networks MX Series Ethernet Services Routers, with powerful switching and security features, delivers advanced features like MPLS, low latency Multicast, and QoS for high-performance enterprises. MPLS enables campus deployments to have increased scalability and resiliency; and improved end-user experience with network segmentation and traffic engineering. The MX Series provides unmatched flexibility and reliability to support advanced services and applications, addressing a wide range of deployments, architectures, port densities, and interfaces.

High Availability

Juniper Networks JUNOS® Software delivers complete Layer 3 functionality for campus devices at no additional cost or license premium. Layer 3 technologies enhance the availability of the network because of reduced failure domains and faster convergence times compared to traditional Layer 2 technologies like Spanning Tree Protocol (STP).

Because it is a single operating system and runs across routing, switching, and security devices, JUNOS reduces the time and effort to plan, deploy, certify, and operate network infrastructure. JUNOS Software provides carrier-class reliability for enterprise networks, and it has been tried and tested by the top service providers around the world.

Consistent User Experience

Juniper Networks WX Series Application Acceleration Platforms and Juniper Networks WXC Series Application Acceleration Platforms deliver fast and consistent application response across the WAN to help ensure uncompromised access to mission-critical applications and services. The WX Series and WXC Series enable IT managers to make the most efficient use of existing resources, while radically simplifying their network architecture by streamlining applications and delivering unprecedented visibility into network performance.

Consistent and comprehensive set of QoS features on routers, switches, and security devices ensure a consistent user experience regardless of location.

Secure

Because security is only as strong as its weakest link, it must be deployed across the entire campus infrastructure. Juniper's campus solutions leverage Juniper Networks Adaptive Threat Management Solutions—the best-in-class security products that cooperate with each other proactively to prevent attacks that evade security point products. This enables the network to dynamically adapt to risks in the environment, and always with a full audit trail.

Integrated Switch Security with EX Series Ethernet Switches

Juniper Networks EX Series Ethernet Switches deliver network access control (NAC) enforcement capabilities with 802.1X support, and they integrate with Juniper Networks Unified Access Control. This enables administrators to enforce access policy and security down to the individual port depending on a user's job-role and device. In addition, a full complement of integrated port security and Layer 2 security features defend against internal and external spoofing, man-in-the-middle attacks, and denial of service (DoS) attacks on the LAN.

Unified Access Control

Designed to address the needs of large multi-national organizations and government agencies, Juniper Networks IC6500 Unified Access Control Appliance scales to support up to 25,000 simultaneous endpoint devices. It can be deployed standalone or in three-unit clusters to increase performance and provide additional scalability, supporting up to 30,000 simultaneous endpoint devices.

Integrated Router Security with the SRX3000 Line

Integrated security in Juniper Networks SRX3000 line protects Web traffic, email, and Web mail from file-based viruses, worms, backdoors, trojans and other types of malware through a complete set of unified threat management (UTM) security features. UTM includes antivirus (instant message scanning, anti-spyware, anti-adware, and anti-phishing), anti-spam, and Web filtering.

The SRX3000 line also includes attack protection at the network and application level through integrated high-performance firewall and intrusion prevention system (IPS) capabilities.

Manage

An important component of any solution being deployed today is the ability to control upfront costs as well as ongoing management costs. Using a single operating system and a single pane for networks management, Juniper simplifies device configuration, troubleshooting and management for the campus.

Consistency with JUNOS Software

JUNOS Software integrates routing, switching, and security services. It offers the power of one operating system to reduce complexity, achieve operational excellence, and deliver dynamic services with lower TCO. The consistent operating environment of JUNOS streamlines network operations and improves the availability, performance, and security of business applications. It also provides stable delivery of new functionality in a steady, time-tested cadence, and provides highly available and scalable software that keeps up with changing needs.

Unified Configuration and Policy Provisioning

Network and Security Manager provides a single management tool for the entire network infrastructure composed of routing, switching, and security devices. NSM provides centralized, end-to-end device life cycle management, granular policy configuration, and comprehensive monitoring, reporting, and investigative tools to improve IT management and cost efficiencies and to maximize the security of the network.

Centralized Security Monitoring

Juniper Networks STRM Series Security Threat Response Managers collect events and alerts from different Juniper and third-party products and aggregate them in order to deliver an enterprise-wide threat management view. STRM Series data collection, normalization, and correlation helps customers detect threats they would otherwise miss, respond to the right threats at the right time, as well as implement appropriate compliance and policy controls. It also includes reports for network reporting, trend analysis, and compliance that are easy to customize.

Minimize Downtime

AIS (Advanced Insight Solutions) is a service that is available as part of J-Care services. It automatically detects problem conditions on JUNOS devices, and then proactively collects the troubleshooting information needed to diagnose and fix the issue. It allows your operational personnel to open a technical support case with JTAC that includes AIS troubleshooting information with a single "click." Using AIS, information about your network is matched to known issues, and vulnerabilities are identified before they can affect customers or users. This significantly reduces mean time to recovery (MTTR), prevents network outages, and helps reduce operational complexity.

Product Portfolio for the Campus Solution

Juniper offers a comprehensive set of products and services to meet the requirements of campus networks. The EX Series switches, Juniper Networks M Series Multiservice Edge Routers, and Juniper Networks MX Series Ethernet Services Routers provide the basic connectivity piece. Firewalls, Unified Access Control, Juniper Networks IDP Series Intrusion Detection and Prevention Appliances, and Juniper Networks SA Series SSL VPN Appliances make up a strong portfolio to meet security requirements. Virtually all products run on the JUNOS Software operating system and can be managed by the NSM application. As added value, Juniper offers world-class professional services that include technical, educational, consulting, and installation and configuration services.
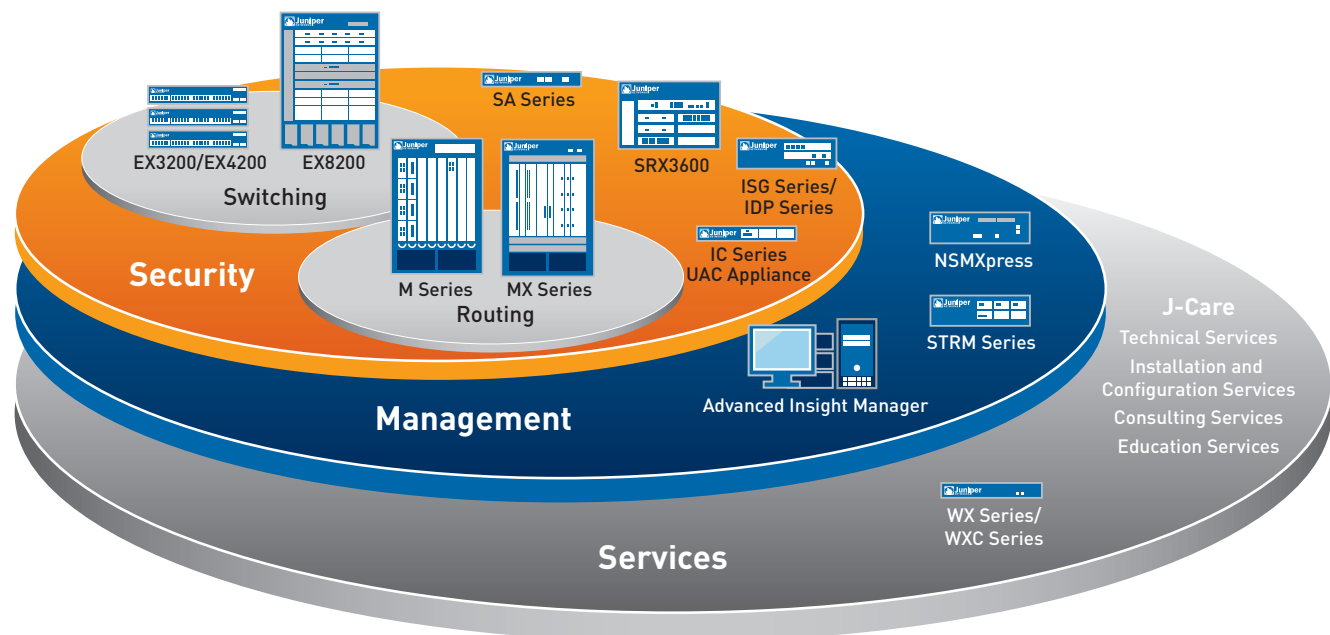

Figure 2: Juniper Networks product portfolio for the campus.

Benefits

High Performance

Juniper Networks Distributed Enterprise Solutions for the campus maximize bandwidth and lower latency for resource-intensive applications, while allowing headroom for future business needs. As enterprises adopt new technologies such as converged communications, multimedia applications, service-oriented architecture (SOA), Software as a Service (SaaS), and server/data center consolidation, these campus solutions ensure that the network doesn't create bottlenecks due to poor performance. Juniper Networks Distributed Enterprise Solutions for the campus consist of a wide portfolio of switches, routers, and security devices designed to meet campus requirements of any size and run any applications. All devices run on JUNOS, thus offering consistent feature implementation and ease of operation.

In networking, there has always been an historic trade-off between performance and features. For example, if a network runs fast, the security features may not be able to keep up, rendering the investment one makes in "bigger pipes" moot. With Juniper's campus solutions, you have security products that move as fast as the rest of your network.

Reliability

Downtime is not an option in today's campus networks and some customers require at least five nines or 99.999 percent of reliability with a real goal of achieving public switched telephone network (PSTN) levels of service. In addition, technologies such as unified communications depend on an optimized and always-on, high-performance network from end-to-end to function effectively. To achieve world-class robust networks, Juniper's campus solutions specifically focus on reliability at multiple layers of the network.

1. Device-level products have high mean time between failures (MTBF) and include redundant power supplies, processors, and cards. Ample scalability ensures headroom for future needs and congestion scenarios.

2. Link-level network designs and features include advanced spanning-tree algorithms, link aggregation groups, redundant trunk groups, Virtual Chassis, route optimization, and redundant path designs.

3. Network-level is a function of JUNOS Software which is a consistent operating system that provides carrier-class network software reliability for the enterprise campus. JUNOS supports software redundancy features including nonstop forwarding (NSF) and unified in-service software upgrade (ISSU), which make IP networking as failure-safe and reliable as telephony networks.

Risk Mitigation

As the network expands to meet business requirements, each new application represents a new threat vector to the network. While both attacks and attackers are growing increasingly sophisticated, the campus becomes a key target because it is the control point for the rest of the enterprise. To mitigate this risk, Juniper's campus solutions leverage Juniper Networks Adaptive Threat Management Solutions—one of the only ways to identify, mitigate, and report on threats with a cooperative security system. It correlates information from security products throughout the network and presents it in an actionable form in real time. Moreover, all security policies are centrally managed and remotely deployed. Juniper Networks is recognized as a leader in enterprise network security, with innovative products and solutions acknowledged as best in their respective categories by analysts from around the world. Furthermore, because they are from Juniper, these products offer something that other products don't—the ability to work together.

Learn more at **www.juniper.net/us/en/solutions/enterprise/security-compliance/ adaptive-threat-management/.**

Lower TCO

Juniper Networks Distributed Enterprise Solutions for the campus are designed to reduce the TCO for an average campus network by up to 50 percent.

- **CapEx savings**—With an open system architecture that leverages standards, businesses can leverage previously deployed technologies to greatly reduce the capital costs involved with extending a network's capabilities. At the same time, the enterprise maintains more choice and flexibility to deploy a best-in-class solution on its own timeline because there is no vendor lock-in. With innovative design alternatives such as Virtual Chassis and integrated products, Juniper's solution reduces the number of devices needed in the campus network.

- **OpEx savings**—Achieved via streamlined operations that include a single operating system and a single network management application reducing the operational expenses of having to learn and manage multiple ways of operating and controlling the network. In addition, reducing the sheer number of devices and simplifying the network produce a direct savings associated with network maintenance and service costs.

Solution Planning, Implementation, and Deployment

Juniper Networks is revolutionizing the economics of today's global information exchange with purpose-built, high-performance services and support that enable customers to support a broad range of services and applications. For more information, please visit **www.juniper.net/products/services.**

Financing

The Juniper Financing Advantage, provided by IBM Global Financing, provides qualified customers with flexible financing capabilities at competitive rates. This enables lower TCO, higher risk mitigation, and the ability to affordably acquire a total solution—including Juniper hardware, software and services—through a single contract!

To take advantage of special offers and learn more, please visit **www.juniper.net/us/en/ how-to-buy/financing-advantage/**.

Summary

Juniper Networks Distributed Enterprise Solutions for the campus deliver unprecedented and rapid ROI by offering operational simplicity with choice and flexibility to adapt to new computing trends, thereby preventing entire campus network redesigns. With an open, consistent, and efficient approach to product design, implementation, and operations, Juniper reduces TCO for campus infrastructure by up to 50 percent. Juniper's campus solutions deliver industry-leading performance, reliability, and security—available in a comprehensive product portfolio to meet the needs of campuses of all sizes.

For more information, please contact your local Juniper representative or visit **www.juniper.net/us/en/solutions/enterprise/campus/**.

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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