

# Juniper Networks Solutions for Research and Education

## Helping R&E Organizations Communicate More Effectively over Interconnected IP Networks

### Challenge

Research and Education (R&E) institutions need high-performance networks to enhance collaboration between researchers, faculty, staff and students, and to support the deployment of new applications.

### Solution

Juniper Networks provides a diverse set of solutions that help R&E organizations communicate and share more effectively through the provision of carrier-class routing platforms, network security and access systems with firewall, IPSec and Secure Socket Layer (SSL) Virtual Private Networks (VPN), and Intrusion Detection and Prevention (IDP) technologies that ensure the dependability and security of their networks.

### Juniper Benefits

- Consolidation and delivery of more powerful research and academic services and applications across highly distributed IP networking environments
- Layered security approach to protect critical information and ensure no disruption of critical research or campus operations
- Improved application performance from within the data center and across the WAN

Academic researchers and educators increasingly rely on high-performance networks to support their use of the leading-edge technologies that contribute to scientific and educational advancements. With the improvement of collaboration technologies and increased use of the Internet, today's Research and Education (R&E) community leverages networked systems to develop and share knowledge in a timely, reliable and flexible manner.

This R&E community includes various end users such as universities, schools and public research organizations, as well as the R&E backbone providers that are either independent or provided by a major carrier. This community also includes national level organizations like a department or ministry of education that oversees the high level R&E community's needs and services. All of these R&E organizations require the non-stop support of their demanding applications from an infrastructure that provides them with optimum performance, end-to-end security, scalability, reliability and advanced features.

### The Challenge

Today, R&E institutions are deploying more powerful, higher performing applications that take advantage of robust network capabilities like Class of Service (CoS), multicast, IPv6 and flow monitoring. The support of these leading-edge research and academic applications like collaborative conferencing, 3D visualization and simulation, grid computing, and distance learning require optimum network performance and reliability without having to sacrifice ease of management and scalability.

However, this increased collaboration between researchers, faculty, staff and students across a largely unsecured environment brings with it additional challenges. R&E institutions are experiencing more vulnerability than ever before within their expanding networks. Adding in the proliferation of wireless network environments and the use of laptop computers, researchers and students have an even greater amount of access to both the internal network and to the external Internet. R&E institutions are looking to find the right balance of open access with adequate layers of security so that there is no disruption of critical research, campus operations or corruption of sensitive data.

To help educational administrative offices integrate functions, many universities and colleges are implementing unique Internet applications that help with the management of graduate and undergraduate education services. Most of these applications offer a comprehensive suite of functional modules to manage the admission, curriculum, evaluations and student affairs of college and university students. These Web-based applications normally consist of a central database, a set of data import and export capabilities, and advanced reporting schemes. A challenge for many educational institutions with these online management systems is the load of traffic that occurs during the start of each semester during student registrations.

## The Juniper Networks R&E Solutions

Juniper Networks helps R&E organizations communicate and share more effectively within and outside their departments with a diverse set of solutions that provide layered security, high performance, and High Availability (HA) for interconnected IP networks.

### Solution Components

Juniper Networks solutions for R&E include:

- Data center, main office or campus, and remote department or campus routing infrastructure solutions that provide the basis of a highly reliable and available high-performance network
- Security and threat management solutions that protect R&E organizations from internal and external threats
- Remote access control solutions that securely improve the productivity of geographically distributed R&E organizations
- Unified access control solutions that transparently and seamlessly control access to R&E network resources and applications
- Application acceleration solutions that improve the performance of applications and wide area networks while maintaining network availability and security

### Juniper Networks Data Center, Main Office/Campus, and Remote Department/Campus Routing Infrastructure Solutions

Juniper Networks infrastructure solutions are high-performance routing platforms that meet bandwidth and reliability demands of global R&E organizations, while ensuring the economics and performance of critical applications. Juniper Networks routing platforms are in use today worldwide by R&E customers deploying complex network services. Powered by an innovative, programmable ASIC-based architecture, and leveraging the production-hardened Juniper Networks JUNOS™ software, these routing platforms enable R&E organizations to economically scale their networks to match any traffic and IP service requirements.

<b>Organization:</b>	<b>U.S. Department of Energy, Energy Sciences Network (ESnet)</b>
<b>Situation:</b>	Looking to support the planned doubling of traffic growth and provide ongoing support for a separate ATM network while migrating to new IP backbone with advanced services.
<b>Solution:</b>	Installed more than two dozen Juniper Networks M10, M20, M40e and T320 routing platforms.
<b>Results:</b>	The stability, performance and expandability of Juniper Networks platforms enabled ESnet to assume a broader role in DOE science missions, to map ATM circuits to MPLS label switched paths (LSPs), to handle multicast-based videoconferences, and to run IPv4 and IPv6 simultaneously over the same production infrastructure.
<b>Customer Quote:</b>	“Advanced networking capabilities provided by Juniper Networks are helping ESnet and the Dept. of Energy maintain leadership in developing and using large-scale computing systems and applications for science.” - George Seweryniak, ESnet Program Manager, Office of Science U.S. Dept of Energy

<b>Organization:</b>	<b>Internet2/Abilene Backbone Network</b>
<b>Situation:</b>	Consortium applications required scalable high-speed backbone routing, IPv4 and IPv6, and multicast at dense 10 Gbps speeds with no performance compromise.
<b>Solution:</b>	Installed 11 Juniper Networks T640 routing platforms as the OC-192c backbone infrastructure.
<b>Results:</b>	Fulfilled the need for high-performance backbone routing of all leading-edge services; one uniform operating system to lower management and operational costs; scaled by plugging new line cards into the T640s.
<b>Customer Quote:</b>	“The T640 platform allows us to provide uncompromising support for new and high-performance applications, including IPv6, multicasting and routing Gigabit-per-second data flows. By making the leap to 10 Gbps, we can let our community focus on what they do and look at the backbone network as an enabling technology instead of a bottleneck.” - Chris Heermann, Internet2 Engineering Group, Senior Network Engineer

## Juniper Networks Security and Threat Management Solutions

Juniper Networks security and threat management solutions provide defense at the network perimeter as well as at the application level to secure R&E organizations against increasingly malicious application-level attacks. These solutions protect networks with integrated features such as VPNs, stateful firewall, Intrusion Detection and Prevention (IDP), content filtering, antivirus, anti-spam, and more—all in a single platform. Deploying these integrated yet standard security solutions has been proven to lower total cost of ownership for R&E organizations. Juniper Networks security solutions are managed by a policy-based, central management system that can scale to meet the needs of the largest R&E networks.

<b>Organization:</b>	<b>University of Nevada, Reno</b>
<b>Situation:</b>	Deploy a secure, scalable and easy-to-use network security solution to authenticate users before accessing the university network, while also stopping worms, trojans, spyware, malware and other emerging attacks from penetrating and proliferating across the network.
<b>Solution:</b>	Juniper Networks Integrated Security Gateway 2000 (ISG 2000) with Intrusion Detection and Protection (IDP) solution and NetScreen 5200 firewall/IPSec VPN products.
<b>Results:</b>	Increased network security and protection, ease of management and increased network reliability.
<b>Customer Quote:</b>	<p>“The Juniper appliances are blocking what they are supposed to block and we aren’t having any problems with the peer-to-peer applications or spyware. We’ve had great success with Juniper’s security solutions.”</p> <p>- Jeff Springer, Network Security Manager, University of Nevada, Reno</p>

## Juniper Networks Remote Access Control Solutions

Juniper Networks remote access control solutions allow R&E employees, faculty, students and business partners to access applications securely using only a standard Web browser. This improves user efficiency and reduces the strain on IT administration.

<b>Organization:</b>	<b>Isle of Wright (IoW) College off the South Coast of England</b>
<b>Situation:</b>	Needed a secure, flexible remote access solution at the right price for teaching staff when abroad, working from home or at the outreach centers.
<b>Solution:</b>	Juniper Networks Secure Access 1000 Series
<b>Results:</b>	For more than 50 key staff members, key work resources are readily yet securely available any time, from any location. Entire network is protected while providing remote access and cost savings of IT budget and management resources.
<b>Customer Quote:</b>	<p>“Juniper Networks solution is exactly what IoW needs, at the right price. It is flexible and easily scales, allowing us to provide remote access to more staff members without incurring significant capital or management overhead costs.”</p> <p>- Rosie Quelch, Network Manager, Isle of Wright College</p>

## Juniper Networks Unified Access Control Solution

R&E organizations need to provide appropriate network access to valid users, while simultaneously protecting network resources and applications against any breach of privacy, integrity or business continuity. Solutions must be flexible enough to comply with government regulations without requiring the replacement of network equipment or creating new levels of user management complexity.

With Juniper Networks Unified Access Control (UAC) solution, R&E IT departments can easily create a unique access control policy for each user or group of users depending on their identity, location and device security state. Juniper Networks UAC delivers robust network protection and secure guest user access, while dynamically addressing network and application access control, and delivering the application visibility and monitoring needed to meet regulatory compliance. All this is accomplished without a forklift upgrade to your LAN, wireless, security or database infrastructure. Through its innovative use of industry standards, open programming interfaces and the support of open standards from the Trusted Network Connect (TNC), a subgroup of the Trusted Computing Group (TCG), Juniper Networks UAC solution makes full use of and delivers protection for existing R&E IT investments.

### Juniper Networks AAA/802.1X Solutions

R&E organizations can ensure that their networks and data remain secure, their users authenticated, and that they meet regulatory compliance by employing Juniper’s family of vendor-agnostic, standards-based Authentication, Authorization and Accounting (AAA) and 802.1X access security solutions.

Juniper Networks Odyssey Access Client (OAC) provides a standards-based, enterprise-class 802.1X client (supplicant) product family that operates effortlessly with multiple authentication types, security profiles, networking environments and complex authentication schemes, supporting advanced security protocols and ensuring secure, appropriate network connectivity. A version of Juniper OAC is available that incorporates a Federal Information Processing Standard (FIPS) 140-2 Level 1 validated (by the NIST and CSE) cryptographic module. Juniper Networks Steel-Belted Radius® (SBR) family of dependable, standards-based AAA/RADIUS servers and appliances significantly enhances the security, management and control of heterogeneous networks by providing scalable authentication control, robust access policy management, and centralized configuration management while supporting many access technologies, user authentication stores and authentication protocols.

When deployed together, Juniper’s OAC and SBR products form a powerful network access policy management and user authentication solution that secures the authentication and connection of wired and WLAN users across network access methods and heterogeneous networks. This ensures that users are connected to the appropriate network in the appropriate manner, that login credentials are not compromised, and that data privacy is maintained, while providing port-based security and enforcement of access policies.

### Juniper Networks Application Acceleration Solutions

Juniper Networks application acceleration platforms improve the performance of applications, both in the data center and across the WAN. R&E organizations use application acceleration platforms to speed business applications between campus locations and remote departments. These solutions increase user satisfaction and extend the life of network components such as servers and WAN links.

<b>Organization:</b>	<b>Los Rios Community College District Sacramento, CA</b>
<b>Situation:</b>	Needed to enable online course registration for up to 900 students at a time while preventing performance problems with Web version of PeopleSoft release 8 and Blackboard Academic Suite.
<b>Solution:</b>	Installed a DX 3250 appliance.
<b>Results:</b>	Delivered consistent registration experience, even for students with slower connections. Reduced bandwidth for PeopleSoft by 60 percent and for Blackboard Academic Suite by 40 percent. Also increased security by adding another layer of protection.
<b>Customer Quote:</b>	“The DS 3250 appliance performs consistently—like a toaster. We forget about it even though we use it and rely on it every day. We intend to implement Microsoft Outlook behind the DX platform. Each of our campuses has Outlook Web access. We predict the Juniper Networks system will improve performance with this application as well.” - Brian Roach, Director of Technical Services, Los Rios Community College District

Juniper Networks R&E Solution Breadth

	<b>Routing Infrastructure</b>	<b>Security and Threat Management</b>	<b>Secure Remote Access</b>	<b>Unified Access Control</b>	<b>Application Acceleration</b>
Data Center	✓	✓		✓	✓
Main Office/Campus	✓	✓		✓	✓
Remote Department and Campuses	✓	✓	✓	✓	✓
Remote/Mobile Users		✓	✓		✓

**Partnerships**

With its global alliance partners, Juniper Networks creates competitive advantage and lowers risk for its customers. Juniper Networks has partnered with leading vendors in content and media, security, infrastructure, managed services delivery, network management and applications. Each partnership is focused on a particular aspect of delivering next-generation networking and security solutions, providing customers with the most sophisticated, open and interoperable solutions in the industry.

**Summary—Optimizing R&E Communications Over IP Networks**

Juniper Networks provides R&E customers around the globe with solutions that improve communications over their IP networks. Through deployment of Juniper Networks proven solutions, R&E organizations at all levels can dramatically increase the performance, availability and security of their most critical research and education functions.

**Next Steps**

For more information on Juniper Networks solutions for research and education, please visit <http://www.juniper.net/solutions/education.html> or contact your Juniper Networks representative today.

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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).



To purchase Juniper Networks solutions, please contact your Juniper Networks sales representative at 1-866-298-6428 or authorized reseller.