REINVENTING THE BROADBAND EDGE SOLUTION

Third Generation Broadband Solution Delivers Game Changing Economics and Open Service Innovation

Challenge

Service providers are faced with rapid network growth, changing customer demands, and deteriorating ARPU. Success *requires a new network* that enables a new breed of solutions, transforms the economics of networking, and facilitates faster service innovation.

Solution

Juniper's third-generation broadband edge solution is based on Juniper Networks MX Series 3D Universal Edge Routers. It is a comprehensive, service optimized solution that is architected from the ground up with market-leading, deployment hardened technology and know-how.

Benefits

· Enables seamless service rollouts and differentiated offerings with a proven, comprehensive solution set

· Delivers greater margin contribution, lower TCO, and greater operational efficiency

· Offers service mash-ups, service velocity, and service agility

The broadband world is evolving towards a connected culture where people, devices, machines, institutions, and governments are truly connected. Implications of these trends are rapid network growth and bandwidth-hungry, media rich applications, and these are exerting great strain on current networks. Operators want to monetize emerging opportunities, but with justifiable economics. Operators also want to move up the value chain to overcome the risk of disintermediation, and to capture the value from advanced, innovative service offerings.

Broadband network architectures are also evolving towards Ethernet-based access with an IP intelligent edge to optimize network economics and to offer a superior service experience. This network evolution creates the opportunity for operators to consolidate their silo network architectures, and to offer a converged service offering such as broadband services, business services, carrier Ethernet services, mobile backhaul services, and mobile broadband services.

As operators look for ways to address these challenges, they are also interested in reinventing their business model based on a transformational broadband edge solution. This demands a new network, one that offers superior economics and enables rather than constrains faster service innovation.
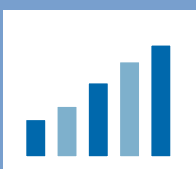

Demands new breed of solution

· Rapid Network Growth
· Evolving customer needs
· Need for technology differentiation

Demands new economics

· Need for lower TCO
· Need for operational efficiency to contain OPEX
· Need for more revenue per platform to be profitable

Demands faster service innovation

· Deteriorating ARPU
· Need for business model innovation
· Need for differentiated service offerings

Figure 1: Drivers of the Broadband Edge

Residential subscriber networks and the services they can offer have evolved dramatically over the past two decades. They have gone from simple, low bit rate Internet connectivity offerings based on a legacy circuit-switched network to flexible, high-speed broadband service offerings based on packet-switched IP networks. The emergence of dynamic applications with greater appetite for bandwidth and the emergence media rich applications for greater connectedness are posing greater strain on the current networks and enables greater opportunities to offer value-added services. These network evolution forces operators evolve toward a service-oriented business model to capture value from consumer and business trends such as media rich collaboration, cloud-based enterprise services, voice/video service, and gaming services.

The Juniper Networks Broadband Edge Solution

Carriers are rolling out rich media content services rapidly over IP networks. Quality of experience, scale, and performance are all intertwined within the networks that deliver the end user experience. Higher expectations demand a new network to deliver a quality user experience and allow service providers to capture value. As carriers seek to move up the value chain to reinvent their business models by offering content and application services, network architecture and solutions need to evolve to facilitate this transition.

Juniper Networks® E Series Broadband Services Routers pioneered Juniper's first-generation solution based on B-RAS technology to offer ATM-centric DSL access. Later, Juniper took another leap with its service-enabled multiservice capabilities within E Series to offer triple-play services. The E Series platform redefined B-RAS from an appliance offering to an integrated IP edge by offering a rich set of residential edge features and services. Juniper is a market leader

in this space with deep knowledge based on years of know-how. Juniper's solution is deployed across the globe and is carrying more than half of the world's subscriber base over its infrastructure.

Now once again, Juniper is reinventing the broadband edge solution with its award-winning MX Series 3D Universal Edge Routers, offering multi-play and value-added service offerings with today's required scale and performance. The MX Series is an Ethernet optimized, intelligent IP service platform. This flagship platform is based on the Trio chipset that provides uncompromising scale on subscriber, service, and bandwidth. The MX Series broadband edge solution is one leg of Juniper's broader universal edge solution set that also delivers business edge, mobile edge, carrier Ethernet, and mobile backhaul solutions. The service convergence on this universal edge platform results in a Service Delivery Gateway that has greater margin contribution per platform and offers solutions such as broadband edge, business edge, mobile edge, carrier Ethernet, and mobile backhaul on a single platform. This convergence further delivers mashups to offer advanced value-added Service Delivery Gateway services such as secure VPN, application-aware VPN, voice/video monitoring, and media rich collaboration applications.

Juniper's third-generation broadband edge solution is based on MX Series routers and Juniper Networks SRC Series Session and Resource Control Modules. It is a comprehensive, service optimized solution that is architected from the ground up with market-leading, deployment hardened technology and know-how. Juniper's service-oriented, third-generation (3G) broadband edge solution offers advanced revenue generating services such as tiered service delivery,captive portal, bandwidth on demand, video on demand,IP television, IP telephony, and advanced gaming within subscriber context.
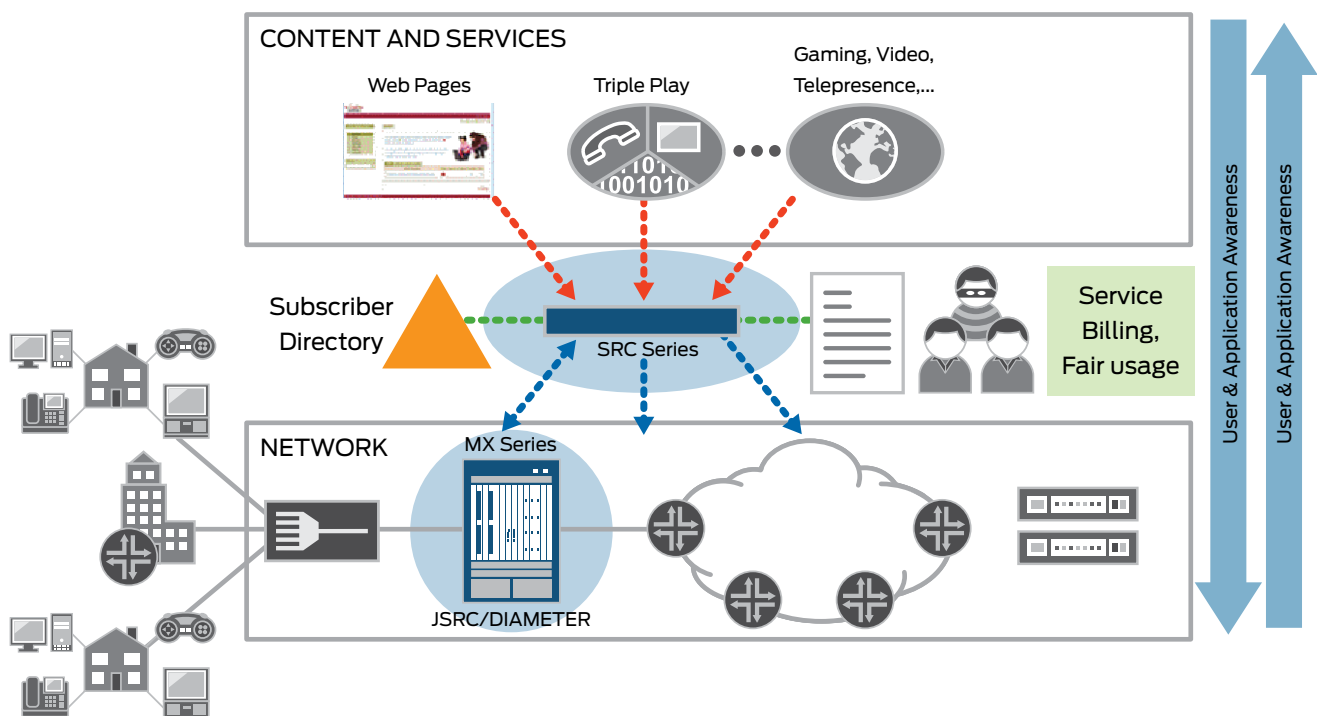

Figure 2: Juniper Networks innovative broadband edge solution

Solution Features/Benefits

Juniper's 3G broadband edge solution offers service providers game changing economics and open service innovation.

Third Generation Solution

As the broadband edge evolves from connectivity services to an innovative IP-centric service delivery, Juniper's solution on the innovative MX Series router provides a launching pad for advanced value-added services with greater scale and performance. It offers seamless service rollouts, a differentiated offering, and a proven, comprehensive solution set Juniper's market-leading approach provides flexible deployment, technology leadership, and deployment hardened code. Being ahead on the learning curve through many years of innovation gives Juniper an edge. A recent EANTC study demonstrates the MX Series' three-dimensional (3D) scale on subscriber, service, and bandwidth fronts.

- **Flexible deployment** – One Juniper Networks Junos® operating system release across MX Series routers provides a seamless operating model. This platform convergence further fueled by service convergence culminates in an innovative universal edge to serve residential, business, and mobile solution spaces. As Ethernet access becomes ubiquitous, more and more providers are migrating PPP subscribers towards more plug-and-play type DHCP-based VLANs. Juniper's universal edge solution supports PPP subscriber termination for legacy systems as well

as DHCP IPv4/IPv6 local server and relay proxy for migrating subscribers towards DHCP access models. Juniper's solution also supports RADIUS and DIAMETER backend servers to facilitate authentication, policy control, and accounting.

- **Technology leadership** – Juniper's solution provides multilayer resiliency by offering path, link, node, element, and protocol level reliability through nonstop active routing (NSR), unified in-service software upgrade (unified ISSU), and industry-leading Virtual Chassis, as well as multichassis link aggregation group (LAG), and L2/L3 redundancy. Virtual Chassis is a key functionality in offering service continuity and operational efficiencies. Based on a modular chassis, it delivers a single control plane and a single management plane along with high availability, ease of management, performance, and scale.

- **Comprehensive solution se**t – Juniper's solution offers flexible L2/L3 wholesale models. Especially on the L2 wholesale front, Juniper identified the trend toward more prolific Layer 2 wholesale-only networks early and has been working toward delivering solutions that are optimized for this network trend. Juniper's broadband edge is a comprehensive solution that offers advanced features such as hierarchical queuing, granular QoS, dynamic multilayer service activation, IPv4/IPv6 support, carrier-grade Network Address Translation, CGN, L2/L3 wholesale support, seamless MPLS, and voice/video quality monitoring.
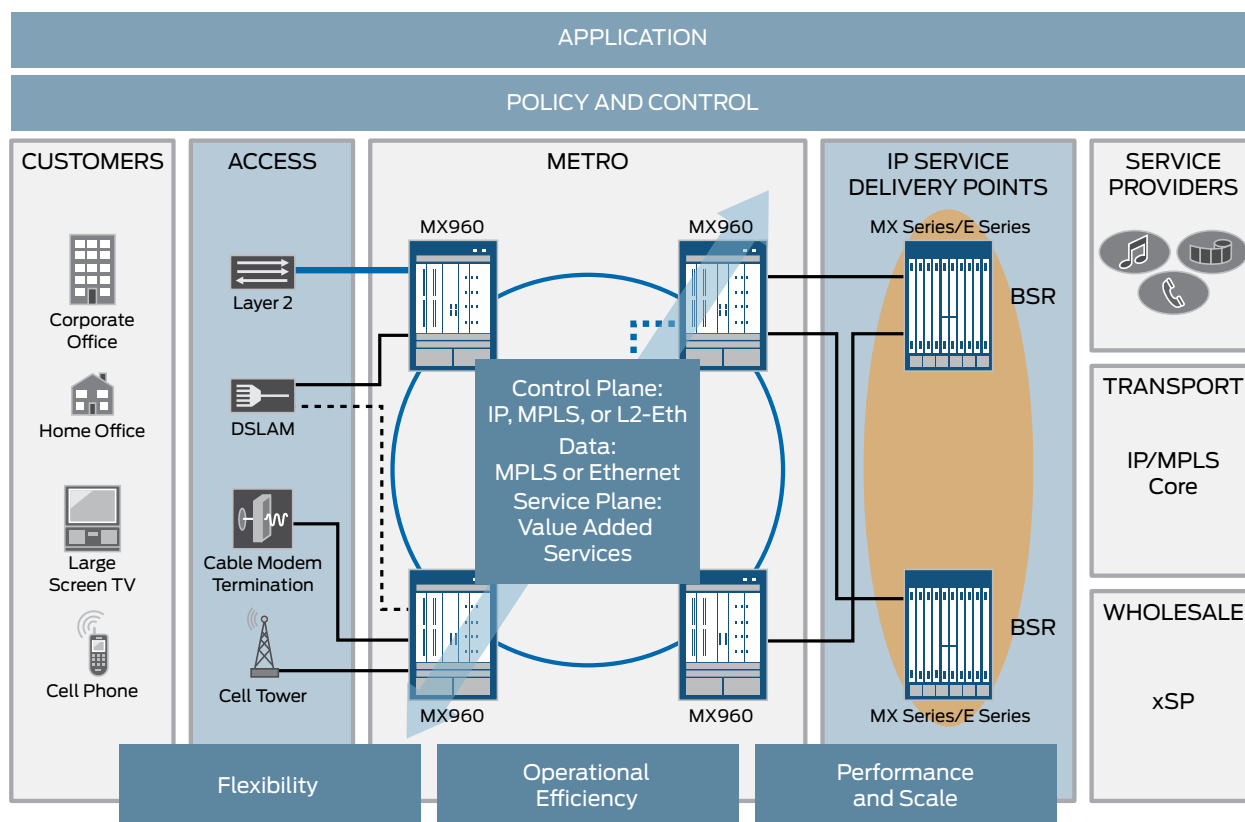

Figure 3: Universal Edge network architecture

Game changing economics

The service convergence that maximizes return on network assets while enabling economy of scope forms the fundamental building blocks for Juniper's game changing economics strategy. These building blocks offer greater margin contribution on service offerings, lower TCO and greater operational efficiency for service providers to cost-effectively build their critical network assets. MX Series architecture with the 3D scale Trio chipset, along with a single Junos OS, forms the catalyst for providing lower TCO as compared to competitive offerings.

Service convergence – One of the key drivers of this solution's economic advantage is the service convergence on the MX Series platform. Greater margin contribution results from Service Delivery Gateway services like Dynamic Application Awareness, comprehensive video, VoIP and IP quality monitoring, and IPS delivered on a single service optimized platform. Competitive solutions require 3 to 7 times more appliances to offer similar multi-play service offerings. The service convergence on 3D scale MX Series routers with open SRC Series service delivery modules fundamentally changes provider economics.

- Maximized return on network assets – In a 2011 study conducted by ACG Research Juniper's solution also offers 45 to 60% lower TCO compare to competitive solutions. Juniper's ROI and TCO advantage is primarily derived from greater system capacity, higher port and slot densities and overall scalability and performance of the Junos Trio chipset. On the power consumption front, Juniper's solution offers 45 to 80% lower power consumption. The cost of ownership is further reduced through lower CAPEX ranging from 39% to 60% and lower OPEX of 65%.
- Economy of scope—Juniper's solution further improves operational efficiency through its Junos OS modular software, offering one release model, one Trio chipset-based architecture, and Juniper Networks Junos Space-based best-in-class offerings. The unparalleled cost advantage is delivered through Juniper's "singular" approach to exploiting the economies of scope, a fundamental shift from the competition that offers superior economies for the provider. Economy of scope is further enhanced through network convergence facilitated by the offering of broadband edge, business edge, and mobile edge on a single universal edge platform.
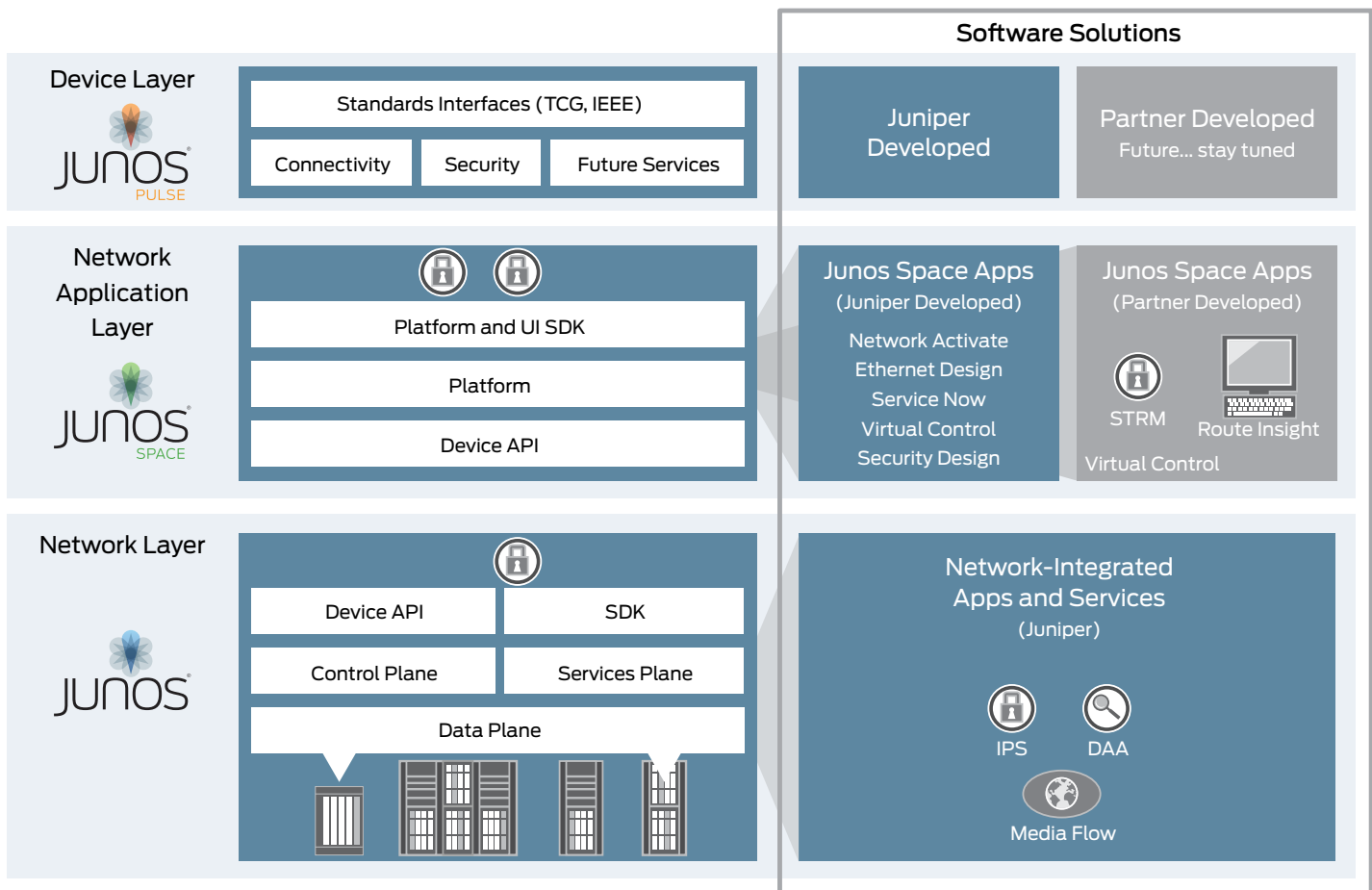

Figure 4. Open Junos OS framework

Open Service Innovation

Juniper's open service innovation is based on the principles of converged service mix, open Junos OS innovation, and optimized service delivery. Service innovation offers service mashups, best-in-class collaboration, service velocity, and service agility enhanced to launch the provider's service-oriented business model innovation.

- **Innovative Service Mix**—Industry-leading Service Delivery Gateway brings advanced services such as stateful firewall, NAT and CGNAT, IPsec, Dynamic Application Awareness, IPS, and IP, VoIP and voice/video quality monitoring to the MX Series 3D router, provides a potential to create innovative service offerings and reduce complexity in operations. This service integration on a converged platform offers contextual service mashup across network layers for greater service innovation. Juniper's multilayer context that spans across network, applications, and subscribers also provides greater policy and control opportunities to offer revenue generating services.

- **Open Junos OS Innovation**—Junos OS at various levels from platform-specific Juniper Networks Junos SDK to appliance-specific Junos Space creates a collaborative environment for best-in-class third-party innovators. These open solutions provide service innovation and agility for service providers to differentiate their offerings and compete in the Web 2.0 space where the nimblest over-the-top providers are delivering new services at a breakneck pace. These collaborations have resulted in Junos Ready Software services such as VoIP service-level agreement (SLA) monitoring, video SLA monitoring, video caching, and video mirroring.

- **Optimized Service Delivery**—Open Junos OS supports the optimized service delivery that innovative service offerings demand. Open IP service creation through the SRC Series programmable platform provides service delivery on a market-leading platform. The SRC Series also provides ease of migration across Juniper's products. Low touch service delivery through the Juniper Networks SDX300 Service Deployment System self service portal gives the user control over the end user experience, and provides revenue generation potential for the provider.

Service providers are using low touch service creation as a way to seamlessly roll out value creating multiplay service offerings. Service delivery platforms are expected to offer policy and control functions such as policy management, subscriber management, authentication, authorization, and accounting (AAA) functions, bandwidth management, and network resource control functions. SRC Series Session and Resource Control Modules extend Juniper's network layer expertise to the policy and control layer and seamlessly integrate into operations support systems/business support systems (OSS/BSS). The SRC Series brings open, standard-based service delivery through its advanced hardware and sophisticated modular software. And it delivers low touch service creation through its software modules (SRC Policy Engine, SRC Diameter Gateway, SRC SOAP Gateway, SRC Volume Tracking Application, and SRC Threat Mitigation Portal).

Solution Components

Juniper Networks MX Series Platforms

Juniper Networks MX Series 3D Universal Edge Routers are Ethernet optimized, intelligent IP, converged edge platforms. They offer all of the benefits of subscriber management and dynamic multilayered service creation with the Trio chipset for greater scale and performance.

The MX Series portfolio contains platforms such as the Juniper Networks MX2020, MX2010, MX960, MX480, MX240 and MX80 3D Universal Edge Routers. They also include service cards such as the MX Series Multiservices Dense Port Concentrator (MS-DPC) and Application Services Modular Port Concentrator (AS-MPC) for advanced services such as stateful firewall, NAT and CGNAT, Dynamic Application Awareness, and IPS, as well as Modular Port Concentrator (MPC) with Juniper Networks Junos Trio chipset for high scale session and service.

Features

- Comprehensive PPP termination, IP sessions, and usage-based billing
- Graceful IPv4 to-IPv6 transition
- Innovative multi-play and service integration
- Flexible L2 and L3 wholesale models
- End-to-end seamless MPLS

Juniper Networks Service Creation Platforms

The Juniper service creation platform consists of SRC Series Session and Resource Control Modules and SDX300 Service Deployment System. These offer subscriber management, policy management, network resource management, and self-service portal functions to facilitate dynamic multilayered service creation.

Features

- Per subscriber authentication and accounting
- Per service accounting
- Policy controlled configurations
- Policy controlled QoS parameters
- Policy-based wholesale selection
- Policy controlled Lawful Intercept (LI)
- Policy controlled multicast
- Dynamic service activation
- Self-service portal

Summary—Third-Generation Solution, Game Changing Economics, and Open Service Innovation

Being ahead on the learning curve through long years of innovation gives Juniper an advantage in the broadband edge space. Built on market leadership and support for more than half the world's subscriber base, Juniper offers a 3G broadband edge solution that gives service providers the richest, most comprehensive and field hardened code base on superior innovative hardware in the industry.

Industry-leading Service Delivery Gateway applications such as stateful firewall, CGN, IPsec, Dynamic Application Awareness, traffic load balancing and IP, VoIP and video quality monitoring within a single platform provides a potential to create innovative service offerings and reduce complexity in operations. Juniper's multilayer context that spans across network, applications, and subscribers also provides greater policy and control opportunities to offer revenue generating services.

Juniper's open service Innovation is a key pillar enabling operators to innovate to achieve the ultimate business model. This pillar is where innovation breeds and differentiation is delivered. This key open innovation with superior economics on a third-generation solution is the game changing recipe that enables service providers to move to the center of value creation to avoid the risk of disintermediation. Juniper's broadband edge solution empowers operators to achieve greater margin contribution and lower TCO, as well as improve operating efficiencies.

Next Steps

To learn more about Juniper Networks broadband edge solution, please visit **www.juniper.net** or contact your local Juniper Networks sales representative.

About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at **www.juniper.net**.

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