SERVICE-ORIENTED MANAGED BUSINESS SERVICES

Creating Value for Service-Oriented Business Edge Services with a Flexible VPN Solution

Juniper Networks business edge solution is a comprehensive VPN toolkit that offers service providers and large enterprises the feature rich, standard-based, secure interworking and streamlined operational model needed to reduce expenses and to enable innovative business service offerings.

Juniper supports a full breadth of technologies for the evolving managed business service's needs. Juniper's comprehensive solution set enables service providers, large enterprises, cable companies, and information intensive organizations to cost-efficiently roll out networks that offer scalable control and forwarding planes, continuous service, and feature richness. VPN deployments using Juniper technology are standards-based, offer secure interworking amongst multiple providers, enable the most stringent service-level agreements (SLAs), and deliver multilayer resiliency. Common protocols offer a consistent, streamlined operational model, thus reducing overall operating and troubleshooting costs.

The Challenge

Today's dynamic applications have an increased appetite for bandwidth. This trend, coupled with the growth of media rich applications requiring ubiquitous connections, is placing a great strain on current networks. They are also creating greater opportunities for providers to offer value-added services. For instance, providers with an installed base of Layer 3 VPNs for unicast service can begin to upsell with new media rich solutions such as collaboration applications, video-based enterprise services, application-aware and mobile VPN. BT's Global Video Exchange TelePresence, and AT&T's Telepresence Solution are just two examples of operators trying to monetize these trends. Service providers and cable operators are offering virtual private LAN service (VPLS) to small and medium businesses, as well as to large enterprises. IPv6 VPNs for new mobile applications is another growing revenue generator. Numerous services such as IPTV, cloud-based services, and financial applications now demand scalable, reliable, and secure next-generation multicast virtual private network (NG MVPN) solutions. The challenge to address rapid network growth with these divergent needs in a changing environment demands network flexibility, service assurance, and new economics.

Challenge
Managed Business Service providers are perceived as mere connectivity providers and are challenged to differentiate and move up the value chain. They are competing with Web 2.0 integrated cloud players who are offering services that span across storage, services, and applications.

Solution
Juniper’s flexible business edge solution is a comprehensive VPN toolkit that offers service providers and large enterprises a feature rich and standard-based network that reduces OpEx and enables innovative value-added service offerings to maximize returns and service assurance.

Benefits
- Enables increased service reach, seamless deployment with a comprehensive solution
- Delivers greater margin contribution and lower TCO with greater operational efficiency
- Offers service continuity, secure service, and quality of service guarantees
The Juniper Networks Business Edge Solution

Juniper’s MPLS VPN portfolio is designed to meet the L2 and L3 needs of provider and enterprise customers to optimize economies of scale over a shared network and offer service-oriented value creation. The service delivery has further evolved to offer VPN enhancing services such as quality-of-service (QoS) prioritized VPN traffic for voice and video as well as VPN-aware multicast and firewall services. Juniper’s MPLS VPN business edge solution comprises technologies such as LDP-BGP VPLS interworking, point-to-multipoint label-switched paths (P2MP LSPs), NG MVPN, MPLS Plug-and-Play, IPsec/generic routing encapsulation (GRE) VPN, to name just a few.

Juniper’s business edge solution is based on the award-winning Juniper Networks® 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 business edge solution is one leg of Juniper’s broader universal edge solution set that also delivers broadband edge, mobile edge, carrier Ethernet, and mobile backhaul solutions.

The management and delivery of this VPN solution is streamlined through Juniper Networks® Junos® operating system script automation and Juniper Networks Junos Space applications. Junos Script automation simplifies configuration for complex VPN services and enforces compliance to specific operational policies and procedures. Junos Space Network Activate offers network discovery automation, MPLS resource management automation, service provisioning, and service validation to streamline network management and service rollouts. Junos Space Route Insight offers real-time, end-to-end L3 topology discovery and makes the service path visible for faster troubleshooting. Junos Space-based management and service delivery is emerging as an innovative and feature rich environment for streamlining the business edge management plane.

Solution Features and Benefits

Flexible VPN Solution

Juniper’s flexible VPN solution is based on universal deployment applicability, management flexibility, and service flexibility to offer increased customer service reach, seamless deployment, and ease of service rollouts. VPNs provide numerous services within a variety of delivery models. This wide deployment of VPN services requires the availability of multiple access connectivity options, service reach across protocol and administrative domain boundaries, and support for multiple topologies and traffic profiles. Drivers include consolidations (mergers and acquisitions), interprovider partnerships, and changing end user requirements based on available access connectivity and protocol options. To meet these dynamic needs, Juniper has created a comprehensive and flexible MPLS VPN toolkit that offers an array of options across multiple parameters. Juniper’s flexible MPLS technology is also playing a greater role in supporting evolving standards such as MPLS-TP in packet transport and MAC-VPN in intra-data center connectivity.

This comprehensive MPLS VPN toolkit offers many benefits:

- Flexible access connectivity options across multiple topologies, protocols, and administrative boundaries
- Scalable control and forwarding planes
- Maximized bandwidth and network efficiency for multicast with P2MP optimizations for VPLS and multicast VPN
- Self-contained multihoming mechanisms for highly available edge service nodes
- Consistent operational model for IPv4, IPv6, unicast, and multicast across L2 and L3 VPNs
- Simplified operations with reduced template-based configuration, maintenance, and troubleshooting complexity
- Cost-efficient rollouts with minimal network disruption
- Efficient packet transport through MPLS-TP support

Multi-Access

- Increase customer service reach with multi-access options
- Enables new business and deployment models such as wholesale and backhaul with L2 VPN access to L3 VPN

Multiprotocol

- Allows deployment flexibility with seamless L2 and L3 services across different signaling (LDP, BGP) protocol boundaries (metro or AS) with innovative interworking solutions
- Supports multicast and IPv6 over the existing IPv4 unicast VPN infrastructure

Multidomain

- Provides intercity, national or international VPN service options with intraprovider and interprovider options
- Solves interdomain challenges during network convergence and mergers

Figure 1: Comprehensive MPLS VPN Tool Kit
• **Universal Deployment Applicability** – LDP-BGP VPLS interworking enables regional or national VPLS deployments to evolve in an economically scalable manner by traversing across different VPLS signaling boundaries that may exist between a metro and WAN with little or no service disruption. For one, LDP-BGP VPLS interworking removes the need to make any changes on LDP VPLS provider edge (PE) routers, thus minimizing configuration costs and downtime. In this way, an existing LDP VPLS deployment can evolve in a cost-efficient cap and grow manner using the more scalable BGP control plane to expand the VPLS.

Similarly, LDP-BGP interworking can facilitate network growth by localizing and extending the reach of VPLS beyond a single LDP VPLS metro domain. One model is the use of BGP VPLS in the WAN to interconnect multiple LDP VPLS metro domains. Using LDP-BGP VPLS interworking, there is no need to significantly change or upgrade the network. Nor is there a need to place an additional burden on the control plane of the LDP VPLS PE router in the metro network.

• **Service and Management Flexibility** – Another unique aspect of Juniper’s solution is providing MPLS Plug-and-Play capability to offer superior operational efficiencies. MPLS Plug-and-Play streamlines network operations using scripts to prevent procedural errors and simplify common configurations. MPLS Plug-and-Play also allows autodiscovery and adaptation to network changes, and automatic response to network conditions. Some of the features include autodiscovery of VPN endpoints, autodiscovery of multicast sources and receivers, automated link and node protection, enforcement of security policies, and bandwidth for RSVP-TE. The template mechanism can be used to configure only specific attributes and have all other common components automatically generated, which is particularly useful for VPN configurations.

**Maximized Return on Network Assets**

In a 2011 study conducted by ACG Research Juniper’s solution also offers 45 to 60% lower TCO compared 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%.

**Service Convergence** – One of the drivers of economic advantage that comes with Juniper’s business edge solution is service convergence on the MX Series 3D Universal Edge Router. Juniper combines a portfolio of optionally licensed MX Series 3D router-integrated services that enable service convergence on a single platform, offering greater margin contribution and greater operational efficiencies in rolling out advanced value-added services such as application-aware VPN, voice/video monitoring, and media rich collaboration applications. Other competing solutions require multiple specialized platforms that result not only in platform proliferation but also bring other implications in terms of service agility and operational complexities. According to a study conducted by Strategy Partners, Juniper’s solution offers almost four times more revenue per platform than the competition. Multiple applications and services such as E-Line, E-LAN, E-Tree, and IP-VPN are delivered by leveraging common technologies to offer operational simplicity and network convergence. This service convergence on MX Series routers with Junos Space service delivery systems fundamentally changes the economics for service providers.
Economy of Scope – Juniper’s solution further improves the operational efficiency of the offering through Junos OS modular software, with one release model, one Trio chipset-based architecture, and Junos Space value-added service offerings. The unparalleled cost advantage is delivered through these singular concepts to exploit the economies of scope. This is a fundamental shift from the competition, and is further enhanced through the network convergence facilitated by the offering of broadband edge, business edge, and mobile edge on a single MX Series 3D Universal Edge Router.

Service Assurance
Juniper’s service assurance is based on end-to-end service restoration, integrated security, and quality of service guarantee. This service assurance foundation offers service continuity, secure service, and service experience to help move operators towards a service-oriented network monetization business model.

Service Continuity – End-to-end restoration plays a key role in delivering service continuity within any business edge solution. As operators offer advanced value-added services, maintaining service continuity becomes a critical component. Juniper’s solution enables multilayer resiliency by offering path, link, node, element, and protocol-level reliability through NSr, ISSu, and Virtual Chassis, service mirroring, multichassis link aggregation group (LAG) and L2/L3 redundancy. Service and network level failure recovery is improved through global and local repair facilities. Even though the global repair is optimal for service restoration, OAM detection-based local repair acts as a traffic restoration mechanism to deliver the required 50 ms restoration. Further, features such as MPLS fast reroute, loop-free alternative (LFA), fast BFD, L2/L3 service mirroring, L2 active/active access, and multihoming provides the enhanced local repair capabilities needed for service continuity.

Industry-leading Virtual Chassis is another key differentiator in offering service continuity and operational efficiencies. Juniper’s Virtual Chassis based on modular chassis architecture delivers a single control plane and management plane, high availability, ease of management, performance, and scale. Redundancy in the Routing Engine, switch fabric, power and cooling systems form the foundation of offering Ha within the modular chassis. Further, ease of management comes from the single management plane concept. In the Virtual Chassis environment, multiple homogeneous MX Series routers are managed through a single image, a single configuration, and one management toolkit.

Secure Service – As service-oriented managed business services take shape, security becomes an integral part of the solution to protect privacy and offer security for a highly monetizable service layer. Juniper’s solution offers integrated security to contain threats such as DDoS attacks, while offering services such as secure remote access and encrypted VPN traffic within private clouds. Service Delivery Gateway security services use the MX Series Multiservices Dense Port Concentrator (MS-DPC) for offering stateful firewall, Network Address Translation (NAT), intrusion detection system (IDS), deep inspection (Di), IPsec, low monitoring, lawful intercept, and passive monitoring. Secure service also enables network-level security to offer filtering and policing per VPN, dynamically propagated packet filters via BGP, IPsec/SSL VPN into L3 VPN, and PE-PE IPsec capabilities.

Goal: Seamless service and network restoration for all failures.

Figure 3: Service continuity with the MX Series 3D Universal Edge Routers.
• **Service Experience**—Value capture within the service-oriented business edge is enhanced through the delivery of a quality experience to the end customer. QoS capabilities offer SLA guarantees and form the key building blocks for delivering the service experience.

The award-winning Junos Trio chipset within MX Series platforms offers hierarchical queuing and granular QoS control to ensure greater flexibility in offering SLA-based media rich value-added services such as collaboration and video streaming. Features such as per-hop QoS enforcements, end-to-end QoS, DiffServ-aware traffic engineering, and multicast call admission control (CAC) offer service guarantees for bandwidth, rerouting, and route failures.

In addition, Juniper Networks Junos SDK delivers value-added services through an ecosystem of third-party application development. These include services such as voice/video monitoring, server load balancing, media caching, and targeted online advertisements that enrich the service experience and also help operators monetize that experience.

**Solution Components**

**MX Series Routers**

MX Series 3D Universal Edge Routers are an Ethernet optimized, intelligent IP/MPLS converged edge platform. They offer all of the benefits of managed business services, along with 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.

**Juniper Networks Junos Space**

The Junos Space network application platform is designed to provide end-to-end visibility and control of the network to enable network resources to be orchestrated in response to business needs. Operators can leverage network intelligence through multilayered network abstractions, automation schemes, templates, and Juniper best practices to significantly simplify the network life cycle, including configuration provisioning and troubleshooting.

Junos Space includes a core set of collaborative automation applications that are hosted in a multi-tenant application environment where applications can be dynamically downloaded and upgraded for zero downtime service. Junos Space applications share platform services and have the same consistent user interface, enabling network operators to reduce application infrastructure costs and complexity, as well as maximize security, performance, and network resources.

**Summary—Flexible VPN Solution, Maximized Returns, and Service Assurance**

Juniper’s business edge solution offers flexible VPN functionality, maximized returns on network assets, and service assurance to help operators move closer to the center of value creation. Juniper has already been chosen by numerous providers based on its flexible MPLS VPN toolkit that enables them to deliver diverse connectivity services more efficiently and cost effectively. Juniper’s industry-leading approach to meeting changing and growing VPN service demands is standards-based and offers numerous access connectivity options, seamlessly supporting multiple protocols across different domains. Juniper’s award-winning Trio chipset-based MX Series platform further transforms operator economics through lower TCO. As the business edge moves towards a service-oriented model, Juniper brings service continuity, secure service, and the service experience to a whole new level.

**Next Steps**

To learn more about Juniper Networks business edge solution, please visit [www.juniper.net](http://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](http://www.juniper.net).