ENTERPRISE INTERNET EDGE

Superior Scale, Performance and Rich Features for Internet Edge

Challenge

As enterprises provide access to cloud computing and video applications, they are challenged with an infrastructure that does not scale to meet growing bandwidth needs, and is limited in interface diversity, high-performance routing, and security features. This causes frequent "fork-lift" upgrades.

Solution

Juniper's solution improves investment protection by enabling massive scalability, seamless upgradeability, and an uncompromised feature set. The solution gives businesses improved flexibility in the Internet edge to meet growing business needs.

Benefits

- **Superior scale**—Uncompromised feature set on a platform that delivers superior scale and performance
- **Pay as you grow**—Ability to scale easily from 20 Gbps to 80 Gpbs on the MX Series midrange routers (MX5, MX10, MX40, and MX80) using software licensing
- **Massive upgradeability**—One product line that scales from 20 Gbps to 2.6 Tbps to improve operational efficiency

The Internet edge acts as a gateway to the Internet for the enterprise. It provides connectivity to the Internet for branch offices and also connects remote workers and partners to enterprise resources. It can also be used to provide backup connectivity to the WAN for branch offices, in case the primary connection to the enterprise WAN fails.

The Internet edge provides access to cloud computing, mission critical applications, and bandwidth hungry applications such as video. The Internet edge must scale seamlessly to support growing application performance and bandwidth needs while supporting a rich set of routing and security features. Juniper Networks Internet edge solution achieves these goals using four fundamental network design principles—simplify, share, secure, and automate. The following sections describe the challenge and Juniper's solution in greater detail.

The Challenge

As enterprises connect remote branch offices, workers, and campuses to the Internet, and they use the Internet to provide access to many applications, they are challenged with an inflexible Internet edge that is constraining as business needs grow. Frequently enterprises need "fork-lift" upgrades of the network infrastructure to meet their scalability, interface diversity, and performance needs.

Figure 1, on page 2, depicts the Internet edge (red square) connected to the Internet provided by ISP-1 and ISP-2, for purposes of resiliency. Edge routers in the Internet edge are connected to two firewall devices that are connected to the aggregation or core router. The data center edge routers are connected to the Internet edge aggregation or core routers and to the access switches. The branches (Branch-1 and Branch-2) and the data center are connected to the Internet through the Internet edge routers. Branch-1 has a backup connectivity through the Internet. Branches are connected to the Internet edge using the enterprise WAN. The remote workers connect to the data center and enterprise WAN through the Internet edge.

The diagram depicts an Internet edge with multiple devices being used as aggregation/core routers, firewalls, and edge routers. These devices need frequent "fork-lift" upgrades to meet growing business needs. A complex, multi-device solution such as this is usually the result of deploying single-purpose network devices that are limited in scalability.

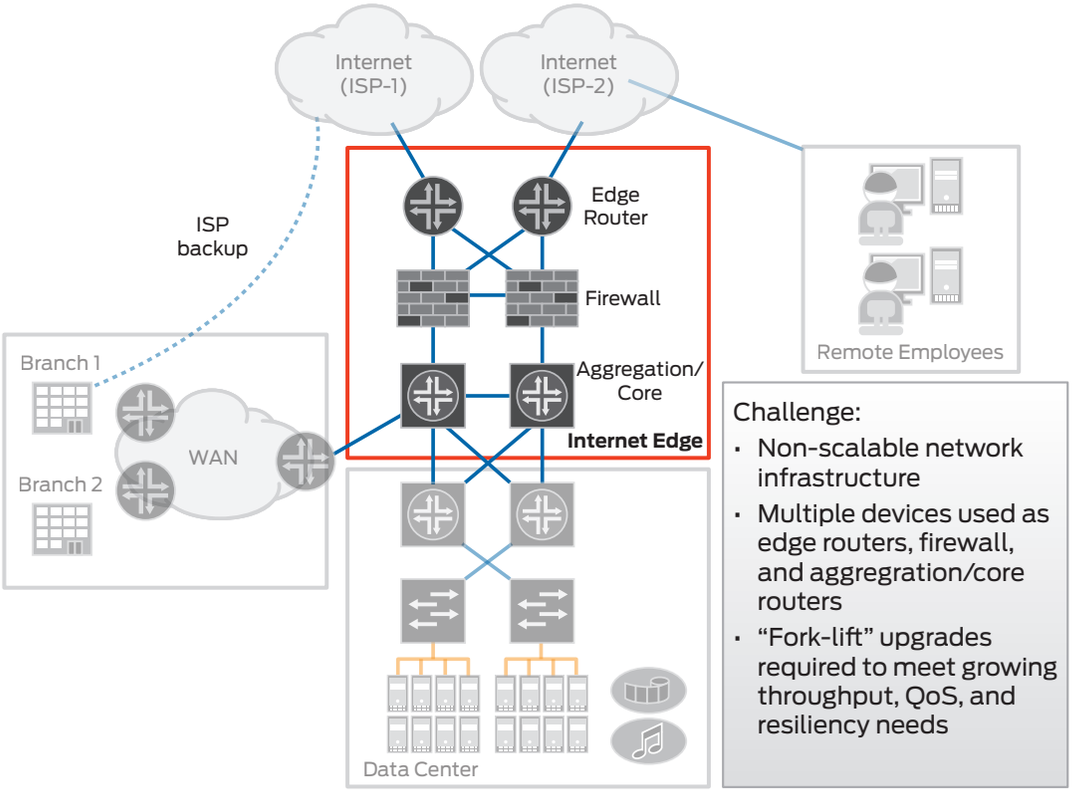

Figure 1: Before—Internet Edge with multiple devices connecting branch offices to the Internet, and remote workers connecting via the Internet

The Juniper Networks Enterprise Internet Edge Solution

Figure 2, on page 3, depicts Juniper's simplified Internet edge that consolidates the aggregation/core routers and the edge routers using the midrange Juniper Networks® MX Series 3D Universal Edge Routers (Juniper Networks MX5, MX10, MX40 and MX80 3D Universal Edge Router).

The midrange routers can be upgraded from 20 Gbps to 80 Gbps using a software license without compromising on features. The Juniper Networks SRX Series Services Gateways provide firewall, antivirus, and deep packet inspection functionality for the Internet edge. Juniper Networks Media Flow connects to MX Series midrange routers and enables improved application performance for rich media content. Media Flow is massively scalable and delivers superior performance for a diverse range of protocols and content types in a single system. It can be flexibly configured to operate in a range of different environments. The branches that need Layer 2 connectivity use a pseudowire between the branches and the Internet edge routers through the MPLS WAN network. The data center is connected to the Internet edge using MX Series routers that provide connectivity to the servers in the data center. The access layer consists of Juniper Networks EX Series Ethernet Switches in a Virtual Chassis configuration connecting the servers to the MX Series routers in the edge layer. The SRX Series routers provide security for the data center traffic and are connected to the MX Series routers in the data center edge.

Features and Benefits

MX Series routers offer unmatched scalability, performance, reliability, and quality of service (QoS) for a variety of enterprise WAN needs. Juniper is now extending the MX Series product line to the midrange (MX5, MX10, MX40, and MX80) without compromising on proven features such as high-performance routing. These midrange routers offer the enterprise superior value at the Internet edge.

Improved Flexibility—Reduced Costs and Improved Value for Investment

High-Performance Routing

MX Series routers provide enterprises with a wide range of high-performance routing technologies to meet Internet edge requirements. These include improved application performance, resiliency, reduced network complexity, and improved operational efficiency:

- **Virtualization**—Network virtualization features such as MPLS make applications completely transparent to underlying network architecture. This allows changes to architecture without impact to applications, enabling greater flexibility. Virtualization also provides more efficient use of resources for lowering costs and improving power utilization.
- **Scalable multicast**—Multicast technologies provide timely delivery of services to a large number of users, and they distribute that traffic efficiently.

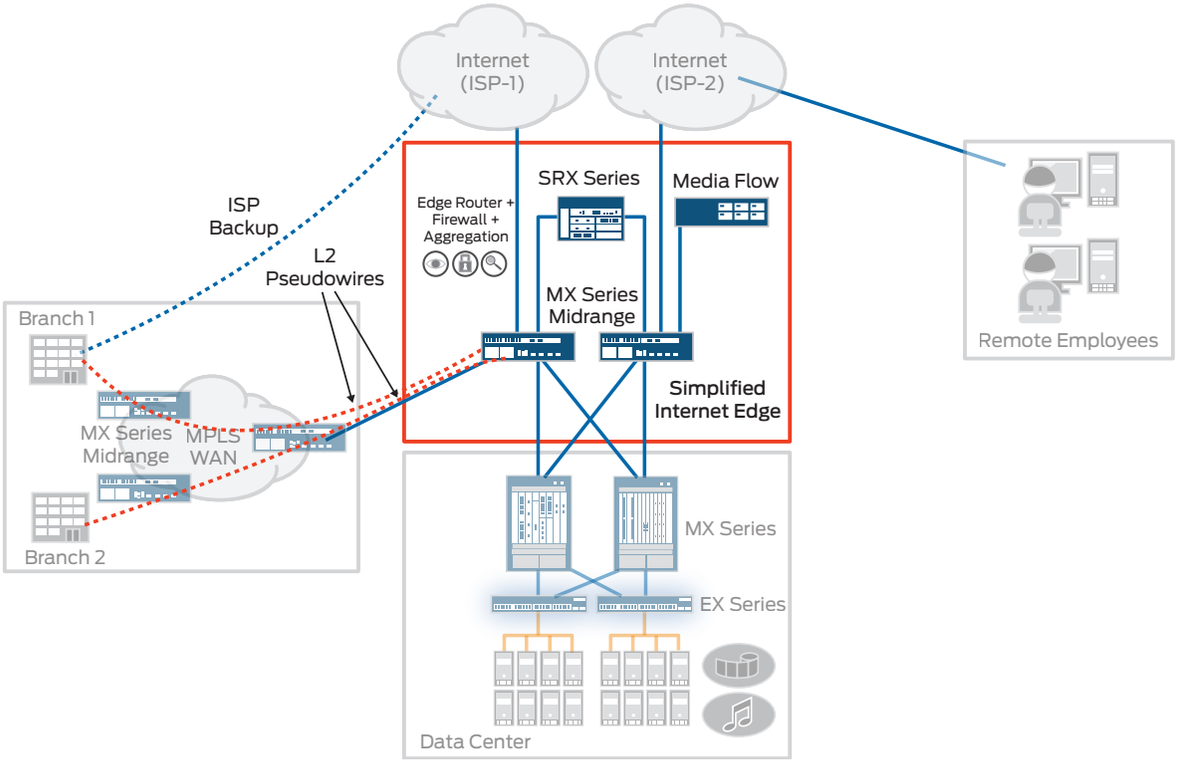

Figure 2: After—Simplified Internet edge consolidates edge, aggregation, and core devices and enables massive upgradeability

- **Carrier-class reliability**—Juniper provides hardware resiliency; and also network and software redundancy.
- **QoS**—Sophisticated policies expedite delay sensitive content with predictable and measurable results.
- **IPV6 and IPV4**—Native support for IPv4 and IPv6 eases the transition to IPv6 and ensures long-term investment protection.

Massive Upgradeability Options

Juniper's midrange MX Series portfolio, enterprises can now consolidate multiple single purpose devices with one powerful 2 RU midrange router. Enterprises deploy multiple devices to support a range of functionality such as MPLS, IP routing, switching, security, legacy technology such as Frame Relay, etc. This often requires the frequent replacement of routers to meet growing bandwidth needs.

Enterprises can also benefit from the seamless upgradeability of MX Series midrange routers to ensure investment protection. Any of the midrange routers can be upgraded through purchase of a software license and additional Modular Interface Controllers (MICs). For instance, the MX5 3D Universal Edge Router can be upgraded to an MX10, MX40, or MX80 router. MX10 can be upgraded to an MX40 or MX80, etc. These routers support a mix of Ethernet and non-Ethernet interfaces. The MX Series midrange router interfaces can be upgraded from 10/100/1000 Mbps to 1 Gbps to 10 Gbps Ethernet and to OC3/OC12/OC48 for non-Ethernet.

Improved Efficiency—Reduced Costs Resulting from Improved Power and Space Utilization

The MX Series has been optimized for space and power without compromising features and performance. Enterprises can benefit from increased efficiency by deploying powerful MX Series midrange routers in the enterprise WAN. At only 320 W, the MX Series midrange routers consume the lowest power in its class on the market today. And the high-end MX Series can use up to 50% less power than comparable routers without compromising performance.

Increased Simplicity—Reduced Operational Expense and Improved Network Stability

All MX Series routers are powered by Juniper Networks Junos® operating system, and this provides consistency of features across the MX Series product portfolio. Feature consistency ensures that enterprises can not only port configurations across the product line but also get a seamless user experience. The resulting simplicity reduces operating expenses and improves network stability.

Solution Components

Enterprises can achieve improved flexibility and efficiency with increased simplicity by designing a Juniper powered solution that is based on four fundamental design principles—Simplify, Share, Secure, and Automate.

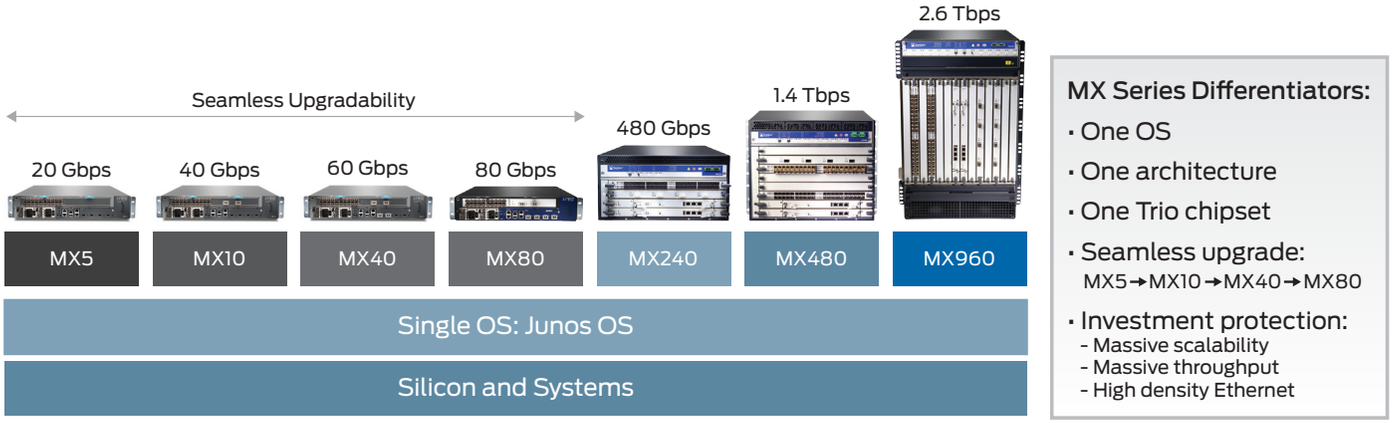

Figure 3: MX Series enterprise routing portfolio simplifies the WAN using one Junos OS, the same Junos Trio silicon, and a consistent architecture

Simplify—the network infrastructure by reducing the number of devices, links, and operating systems

Figure 3 shows the MX Series product portfolio ranging from the MX5 to the Juniper Networks MX960 3D Universal Edge Router. The MX Series family covers a range of throughput from 20 Gbps to 2.6 Tbps to provide a comprehensive routing solution for the enterprise. The MX5, MX10, MX40, and MX80 3D Universal Edge routers can seamlessly scale to support a range of speeds -20 Gbps, 40 Gbps, 60 Gbps or 80 Gbps using software license. These midrange routers are ideal for both Ethernet and non-Ethernet environments and deliver uncompromised functionality in a compact form factor. The high-end MX Series (MX240, MX480 and MX960) supports industry leading density, scalability and throughput. These routers have integrated routing, switching and security suitable for a variety of enterprise needs. The universal edge routing portfolio uniquely addresses several high performance routing needs with a single platform, powered by our innovative silicon, operating system, and architecture common across the MX Series product line. By deploying highly scalable MX Series routers, customers can simplify the network by eliminating multiple special purpose devices.

Share—the network infrastructure through network virtualization

Network virtualization features such as MPLS, logical systems, virtual routers, etc., provide better utilization of resources and help in lowering costs. Network virtualization also enables customers to quickly respond to changing business needs by hiding physical infrastructure changes to applications.

Secure—the network comprehensively

Today's security requirements have grown as an organization's interconnected network must support an increasing number of remote users that include suppliers, partners, customers, and employees at remote locations. Attacks have also grown in sophistication and frequency. The MX Series supports integrated security modules that protect the WAN:

1. **Comprehensive Security**—A comprehensive set of security features that include Web filtering, deep inspection, J-Flow monitoring of flows, and intrusion detection.
2. **Distributed Denial of Service (DDoS) Attack Prevention**—The MX Series routers are built to protect the enterprise WAN from Address Resolution Protocol (ARP) storms, include sophisticated access control list (ACL) rules to protect against control plane attack, provide protection against SYN and Internet Control Message Protocol (ICMP) attacks, etc.
3. **VPNs**—IPsec VPN and MPLS VPN that provide a logical separation of data and improve the privacy of data. These also offer a cost-effective alternative to expensive dedicated links to provide traffic separation.

Enterprises that need a comprehensive and dedicated security device can benefit from deploying SRX Series gateways in a solution with MX Series routers. Both platforms support comprehensive virtualization technologies and can easily be combined using MPLS to create a powerful and secure routing solution.

Automate—the network provisioning, monitoring, and troubleshooting

To simplify network provisioning, monitoring, and maintenance, several management tools are recommended to accelerate service deployment, reduce network downtime, and minimize human error.

Juniper Networks Junos® Space offers a range of tools ideal for the enterprise WAN, some of which include:

- **Junos Space Ethernet Design**—Provides best practice service definition such as port security, QoS, spanning tree, etc., to plan, simulate, model, and diagnose issues in the network
- **Junos Space Network Activate**—Provides a best practice definition for Ethernet services to quickly, accurately, and easily provision VPNs
- **Junos Space Route Insight**—Provides a tool to easily plan, simulate, model, and diagnose issues in the MPLS network

Enterprises can also benefit from Junos OS automation that simplifies operational tasks, automates responses to specific events, and minimizes human error by enforcing best practices for device configurations. Users can also automate many mundane tasks such as tracking bug status, end-of-life (EOL) status, and managing inventory using Juniper Care.

Summary—Juniper Networks Enterprise Edge Solution Simplifies internet Access and Reduces TCO

As enterprises rely on the Internet edge to provide access to cloud computing applications, mission critical applications, and video feeds, they need a network that can seamlessly scale for increasing application performance and bandwidth needs, while at the same time supporting a rich set of routing and security features. Juniper's enterprise Internet edge solution achieves these goals using four fundamental network design principles—Simplify, Share, Secure, and Automate. Powered by MX Series routers covering a range of throughput from 20 Gbps to 2.6 Tbps, Juniper's solution improves investment protection by enabling businesses with massive upgradeability and uncompromising feature set. A simplified Internet edge consolidates high-performance edge, aggregation, and core devices, and enables massive scalability to meet growing business needs.

Next Steps

- To learn more about Juniper's enterprise WAN solution, please visit the following links for additional information or contact your Juniper Account team.
- Enterprise WAN Reference Architecture: **www.juniper.net/us/en/local/pdf/reference-architectures/8030009-en.pdf**
- Extending the Virtualization Advantage with Network Virtualization: **www.juniper.net/us/en/local/pdf/whitepapers/2000342-en.pdf**
- **www.juniper.net/us/en/solutions/enterprise**
- **www.juniper.net/us/en/products-services/routing**

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**.

Corporate and Sales Headquarters
Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or 408.745.2000
Fax: 408.745.2100
www.juniper.net

APAC Headquarters
Juniper Networks (Hong Kong)
26/F, Cityplaza One
1111 King's Road
Taikoo Shing, Hong Kong
Phone: 852.2332.3636
Fax: 852.2574.7803

EMEA Headquarters
Juniper Networks Ireland
Airside Business Park
Swords, County Dublin, Ireland
Phone: 35.31.8903.600
EMEA Sales: 00800.4586.4737
Fax: 35.31.8903.601

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

3510393-001-EN Apr 2011

Printed on recycled paper