Enterprise LAN Design with Juniper EX-series
Agenda

- Remote/Branch Office Networks
- Corporate/Campus Office Networks
- Network Design Best Practices
- Network Security and Access Control
- Networking for Unified Communications
- Data Center Networks
Remote/Branch Office Networks
Small Branch Office Infrastructure (24-48 Ports)
Small Branch Office Infrastructure (24-48 Ports)

WAN Edge
- Single Power Supply
- Integrated Security/VPN Services
- Integrated WX WAN Optimization
- Integrated Avaya Voice Gateway
- 16-port GE UPIMs for non-POE devices
- J-Web Management

Access Layer
- Single or dual power supplies
- Power over Ethernet 10/100/1000
- UAC enforcement point
- LLDP-MED for auto phone detection
- L3 to the edge or L2 RSTP/MST
- Virtual Chassis
- GbE uplinks – 10GbE upgradable
- Host Checker
- Personal Firewall

WAN Edge
- Single Power Supply
- Integrated Security/VPN Services
- Integrated WX WAN Optimization
- Integrated Avaya Voice Gateway
- 16-port GE UPIMs for non-POE devices
- J-Web Management
Medium Branch Office Infrastructure (48-96 Ports)
Large Branch Office Infrastructure (Multiple Floors, >100 Ports)
Large Branch Office Infrastructure (Multiple Floors, >100 Ports)

WAN Edge
- Dual Power Supplies
- Integrated Avaya Voice Gateway
- Integrated WX WAN Optimization
- Integrated Security/VPN Services
- J-Web Management

Aggregation Layer
- Dual Power Supplies
- Fiber Aggregator (+copper)
- Wire Speed, Non-blocking
- Virtual Chassis
- J-Web Management

Core Layer
- Dual Power Supplies
- GbE uplinks & 10GbE Upgradable
- Virtual Chassis
- J-Web Management
Corporate/Campus Office Networks
Corporate Head Office Infrastructure
Corporate Head Office Infrastructure

LAN Core
- High-density, wire-rate 10GbE
- Flexible modular scaling
- Fully redundant hardware
- Fully featured Layer 2 and Layer 3

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Access Layer
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Network Design Practices
Campus Switching and Routing

- Layer 2 switching typically deployed in the Access Layer
- Layer 2 switching typically deployed in Access-Aggregation links
  - Spanning Tree Protocol (STP) used for redundant paths
  - STP lacks fast convergence and the ability to load-share
  - Additional expense for redundant-only links
- Layer 3 routing deployed in Aggregation-Core links as well as the Core Layer
  - OSPF Equal-Cost Multipath (ECMP) used to quickly converge around failed links and/or nodes
  - ECMP supports load-sharing of multiple links
  - Redundant links are used for additional network capacity in non-failed environment
  - VRRP required in core
Best Practice –
Layer 3 in the Access Layer

- Layer 2 switching deployed in the Access Layer to access devices only
- Layer 3 routing deployed in Access-Aggregation links
  - OSPF ECMP used to quickly converge around failed links and/or nodes
  - Redundant links are used for additional network capacity in non-failed environment
  - STP and VRRP eliminated
  - Juniper EX series supports OSPF ECMP as part of base license
Simplifying the LAN Core and WAN Edge

**Challenge**

- Separate devices for LAN Core and WAN Edge
  - Ethernet LAN Core switch
  - Legacy media conversion provided by WAN Edge routers
- Multiple devices to deploy and manage

**Juniper Solution**

- MX Series Ethernet Services Router
  - High-performance density required of a LAN core switch
  - Scalability required of a WAN Edge router
- Simplified, collapsed LAN Core and WAN Edge

Juniper provides simplified solutions to reduce CAPEX and OPEX
Simplifying the LAN Core

**Challenge**
- Evolving Campus LAN requires higher performance and densities at Core
  - Outgrown capacities of legacy Layer 3 switches
  - Low density, oversubscribed 10GbE interfaces
- Complex operations and non-deterministic traffic flows

**Juniper Solution**
- EX 8200 Ethernet Switch
  - High-performance required of a LAN core switch
  - Up to 128 wire-rate 10GbE interfaces
- Simplified LAN Core, improved operations and increased application performance

Juniper provides simplified solutions to reduce CAPEX and OPEX
EX-series Virtual Chassis™ Technology

- Two or more EX 4200 series switches interconnected via the 128GB/s Virtual Chassis backplane (VCP) or 10Gb/s Virtual Chassis Extender (VCE)
- Operate as a single Juniper chassis system
- Superior resiliency
  - Redundant route engines
  - Redundant backplane
  - Redundant unit power/fans
  - Extend link aggregation across multiple VC members
- Simplified management
  - Single management interface
  - Single version of JUNOS
  - Single configuration
- Flexibility
  - Add additional units and uplinks as capacity requirements grow
Network Security and Access Control
HQ Security Trends and Challenges

**Trends**
- Increased mobility of users in HQ
- Increased utilization of contractors
- Co-location of partners on site
- Rollout of applications such as VoIP and Wireless access

**Challenges**
- Provide secure LAN & WLAN access
- High performance security across large or multiple LANs
- Enable secure access to applications for employees, contractors, partners and other onsite users over both wired and wireless LANs
- Protect campus resources from internal and external threats
Network Security Architecture

- **Integrated FW/VPN devices**
  - Protects high-speed networks from network and application level attacks
  - Virtualization & secure zones simplifies network integration and deployment of internal security

- **Intrusion Prevention (IDP)**
  - Comprehensive protection against current and emerging threats at both application and network layer
  - Day Zero protection against worms, Trojans, spyware, key loggers, and other malware

- **Secure Remote Access**
  - Clientless granular access control with best in class end point security
  - Coordinated identity based threat response with IDP detects and drops malicious application traffic

- **Unified Access Control**
  - Protects network from managed & unmanaged endpoints
  - Provide enforcement using any vendor’s 802.1X-enabled infrastructure
  - Ethernet Switching
Networking for IP Telephony and Unified Communications
Unified Communications and IP Telephony

**Situation**
- More distributed workforce
- Workers require real-time access to resources
- Unified Communications can reduce costs, increase productivity
- Rollout of applications such as VoIP and Wireless access

**Challenges**
- VoIP is sensitive to delay or disruption
- High security standards for networks supporting Unified Communications
- Meet high-availability expectations of end users

**Juniper Solutions**
- Assure voice quality
- Carrier-class Reliability
- Protect network infrastructure and Unified Communications from security breaches
- Interoperate seamlessly with leading application vendors
Juniper Products for Unified Communications

- **WAN Acceleration (WX)**
  - Increases existing bandwidth capacity to support VoIP
  - Improves performance of data components of other telephony applications (messaging, contact center)
  - Ensures minimal latency (~2ms) for both voice and data traffic

- **Switching (EX-series) & Routing (M-Series)**
  - Carrier-class reliability
  - Minimizes latency, jitter, and packet loss to ensure voice and data performance
  - MPLS support to expedite VoIP traffic

- **Firewall / IPSec VPN**
  - NAT support simplifies IP telephony implementation and boosts security
  - Policy-based virtualization enables network segmentation to control resources and enhance VoIP performance

- **Intrusion Prevention (IDP)**
  - Protects VoIP servers and clients from worms, Trojans, malware and other emerging threats and vulnerabilities
Data Center Networking
Data Center Infrastructure
Data Center Access (Top of Rack)

- Less switches to manage
- Less uplinks
- Lower aggregation switch ports
- No spanning tree
Design Collateral

- Reference Architectures
- Design Guides
- Implementation Guides

www.juniper.net/switch